Automation platform

Modicon TSX Micro
and PL7 software

Catalogue
January
04

a brand of Schneider Electric

Telemecanique

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Modicon TSX Micro automation platform
TSX 37 05/08/10/21/22 PLCs

1

Applications		For low to medium complexy control systems		
No. of slots	Base	2 (1 equipped with discrete I/O module)	3 (2 equipped with discrete I/O module)	2 (1 equipped with discrete I/O
	Extension	–		2
No. of discrete I/O, connection	Per HE10 connector *(1)*	92	120	–
	Per terminal block *(1)*	60 *(28 I/O)*	88 *(56 I/O)*	124 *(28 I/O)*
Remote I/O (except bus)		–		96 inputs/outputs via 1 half-format
App-spec. inputs/outputs	Integrated analogue	–		
	Analogue	2 half-format modules (4, 8 I - 2, 4 O ou 4 I/2 O)		
	Integrated counting	2 x 500 Hz channels using discrete inputs		
	Counting	2 half-format modules (1, 2 x 40 kHz channels, 2 x 500 kHz channels, 1 x 1 MHz SSI channel)		
	Communication	1 x integrated RS 485 channel (TER port)		
Field bus connections	AS-Interface master	–		1 AS-Interface bus half-format
	Fipio agent function	–		
	CANopen master	–		
Bus and serial link connections	Integrated Modbus (RTU)	1 slave port (TER port)		1 master/slave port (TER port)
	Integrated Uni-Telway	1 voie maître/esclave (prise TER)		
	Modbus/Uni-Telway/Fipio	–		
	Integrated character mode	1 TER port		
Network connections	Ethernet TCP/IP	–		1 Ethernet TCP/IP external module
	Nertwork cards	–		
Process control		Control loops, 3 integrated functions : PID, PWM (pulse width modulation) et SERVO (discrete valve		
Real-time clock		–		Integrated (second, minute, hour,
Memory capacity	Integrated RAM	11 Kwords		14 Kwords
	Extension *(2)*	–		
	Data storage	–		
Power supply		~ 100/240 V (integrated ⎓ 24 V sensor power supply)		
Type of PLCs		**TSX 37 05 028DR1**	**TSX 37 08 056DR1**	**TSX 37 10 028●R1**
Pages		1/15		

(1) The value in bracket and in italics corresponds to number of I/O providing with the basic PLC configuration.
(2) For program and constants zones.

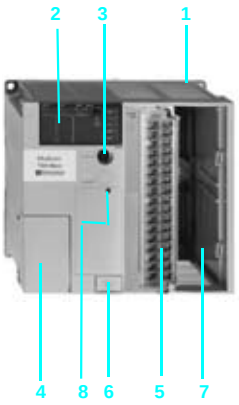
	For control systems which require a signifiant amount of processing (program and data) and:or communication	For control systems which require low-cost analogue I/O and fast counting functions
module)	3 (non-equipped with discrete I/O module)	
	2	
184 *(28 ou 64 I/O depending on model)*	248	
–	160	
module connecting to 4 Nano componants (PLC base or discrete/analogue extension, 200 m max.)		
		8 inputs 8 bits, 1 ouput 8 bits
	4 half-format modules (4, 8 I - 2, 4 O ou 4 I/2 O)	
		2 x 500 Hz channels using discrete inputs and 2 integrated 10 kHz channels
	4 half-format modules (1, 2 x 40 kHz channels, 2 x 500 kHz channels, 1 x1MHz SSI channel)	
	1 x integrated RS 485 channel (AUX port)	
module (31 slaves)		
	1 PCMCIA card in slot for a communication card	
	1 PCMCIA card in slot for a communication card	
	1 master/slave port (AUX port)	
	1 master/slave port (AUX port)	
	1 PCMCIA card in slot for a communication card: serial link, Uni-Telway bus, Modbus bus or Fipio bus (agent)	
	1 AUX port	
or Modem (PPP) RS 232C serial link		
	1 PCMCIA card in slot for a communication card: Fipway network or Modbus Plus network	
control) with MMI on CCX 17 operator panel (control and adjustment of 9 loops maximum)		
day, month and year)		
	20 Kwords	
	128 Kwords	
	128 Kwords	
⎓ 24 V non-isolated	∿ 100/240 V (integrated ⎓ 24 V sensor power supply)	⎓ 24 V non-isolated
TSX 37 10 128D●1	**TSX 37 10 1●●DTK1**	**TSX 37 21 101**	**TSX 37 21 001**	**TSX 37 22 001**	**TSX 37 22 101**

Modicon TSX Micro automation platform
TSX 37 05 PLCs

Presentation

The TSX 37 05 PLC comprises a rack which integrates ∿ 100/240 V power supply, a processor including a 11 Kword memory (program, data and constants), 1 Flash EPROM backup memory, a TSX DMZ 28DR discrete I/O module (16 inputs and 12 relay outputs) and an available slot.
The available slot can accept:
- 1 standard format discrete I/O module of any type.
- 2 half format discrete I/O, safety, analog I/O or counter modules.

Description



The TSX 37 05 PLC comprises:

1 2-slot rack.

2 Centralized display block.

3 Terminal port (TER) (Uni-Telway master/slave, Modbus RTU slave protocol or characters string).

4 Cover for accessing the power supply terminals.

5 Discrete module with 16 inputs and 12 outputs, placed in the first slot (positions 1 and 2). Including screw terminal block.

6 Cover for accessing optional battery.

7 Available slot.

8 Reset button.

Selection

Selection of modules to be inserted in addition to the 16-input/12-output module present at rack no. 1

Type of module to be inserted		Max number of modules		Format		Connection	
		1	2	Standard	Half	Connector	Term.blk
Discrete Inputs/Outputs	8 inputs		■		■		■
	12 inputs		■		■	■	■
	32 inputs	■		■			■
	4 outputs		■		■		■
	8 outputs		■		■	■	■
	32 outputs	■		■			■
	16 inputs/outputs		■		■	■	
	28 inputs/outputs	■		■		■	■
	64 inputs/outputs	■		■		■	
Preventa safety module			■		■		■
Analogue I/O	4 or 8 inputs		■		■		■
	2 or 4 outputs		■		■		■
	4 inputs and 2 outputs		■		■		■
Counter/positioning channels	1 incremental code channel		■		■	■	
	2 incremental code channels		■		■	■	
	1 absolute encoder channel		■		■	■	

■ Possible insertion

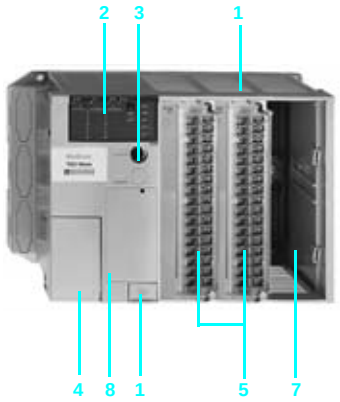
Functions: pages 1/8 and 1/9
Characteristics: pages 1/13 and 1/14
References: pages 1/15 and 1/16
Dimensions, mounting: page 1/17

Modicon TSX Micro automation platform
TSX 37 08 PLCs

Presentation

The TSX 37 08 PLC comprises a rack which integrates ⏦ 100/240 V power supply, a processor including a 11 Kword memory (program, data and constants), 1 Flash EPROM backup memory, 2 TSX DMZ 28DR discrete I/O modules (16 inputs and 12 relay outputs) and an available slot.
The available slot can accept:
- 1 standard format discrete I/O module of any type.
- 2 half format discrete I/O, safety, analog I/O or counter modules.

Description



The TSX 37 08 PLC comprises:

1 3-slot rack.

2 Centralized display block.

3 Terminal port (TER) (Uni-Telway master/slave, Modbus RTU slave protocol or characters string).

4 Cover for accessing the power supply terminals.

5 Two discrete modules with 16 inputs and 12 outputs, placed in the first and second slot (positions 1 to 4). Including screw terminal block.

6 Cover for accessing optional battery.

7 Available slot.

8 Reset button.

Selection

Selection of modules to be inserted in addition to the 16-input/12-output module present at rack no. 1

Type of module to be inserted		Max number of modules		Format		Connection	
		1	2	Standard	Half	Connector	Term.blk
Discrete Inputs/Outputs	8 inputs		■		■		■
	12 inputs		■		■	■	■
	32 inputs	■		■			■
	4 outputs		■		■		■
	8 outputs		■		■	■	■
	32 outputs	■		■			■
	16 inputs/outputs		■		■	■	
	28 inputs/outputs	■		■		■	■
	64 inputs/outputs	■		■		■	
Preventa safety module			■		■		■
Analog I/O	4 or 8 inputs		■		■		■
	2 or 4 outputs		■		■		■
	4 inputs and 2 outputs		■		■		■
Counter/positioning channels	1 incremental code channel		■		■	■	
	2 incremental code channels		■		■	■	
	1 absolute encoder channel		■		■	■	

■ Possible insertion

Functions: pages 1/8 and 1/9
Characteristics: pages 1/13 and 1/14
References: pages 1/15 and 1/16
Dimensions, mounting: page 1/17

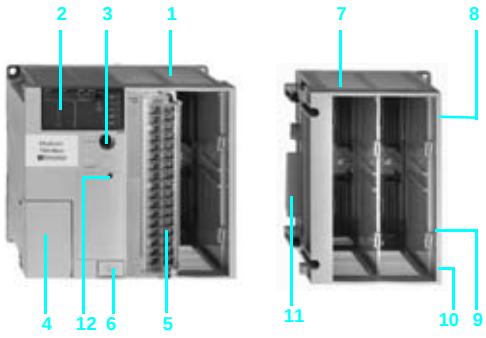
Modicon TSX Micro automation platform
TSX 37 10 PLCs

Presentation

Compact and modular TSX 37 10 PLCs differ in their supply voltage and the type of discrete I/O module fitted in the first slot.
Each TSX 37 10 configuration comprises a rack which integrates a power supply (⎓ 24 V or ∿ 100/240 V), a processor including a 14 Kword RAM memory (program, data and constants), a Flash EPROM backup memory, a real-time clock, a discrete I/O module (28 or 64 I/O) and an available slot. A TSX RKZ 02 mini extension rack enables the number of slots to be increased by 2 (4 positions).
Each available slot can accept:
- 1 standard format discrete I/O module of any type.
- 2 half format discrete I/O, safety, analog I/O or counter modules.

Also, TSX 37 10 PLCs can connect to the Ethernet network TCP/IP or to a Modem via the TSX ETZ 410/510 external stand-alone module.

Description



TSX 37 10 PLCs and the TSX RKZ 02 mini extension rack comprise:
1 2-slot base rack.
2 Centralized display block.
3 Terminal port (TER) (Uni-Telway, Modbus RTU master/slave protocol or characters string).
4 Cover for accessing the power supply terminals.
5 28 or 64 discrete I/O module, placed in the first slot (positions 1 and 2).
6 Cover for accessing optional battery.
7 Mini extension rack with 2 available slots -(positions 5 to 8).
8 LED showing presence of ⎓ 24 V.
9 Power supply terminals protected by removable cover, to connect an auxiliary ⎓ 24 V power supply if PLCs are supplied with ∿ 100/240 V.
10 Earth terminal.
11 Connectors to the base PLC.
12 Reset button.

Selection

TSX 37 10 base PLC selection

Power supply	I/O module integrated in 1st slot				Connection		Reference
	Number of inputs		Number of outputs		HE 10 Connector	Screw terminal block	
	⎓ 24 V	∿ 110/120 V	Solid state ⎓ 24 V	Relay			
⎓ 24 V	16		12				TSX 37 10 128DT1
	16		12				TSX 37 10 128DTK1
		16		12			TSX 37 10 128DR1
	32		32				TSX 37 10 164DTK1
∿ 110/240V		16		12			TSX 37 10 028AR1
	16			12			TSX 37 10 028DR1

Selection of modules to be inserted (3 slots available, that is a maximum of 6 positions)

Type of module to be inserted		Maximum number of modules *(1)*				Format		Connection	
		1	2	4	6	Stand.	Half	Connect.	Term.blk
Discrete Inputs/Outputs	8 inputs								
	12 inputs								
	32 inputs			*(2)*					
	4 outputs								
	8 outputs								
	32 outputs			*(2)*					
	16 inputs/outputs								
	28 inputs/outputs			*(2)*					
	64 inputs/outputs		*(2)*						
Preventa safety module									
AS-Interface bus or I/O extension		*(3)*							
Analog I/O	4 or 8 inputs								
	2 or 4 outputs								
Counter/positioning channels	1 or 2 incremental encoder channels								
	1 absolute encoder channel								
Communication	Ethernet TCP/IP or external Modem					*External module*			

Possible selection or insertion

(1) With TSX RKZ 02 mini extension rack.
(2) This includes a standard format module to be inserted in the 1st slot of the PLC.
(3) The remote discrete I/O extension modules and AS-Interface bus modules are installed in position 4 which means that their use is mutually exclusive.

Functions: pages 1/8 and 1/9
Characteristics: pages 1/13 and 1/14
References: pages 1/15 and 1/16
Dimensions, mounting: page 1/17

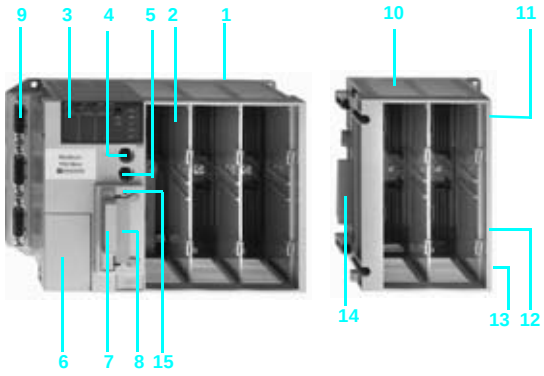
Modicon TSX Micro automation platform
TSX 37 21/22 PLCs

Presentation

Modular TSX 37 21/22 PLCs differ in their supply voltage and/or the possibility of fast counting and analogue functions integrated on the base.
Each PLC comprises: a 3-slot rack which integrates a power supply (⎓ 24 V or ∿ 100/240 V), a processor including a 20 Kword RAM memory (program, data and constants), 1 Flash EPROM backup memory, 2 slots for a PCMCIA card (1 communication card and 1 memory extension card of 128 Kwords maximum) and a real-time clock. A TSX RKZ 02 mini extension rack enables the number of slots to be increased by 2 (4 positions).
Each available slot can accept:
- 1 standard format discrete I/O module.
- 2 half format discrete I/O, safety, analog I/O or counter modules.

Also, TSX 37 21/22 PLCs can connect to the Ethernet network TCP/IP or to a modem via the TSX ETZ 410/510 external stand-alone module.

Description



TSX 37 21/22 PLCs and the TSX RKZ 02 mini extension rack comprise:
1 3-slot base rack (positions 1 to 6).
2 Slot reserved for a standard format module.
3 Centralized display block.
4 Terminal port (TER) (Uni-Telway, Modbus RTU master/slave protocol or characters string).
5 Man-machine interface port labeled AUX.
6 Cover for accessing the power supply terminals.
7 Slot for a PCMCIA memory extension card.
8 Slot for a PCMCIA communication card.
9 On TSX 37 22, SUB-D connectors type for integrated analogue and counter functions.
10 Mini extension rack with 2 available slots (positions 7 to 10).
11 LED showing voltage presence of ⎓ 24 V.
12 Power supply terminals protected by removable cover, to connect an auxiliary ⎓ 24 V power supply if PLCs are supplied with ∿ 100/240 V.
13 Earth terminal.
14 Connectors to the base PLC.
15 Reset button.

Selection

Selection of modules to be inserted (5 slots available, that is a maximum of 9 positions)

Type of module to be inserted		Maximum number of modules *(1)* 1	3	4	5	9	Format Stand.	Half	Connection Connect.	Term.blk
Discrete Inputs/ Outputs	8 inputs					*(3)*				
	12 inputs					*(2)*				
	32 inputs				*(2)*					
	4 outputs					*(2)*				
	8 outputs					*(2)*				
	32 outputs				*(2)*					
	16 inputs/outputs					*(2)*				
	28 inputs/outputs				*(2)*					
	64 inputs/outputs		*(2)*							
Preventa safety module										
AS-Interface bus or I/O extension		*(3)*								
Analog I/O	4 or 8 inputs									
	2 or 4 outputs			*(4)*						
	2 inputs and 4 outputs			*(4)*						
Counting/ positioning	1 or 2 incremental encoder channels									
	1 absolute encoder channel									
Communication (PCMCIA card on processor)	Serial link									
	CANopen bus									
	Modbus bus									
	Fipio Agent bus									
	Uni-Telway bus									
	Modbus Plus network									
	Fipway network									
Communication	Ethernet TCP/IP or external Modem						*External module*			

Possible insertion

(1) With TSX RKZ 02 mini extension rack.
(2) Comprises a standard format module to be placed in 1st slot of the PLC.
(3) The remote discrete I/O extension modules and AS-interface bus modules are installed in position 4 which means that their use is mutually exclusive.
(4) With a maximum of 2 (TSX AMZ 600/ASZ 200) modules in the base.

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Dimensions, mounting: page 1/17

Modicon TSX Micro automation platform
TSX 37 05/08/10/21/22 PLCs

1

Functions

Discrete inputs/outputs

The range of in-rack discrete I/O modules offers several possibilities for meeting requirements:
■ Cost-effective connection where a ⎓ 24 V solution is required (mixed I/O modules with HE type 10 connectors for direct connection to pre-actuators in the device using cables with flying leads or direct connection to the TELEFAST2 pre-wired system).
■ Connection to the screw terminal block on the front panel of mixed I/O modules.

A set of half format modules enable the PLC configuration to be adapted as closely as possible to the user's requirements in terms of number, range of I/O and type of connection.

For further details, see pages 2/6 to 2/17.

The TSX DPZ 10D2A Preventa type safety relay module provides a monitoring function for the emergency stop pushbuttons or limit switches, and is adapted to conform to the safety requirements stipulated in EN 954-1.

For further details, see pages 2/18 to 2/23.

Remote discrete I/O extension module

TSX 37 10/21/22 Micro PLCS offer two different possibilities for extending the I/O:
■ Either with the TSX STZ 10 remote discrete I/O extension module. The discrete I/O of 4 Nano PLCs can be used at a distance of up to 200m (one of which can be a Nano extension PLC).
These Nano PLCs can be used as remote discrete I/O or local slave PLCs.

For further details, see pages 2/24 et 2/25.

■ The AS-Interface sensor/actuator bus. TSX Micro PLCs are connected to the AS-Interface bus via an AS-Interface master module. In this case, the PLC becomes the master station on the bus and manages a maximum of 248 I/O over a distance of up to 100 m (200 m with a repeater).

For further details, see pages 4/26 to 4/29.

■ The CANopen machine bus. The communication of the Micro TSX 37 21/22 PLCs enables the connectivity to the CANopen machine bus. It is appeared as a PCMCIA card equipped with a cable (length 0.5m) and a tap junction (with 9-way SUB-D connector). This TSX CPP 110 kit allows the direct linking to the bus and ensures the role of the master on the CANopen bus. The PCMCIA card is inserted into the reserved slot for communication card, available on the TSX 37 21 and TSX 37 22.

For further details, see pages 4/22 to 4/25.

Analogue I/O and process control

TSX Micro PLCs offer several ways of performing analogue processing:
■ For data input or commands which do not need a high resolution level, using I/O integrated in TSX 37 22 PLCs.
■ For precise measurement and commands, using TSX AEZ/ASZ/AMZ ●●● half format analogue I/O modules.
■ To locate analog I/O remotely via the TSX STZ 10 rackmaster module with TSX 37 10/21/22 PLCs. The latter enables the use of three TSX AMN 400● analog extensions, each equipped with 3 analogue inputs and one analog output.

For further details, see pages 3/5 and 3/6.

TSX Micro PLCs have, as standard, process control functions which can be accessed by the user via the PL7 Micro, PL7 Junior or PL7 Pro programming software.

For further details, see pages 3/10 to 3/13.

Modicon TSX Micro automation platform
TSX 37 05/08/10/21/22 PLCs

Counting/positioning

Counter modules TSX Micro PLCs offer several ways of counting:

■ Using 500 Hz discrete inputs (2 up/down counter channels with upcounting, downcounting or up/down counting functions, with or without detection of direction of operation).

■ 10 kHz counter channels integrated into TSX 37 22 PLC bases (2 10 kHZ fast counter channels, with 1 channel having down-counting functions as above).

■ Counting/positioning TSX CTZ modules ●A, from 40...500 kHz or TSX CTZ 2B, from 200 kHz...1 MHz. These half format modules are inserted in the available slots in the base rack.

For further details, see pages 3/16 to 3/25.

Communication

TSX Micro PLCs offer several possibilities:

■ Integrated communication which offers cost-effective dialogue functions via the terminal port for TSX 37 05/08/10 PLCs or via the terminal and man-machine interface ports for TSX 37 21/22 PLCs. These RS 485 type non-isolated links use Uni-Telway master/slave, Modbus RTU slave or character string.
Also TSX 37 10/21/22 PLCs integrate Modbus master protocol.

■ PCMCIA format communication card for TSX 37 21/22 PLCS. They have a dedicated slot for the PCMCIA format communication card ("Full-duplex" asynchronous serial link, CANopen bus, Fipio bus, Uni-Telway or Modbus, Modbus Plus or Fipway network).

■ Ethernet TCP/IP 10/100 MHz external modules. This external module connects to the terminal port of TSX 37 10/21/22 PLCs and has Uni-TE and Modbus messaging. It also allows connection to an external modem using PPP protocol.

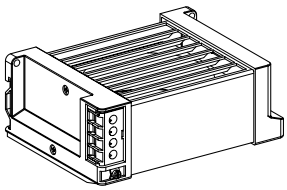
For further details, see pages 4/6 to 4/21.

Fan modules

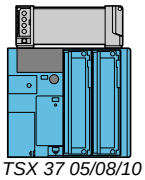
TSX FAN ●●P fan modules installed above TSX Micro PLCs ensure a forced air convection, which creates a uniform ambient temperature within the enclosure and eliminates any hot spots which might exist.

Fan modules are required when the ambient temperature is between 60 °C and 70 °C. Forced ventilation is used to eliminate hot spots *(1)*.
Three types of fan module are available: ⎓ 24 V, ∿ 110 V and ∿ 220 V.

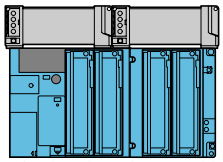
One fan module is required for a TSX 37 05/08/10/21/22 configuration, two fan modules are required for a TSX 37 10/21/22 configuration with the TSX RKZ 02 mini rack.



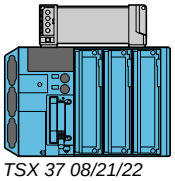
TSX FAN ●●P



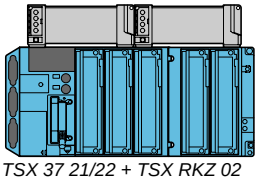
TSX 37 05/08/10



TSX 37 10 + TSX RKZ 02



TSX 37 08/21/22



TSX 37 21/22 + TSX RKZ 02

(1) For an ambient temperature of between 25 °C…60 °C, the use of fan modules increases the MBTF.

Modicon TSX Micro automation platform
TSX 37 05/08/10/21/22 PLCs

Memory structure

The memory structure of TSX Micro PLCs consists of two distinct zones:
■ An internal RAM memory designed to receive the application (data, program and constants) of
□ 11 Kwords for TSX 37 05/08 PLCs,
□ 14 Kwords for the TSX 37 10 PLC,
□ 20 Kwords for TSX 37 21/22 PLCs.
■ A Flash EPROM memory of:
□ 12 Kwords for TSX 37 05/08 PLCs,
□ 16 Kwords for TSX 37 10/21/22 PLCs
designed to back up the application program (11 or 14 Kwords maximum) and to back up 1024 %MW internal words in the event of a battery failure or no battery.

For TSX 37 21/22 PLCs, the internal RAM memory can be extended via a 32, 64 or 128 Kwords PCMCIA memory card, either RAM or Flash EPROM. The same memory card incorporated the possibility of contained a storage zone for additional data, e.g. for production data and manufacturing recipes.

PCMCIA memory extension cards for TSX 37 21/22 PLCs

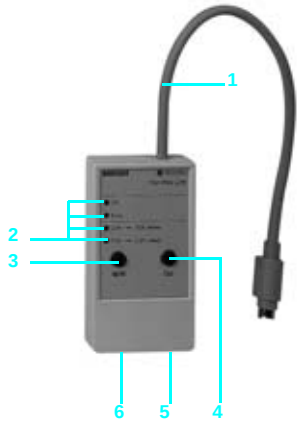
These cards can be used to extend the PLC internal memory for storing the application program and constants.
Two types of memory card are available:
■ **Battery-backed RAM type memory card**
Used in particular during application program creation and debugging, this card enables all application transfer and modification services in online mode.
The memory is backed up by a removable battery integrated in the memory card.
■ **Flash EPROM type memory card**
Used when the debugging of the application program is complete, this card enables one global transfer only of the application and avoids the problems of backup via battery.

A third type of card can also be used to store additional data:
■ **Battery-backed RAM type memory card or battery-backed RAM and Flash EPROM**
Used particularly in association with the Modem link, these are used to extend the processor's internal memory, and also to store recipe or data log for later consultation via a telephone link.
The RAM memory is backed up by a removable battery integrated in the memory card.

Another type of PCMCIA memory card is available:
■ **Backup type memory card (for TSX 37 21/22 PLCs)**
Previously loaded with the application program, this card is used to reload the application program into the internal RAM memory and the internal Flash EPROM memory of the processor, without requiring the use of a programming terminal.

Program loader

The TSX PRG LDR module is designed to simplify duplicating or updating applications on Nano and TSX Micro PLCs without the need for a programming terminal. An application (15 Kwords maximum in internal RAM) can be transferred from a PLC in the TSX PRG LDR module (and saved within it), then transferred from the TSX PRG LDR module to the PLC.



The front panel of the TSX PRG LDR module comprises:
1 A cord for connecting to the PLC terminal port.
2 Four operation indicator LEDs.
3 A W/R button which selects the program transfer direction (PLC ➞ module or module ➞ PLC).
4 A GO button to start the transfer.
5 A Write Only switch which prevents PLC ➞ module transfer.
6 A Program Protect switch which protects the PLC application as read-only after the transfer.

Functions: pages 1/8 and 1/9
Characteristics: pages 1/13 and 1/14
References: pages 1/15 and 1/16
Dimensions, mounting: page 1/17

Modicon TSX Micro automation platform
TSX 37 05/08/10/21/22 PLCs

Application memory

The application memory is divided into memory zones, which are physically shared between the internal RAM memory and the PCMCIA memory card (if the TSX 37 21/22 PLC has a memory card):

- The application data zone which is always is the internal RAM memory.
- The application program zone in the internal RAM memory or on the PCMCIA memory card.
- The constants zone in the internal RAM memory or on the PCMCIA memory card.
- The Flash EPROM zone for the application program backup, the constants and 1 K internal words.
- The file storage zone in the PCMCIA memory card.

If the content of the RAM memory is lost (battery fault or no battery) then the content of the Flash EPROM memory (program, constants and 1 K internal words) is automatically transferred to the internal RAM memory. The backup copy of the application in the Flash EPROM memory requires that the PLC does not have a PCMCIA memory extension card and that the size of the program and the constants does not exceed 16 Kwords.

Two types of application memory organization are possible for TSX Micro PLCs depending on whether the PLC is equipped with a memory extension in the form of a PCMCIA card:

Application in the internal RAM
The application is loaded entirely in the battery-backed internal RAM of the processor with a capacity of:

- 11 Kwords for TSX 37 05/08, shared, for example: as 3 Kwords of application data and 8 Kwords of the program and its constants.
- 14 Kwords for TSX 37 10, shared, for example: as 500 words of application data and 13.5 Kwords of the program and its constants.
- 20 Kwords for TSX 37 21/22, shared, for example: as 4 Kwords of application data and 16 Kwords of the program and its constants.

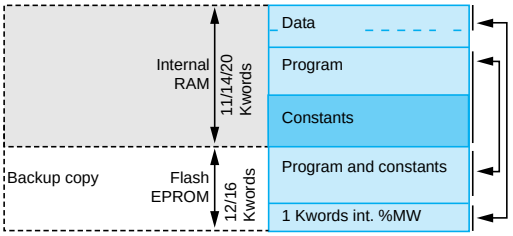
Application in the internal Flash EPROM
The total volume is equal to the application volume in RAM, limited to 11 Kwords or 15 Kwords, to which the backup of the first 1024 data words (%MW) is added.

Application in the PCMCIA card
The PCMCIA memory card contains the program and the constants.
The additional data storage zone for 128 Kword data (available according to the PCMCIA card model) can be used for distributed applications, for storing information which can be consulted remotely via Modem.
This zone can also be used for storing manufacturing recipes.

Internal RAM data
The data zone can be extended to 20 Kwords, and is only held in the PLC internal RAM.

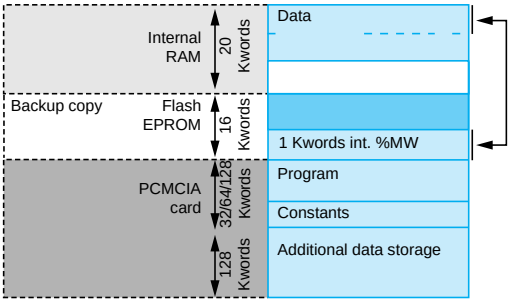
Data backup
The first 1024 words are backed up by the PLC internal Flash EPROM memory. PL7 Micro/Junior/Pro software aids the application designer in the management of the structure and the occupation of memory space for TSX Micro PLCs.

TSX 37 05/08/10/21/22 (without PCMCIA card)



1 Application data (17.5 Kwords maximum).
2 Descriptor and exedutable code for tasks.
3 Constant words, initial values and configuration.

TSX 37 21/22 (with a PCMCIA card)



1 Application data (17.5 Kwords maximum).
2 Descriptor and exedutable code for tasks.
3 Constant words, initial values and configuration.
4 According to the PCMCIA card model.

Application protection

Whatever the PLC's memory structure is: application in internal RAM or on the PCMCIA card, it is possible to protect the structure to prohibit access (reading or program modification) in online mode using PL7 Micro/Junior/Pro software.

Backup application

Micro TSX 37 21/22 PLCs make it possible to save the 32 Kwords maximum application (programs and constants) on a Backup TSX MFP BAK 032P memory card. The internal RAM memory can thus be reloaded with the contents of this Backup memory card.
This Backup function is not available if the application runs on a PCMCIA RAM or Flash EPROM memory card.

Functions: pages 1/8 and 1/9
Characteristics: pages 1/13 and 1/14
References: pages 1/15 and 1/16
Dimensions, mounting: page 1/17

Modicon TSX Micro automation platform
TSX 37 05/08/10/21/22 PLCs

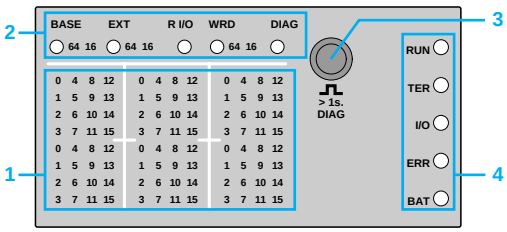
Centralized display

TSX Micro PLCs are equipped with a display block which groups together centrally all the data required for the control, diagnostics and maintenance of the PLC and all its modules, as well as simple man-machine interface functions.

The centralized display provides:

- Display of the local or remote I/O channel states (I/O of Nano PLCs).
- Display of devices on the AS-Interface bus and AS-Interface bus diagnostics (see page 4/26).
- Display of diagnostics of faulty channels or modules.
- Display of internal data:
  - bits,
  - bit strings,
  - word strings,
  - program variables (active steps, application information, etc).
- 4-digit multiple digital display.

Description



The centralized display block comprises:

1 Three blocks of 32 LEDs representing the slots in which the modules are installed in the base rack or mini extension rack.

2 An information line consisting of LEDs which show the display operating modes.

3 A command push button which provides access to the various display operating modes.

4 Five LEDs:
- RUN, PLC run/stop,
- TER, traffic on the terminal port,
- I/O, I/O fault,
- ERR, processor or application fault,
- BAT, battery fault or no battery.

Functions: pages 1/8 and 1/9
Characteristics: pages 1/13 and 1/14
References: pages 1/15 and 1/16
Dimensions, mounting: page 1/17

Modicon TSX Micro automation platform
TSX 37 05/08/10/21/22 PLCs

Characteristics

TSX Micro PLCs have been developed to conform to the national and international standards concerning electronic devices for industrial control systems:
- Specific requirements for programmable controllers: functional characteristics, resistance, robustness, safety, etc. IEC 61131-2, CSA 22-2, UL 508.
- Merchant navy requirements from the main European bodies: BV, DNV, GL, GOST, LR, RRS.
- European directives (low voltage, electromagnetic compatibility), CE marking.
- Electrical qualities and self-extinguishing capacity of insulating materials: UL 746C, UL 94, etc. See page 6/4.

Environmental characteristics (characteristics common to all TSX Micro PLC components)

Temperature	Operation	**°C**	0...+ 60 (+ 5...+ 55 conforming to IEC 61131-2), 0…+ 70 with TSX FAN ventilation modules
	Storage	**°C**	- 25...+ 70 (conforming to IEC 61131-2)
Relative humidity	Operation		10 %...95 %, without condensation
	Storage		5 %..95 % conforming to IEC 61131/2 without condensation
Altitude		**m**	0…2000
Mechanical withstand	Resistant to vibrations		Conforming to IEC 68-2-6, Fc test
	Resistant to shocks		Conforming to IEC 68-2-27, Ea test
Resistant to electrostatic discharge	Withstand to electrostatic discharge		Conforming to IEC 1000-4-2, level 3 *(1)*
Resistance to HF interference	Resistant to electromagnetic fields		Conforming to IEC 1000-4-3, level 3 *(1)*
	Resistant to rapid transient bursts		Conforming to IEC 1000-4-4, level 3 *(1)*
	Resistant to shock waves		Conforming to IEC 1000-4-5
	Resistant to damped oscillatory waves		Conforming to IEC 1000-4-12
Resistance to LF interference			Conforming to IEC 61131-2

Power supply characteristics

Type of power supply				**Power supply ∿**	**Power supply ⎓**
Primary	Voltage	Nominal	**V**	∿ 100...240	⎓ 24
		Limit (including ripple)	**V**	∿ 90…264	⎓ 19.2...30V possible up to 34 V for 1 hr per 24 hrs
	Frequency	Nominal (limit)	**Hz**	50-60 (47-63)	–
	Current	Nominal input	**A**	⩽ 0.7 (∿ 100 V), ≤ 0.3 (∿ 240 V)	2
		Inrush *(2)*	**A**	⩽ 60	⩽ 60
	Micro-breaks	Accepted duration		⩽ 1/2 period, repetition ≥ 1 s	⩽ 10 ms, repetition ⩾ 1 s
Secondary	Power	Total useful (typical)	**W**	24 (32 peak)	16 (18 peak)
	Output currents	⎓ 5 V output	**A**	2.8 (3.2 peak)	2.8 (3.2 peak)
		Output ⎓ 24 VR (for relay outputs)	**A**	0.5 (0.6 peak)	–
		⎓ 24 V output sensors	**A**	0.4 (0.6 peak)	–
	Protection integrated on the outputs against	Overloads		Yes	Yes
		Short-circuits		Yes	Yes
Isolation	Dielectric resistance	Primary/ secondary	**V rms**	2000 - 50/60 Hz	No isolation, 0 V internal connected to the PLC ground

(1) Minimum level in the test conditions defined by the standards.
(2) Values to be taken into account when starting up several devices at the same time or when sizing protection devices.

Functions: pages 1/8 and 1/9
References: pages 1/15 and 1/16
Dimensions, mounting: page 1/17

Modicon TSX Micro automation platform

TSX 37 05/08/10/21/22 PLCs

1

Processor chracteristics

Type of PLc				TSX 37 05	TSX 37 08	TSX 37 10	TSX 37 21	TSX 37 22
No. of slots	Basic			2	3	2	3	
	With extension rack, 2 slots			–		4	5	
Functions (Max.no.)	Discrete I/O *(1)*	Screw terminal block		60 *(28 I/O)*	88 *(56 I/O)*	124 *(28 I/O)*	160 *(–)*	
		HE10 connector		92	120	184 *(28 or 64 I/O)*	248 *(–)*	
		64 channel modules		1		2	3	
	Analog I/O	Integrated		–				8 I et 1 O
		Modules		2			4	
		Type of modules		Half format module 4 or 8 I, 2 or 4 O, 4 I/O				
		Regulation		The number of loops is limited by the number of analogue modules and by the size of memory				
	Counting channels *(2)*	Integrated		–				2 channel 10 kHz
		Modules		2		2 *(3)*	4 *(3)*	
		Type of modules		Half format module 1 or 2 channel 40/500 kHz, 1 channel SSI 1 MHz				
		Discrete I/O		2 channels 500 Hz				
	Integrated connections	Serial link		1 link with 1connector (TER) 19.2 Kbit/s			1 link with 2 connectors (TER and AUX) 19,2 Kbit/s	
		Type of links		Uni-Telway master/slave				
				Modbus slave RTU Character mode		Modbus master/slave RTU Character mode		
	Networks and bus connections	Ethernet TCP/IP		–		1 (Ethernet TCP/IP external module or RS 232 Modem)		
		Fipway network, Modbus Plus		–			1 *(4)*	
		AS-Interface bus		–		1 Half format module (profil M2) *(5)*		
		CANopen bus		–			1 *(4)*	
		Modbus bus, Uni-Telway, Characters string		–		1 *(4)*	1 *(4)*	
	Extension by Nano base and Nano extension (200 m maxi)			–		1 half-format module *(5)* for 96 discrete I/O or 12 analogue I/O (4 Nano bases 24 I/O or 3 analogue extensions 3 I/1 O)		
Real time clock				–				
Memory	Max. capacity	Internal RAM which can be backed up	**Kwords**	11		14	20	
		Program and constants	**Kwords**	–			128 with PCMCIA card	
		Data storage	**Kwords**	–			128	
	Max. data storage size	Internal bits %Mi	**bits**	256				
		Internal words %MWi	**Kwords**	1 *(6)*			1 *(6)*, 17,5 with PCMCIA card	
		Constants words %KWi	**Words**	128 *(6)*				
Application structure		Master task		1				
		Fast task		1				
		Event processing		8			16 (where 1 has priority)	
Execution time for 1 instruction	Without PCMCIA card	Boolean	**µs**	0,25			0,13	
		On word or fixed-point arithmetic	**µs**	4,81			4,50	
	With PCMCIA card	Boolean	**µs**	–			0,19	
		On word or fixed-point arithmetic	**µs**	–			4,50	
No. of K instructions executed by ms	Without PCMCIA card	100 % boolean	**Kinst/ ms**	3,03			5,88	
		65 % boolean and 35 % numerical	**Kinst/ ms**	0,25			0,27	
	With PCMCIA card	100 % boolean	**Kinst/ ms**	–			4,00	
		65 % boolean and 35 % numerical	**Kinst/ ms**	–			0,266	
Overhead système		Master task	**ms**	1,9			1,6	2,3

(1) The value in bracket and in italics corresponds to number of I/O providing with the basic PLC configuration.
(2) Maximum number of couting/positioning channels, see page 3/16.
(3) TSX CTZ●● counting/positioning modules, only in the TSX Micro base.
(4) PCMCIA to insert in the communication card slot
(5) The remote discrete I/O extension modules and AS-Interface bus modules are installed in position 4 which means that their use is mutually exclusive.
(6) Default size, can be extended, but will have an adverse effect on the size of the application program.

Functions: pages 1/8 and 1/9
References: pages 1/15 and 1/16
Dimensions, mounting: page 1/17

Modicon TSX Micro automation platform
TSX 37 05/08/10/21/22 PLCs

TSX 37 05/10 ●28●●1

Basic TSX 37 05/08 PLC configurations (1 slot available)

Power supply	Integrated memories		Integrated memory Discrete I/O modules		Reference	Weight
	RAM	Flash EPROM	Type	Connection		kg
∿ 100…240 V	11 Kwords	12 Kwords	1 modules with 16 I ⎓ 24 V,12 O relay	Via screw terminal block (supplied)	**TSX 37 05 028DR1**	2.370
			2 modules with 16 I ⎓ 24 V, 12 O relay	Via screw terminal block (supplied)	**TSX 37 08 056DR1**	2.720

TSX 37 08 056 DR1

Basic TSX 37 10 PLC configurations (1 slot available)

Power supply	Integrated memories		Integrated memory Discrete I/O modules		Reference	Weight
	RAM	Flash EPROM	Type	Connection		kg
⎓ 24 V	14 Kwords	15 Kwords	1 module with 16 I ⎓ 24 V 12 Solid state O 0.5 A	Via screw terminal block (supplied)	**TSX 37 10 128DT1**	1.870
			1 module with 16 I ⎓ 24 V 12 O relay	Via screw terminal block (supplied)	**TSX 37 10 128DR1**	1.900
			1 module with 16 I ⎓ 24 V 12 Solid state O 0.5 A	Via HE 10 type connector	**TSX 37 10 128DTK1**	1.740
			1 module with 32 I ⎓ 24 V 32 Solid state O 0.1 A	Via HE 10 type connector	**TSX 37 10 164DTK1**	1.820
∿ 100…240 V	14 Kwords	15 Kwords	1 module with 16 I ∿ 115 V 12 O relay	Via screw terminal block (supplied)	**TSX 37 10 028AR1**	1.910
			1 module with 16 I ⎓ 24 V 12 O relay	Via screw terminal block (supplied)	**TSX 37 10 028DR1**	1.910

TSX 37 10 164DTK1

Basic TSX 37 21/22 PLC configurations (3 slots available)

Power supply	Integrated memories		Integrated functions	Reference	Weight
	RAM	Flash EPROM			kg
⎓ 24 V	20 Kwords	5 Kwords	–	**TSX 37 21 101**	1.720
			8 analog inputs 0-10 V 1 analog output 0-10 V 1 Up/down counter 10 kHz 1 counter 10 kHz	**TSX 37 22 101**	1.750
∿ 100…240 V	20 Kwords	15 Kwords	–	**TSX 37 21 001**	1.720
			8 analog inputs 0-10 V 1 analog output 0-10 V 1 Up/down counter 10 kHz 1 counter 10 kHz	**TSX 37 22 001**	1.750

TSX 37 22 ●01

TSX RKZ 02

Mini extension rack

Capacity	Use	Number maximum	Reference	Weight kg
2 slots (possibility of 4 positions)	PLCs TSX 37 10/21/22	1 mini rack per PLC	**TSX RKZ 02**	0.630

Documentation

TSX Micro base and module installation manual	See page 1/4	–

Description: pages /4 to 41/7 | Functions: pages 1/8 and 1/9 | Characteristics: pages 1/13 and 1/14 | Dimensions, mounting: page 1/17

Modicon TSX Micro automation platform
TSX 37 05/08/10/21/22 PLCs

TSX MRP ●●●P

References (continued)

Extension for application memory

Use	Memory size		Reference	Weight kg
	Application	Data storage		
TSX 37 21/22	32 Kwords	–	TSX MRP 032P	0.060
		128 Kwords	TSX MRP 232P	0.060
	64 Kwords	–	TSX MRP 064P	0.060
		128 Kwords	TSX MRP 264P	0.060
	128 Kwords	–	TSX MRP 0128P	0.060
		128 Kwords	TSX MRP 2128P	0.060

Extension Flash EPROM PCMCIA memory

Use	Memory size		Reference	Weight kg
	Application	Data storage		
TSX 37 21/22	32 Kwords	–	TSX MFP 032P	0.060
		128 Kwords	TSX MFP 232P	0.060
	64 Kwords	–	TSX MFP 064P	0.060
		128 Kwords	TSX MFP 264P	0.060
	128 Kwords	–	TSX MFP 0128P	0.060

Backup card (1)

Use	Memory size		Reference	Weight kg
	Application	Data storage		
TSX 37 05/08/10	32 Kwords	–	TSX MFP BAK 032P	0.060

TSX FAN ●●P

Fan modules

Description	Quantity to be used	Supply	Reference	Weight kg
Fan modules (2)	1 for TSX 37 05/08/10/21/22 2 for TSX 37 10/21/22 with TSX RKZ 02	⎓ 24 V	TSX FAN D2P	0.500
		∿ 100…120 V	TSX FAN A4P	0.500
		∿ 200…240 V	TSX FAN A5P	0.500

TSX PRG LDR

Separate parts

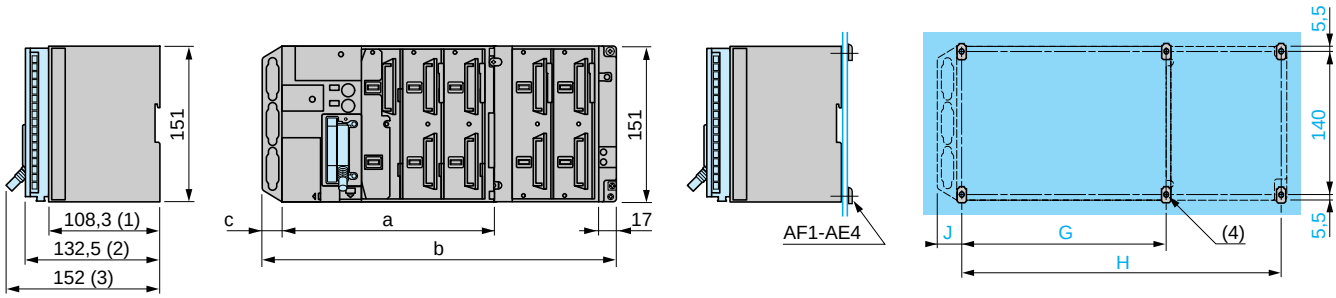
Description	Use	Quantity	Unity reference	Weight kg
Program loader with terminal port conn. cable	Simplifies duplication, updating or backup of 15 Kwords applications (program) and constants in internal RAM (length: 0.3m)		TSX PRG LDR	0.150
Connection accessories	Discrete I/O		See page 2/14	–
	Discrete I/O with Telefast 2		See pages 2/34 and 2/35	–
	Integrated analog I/O		See page 3/9	–
	Integrated counter channels		See page 3/19	–
Backup batteries	TSX 37 05/08/10/21/22 internal RAM	–	TSX PLP 01	0.030
		Pack of 10	TSX PLP 101	0.320
	RAM type PCMCIA memory card	–	TSX BAT M01	0.010
Cover for empty slot	TSX 37 05/08/10/21/22 PLCs	Pack of 10	TSX RAZ 01	0.010
Gripper	Memory extension card (PCMCIA type 1)		TSX P CAP	0.030

(1) Card previously loaded to enable the TSX Micro application program to be updated without needing a programming terminal (the program must be entirely contained in the internal RAM).
(2) One fan module for a TSX 37 05/08/10/21/22 configuration, two fan modules for a TSX 37 10/21/22 configuration with mini rack TSX RKZ 02. Required for an ambient temperature between 60 °C and 70 °C.
(3) Cover to be mounted in positions which do not hold a module to obtain IP 20 level of protection.

Modicon TSX Micro automation platform
TSX 37 05/08/10/21/22 PLCs

Dimensions, mounting

Side view **Front view** **Mounting**

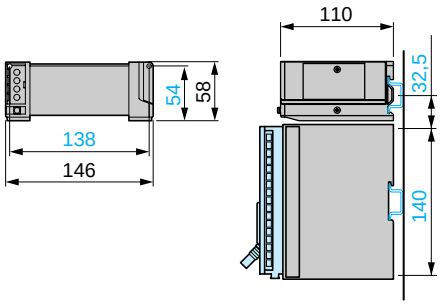


TSX 37	a	b	c
05 028DR1	170.3	–	–
08 056DR1	227.9	–	19
10 028/128/164●●1	170.3	282.7	–
21/22 ●01	227.9	341.4	19

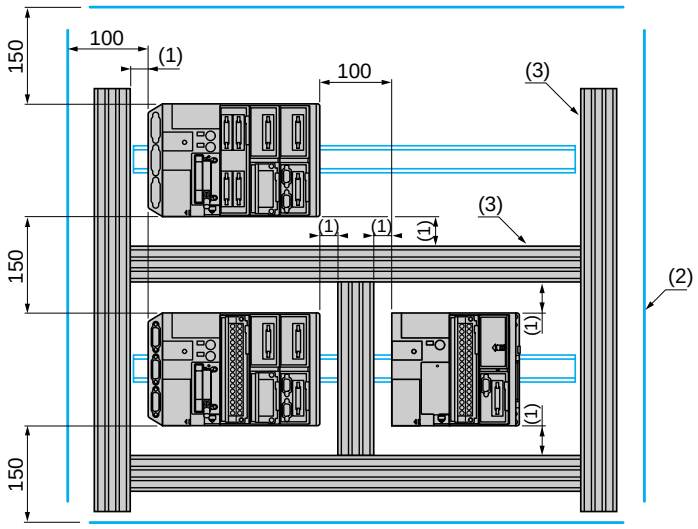
TSX 37	G	H	J
05 028DR1	159.2	–	5
08 056DR1	198.9	–	24
10 028/128/164●●1	159.2	271.7	5
21/22 ●01	198.9	311.4	24

(1) Empty PLC
(2) With screw terminal block
(3) With HE 10 type or SUB-D connectors
(4) Fixing holes for M4 screws

Mounting for TSX FAN ●●P modules



Installation regulations



(1) ≥ 50 mm
(2) Switch gear or enclosure
(3) Cable ducting or wiring clip

Contents

2 - Discrete I/O

2.1 - Discrete I/O

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- Extension module for Nano PLCs . . . . . *page 2/24*

2.2 - Connection interfaces

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- Telefast 2 pre-wired system
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  - Accessories for connection sub-bases . . . . . *page 2/40*
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2.3 - Phaseo power supplies

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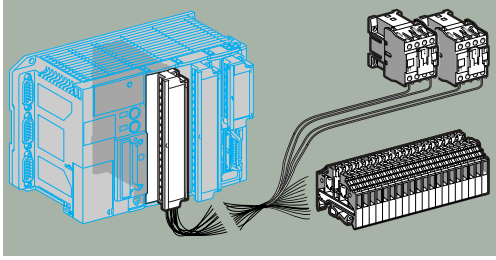
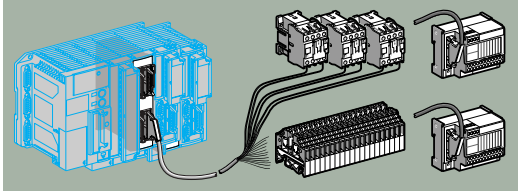
- Presentation . . . . . *page 2/52*
- Characteristics . . . . . *page 2/56*
- References . . . . . *page 2/60*
- Dimensions . . . . . *page 2/62*

Modicon TSX Micro automation platform
Discrete I/O modules

Applications with standard format modules	**I/O connection on screw terminal block**: via bare wires, via wires fitted with cable ends, or wires fitted with			
				
Type	32 inputs	32 outputs		
Nature	Inputs ⎓ 24 V	Outputs ⎓ 24 V solid state 0.5 A	Outputs ⎓/∿ relay 2A (Ith)	
Connection	Connection via screw terminal block (supplied with the module)			
Possible association with Telefast 2 sub-base	Connection sub-base			
	I/O adaptor sub-base			
Possible association with Tego systems	Tego Dial			
	Tego Power			
Isolated inputs	Control	Sensor voltage monitoring		
	IEC 1131-2 conformity	Type 2		
	Logic	Positive		
	Prox.sens. compat. conforming to standard IEC 947-5-2	⎓ 2-wire, ⎓/∿ 2-wire, ⎓ 3-wire PNP		
Isolated outputs	Control		Preactuator voltage monitoring Configurable fallback of outputs	Configurable fallback of outputs
	IEC 1131-2 conformity		Yes	–
	Protection		Protected	Non-protected
	Logic		Positive	–
Type of modules	**TSX DEZ 32D2**	**TSX DSZ 32T2**	**TSX DSZ 32R5**	
Pages	2/13			

open or closed tags (minimum cross-section 0.2mm², maximum 1.5 mm²)

I/O connection on HE 10 type connector: with preformed cables with flying leads (cross-section 0.324 mm²), ribbon cables (cross-section 0.08 mm²) or conection cables (cross-section 0.324 mm²).

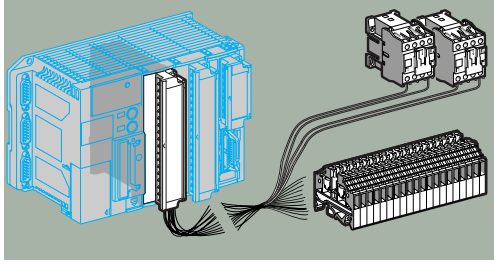


16 inputs/12 outputs			32 inputs/32 outputs
Inputs ⎓ 24 V Relay outputs 3 A (Ith)	Inputs ∿ 100…120 V Relay outputs 3 A (Ith)	Inputs ⎓ 24 V Outputs ⎓ 24 V/0.5 A	Inputs ⎓ 24 V Outputs ⎓ 24 V/0.1 A
		Connection via 20-way HE 10 connector	
		8, 12 or 16 channels, with or without LED, with common or terminals per channel	
		Inputs: 16 channels ⎓ 5 V TTL, ⎓ 24 V, ⎓ 48 V, ∿ 48 V, ∿ 115 V or 230 V, 2 terminals per channel Outputs: 8 or 16 channels, with 1 N/O, 1 or 2 C/O or solid state relays, ⎓ 5…48 V, ⎓ 24 V, ∿ 24…240 V 1 or 2 terminals per channel	
		Yes (see page 2/44)	
			Yes (see page 2/46)
Sensor voltage monitoring			
Type 1	Type 2	Type 1	
Positive/Negative	–	Positive	
⎓ 2-wire, ⎓ 3-wire PNP/NPN	⎓/∿ 2-wire, ∿ 2-wire	⎓ 2-wire, ⎓ 3-wire PNP	
		Preactuator voltage monitoring Configurable fallback of outputs	
		Yes	
		Protected	
		Positive	
TSX DMZ 28DR	**TSX DMZ 28AR**	**TSX DMZ 28DT**	**TSX DMZ 28DTK**	**TSX DMZ 64DTK**

Modicon TSX Micro automation platform
Discrete I/O modules

Applications for half-format modules

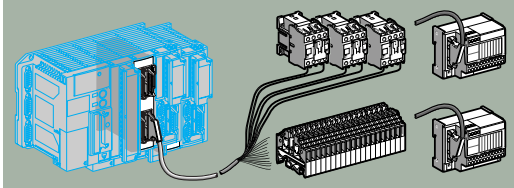
I/O connection on screw terminal block: via bare wires, via wires fitted with cable ends, or wires fitted with maximum 1.5 mm².



Type	12 inputs	8 inputs		8 outputs
Nature	Inputs ⎓ 24 V	Inputs ∿ 100…120 V	Inputs ∿ 200…240 V	Outputs ⎓/∿ relay 3 A (Ith)
Connection	Connection via screw terminal block (supplied with the module)			
Possible association with Telefast 2	Connection sub-base			
	I/O adaptor sub-base			
Possible association with Tego systems	Tego Dial			
	Tego Power			
Isolated inputs	Control	Sensor voltage monitoring		
	EC 1131-2 conformity	Type 1	Type 2	Type 1
	Logic	Positive/negative	–	
	Prox.sens.compat. conforming to standard IEC 947-5-2	⎓ 2-wire ⎓ 3-wire PNP/NPN	⎓/∿ 2-wire, ∿ 2-wire	∿ 2-wire
Isolated outputs	Control			Configurable fallback of outputs
	IEC 1131-2 conformity			–
	Protection			Non-protected
	Logic			–
Type of modules	**TSX DEZ 12D2**	**TSX DEZ 08A4**	**TSX DEZ 08A5**	**TSX DSZ 08R5**
Pages	2/13			

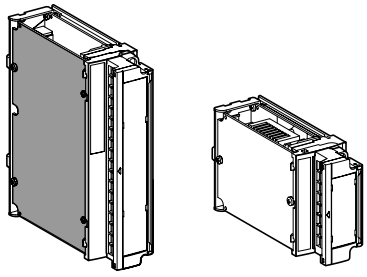
open or closed tags (minimum cross-section 0.28 mm²),

I/O connection on HE 10 connector: with preformed cables with flying leads (cross-section 0.324 mm²) ribbon cables (cross-section 0.08 mm²) or connection cables (cross-section 0.324 mm²).



4 outputs	8 outputs	12 inputs	8 inputs/8 outputs
Outputs ⎓ 24 V/2 A	Outputs ⎓ 24 V/0.5 A	Inputs ⎓ 24 V	Inputs ⎓ 24 V Outputs ⎓ 24 V/0.5 A
	Connection via 20-way HE 10 connector		
	8, 12 or 16 channels, with or without DEL, with common or 2 terminals per channel Inputs: 16 channels ⎓ 5 V TTL, ⎓ 24 V, ⎓ 48 V, ∿ 48 V, ∿ 115 V or 230 V, 2 terminals per channel Outputs: 8 or 16 channels with 1 N/O pr C/O pr spmod state remaus, ⎓ 5…48 V, ⎓ 24 V, ∿ 24…240 V 1 or 2 terminals per channel		
			Yes (see page 2/44)
			Yes (see page 2/46)
		Sensor voltage monitoring	
		Type 2	Type 1
		Positive	
		⎓/∿ 2-wire, ⎓ 2-wire ⎓ 3-wire PNP	⎓ 2-wire, ⎓ 3-wire PNP
Preactuator voltage monitoring Configurable fallback of outputs			Preactuator voltage monitoring. Configurable fallback of outputs
Yes			Yes
Protected			Protected
Positive			Positive
TSX DSZ 04T22	**TSX DSZ 08T2**	**TSX DSZ 08T2K**	**TSX DEZ 12D2K**	**TSX DMZ 16DTK**

Modicon TSX Micro automation platform
Discrete I/O modules

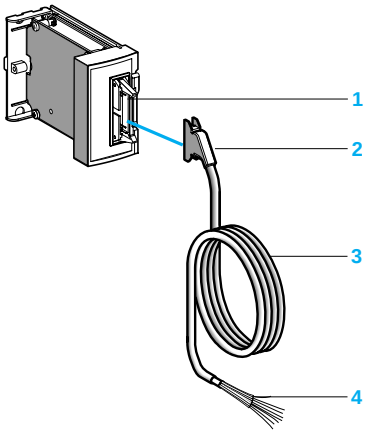


Connection principles

Connecting modules with screw terminal blocks

The screw connection terminal blocks are fitted with a removable cover ensuring:
- The screws are held in place
- Personnel safety

Each terminal on a screw terminal block can accept bare wires or wires fitted with cable ends, with closed or open tags. The capacity of each terminal is:
- Minimum:
  - 1 wire 0.28 mm^2 (AWG 23) without cable end
- Maximum:
  - 2 wires 1 mm^2 (AWG 17) with cable end, or
  - 1 wire 1.5 mm^2 (AWG 15) without cable end, or
  - 1 open or closed tag for wires of 1 mm^2 (AWG 17).



Connecting modules with HE 10 type connectors

Prewired cable with 20 flying leads, gauge 22 (0.324 mm^2)

Used for the simple and direct wire to wire connection of the I/O of modules with connectors 1 to the sensors, preactuators or terminals.
The prewired cable 3 comprises:
At one end, a moulded HE 10 type connector 2 with 20 x 0.34 mm^2 cross-section wires in a sheath.
At the other end 4, flying leads -differentiated by colour coding conforming to DIN 47100.

TSX CDP 301: length 3 m,
TSX CDP 501: length 5 m,
TSX CDP 1001: length 10 m.

Sheathed rolled ribbon cable, gauge 28 (0.08 mm^2)

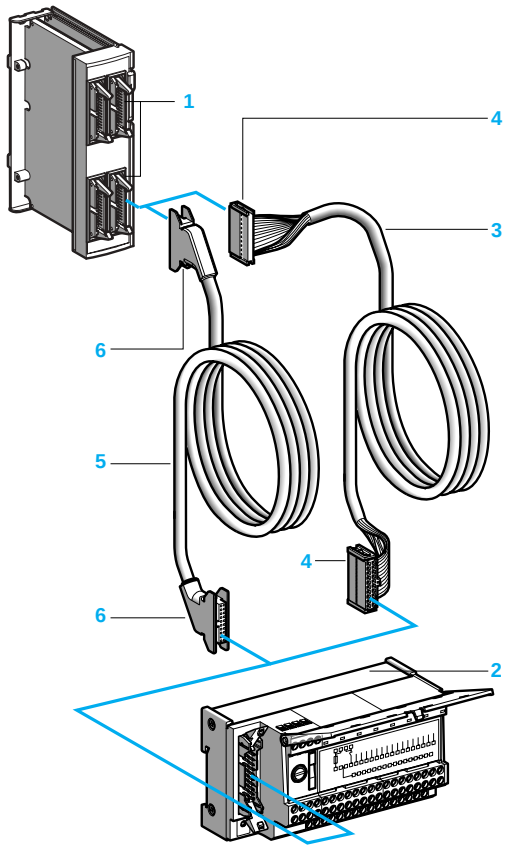
Used to connect the I/O of modules with HE 10 type connectors 1 to Telefast 2 connection and adaption rapid wiring interfaces 2. The cable 3 comprises 2 HE 10 type connectors 4 and a sheathed rolled ribbon cable with 0.08 mm^2 cross-section wires.
Bearing in mind the small cross-section of the wire, this method of connection is only recommended for low current I/O (100 mA maximum per input or per output).

TSX CDP 102: length 1 m,
TSX CDP 202: length 2 m,
TSX CDP 302: length 3 m.

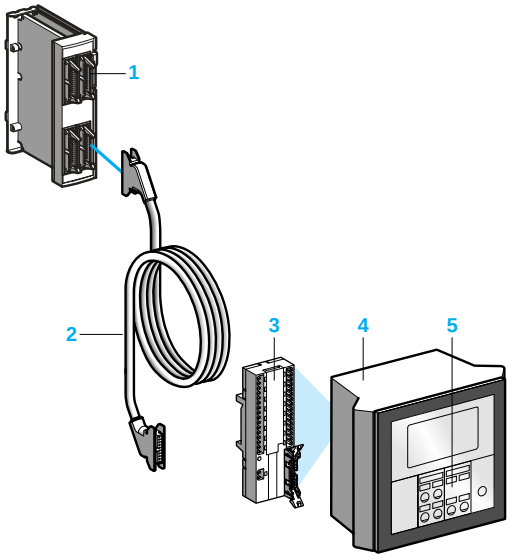
Connection cable, gauge 22 (0.324 mm^2)

Used to connect the I/O of modules with HE 10 type connectors 1 to Telefast 2 connection and adaption rapid wiring interfaces 2. The cable 5 comprises 2 moulded HE 10 type connectors 6 and a cable suitable for carrying higher currents (500 mA maximum).

TSX CDP 053: length 0.5 m,
TSX CDP 103: length 1 m,
TSX CDP 203: length 2 m,
TSX CDP 303: length 3 m,
TSX CDP 503: length 5 m,
TSX CDP 1003: length 10 m.



Characteristics: pages 2/9 to 2/12
References: pages 2/13 and 2/14
Connections: pages 2/15 to 2/17



Connection principles (continued)

Connection to Tego Dial and Tego Power systems

The TSX DMZ 16 DTK 1 module is also designed for association with Tego Dial and Tego Power *(1)* systems set up.

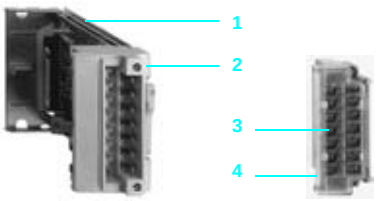
In the example the connection is achieved by simply connecting cable TSX CDP ●●3 2 to the APE-1B24M Dialbase sub-base 3 installed on the Dialpack console 4, which is fitted with a mounting plate 5 for MMI components.

Description

Discrete I/O modules connected via screw terminal block

Half-format or standard format I/O modules with connection via screw terminal block comprise:

1 At rigid metal casing.
2 At locking mechanism for fixing the module in its slot. This can only be accessed when the terminal block is removed.
3 At removable screw terminal block for connection to sensors and preactuators.
4 At cover for the terminal block screws, which also serves as a label holder.

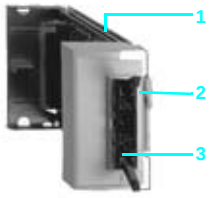


Half-format or standard format I/O module

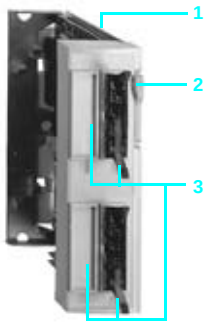
Discrete I/O modules connected via connector

I/O modules with connection via connector comprise:

1 At rigid metal casing.
2 At locking mechanism for fixing the module in its slot.
3 One, two or four HE 10 connectors for connection to sensors and preactuators.



Half-format I/O module



Standard format I/O module

Discrete I/O module connected via connector and cage terminal

The TSX DMZ 16DTK module comprises:

1 At rigid metal casing.
2 At locking mechanism for fixing the module in its slot.
3 One HE 10 connector for connection to sensors and preactuators.
4 At cage terminal for connecting the input and output power supplies.

(1) See pages 2/44 to 2/3.

Characteristics: pages 2/9 to 2/12
References: pages 2/13 and 2/14
Connections: pages 2/15 to 2/17

Modicon TSX Micro automation platform
Discrete I/O modules

Functions

I/O assignment
By software configuration, specific functions can be assigned to certain inputs. The first four inputs of a discrete I/O module located in slot 1 of a TSX Micro PLC can be configured as discrete inputs, latching inputs, event-triggered inputs or up/down counter inputs.

Inputs which can be configured as latching inputs
These are inputs %I1.0 to %I1.3. The principle is that, on a pulse which is shorter than the PLC scan, the pulse is stored and processed on the next PLC scan. The pulse is taken into account when the input changes state (rising and/or falling edge depending on the selected configuration).

Inputs which can be configured as event-triggered inputs
These are inputs %I1.0 to %I1.3. On command events, the application program is diverted directly to the event processing associated with the input causing the event. The event is taken into account when the input changes state (rising and/or falling edge depending on the selected configuration).

Inputs which can be configured as up/down counter inputs
These are inputs %I1.0 to %I1.3. Depending on the software configuration, these inputs enable the creation of up to 2 up/down counter channels, each of which can execute one of the following functions independently: upcounting function, downcounting function, up/down counting with or without direction discrimination.

RUN/STOP command
Input %I1.8 can be set to control the RUN/STOP command on the PLC. This is taken into account on a rising edge. At STOP command via an input has priority over the RUN command via the terminal or network.

Program and data backup input
Input %I1.9 can be set to back up the application program in the Flash EPROM memory (in the internal RAM) and the first 1000 words %MWi maximum on a rising edge.

Alarm output
On a PLC base, output %Q2.0 can, after configuration, be assigned to the ALARM function. When setting the PLC to RUN and if no blocking fault is detected, the alarm output changes to state 1. It can be used in safety circuits external to the PLC, for example to control the output preactuators power supply, or the TSX Micro PLC power supply.

2/3-wire proximity sensor compatibility

Type of sensors	Types of inputs	⎓ 24 V Type 1 Positive logic	⎓ 24 V Type 2 Positive logic	⎓ 24 V Negative logic	∿ 100…120 V Type 2	∿ 200…240 V Type 1
All ⎓ 3-wire prox. sensors, PNP type		■	■			
All ⎓ 3-wire prox. sensors, NPN type				■		
⎓ 2-wire proximity sensor, Telemecanique or other brand having the following characteristics: ■ Residual voltage, closed ⩽ 7 V ■ Minimum switching capacity ⩽ 2.5 mA ■ Residual current, open ⩽ 1.5 mA		■	■	■		
⎓/∿ 2-wire proximity sensor			■		*(1)*	■
∿ 2-wire proximity sensor					*(1)*	■

■ Compatible

(1) In the nominal voltage range ∿ 220…240 V.

Characteristics: pages 2/9 to 2/12
References: pages 2/13 and 2/14
Connections: pages 2/15 to 2/17

Modicon TSX Micro automation platform
Discrete I/O modules

Characteristics of ⎓ 24 V input modules *(1)*

Type of modules				TSX DEZ 12D2/TSX DMZ 28DR		TSX DEZ 12D2K/TSX DEZ 32D2	TSX DMZ 16DTK
Number of inputs				12/16		12/32	8
Connection				Screw terminal block		HE 10 connector/screw terminal block	HE 10 connector/ enclosed terminal block
Nominal input values	Voltage		**V**	⎓ 24 (positive logic)	⎓ 24 (negative logic)	⎓ 24 (positive logic)	
	Current		**mA**	9	6	7	
	Sensor supply (ripple included)			19…30 (possible up to 34 V, limited to 1 hour per 24 hours)			
Input limit values	At state1	Voltage	**V**	⩾ 11	⩽ 8	⩾ 11	
		Current	**mA**	> 2.5		> 6	> 2.5
	At state 0	Voltage	**V**	< 5	> Ual - 5	< 5	
		Current	**mA**	< 1,5		< 2	< 1.5
Input impedance at state 1			**KΩ**	2.4	4	3,4	
Configurable response time	State 0 to 1		**ms**	0.1…7.5			
	State 1 to 0		**ms**	0.1…7.5			
IEC 1131-2 conformity				Yes, type 1	–	Yes, type 2	Yes, type 1
Proximity sensor compatibility 2/3-wire				Yes			
Isolation resistance			**MΩ**	> 10 at ⎓ 500 V			
Type of input				Resistive		Current sink	Resistive
Consumption				See page 6/4			
Dissipated power			**W**	**TSX DEZ 12D2:** 2,7 **TSX DMZ 28DR:** 4.5		**TSX DEZ 12D2K:** 2,7 **TSX DEZ 32D2:** 6	3
Isolation	Between channels and ground		**V rms**	1500 - 50/60 Hz for 1 minute			
	Between channels and internal logic		**V rms**	1500 - 50/60 Hz for1 minute			

Type of modules				TSX DMZ 28DTK/DMZ 28DT	TSX DMZ 64DTK	TSX ACZ 03 *(3)*
Number of inputs				16	32	8
Connection				HE 10 connector/screw terminal block	HE 10 connector	SUB- D connector
Nominal input values	Voltage		**V**	⎓ 24 (positive logic)		
	Current		**mA**	7	3.5	8
	Sensor supply (ripple included)			19…30 (possible up to 34 V, limited to 1 hour per 24 hours)		
Input limit values	At state1	Voltage	**V**	⩾ 11		
		Current	**mA**	> 2.5		
	At state 0	Voltage	**V**	< 5	< 5	< 5
		Current	**mA**	< 1.5	< 1.4	< 1.4
Input impedance at state 1			**KΩ**	3.4	6.3	2.67
Configurable response time	State 0 to 1		**ms**	0.1…7.5		1/1.5 (fixe)
	State 1 to 0		**ms**	0.1…7.5		0.2/0.3 (fixe)
EC 1131-2 conformity				Yes, type 1		
Proximity sensor compatibility 2/3-wire				Yes		
Isolation resistance			**MΩ**	> 10 at ⎓ 500 V		
Type of input				Resistive	Current sink	Resistive
Consumption				See page 6/4		
Dissipated power			**W**	5		–
Isolation	Between channels and ground		**V rms**	1500 - 50/60 Hz for 1 minute		–
	Between channels and internal logic		**V rms**	1500 - 50/60 Hz for 1 minute		–

(1) Characteristics at 60 °C for 60 % I/O loading or at 30 °C for 100 % I/O loading.
(2) Adaptation and analogue adjustment module enables the transformation of 8 integral analogue inputs for TSX 37 22 bases into 8 discrete inputs (see page 3/4).

References:
pages 2/13 and 2/14

Connections:
pages 2/15 to 2/17

Characteristics of a.c. input modules (1)

Type of modules				TSX DEZ 08A4	TSX DEZ 08A5	TSX DMZ 28AR
Number of inputs				8		16
Connection				Screw terminal block		
Nominal input values	Voltage		**V**	∼ 100…120	∼ 200…240	∼ 100…120
	Current	50 Hz	**mA**	11	10	11
		60 Hz	**mA**	13	12	13
	Frequency		**Hz**	47…63		
	Sensor supply		**V**	85…132	170…264	85…132
Input limit values	At state 1	Voltage	**V**	⩾ 74	⩾ 120	⩾ 74
		Current	**mA**	⩾ 6 (for U = 74 V)	⩾ 6 (for U = 164 V)	⩾ 6 (for U = 74 V)
	At state 0	Voltage	**V**	< 20	< 40	< 20
		Current	**mA**	< 4	< 5	< 4
Response time	State 0 to 1	50 Hz	**ms**	11…18		
		60 Hz	**ms**	9…16		
	State 1 to 0	50 Hz	**ms**	11…24		
		60 Hz	**ms**	10…22		
IEC 1131-2 conformity				Yes, type 2	Yes, type 1	Yes, type 2
Proximity sensor compatibility 2-wire				Yes		
Isolation resistance			**MΩ**	> 10 at ⎓ 500 V		
Type of input				Capacitive		
Consumption				See page 6/4		
Dissipated power			**W**	1.7	1.4	5.6
Isolation	Between channels and ground		**V rms**	2000 - 50/60 Hz for 1 minute		
	Between channels and internal logic		**V rms**	2000 - 50/60 Hz for 1 minute		

(1) Characteristics at 60 °C for 60 % I/O loading or at 30 °C for 100 % I/O loading.

References:
pages 2/13 and 2/14

Connections:
pages 2/15 to 2/17

Characteristics of solid state output modules (1)

Type of modules		TSX	DSZ 08T2K	DMZ 28DTK	DSZ 08T2	DMZ 28 DT	DSZ 32T2
Number of outputs			8	12	8	12	32
Connection			HE 10 connector		Screw terminal block		
Nominal output values	Voltage	**V**	⎓ 24				
	Current	**A**	0.5				
	Tungsten filament lamp	**W**	10				
Limit output values	Voltage	**V**	19…30 (possible up to 34 V, limited at 1 hour per 24 hours)				
	Current (for U = 30 ou 34 V)	**A**	0.625				
Logic			Positive, current source				
Leakage current at state 0		**mA**	< 0.5 (< 2 for accidental disconnection of the 0 V module)				
Residual voltage		**V**	< 0.3 (for I = 0.5 A)				
Minimum load impedance		Ω	48				
Response time (2)	From state 1	**ms**	< 0.5				
	From state 0	**ms**	< 0.5				
Switching frequency on inductive load		**Hz**	< 0.6/LI²				
Built-in protection	Against overvoltages		By Zener diode				
	Against reverse polarity		By reverse mounted diode on power supply. Provide 1 fast-blow fuse on the + ⎓ 24 V of the preactuator supply.				
	Against short-circuits and overloads	**A**	By current limiter and thermal breaker 0.75 ⩽ Id ⩽ 2				
Paralleling of outputs			2 outputs max.				
Consumption			See page 6/4				
Nominal dissipated power	Via module	**W**	3.5				3.2
	Via channel at 1	**W**	0.15				
Isolation(test voltage)	Between output and ground	**V rms**	1500 - 50/60 Hz for 1 minute				
	Between outputs and internal logic	**V rms**	1500 - 50/60 Hz for 1 minute				
	Insulation resistance	**MΩ**	> 10 at ⎓ 500 V				

Type of modules			TSX DSZ 04T22	TSX DMZ 16DTK	TSX DMZ 64DTK
Nombre de sorties			4	8	32
Connection			Screw terminal block	HE 10 connector, cage terminal block	HE 10 connector
Nominal output values	Voltage	**V**	⎓ 24		
	Current	**A**	2	0.5	0.1
	Tungsten filament lamp	**W**	15	10	1.2 max.
Limit output values	Voltage	**V**	19…30 (possible up to 34 V, limited at 1 hour per 24 hours)		
	Current (for U = 30 ou 34 V)	**A**	2.5	0.625	0.25
Logic			Positive, current emis		
Leakage current at state 0		**mA**	< 0.5	< 0.5 (< 2 for accidental disconnection of the 0 V module)	< 0.1
Residual voltage		**V**	< 0.8 (for I = 2 A)	< 0.3 (for I = 500 mA)	< 1.5
Minimum load impedance		Ω	12	48	220
Response time (2)	From state 1	**ms**	< 1	< 0.5	< 0.25
	From state 0	**ms**	< 1	< 0.5	< 0.25
Switching frequency on inductive load		**Hz**	< 0.5/LI²	< 0.6/LI·	< 0.5/LI
Built-in protection	Against overvoltages		By Zener diode		
	Against reverse polarity		By reverse mounted diode on power supply. Provide 1 fast-blow fuse on the + ⎓ 24 V of the preactuator supply.		
	Against short-circuits and overloads	**A**	By current limiter and elecctronic breaker 2.6 ⩽ Id ⩽ 5	By current limiter and thermal breaker 0.75 ⩽ Id ⩽ 2	By current limiter and elecctronic breaker 0.125 ⩽ Id ⩽ 0.185
Paralleling of outputs			2 outputs max.		3 outputs max.
Consumption			See page 6/4		
Nominal dissipated power	Via module	**W**	3.8	3	3.5
	Via channel at 1	**W**	1.15 (U = 24 V)	0.15	< 0.7 (U = 24 V)
Isolation(test voltage)	Between output and ground	**V rms**	1500 - 50/60 Hz for 1 minute		
	Between outputs and internal logic	**V rms**	1500 - 50/60 Hz for 1 minute		
	Insulation resistance	**MΩ**	> 10 at ⎓ 500 V		

(1) Characteristics at 60 °C for 60 % I/O loading or at 30 °C for 100 % I/O loading.
(2) All outputs have fast demagnetisation circuits for electro-magnets. Discharge time of electro-magnets < L/R.

References:
pages 2/13 and 2/14

Connections:
pages 2/15 to 2/17

Characteristics of relay outputs (connection via screw terminal block) (1)

Type of modules				TSX DSZ 08R5	TSX DMZ 28DR	TSX DMZ 28AR		TSX DSZ 32R5			
Number of outputs				8	12	12		32			
Operating limit values		∼	V	19…264							
		⎓	V	10…34							
Type of contact				NO							
Thermal current			A	3 (5 A max. per common of each group of channels)				2 (7 A max. per common of each group of 16 channels			
a.c. load	Resistive AC-12	Voltage	V	**24**	**48**	**110**	**220**	**24**	**48**	**110…120**	**200…240**
		Power	VA	50 *(8)*	50 *(10)* 110 *(7)*	110 *(10)* 220 *(7)*	220 *(10)*	50 *(6)*	100 *(5)*	200 *(4)*	200 *(6)*
	Inductive AC - 14 and AC - 15	Voltage	V	**24**	**48**	**110**	**220**	**24**	**48**	**110…120**	**200…240**
		Power	VA	24 *(7)*	10 *(15)* 24 *(13)*	10 *(16)* 50 *(12)* 110 *(3)*	10 *(16)* 50 *(14)* 110 *(10)*, 220 *(2)*	24 *(2)*	50 *(2)*	10 *(9)* 50 *(3)*	10 *(11)* 50 *(5)*
d.c. load	Resistive DC-12	Voltage	V	**24**				**24**			
		Power	W	24 (1 x 10^6 cycles of operations) 40 (0.3 x 10^6 cycles of operations)				12 (0.5 x 10^6 cycles of operations) 24 (0.3 x 10^6 cycles of operations) 48 (0.15 x 10^6 cycles of operations)			
	Inductive DC - 13 (L/R = 60 ms)	Voltage	V	**24**				**24**			
		Power	W	10 (2 x 10^6 cycles of operations) 24 (1 x 10^6 cycles of operations)				6 (0.12 x 10^6 cycles of operations) 12 (0.06 x 10^6 cycles of operations) 24 (0.03 x 10^6 cycles of operations)			
Response time	Activation		ms	< 10							
	Desactivation		ms	< 10							
Built-in protection	Against short-circuits and overloads			None, obligatory mounting of a fast blow fuse per channels or groups of channels							
	Against inductive overvoltages in ∼			None, obligatory parallel mounting of a RC circuit or an MOV (ZNO) peak limiter appropriate to the voltage							
	Against inductive overvoltages in ⎓			None, obligatory mounting of a flywheel diode on the terminals of each preactuator							
Consumption				See page 6/4							
Type of modules				**TSX DSZ 08R5**	**TSX DMZ 28DR**	**TSX DMZ 28AR**		**TSX DSZ 32R5**			
Dissipated power per module			W	1.5	4.5	5.6		3.5			
Isolation (test voltage)	Between outputs and ground		V rms	2000 - 50/60 Hz for 1 minute							
	Between outputs and internal logic		V rms	2000 - 50/60 Hz for 1 minute							
	Insulation resistance		MΩ	> 10 at ⎓ 500 V							

(1) Characteristics at 60 °C for 60 % I/O loading or at 30 °C for 100 % I/O loading.
(2) For 0.1 x 10^6 operations.
(3) For 0.15 x 10^6 operations.
(4) For 0.2 x 10^6 operations.
(5) For 0.25 x 10^6 operations.
(6) For 0.3 x 10^6 operations.
(7) For 0.5 x 10^6 operations.
(8) For 0.7 x 10^6 operations.
(9) For 0.8 x 10^6 operations.
(10) For 1 x 10^6 operations.
(11) For 1.2 x 10^6 operations.
(12) For 1.5 x 10^6 operations.
(13) For 2 x 10^6 operations.
(14) For 3 x 10^6 operations.
(15) For 5 x 10^6 operations.
(16) For 10 x 10^6 operations.

References:
pages 2/13 and 2/14

Connections:
pages 2/15 to 2/17

Modicon TSX Micro automation platform
Discrete I/O modules

References

Discrete input modules

TSX DEZ 12D2

Nature of current	Input voltage	Modularity (no.of channels)	Format	Connection	Reference	Weight kg
⎓	24 V (positive logic IEC type 2)	12	Half	Via HE 10 type connector *(1)*	**TSX DEZ 12D2K**	0.160
		32	Standard	Via screw terminal block (supplied)	**TSX DEZ 32D2**	0.290
	24 V ((positive logic IEC type 1 or (negative logic)	12	Half	Via screw terminal block (supplied)	**TSX DEZ 12D2**	0.230
∿	100…120 V IEC type 2	8	Half	Via screw terminal block (supplied)	**TSX DEZ 08A4**	0.230
	200…240 V IEC type 1	8	Half	Via screw terminal block (supplied)	**TSX DEZ 08A5**	0.230

Discrete output modules

TSX DSZ 08T2K

Nature of current	Output voltage	Modularity (no.of channels)	Format	Connection	Reference	Weight kg
⎓ **solid state protected**	24 V/0.5 A protected	8	Half	Via HE 10 type connector *(1)*	**TSX DSZ 08T2K**	0.180
				Via screw terminal block (supplied)	**TSX DSZ 08T2**	0.240
		32	Standard	Via screw terminal block (supplied)	**TSX DSZ 32T2**	0.420
	24 V/2 A protected	4	Half	Via screw terminal block (supplied)	**TSX DSZ 04T22**	0.310
⎓/∿ **relay, not protected**	⎓ 24 V or ∿ 24…240 V	8	Half	Via screw terminal block (supplied)	**TSX DSZ 08R5**	0.260
		32	Standard	Via screw terminal block (supplied)	**TSX DSZ 32R5**	0.580

Discrete I/O modules

TSX DMZ 16DTK

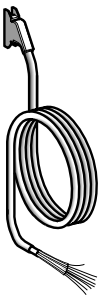
TSX DMZ 28DT *TSX DMZ 64DTK*

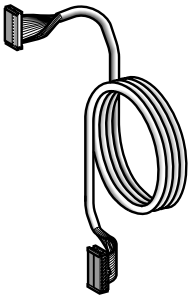
Nombre d'E/S	Number, type of inputs	Number, type of outputs	Format	Connection	Reference	Weight kg
16	8, ⎓ 24 V (positive logic IEC type 1)	8, solid state ⎓ 24 V/0.5 A protected	Half	Via HE 10 type connector *(1)* and enclosed terminal block	**TSX DMZ 16 DTK**	0.160
28	16, ⎓ 24 V (positive logic IEC type 1)	12, solid state ⎓ 24 V/0.5 A protected	Standard	Via HE 10 type connector *(1)*	**TSX DMZ 28DTK**	0.330
				Via screw terminal block (supplied)	**TSX DMZ 28DT**	0.465
	16, ⎓ 24 V (positive logic IEC type 1 or negative logic	12, relay 50 VA not protected	Standard	Via screw terminal block (supplied)	**TSX DMZ 28DR**	0.500
	16 ∿ 100…120 V IEC type 2	12, relay 50 VA not protected	Standard	Via screw terminal block (supplied)	**TSX DMZ 28AR**	0.500
64	32, ⎓ 24 V (positive logic IEC type 1)	32, solid state ⎓ 24 V/0.1 A protected	Standard	Via HE 10 type connector *(1)*	**TSX DMZ 64DTK**	0.410

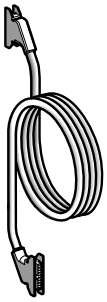
(1) Module supplied with HE 10 type connector cover.

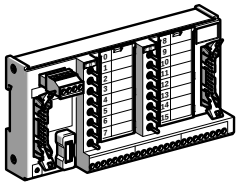
Characteristics: pages 2/9 to 2/12
Connections: pages 2/15 to 2/17

Modicon TSX Micro automation platform
Discrete I/O modules


TSX CDP ●●1


TSX CDP ●●2


TSX CDP ●●3


ABE 7TES160

TSX BLZ H01

TSX BLZ L01

References (continued)

Connecting cables for I/O modules fitted with HE 10 type connectors

Description	Constitution Use	Section	Length	Reference	Weight kg
20-wire preformed cable (500 mA max.)	1 HE 10 type connector, moulded 1 end free with wires identified	0.324 mm²	3 m	**TSX CDP 301**	0.405
			5 m	**TSX CDP 501**	0.720
			10 m	**TSX CDP 1001**	1.210
Preformed connection cables (100 mA max.)	2 HE 10 type connectors for Telefast 2 system	0.08 mm²	1 m	**TSX CDP 102**	0.090
			2 m	**TSX CDP 202**	0.170
			3 m	**TSX CDP 302**	0.250
Connecting cables (500 mA max.)	2 HE 10 type connectors, moulded, for Telefast 2, Tego Dial et Tego Power systems	0.324 mm²	0.5 m	**TSX CDP 053**	0.085
			1 m	**TSX CDP 103**	0.150
			2 m	**TSX CDP 203**	0.280
			3 m	**TSX CDP 303**	0.410
			5 m	**TSX CDP 503**	0.670
			10 m	**TSX CDP 1003**	1.230

Simulator sub-base for I/O modules fitted with HE 10 type connectors

Description	Use	Reference	Weight kg
Telefast 2 16-channel simulator sub-base for discrete inputs/outputs	Has 2 HE 10 type connectors which enable it to be inserted between the PLC I/O module and the ABE 7H/P/R/S Telefast 2 I/O sub-base. Used for display, forcing, inhibition or continuity of discrete I/O	**ABE 7TES160**	0.350

Replacement parts

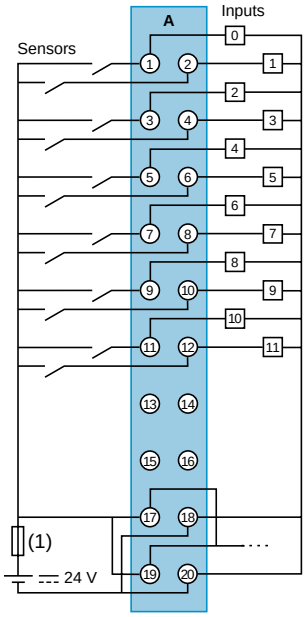
Description	Use	Reference	Weight kg
Screw terminal blocks (supplied with I/O modules with screw terminal block connection)	For half-format modules	**TSX BLZ H01**	0.055
	For standard format modules	**TSX BLZ L01**	0.115

Characteristics: pages 2/9 to 2/12
Connections: pages 2/15 to 2/17

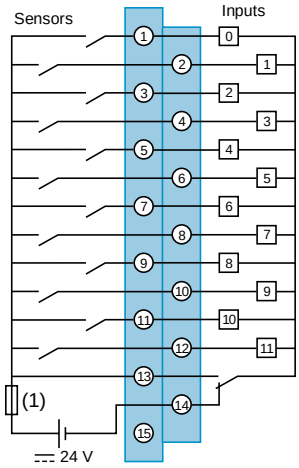
Modicon TSX Micro automation platform
Discrete I/O modules

Connections

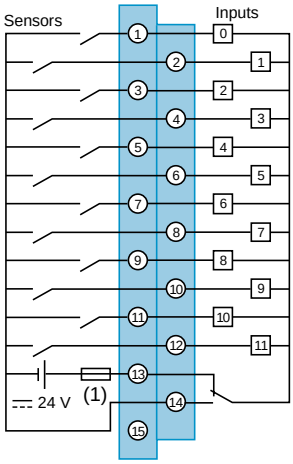
TSX DEZ 12D2K
Positive logic



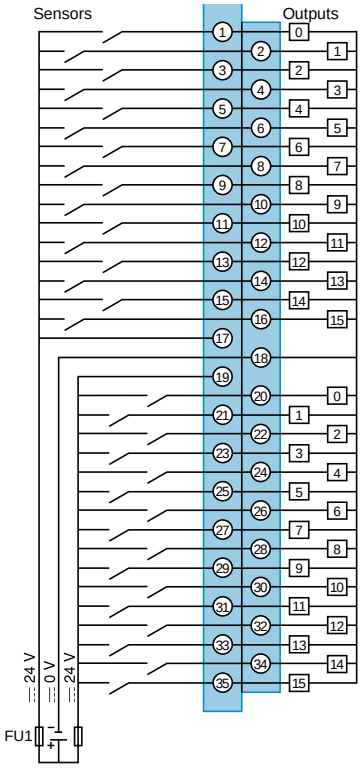
TSX DEZ 12D2
Positive logic



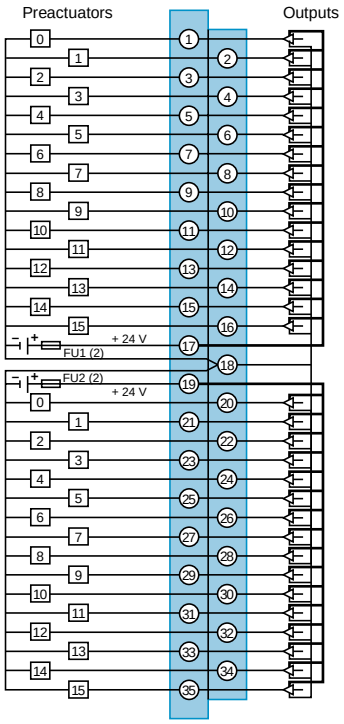
Negative logic



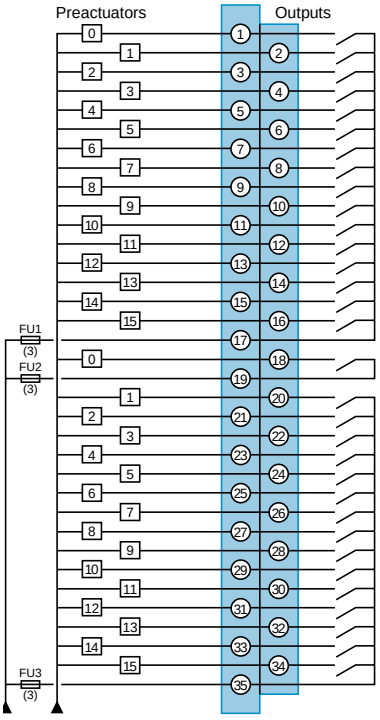
TSX DEZ 32D2



TSX DSZ 32T2



TSX DSZ 32R5



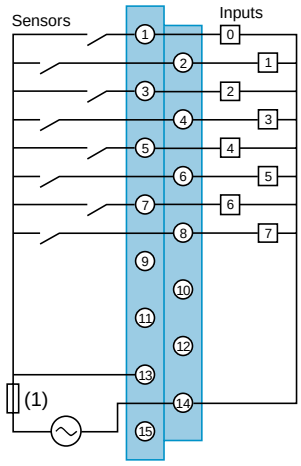
(1) 0.5 A fast blow fuse
(2) 10 A fast blow fuse
(3) Fast blow fuses, rated according to the load

Characteristics:
pages 2/9 to 2/12

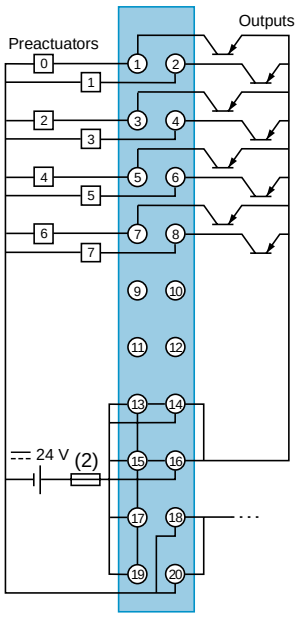
References:
pages 2/13 and 2/14

Modicon TSX Micro automation platform
Discrete I/O modules

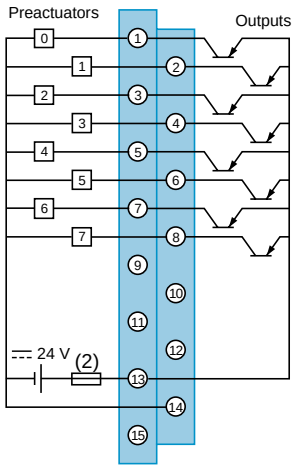
TSX DEZ 08A4/08A5



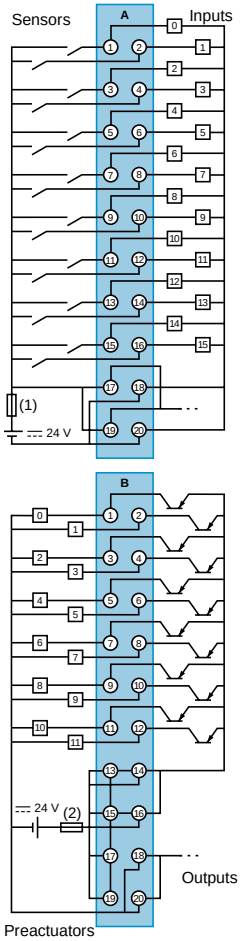
TSX DSZ 08T2K



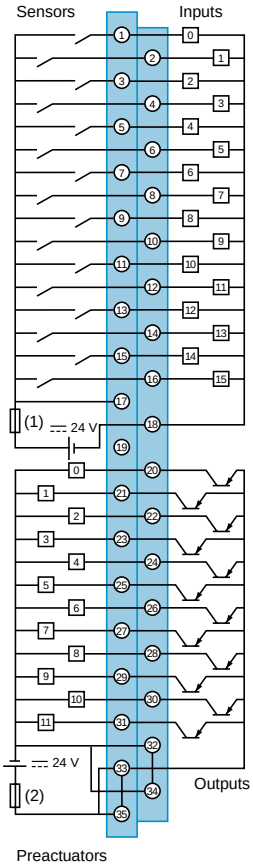
TSX DSZ 08T2



TSX DEZ 28DTK

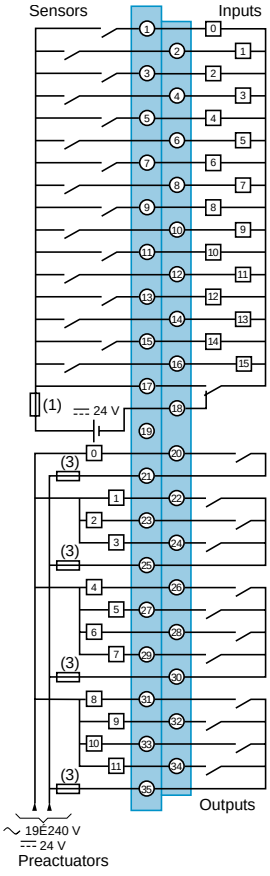


TSX DMZ 28DT



TSX DMZ 28DR

Positive logic (Sink)



Negative logic (Source):
+ 24 V = terminal 17
- 24 V = terminal 18 = common

(1) 0.5 A fast blow fuse

(2) 10 A fast blow fuse

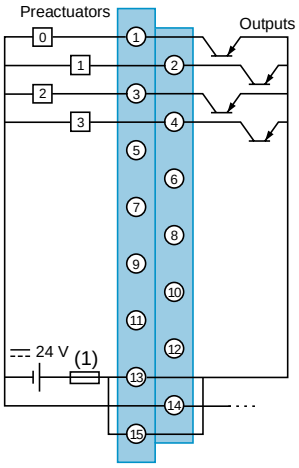
(3) Fast blow fuses, rated according to the load

Characteristics:
pages 2/9 to 2/12

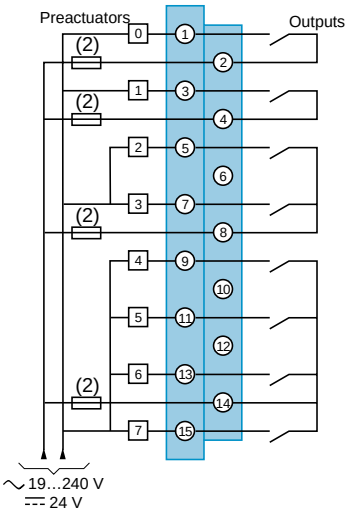
References:
pages 2/13 and 2/14

Connections (continued)

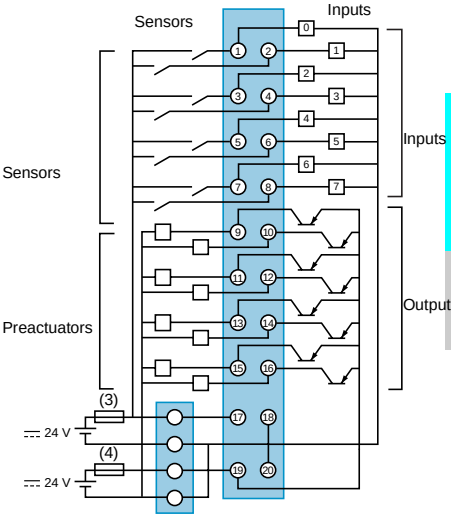
TSX DSZ 04T22



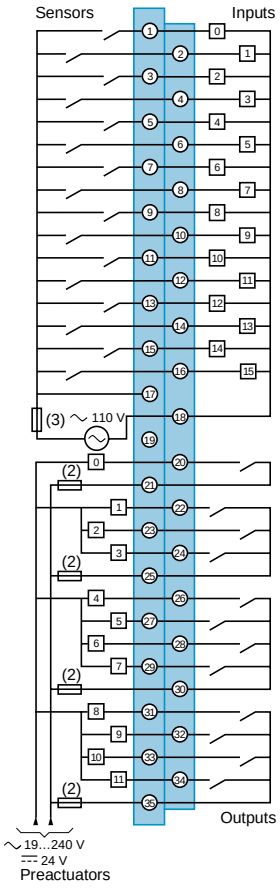
TSX DSZ 08R5



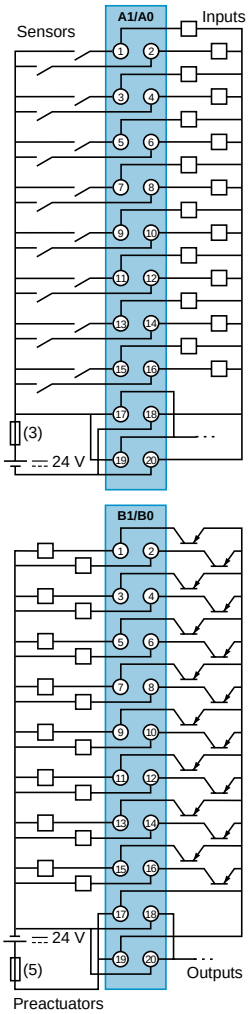
TSX DMZ 16DTK



TSX DMZ 28AR



TSX DMZ 64DTK



N° of channels

A1	A0
16	0
17	1
18	2
19	3
20	4
21	5
22	6
23	7
24	8
25	9
26	10
27	11
28	12
29	13
30	14
31	15

N° of channels

B1	B0
16	0
17	1
18	2
19	3
20	4
21	5
22	6
23	7
24	8
25	9
26	10
27	11
28	12
29	13
30	14
31	15

(1) 0.5 A fast blow fuse
(2) Fast blow fuses, rated according to the load
(3) 0.5 A fast blow fuse
(4) 6.3 A fast blow fuse
(5) 2 A fast blow fuse

20-wire preformed cable
TSX DEZ/DSZ/DMZ ●●●●K

Correspondence between HE 10 connector pin and colour of wire

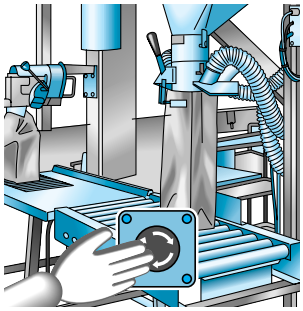
1	white	11	grey/pink
2	brown	12	red/blue
3	green	13	white/green
4	yellow	14	brown/green
5	grey	15	white/yellow
6	pink	16	yellow/brown
7	blue	17	white/grey
8	red	18	grey/brown
9	black	19	white/pink
10	purple	20	pink/brown

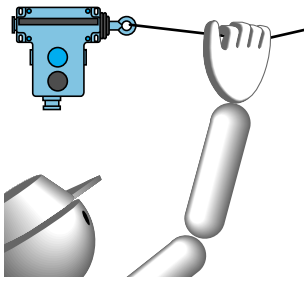
Characteristics: pages 2/9 to 2/12
References: pages 2/13 and 2/14

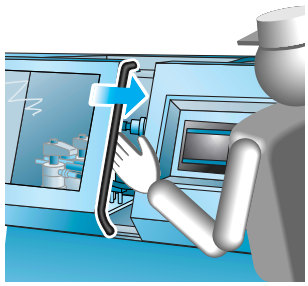
Modicon TSX Micro automation platform
Use of Preventa safety modules

Safety

Production workshops and technical building installations are subject to increasing requirements in terms of machine safety







A good machine is a safe machine, combining:
- Safety of personnel (machine is not dangerous).
- Availability of the production tool (machine operational at any time).
- Safety is achieved by:
  - simultaneously optimising safety and availability,
  - using basic principles: redundancy, self-monitoring, etc,
  - considering reliability (failure determining the behavior of the machine in a specified position, positive safety features),
  - ease of maintenance.

The machinery directive and the work equipment directive

The machinery directive

A machine manufacturer is required to conform to the machinery directive. The machinery directive (89/392/EEC, 91/36/EEC, 93/44/EEC and 93/68/EEC) is designed to ensure the free circulation of machinery and safety components in European Union countries and to improve the level of safety for personnel. Harmonised European standards establish technical specifications which comply with the minimum safety requirements defined in the corresponding directive.
Manufacturers must produce machinery which conforms to safety requirements.

The work equipment directive

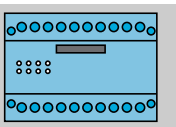
The user is required to ensure that his range of machines conforms to the use of work equipment by workers at work directive. Directive 89/655/EEC lays down the minimum objectives for protection in the working environment and in particular concerns the use of products. The directive specifies the general framework of preventative measures which should be taken in the workplace.

Safety and automated systems

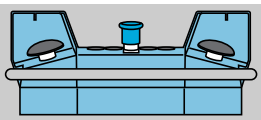
All dangerous areas must be identified and have restricted access, controlled in a secure manner, ie. any breakdown or careless operation must leave the automated system in a safe position.
It should be noted that the use of safety products does not necessarily mean that the machine conforms to the machinery directive.
It is the operation, wiring, compatibility and scheme used, which make the entire machine safe. It is more important to think in terms of safety solutions rather than safety products.

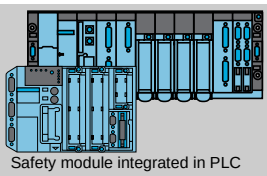
Groupe Schneider, safety specialists

Groupe Schneider, specialists in safety, has a range of several thousand products, all concerned directly or indirectly with safety. Some of these products are exclusively designed for safety.


Preventa safety module

"Mushroom head" emergency stop button

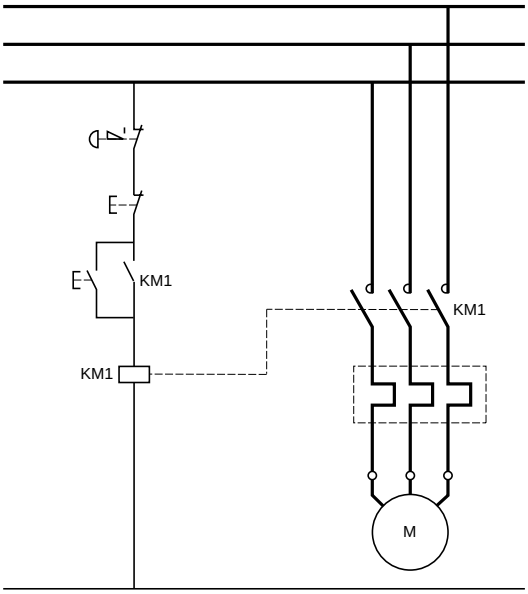

Two-handel control


Safety module integrated in PLC

For further details on components for safety applications, please consult our specialist catalogue.

Modicon TSX Micro automation platform
Use of Preventa safety modules

Non-controlled safety systems



The control signal from the protection device (emergency stop pushbutton illustrated to the left) acts directly on the power contactor of the machine.

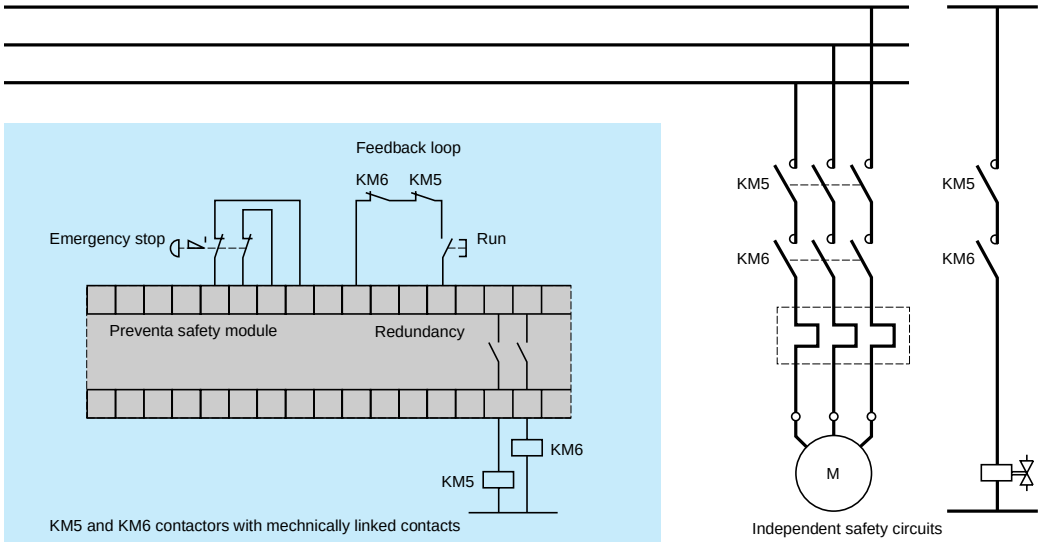
In this type of scheme, the risks of simple faults are:
- emergency stop button being shorted.
- KM1 contactor sticking.

When the operator presses an emergency stop button, the instruction is not processed, and another sequence can begin following the emergency stop, despite the presence of the fault.

In the case of failure, the safety function *(1)* **is compromised.** Therefore, a reliable intermediate relay system must be used.

(1) A safety function is a function whose non-execution or untimely execution results in the immediate placement of the equipment into a non-hazardous position.

Safety system controlled by a Preventa safety module



Preventa safety modules provide a **reliable** interposing relay function by eliminating the risks of:

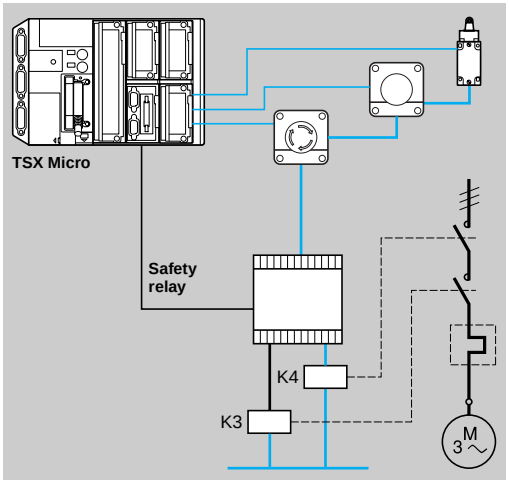
- A control circuit fault (inputs).
- A power circuit fault (outputs).
- A fault on an internal safety module component.

The safety function remains operative whenever any one of these faults occur.
For the use of mechanically linked contacts CA2-DN22/DN31, LC1-D09/D18/D25, LP1-D09/D18/D25 with contacts which can be used in the feedback loop, please consult your Regional Sales Office.

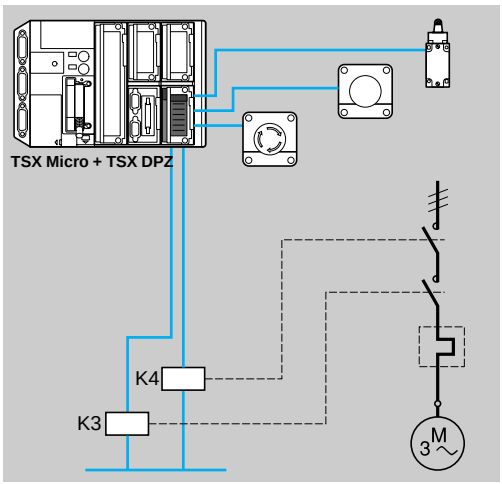
Modicon TSX Micro automation platform

Safety automation system solutions

Preventa safety module type TSX DPZ



Solution with safety relay and separate PLC



Simplification using the safety module integrated in the PLC

Presentation

The TSX DPZ 10D2A Emergency stop monitoring module integrated into the TSX Micro PLC combines:

- The ease of use of Preventa safety modules.
- PLC diagnostics performance.

It also maintains all the advantages of a standard PLC (extended choice of I/O, ease of installation, flexibility of hardware and software developments, etc).

The TSX DPZ 10D2A Emergency stop monitoring module combines a Preventa (XPS) hard-wired safety relay and a discrete acquisition function in a half-slot, for full diagnostics of input contacts and the state of safety circuit outputs.

The TSX DPZ 10D2A safety module is used to interrupt one or more Emergency or safety stop control circuits in complete safety, in accordance with EN 60204-1.

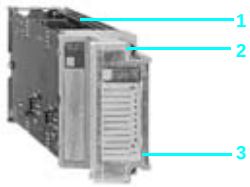
The proven safety of hard-wired technology and the capacity of the TSX Micro PLC make module TSX DPZ 10D2A the optimum solution for making machines more reliable, safer, more compact and more cost-effective.

Application developments requiring safety systems and PLC diagnostics

LModule TSX DPZ 10D2A is suitable for Emergency stop and limit switch monitoring applications, requiring a level of safety up to category 3 *(1)* according to EN 954-1 (safety related parts of control systems).

(1) For more information on control system safety categories, please consult our specialist catalogue "Preventa safety solutions".

Description



Emergency stop monitoring module TSX DPZ 10D2A comprises:

1 A metal casing with a locking system for fixing the module in its slot. This system is only accessible when the screw terminal block is removed.

2 A removable screw terminal block for connecting sensors and preactuators.

3 A cover giving access to the screw terminal block, which also holds the marker legend.

Characteristics: page 2/22
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Connections: page 2/23

Modicon TSX Micro automation platform

Safety automation system solutions

Preventa safety module type TSX DPZ

Safety module TSX DPZ 10D2A provides the following functions:

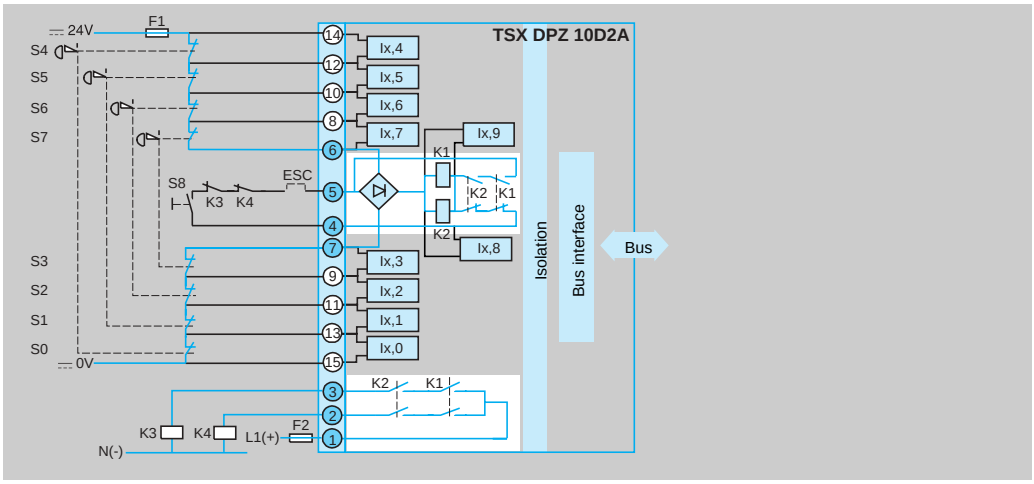
- Monitoring of 1 to 4 dual (or single), N/C (normally closed) contacts in pushbuttons, Emergency stops or limit switches on safety guards for an Emergency stop or immediate safety stop system (category 0 Emergency stop conforming to EN 418).
- Hard-wired safety module identical to Preventa safety module XPS:
  - 2 N/O safety output circuits,
  - category 3.
- Safety module independent of the TSX Micro PLC processor: **the PLC does not affect the safety module.**
- 10 LEDs on the TSX Micro PLC display panel: power supply failure and full diagnostics of the safety system.
- Electronic data acquisition units for full diagnostics of the safety system:
  - reading the state of the 8 pushbutton or limit switch inputs,
  - reading the enable input and the feedback loop,
  - reading the control signal of the 2 safety outputs,
  - monitoring the external power supply for the module.

This electronic data acquisition is designed so that the first failure will not adversely affect the safety function. If the safety system uses more sensors, it is possible to daisy-chain several TSX DPZ 10D2A modules.

Schematic diagram

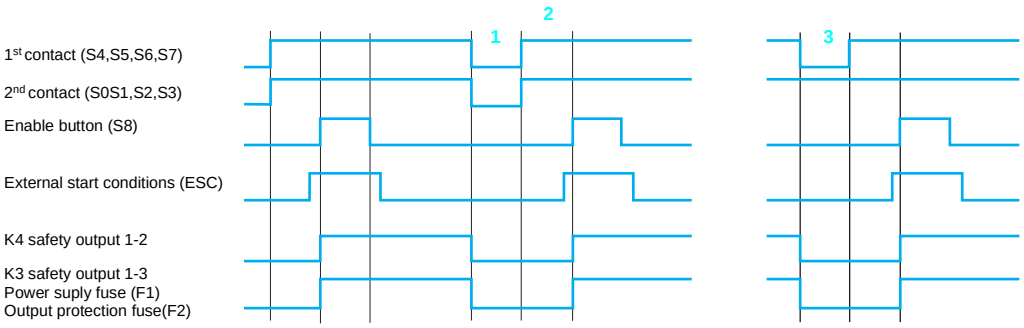
To ensure correct operation of the safety function whatever the first failure, the following must be used :

- At the inputs: Emergency stop pushbuttons or safety limit switches with dual contacts.
- At the outputs: if relaying is required, use relays with guided contacts.
- Module power supply: use an F1 protection fuse (see characteristics on page 2/22).



6-7	Control of the safety system.
1-2 et 1-3	Safety outputs, volt-free.
4-5	Feedback loop and run enable (ESC: additional enable conditions).
14-15	Monitoring of module ⎓ 24 V external power supply.
14-12, 12-10, 10-8, 8-6, 7-9, 9-11, 11-13, 13-15	8 read channels for the Emergency stop pushbutton or limit switch contacts

Functional diagram



1 Emergency stop or limit switch activated.
2 Emergency stop reset or limit switch closed.
3 Error on contact S0…S3.

Characteristics: page 2/22
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Modicon TSX Micro automation platform

Safety automation system solutions

Preventa safety module type TSX DPZ

Standards and certifications

Standards	Whole machine	Electrical equipment of industrial machines		EN 60204-1 ou IEC 204-1, EN 292
		Emergency stop device		EN 418
	Product	Safety of machinery: safety related parts of control systems		EN 954-1 category 3, pr EN 954-2, EN 1088 IEC 61508 (SIL 2)
	PLC	Specific requirements		IEC 1131-2 or EN 61131-2, CSA 22-2, UL 508
Certifications				BG, INERIS, INRS, UL, CSA

General characteristics

Power supply	Nominal voltage	**V**	⎓ 24
	Limit operating voltage	**V**	⎓ 21.6…30
	Error signalling	**V**	⎓ < 16
	Maximum consumption	**mA**	< 200
Protection via external F1 fuse	Conforming IEC 947-5-1	**A**	1 (gl)
Consumption on internal 5 V		**mA**	< 20
Isolation		**kV**	4 (overvoltage category III, degree of pollution 2)

Characteristics of discrete inputs

Nominal voltage		**V**	⎓ 24
Modularity	Emergency stop or limit switch discrete inputs		8
	Feedback loop discrete input		1
Logic			Positive
Inrush current		**A**	10/100 µs
Isolation between input and earth		**V rms**	1500 - 50/60 Hz for 1 minute
Power	Dissipated in the module	**W**	< 4.5

Characteristics of safety relay outputs

Modularity				2 volt-free outputs			
Limit operating voltage	a.c.		**V**	∿ 19…264			
	d.c.		**V**	⎓ 17…250			
Max. thermal current (I the)			**A**	1.25			
Minimum current			**mA**	10			
a.c. load	Inductive AC-15 duty	Voltage	**V**	**∿ 24**	**∿ 48**	**∿ 110**	**∿ 220**
		Power	**VA**	30	60	140	165
d.c. load	Inductive DC-13 duty (L/R = 100 ms)	Voltage	**V**	**⎓ 24**			
		Power	**VA**	30			
Response time			**ms**	< 100			
Type of contacts				AgNi gold flashed			
External output protection via F2 fuse	Conforming IEC 947-5-1		**A**	4 (gl)			
Isolation between input and earth	Insulation voltage conforming DIN VDE 0110 part 2		**V**	300			
	Test voltage		**V rms**	2000-50/60 Hz for 1 minute			

Environment

Temperatures	Operation	**°C**	- 10 °C…+ 60 °C
	Stockage	**°C**	- 25 °C…+ 60 °C
Degree of protection			IP 20 conforming IEC 529
Connecting cable c.s.a.	Without cable end	**mm²**	1 x 0.8 minimum
	With cable end	**mm²**	2 x 1 maximum

Reference

Inputs number	Voltage	Safety outputs	Connection Format	Reference	Weight kg
4 Emergency stops or limit switches (dual or single contacts) 1 Start button	⎓ 24 V	2 “N/O” (volt-free) 1.25 A (I the)	Via screw terminal block (suplied) Half-format	**TSX DPZ 10D2A**	0.280

TSX DPZ 10D2A

Connections:
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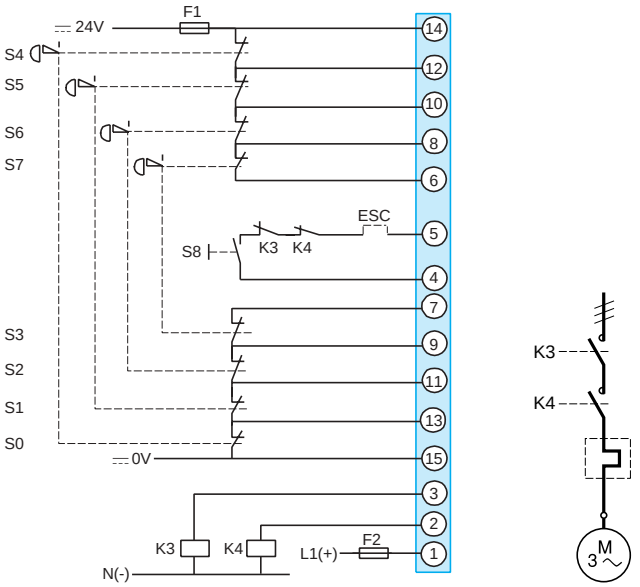
Modicon TSX Micro automation platform

Safety automation system solutions

Preventa safety module type TSX DPZ

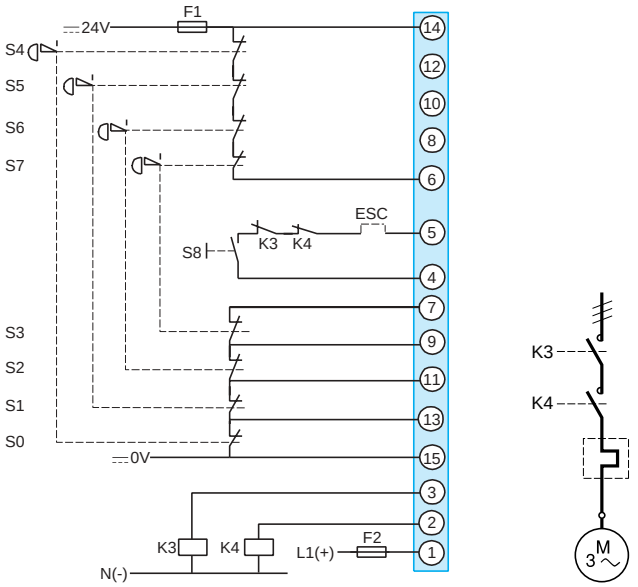
Category 3 wiring diagrams (redundant inputs and outputs): recommended applications

Connection of 4 sensors with dual contacts



The states of all the contacts in the input circuit are read by the PLC. The consistency test carried out by the PLC program on the input contacts enables it to signal and locate precisely the faulty contact(s).
When using less than 4 dual contacts, the input terminals not in use must be linked. For example, if contacts S0 and S4 are not in use, a bridge is required between terminals 14 and 12 and terminals 13 and 15.

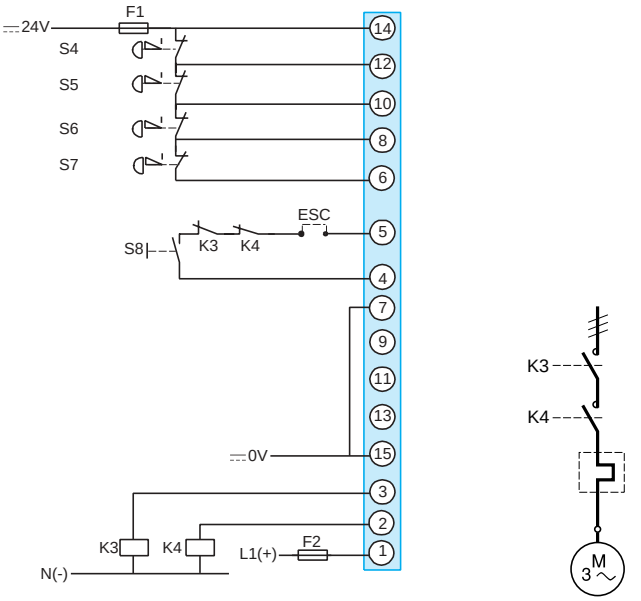
Connection of 4 sensors with dual contacts for existing installations



Suitable for use with existing wiring; with one contact on the safety module and one contact for diagnostics, this wiring enables global reading of the state of contacts S4 to S7 and individual reading of contacts S0 to S3.
The consistency test carried out by the PLC program on the inputs enables it to signal any inconsistency with partial location of the fault.

Wiring diagram with single contacts

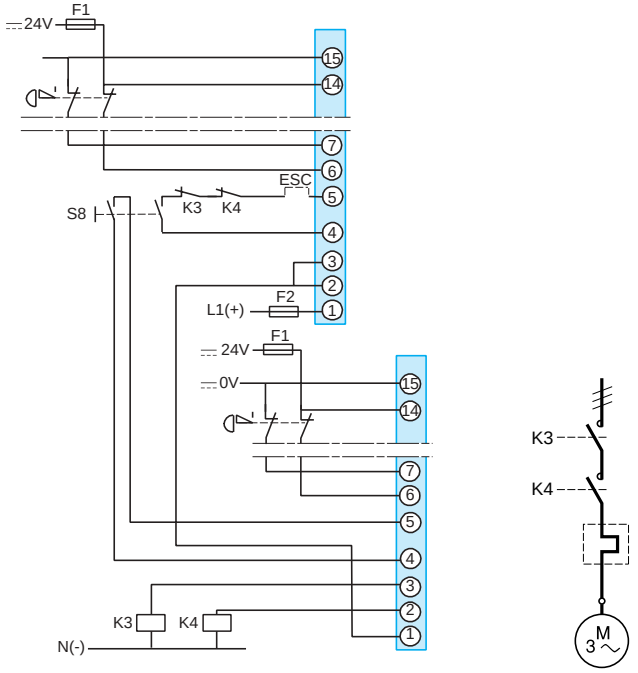
Connection of 4 sensors with dual contacts



Not all faults are detected. A short-circuit on a pushbutton or limit switch is not detected.
When using less than 4 single contacts, the input terminals not in use must be linked.
For example, if contact S5 is not in use, a bridge is required between terminals 10 and 12.

Connecting TSX DPZ 10D2A modules in series

Connection of 4 sensors with dual contacts for existing installations



The connection of safety relay outputs in series enables diagnostics for up to 32 single or dual contact pushbuttons or limit switches. The number of modules connected in series is limited by the number of slots available on the TSX Micro PLC.

Characteristics:
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References:
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Modicon TSX Micro automation platform
TSX STZ extension module for Nano PLCs

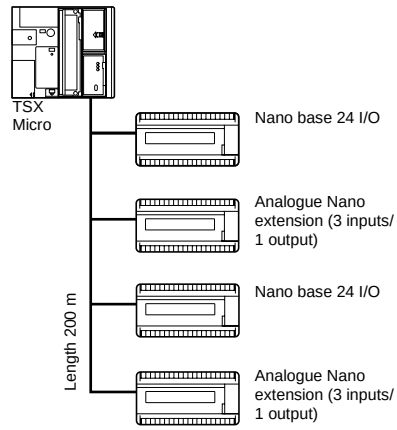
Presentation

The TSX STZ 10 I/O extension module is used to connect up to 4 Nano devices, which may be PLC bases, analogue I/O extensions or a discrete I/O extension. These remotely installed Nano bases or extensions (200 metres maximum from the TSX Micro PLC) can be used as :

- I/O of the Micro PLC. In this case the number of I/O managed by the TSX Micro PLC can be increased by 96 discrete I/O or 12 analogue I/O.
- Local “slave” PLCs *(1)* with data exchanges from application to application between Micro and each Nano base (the maximum number of Nano bases is limited to 3). In this application, an FTX 117 terminal or PL7 07 software is required for software installation on Nano “slave” PLCs.

It is possible to combine both types of configuration on one link.
The TSX STZ 10 half-format module is inserted in position 4 which means that its use excludes integration of the TSX SAZ 10 AS-Interface bus master module.

Remote discrete I/O configuration



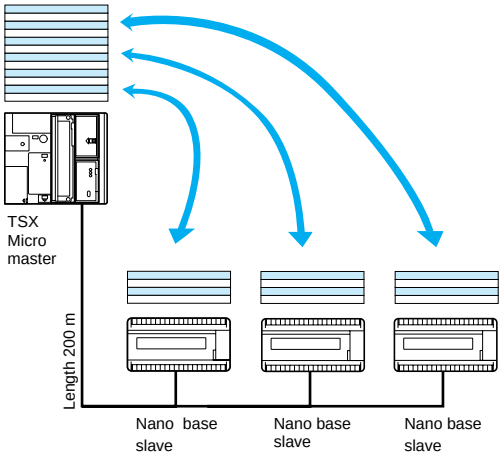
Remote discrete or analogue I/O configuration enables :

- A reduction in wiring costs in installations spread over a wide area.
- The I/O status display to be positioned close to the operative part.
- The application to be developed as required by adding I/O blocks.

It is not necessary to configure or program the Nano bases.
To simplify use of these architectures, the Nano I/O are considered, by the PL7 Micro/Junior/Pro programming software, to be objects integrated in the TSX Micro PLC.

Configuration:
One to four Nano PLC bases with 10, 16 or 24 I/O, i.e. a maximum of 96 discrete I/O.

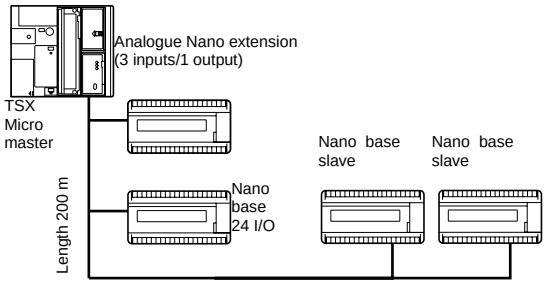
Local “slave” PLC configuration



Apart from the advantages already mentioned, this type of configuration enables each sub-assembly or process block to be handled independently, and only the data necessary for the synchronization and control of sub-assemblies to be handled at the highest level. This structure also ensures better availability in the event of sub-assembly failure or repair.

This configuration enables application data to be exchanged between a TSX Micro PLC and up to three Nano PLCs. This data, set at two read words and two write words per Nano, is exchanged transparently with the Micro master. Slave Nano PLCs are programmed and set up in PL7 language, using an FTX 117 dedicated terminal or PL7 07 software.

Mixed configuration



It is possible to combine both types of configuration on one link, in which case the maximum number of Nano PLCs is limited to 4.

(1) Cannot be used with Nano extensions.

References :
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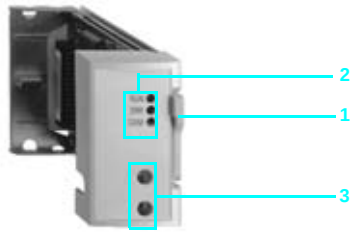
Modicon TSX Micro automation platform

TSX STZ extension module for Nano PLCs

Description



The front panel of the TSX STZ 10 I/O extension module for Nano PLCs comprises :

1 Locking system for fixing the module in its slot.

2 Three indicator lamps to display module operating status :
- RUN : correct operation of module,
- ERR : error in module,
- COM : display of link traffic .

3 Opening for cable routing.

Location: position 4 of TSX Micro PLC base.

Selection of Nano bases or extensions

Type	Power supply		Type of discrete input		Type of discrete output			1 analogue channel modules as extension		References
	~ 100/240 V	⎓ 24 V	⎓ 24 V	~ 115 V	⎓ 24 V transistors		Relay			
					Negative logic	Positive logic	⎓ 24 V ~ 24/240 V	Inputs	Outputs	
10 discrete I/O bases (6 inputs, 4 outputs) *(1)*	■		■				■	■		**TSX 07 30 1028**
	■		■		■			■	■	**TSX 07 30 1008**
		■	■		■			■	■	**TSX 07 30 1002**
		■	■				■	■		**TSX 07 30 1022**
		■	■			■		■	■	**TSX 07 30 1012**
16 discrete I/O bases (9 inputs, 7 outputs) *(1)*	■		■				■	■		**TSX 07 31 1628**
	■			■			■			**TSX 07 31 1648**
	■		■		■			■	■	**TSX 07 31 1608**
		■	■		■			■	■	**TSX 07 31 1602**
		■	■				■	■		**TSX 07 31 1622**
		■	■			■		■	■	**TSX 07 31 1612**
24 discrete I/O bases (14 inputs, 10 outputs) *(1)*	■		■				■	■		**TSX 07 31 2428**
	■		■		■			■	■	**TSX 07 31 2408**
		■	■		■			■	■	**TSX 07 31 2402**
		■	■				■	■		**TSX 07 31 2422**
		■	■			■		■	■	**TSX 07 31 2412**
Extensions 9 inputs/7 outputs *(2)*	■		■				■			**TSX 07 EX 1628**
		■	■			■				**TSX 07 EX 1612**
Extensions 14 inputs/10 outputs *(2)*	■		■				■			**TSX 07 EX 2428**
		■	■			■				**TSX 07 EX 2412**
Analogue extensions (3 inputs, 1 output) *(3)*	■									**TSX AMN 4000**
		■								**TSX AMN 4001**

■ Function performed

(1) Maximum 4 bases with remote discrete I/O configuration, maximum 3 bases with "slave" PLC configuration.
(2) Maximum 1 discrete extension..
(3) Maximum 3 analogue extensions.

Reference

I/O extension module for Nano PLCs

TSX STZ 10

The TSX STZ 10 half-format module can be inserted in position 4 which means that its use excludes integration of the TSX SAZ 10 AS-Interface bus module.

Description	Use	Format	Connections	Reference	Weight kg
Remote discrete I/O extension module	TSX 37 10 TSX 37 21/22 PLCs	Half	Via terminal block integrated in module	TSX STZ 10	0.180

Presentation : page 2/24

Modicon TSX Micro automation platform

Telefast® 2 pre-wired system

Discrete input and/or output sub-bases

Applications	Discrete input or output				
	817436	817437	817438		
Relay amplification	–				
Equipped with relay	–				
Control voltage	⎓ 24 V				
Output voltage	⎓ 24 V				
Output current per channel	0.5 A				
Modularity	16		8 -12 -16		
No. of terminals per channel	1	1 to 3	1	2	
Type of connection terminals	Signal	Signal, common (configurable ⎓ 24 V or 0 V)	Signal	Signal, Common (configurable ⎓ 24 V or 0 V)	
Connectors	20-way HE10 connector				
Terminal block					
removable	No		No		
type of terminals	Screw		Screw or spring		
Additional or optional* function	Low cost version fitted with cable	Miniature sub-bases	Compact size *	Type 2 input * *(1)*	Isolator *
Device type	**ABE-7H20E●●● 7H32E●●●**	**ABE-7H16C●●**	**ABE-7H●●R1● 7H●●R50**	**ABE-7H●●R2●**	**ABE-7H●●S21**
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(1) For TSX Micro and Premium PLCs.

Discrete input and output

817432

521500

–		Removable electromechanical or solid state	
–		No	Yes
⎓ 24 V			
⎓ 24 V		⎓ 24 V (solid state) ⎓ 5... 24 V, ∿ 230 V (electromechanical)	
0.5 A	0.5 A	5 A (E.M.), 2 A (solid state)	5 A (th)
16		16 8 passive inputs 8 relay outputs	
1	2	1	
Signal, 2 common connections between the inputs and the outputs.	Signal, common, 2 common connections between the inputs and the outputs.	1 N/O contact and common, 4 output channels 2 input connection points	
20-way HE10 connectors			
No			
Screw			
Miniature sub-base Synergy with Tego Power and API Micro PLC		Miniature sub-base - Common per 4 channels Synergy with Tego Power and API Micro PLC	
ABE-7H16CM11	**ABE-7H16CM21**	**ABE-7P16M111**	**ABE-7R16M111**
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Modicon TSX Micro automation platform

Telefast® 2 pre-wired system

Discrete input and output sub-bases

Applications	Discrete output					

Relay amplification	Electromechanical, fixed			Electromechanical or solid state		
Equipped with relay	Yes			Yes	No	No
Control voltage	⎓ 24 V					
Output voltage	⎓ 5 V... 30 V ∿ 230 V		⎓ 5 V... 150 V ∿ 230 V	⎓ 24 V (solid state) ⎓ 5 V... 24 V, ∿ 230 V (E.M.)		⎓ 5 V... 150 V ∿ 230 V
Output current per channel	2 A (th)	3 A (th)	5 A (th)	2 A (solid state), 6 A (electromechanical)		Depends on relay mounted 0.5 to 10 A
Modularity	8	8 - 16		16		8 or 16
No. of terminals per channel	2	1	2	1		2 to 3
Type of connection terminals	1 N/O contact and common Volt-free	1 N/O contact	1 N/O contact and common	1 N/O contact		Signal, Polarities
Connectors	20-way HE 10 connector					
Terminal block removable	Yes	Yes	Yes	No		No
type of terminals	Screw or spring			Screw		Screw or spring
Additional or optional* function	Miniature sub-base Bistable relay	Volt-free or common per 8 channels		Miniature sub-bases Common per 4 channels		Isolator and fuse
Device type	**ABE-7R08S216●**	**ABE-7R●●S1●●**	**ABE-7R●●S2●●**	**ABE-7R16T111**	**ABE-7P16T111**	**ABE-7P16T2●●● 7P08T3●●●**
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(1) For TSX Micro and Premium PLCs.

				Discrete input			
Electromechanical, removable		Solid state, fixed	–	–		Solid state, fixed	Solid state, removable
Yes		Yes	–	–		Yes	No
						From ⎓ 24 V to ∿ 230 V	From 5 V TTL to ∿ 230 V
⎓ 5 V... 150 V ∿ 230 V		⎓ 24 V					
5A (th)	8 A (th)	from 0.5 to 2 A	125 mA	0.5 A	125 mA	12 mA	
16							
2 to 3	2 to 6	2		3	2		
1 C/O contact or 1 N/O contact and common	1 C/O contact or 2 C/O contacts and common	Signal and 0 V		Signal ⎓ 24 V and 0 V	Signal can be isolated, Protected common	Signal	Signal and common
No		Yes	No	No		Yes	No
Screw		Screw or spring		Screw		Screw or spring	
Volt-free or common per: 8 channels	4 channels	Fault signal	Isolator and fuse (indicator)	3-wire proximity sensor	Isolator and fuse (indicator)	–	
ABE-7R16T2●●	**ABE-7R16T3●●**	**ABE-7S●●S2B●**	**ABE-7H16F43**	**ABE-7H16R3●**	**ABE-7H16S43**	**ABE-7S16E2●●**	**ABE-7P16F31●**
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Modicon TSX Micro automation platform

Telefast® 2 pre-wired system

Analogue sub-bases

Applications	Analogue signals and special functions			

Compatibility	TSX Micro	Premium	Standard	
Type of signal	Counter inputs and analogue I/O	Counter inputs Axis control Position control	Analogue inputs Current Voltage Pt 100	Analogue outputs Current Voltage
Functions	Passive connection, point-to-point with shield continuity			
Modularity	1 counter channel or 8 analogue inputs + 2 analogue outputs		8 channels	4 channels
Control voltage	⎓ 24 V			
Output voltage	⎓ 24 V			
Output current per channel	25 mA			
Number of terminals per channel	2		2 or 4	2 or 4
Type of connector	15-way SUB-D + 9-way SUB-D		25-way SUB-D	
Terminal block				
removable	No		No	
type of terminals	Screw		Screw	
Device type	**ABE-7CPA01**		**ABE-7CPA02**	**ABE-7CPA21**
Pages	2/42			

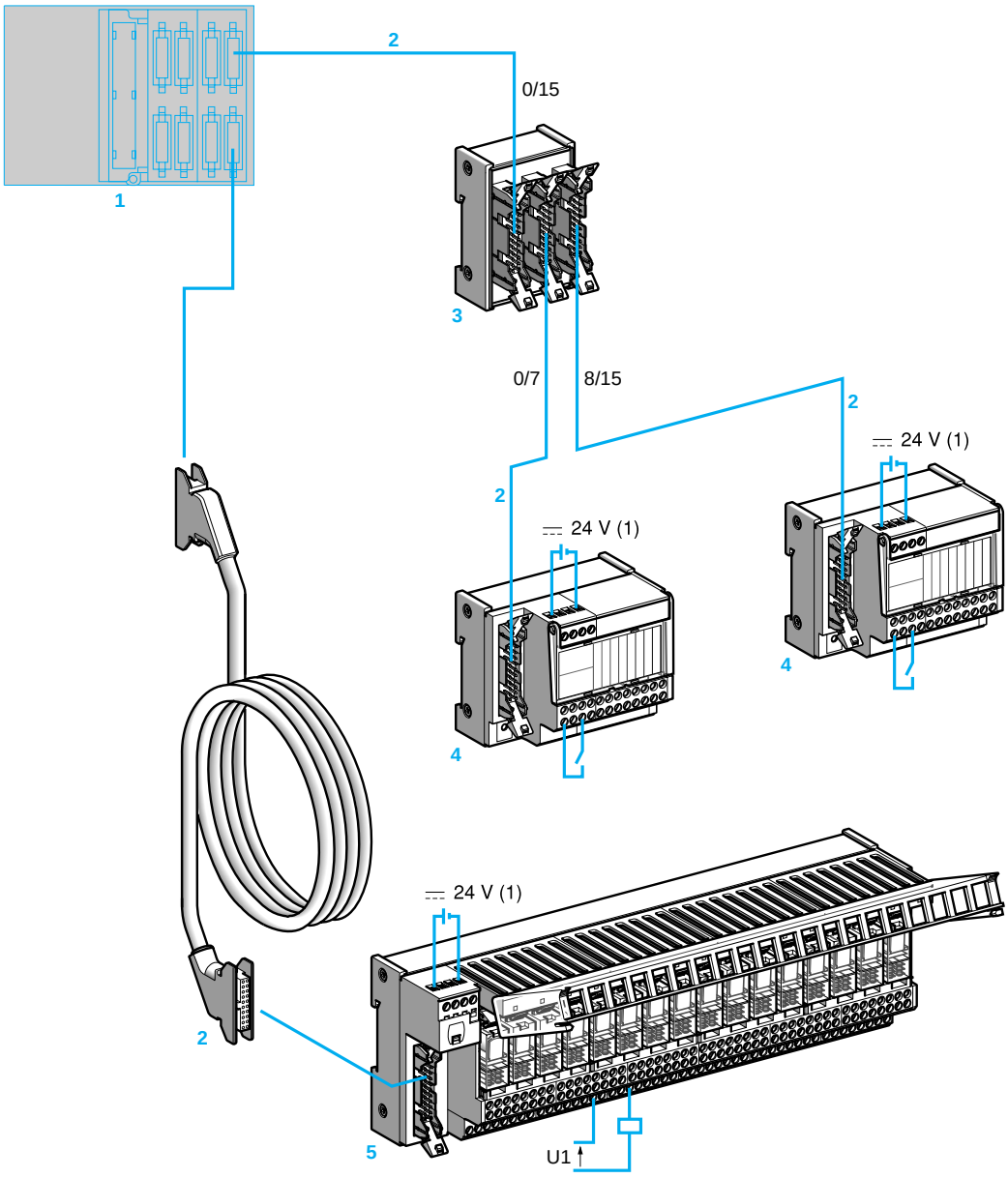
817435

817434

Premium TSX AEY810	Premium TSX CAY●1 TSX CTY2C	Premium TSX AEY1614	Premium TSX PAY2●2	
Analogue inputs Current Voltage Pt 100	Isolated analogue inputs	Inputs Counter	Inputs for thermocouples	I/O
Distribution of sensor power supplies per limiter (25 mA)	Distribution of isolated sensor power supplies per converter	Acquisition of value from an absolute encoder	Connection of 16 thermocouples with cold junction compensation	Safety module (BG)
8 channels	8 channels	1 channel	16 channels	12 Emergency stops
				–
		–	2 or 4	1
25-way SUB-D	25-way SUB-D	15-way SUB-D	25-way SUB-D	50-way SUB-D
No	No	No	No	No
Screw	Screw or spring	Screw	Screw	Screw
ABE-7CPA03	**ABE-7CPA31●**	**ABE-7CPA11**	**ABE-7CPA12**	**ABE-7CPA13**

Modicon TSX Micro automation platform

Telefast® 2 pre-wired system
Connection cables for Micro PLCs



1 I/O modules equipped with HE 10 connectors. Available in modules of 8, 12, 28 and 64 I/O.

2 A single type of cable equipped with 20-way HE 10 connectors irrespective of the 8, 12 or 16-channel modularity. The HE 10 connectors may be moulded (TSX CDP●●●) or self-perforating (ABF-H20H●●●).
These cables are available in 0.5, 1, 2, 3 and 5 metre lengths. They use AWG 28 (0.08 mm^2) for connection of inputs and relay sub-bases, and AWG 22 (0.324 mm^2) for direct connection of the 8 and 28 I/O module 0.5 A outputs.

3 16 channels may be split into 2 x 8 channels using splitter sub-base ABE-7ACC02.

4-5 8-channel and 16-channel sub-bases respectively.

(1) The ⎓ 24 V power supply is connected using Telefast 2 sub-bases only. The ⎓ 0 V connections must be equipotential.

Modicon TSX Micro automation platform

Telefast® 2 pre-wired system
Micro PLC I/O modules and interface sub-bases

I/O modules for TSX Micro PLCs

		⎓ 24 V discrete							Counter		Analogue and counter
		I/O					Inputs	Outputs	Auxiliary inputs	Counter	
		8 I + 8 Q	1 x 16 I	1 x 12 Q	2 x 16 I	2 x 16 Q	1 x 12 I	1 x 8 Q	–	–	–
Integrated in the PLCs	**TSX**	–	**37 10 128DTK1**		**37 10 164DTK1**		–	–	–	–	**37 22 001**
	TSX	–	–		–		–				**37 22 101**
With modules	**TSX**	**DMZ 16DTK**	**DMZ 28DTK**		**DMZ 64DTK**		**DEZ 12D2K**	**DSZ 08T2K**	**CTZ 1A**	**CTZ 1A**	–
	TSX	–	–		–		–	–	**CTZ 2A**	**CTZ 2A**	–

Connection sub-bases

8 chans.	**ABE-7H08R●●**		(1)		(1)	(1)			**ABE-7H08R10** (2)		
	ABE-7H08S21		(1)		(1)	(1)					
12 chans.	**ABE-7H12R●●**										
	ABE-7H012S21										
16 chans.	**ABE-7H16R●●/H16C●●/ H20E●●●**								**ABE-7H016R20** (3)		
	ABE-7H16S21										
	ABE-7H16R23										
	ABE-7H16F43										
	ABE-7H16S43										

Input adaptor sub-bases

16 chans.	**ABE-7S16E2●●**						(5)				
	ABE-7P16F3●●						(5)				

Input and output adaptor sub-bases

16 chans. 8 I + 8 Q	**ABE-7H16CM●1**										
	ABE-7●16M111										

Output adaptor sub-bases

8 chans.	**ABE-7S08S2●●**					(1)					
	ABE-7R08S●●●					(1)					
	ABE-7P08T330					(1)					
16 chans.	**ABE-7S16S●●●**										
	ABE-7R16S●●●			(4)							
	ABE-7R16T●●●			(4)							
	ABE-7P16T●●●			(4)							

Sub-bases for analogue/counter I/O

	ABE-7CPA01										
	ABE-7CPA11										
	ABE-7CPA02										
	ABE-7CPA03										

(1) Via splitter sub-base ABE-7ACC02, which allows 16 channels to be split into 2 x 8 channels.
(2) With module TSX CTZ 1A, to be used with sub-bases with no LED.
(3) With module TSX CTZ 2A, to be used with sub-bases with no LED.
(4) The last four channels are not used and remain at 1.
(5) The last four channels are not used.

Pre-wired cables

Modicon TSX Micro automation platform

Telefast® 2 pre-wired system
Connection sub-bases for analogue and counter channels

816477

ABE-7CPA02

Connection sub-base for counter and analogue channels

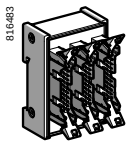
Functions	For PLCs	Compatible modules	Type of connection Telefast 2 side	Type of connection	Reference	Weight kg
Counting and analogue	Modicon TSX Micro	Integrated analogue and counter TSX 37.22 TSX CTZ●A	15-way SUB-D	Screw	**ABE-7CPA01**	0.300
Counting Axis control Position control	Modicon Premium	TSX CTY●A TSX CAY●1	15-way SUB-D	Screw	**ABE-7CPA01**	0.300
Parallel output absolute encoder connection	Modicon Premium	TSX CTY●A TSX CAY●1	15-way SUB-D	Screw	**ABE-7CPA11**	0.330
Distribution of 16 thermocouples	Modicon Premium	TSX AEY1614	25-way SUB-D	Screw	**ABE-7CPA12**	0.300
Passive distribution of 8 channels on screw terminal block with shielding continuity	TSX 47/107 Modicon Premium	TSX AEM8●1 TSX AEM16●● TSX ASY810 TSX AEY1600 TSX A●Y800	25-way SUB-D	Screw	**ABE-7CPA02**	0.290
Distribution of 4 analogue output channels	Modicon Premium	TSX ASY410 TSX AEY420	25-way SUB-D	Screw	**ABE-7CPA21**	0.210
Distribution and supply of 8 analogue channels with limitation of each current loop	TSX 47/107 Modicon Premium	TSX AEM8●1 TSX AEM16●● TSX AEY800 TSX AEY1600	25-way SUB-D	Screw	**ABE-7CPA03**	0.330
Distribution and supply of 8 analogue input channels isolated from each other with 25 mA/ channel limiter	Modicon Premium	TSX AEY810	25-way SUB-D	Screw	**ABE-7CPA31**	0.410
				Spring	**ABE-7CPA31E**	0.410
Safety	Modicon Premium	TSX PAY2●2	25-way SUB-D	Screw	**ABE-7CPA13**	0.290

Modicon TSX Micro automation platform

Telefast® 2 pre-wired system
Accessories for connection sub-bases

Software

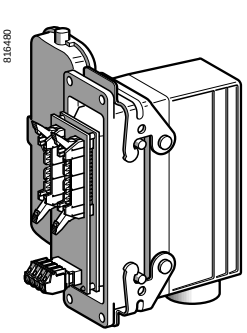
Description	Operating system	Reference	Weight kg
Software for client label marking	Under Windows version 3.1 or 95	**ABE-7LOGV10**	0.350
Pack of 25 pre-cut label sheets (160 labels)	–	**ABE-7LOGF25**	0.200



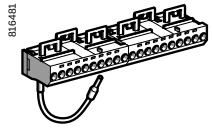
ABE-7ACC02

Accessories

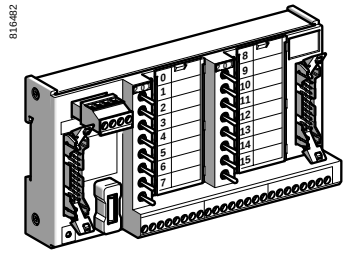
Description	No. of channels	Characteristics	Order in multiples of	Unit reference	Weight kg
Kit for fixing on solid plate	–	–	10	**ABE-7ACC01**	0.008
Splitter sub-base	–	16 as 2 x 8 channels	1	**ABE-7ACC02**	0.075
Redundant output sub-base	–	16 as 2 x 16 channels	1	**ABE-7ACC10**	0.075
Redundant input sub-base		16 as 2 x 16 channels	1	**ABE-7ACC11**	0.075
Removable continuity blocks	–	10 mm wide	4	**ABE-7ACC20**	0.007
	–	12 mm wide	4	**ABE-7ACC21**	0.010
Locating device for removable terminal block	–	–	100	**ABE-7ACC30**	0.100
Enclosure feedthrough with industrial connector	32	40-way	1	**ABE-7ACC80**	0.300
Plug-in 40-way male connector	32	For mounting on ABE-7ACC80	1	**ABE-7ACC81**	0.370
Enclosure feedthrough with CNOMO M23 connector	16	19-way	1	**ABE-7ACC82**	0.150
(1 x 20-way HE 10 connector, PLC end)	8 and 12	19-way	1	**ABE-7ACC83**	0.150
Impedance adaptor for Type 2 compatibility	–	Used with ABE-7ACC82 and ABE-7ACC83	1	**ABE-7ACC85**	0.012
IP 65 cable gland	–	For 3 cables	1	**ABE-7ACC84**	0.300
Additional snap-on terminal blocks (shunted terminals)	8	10 screw terminals	5	**ABE-7BV10**	0.030
		10 spring terminals	5	**ABE-7BV10E**	0.030
	16	20 screw terminals	5	**ABE-7BV20**	0.060
		20 spring terminals	5	**ABE-7BV20E**	0.060
I/O simulator sub-base	16	Display, forcing inhibition, continuity	1	**ABE-7TES160**	0.350
Adhesive label holder	–	For 6 characters	50	**AR1-SB3**	0.001
Fast blow fuses 5 x 20, 250 V, UL	–	0.125 A	10	**ABE-7FU012**	0.010
		0.5 A	10	**ABE-7FU050**	0.010
		1 A	10	**ABE-7FU100**	0.010
		2 A	10	**ABE-7FU200**	0.010
		4 A	10	**ABE-7FU400**	0.010
		6.3 A	10	**ABE-7FU630**	0.010



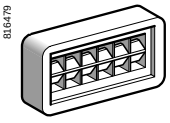
ABE-7ACC80 + ABE-7ACC81



ABE-7BV20



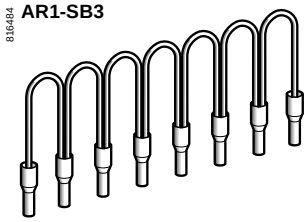
ABE-7TES160



AR1-SB3

"Flexible commoning links" accessories

Description	For common	Colour	Distance between cable ends	Reference	Weight kg
			cm		
Flexible commoning links Modularity 8 x 1 mm²	Coil	White	12	**ABF-C08R12W**	0.020
			2	**ABF-C08R02W**	0.010
	~	Red	12	**ABF-C08R12R**	0.020
			2	**ABF-C08R02R**	0.010
	⎓	Blue	12	**ABF-C08R12B**	0.020
			2	**ABF-C08R02B**	0.010



ABF-C08R●●●

Modicon TSX Micro automation platform

Telefast® 2 pre-wired system
Passive connection sub-bases

816460

816461

ABE-7H20E●●●

Passive connection sub-bases for discrete signals

"Low cost" sub-bases

Function	No. of channels	No. of terminals per channel	No. of terminals on row number	For PLCs	Length of PLC connection cable	Type of connection	Reference	Weight
					m			kg
Input or Output	16	1	2	Modicon TSX Micro/Premium	1	Screw	**ABE-7H20E100**	0.330
					2	Screw	**ABE-7H20E200**	0.410
					3	Screw	**ABE-7H20E300**	0.480
				Siemens S7	1.5	Screw	**ABE-7H32E150**	0.360
					3	Screw	**ABE-7H32E300**	0.460

"Miniature" sub-bases

Function	No. of channels	No. of terminals per channel	No. of terminals on row number	LED per channel	Polarity distribution	Type of connection	Reference	Weight
								kg
Input or Output	16	1	1	No	No	Screw	**ABE-7H16C10**	0.160
				Yes	No	Screw	**ABE-7H16C11**	0.160
		2	2	Yes	0 or 24 V	Screw	**ABE-7H16C21**	0.205
		3	3	Yes	0 and 24 V	Screw	**ABE-7H16C31**	0.260
Input and Output (1)	16	1	1	Yes	No	Screw	**ABE-7H16CM11**	0.160
		2	2	Yes	0 or 24 V	Screw	**ABE-7H16CM21**	0.200

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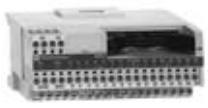
ABE-7H16C21

816463



ABE-7H16CM21

(1) 8 I + 8 Q : these products have 2 commons connections which enable inputs and outputs to be connected to the same sub-base at the same time.

Modicon TSX Micro automation platform

Telefast® 2 pre-wired system
Passive connection sub-bases

816464

ABE-7H16R50

Passive connection sub-bases for discrete signals (continued)

Function	No. of channels	No. of terminals per channel	No. of terminals on row number	LED per channel	Polarity distribution	Isolator (I) Fuse (F) per channel	Type of connection	Reference	Weight kg
Input or Output	8	1	1	No	No	–	Screw	**ABE-7H08R10**	0.187
				Yes	No	–	Screw	**ABE-7H08R11**	0.187
		2	2	Yes	0 or 24 V	–	Screw	**ABE-7H08R21**	0.218
						I	Screw	**ABE-7H08S21**	0.245
	12	1	1	No	No	–	Screw	**ABE-7H12R10**	0.274
				Yes	No	–	Screw	**ABE-7H12R11**	0.274
			2	No	No	–	Screw	**ABE-7H12R50**	0.196
		2	2	No	0 or 24 V	–	Screw	**ABE-7H12R20**	0.300
				Yes	0 or 24 V	–	Screw	**ABE-7H12R21**	0.300
						I	Screw	**ABE-7H12S21**	0.375
	16	1	1	No	No	–	Screw	**ABE-7H16R10**	0.274
				Yes	No	–	Screw	**ABE-7H16R11**	0.274
							Spring	**ABE-7H16R11E**	0.274
			2	No	No	–	Screw	**ABE-7H16R50**	0.196
							Spring	**ABE-7H16R50E**	0.196
		2	2	No	0 or 24 V	–	Screw	**ABE-7H16R20**	0.300
				Yes	0 or 24 V	–	Screw	**ABE-7H16R21**	0.300
							Spring	**ABE-7H16R21E**	0.300
						I	Screw	**ABE-7H16S21**	0.375
							Spring	**ABE-7H16S21E**	0.375
		3	3	No	0 and 24 V	–	Screw	**ABE-7H16R30**	0.346
				Yes	0 and 24 V	–	Screw	**ABE-7H16R31**	0.346
Type 2 input (1)	16	2	2	Yes	0 and 24 V	–	Screw	**ABE-7H16R23**	0.320
Input	16	2	1	Yes	24 V	I, F (2)	Screw	**ABE-7H16S43**	0.640
Output	16	2	1	Yes	0 V	I, F (2)	Screw	**ABE-7H16F43**	0.640

816465

ABE-7H16R31

816466

ABE-7H16●43

(1) For Modicon TSX Micro, Premium and Numerical Controller NUM 1020/1060.
(2) With LED to indicate blown fuse.

Modicon TSX Micro automation platform

Telefast® 2 pre-wired system
Connection sub-bases with soldered relays and plug-in terminal blocks

816467

ABE-7S16E2●●

Sub-bases with soldered solid state inputs, plug-in terminal blocks

Number of channels	No. of terminals per channel	Isolation PLC/application	Voltage V	Type of connection	Reference	Weight kg
16	2	Yes	⎓ 24	Screw	**ABE-7S16E2B1**	0.370
				Spring	**ABE-7S16E2B1E**	0.370
			⎓ 48	Screw	**ABE-7S16E2E1**	0.370
				Spring	**ABE-7S16E2E1E**	0.370
			∿ 48	Screw	**ABE-7S16E2E0**	0.386
				Spring	**ABE-7S16E2E0E**	0.386
			∿ 110	Screw	**ABE-7S16E2F0**	0.397
				Spring	**ABE-7S16E2F0E**	0.397
			∿ 230	Screw	**ABE-7S16E2M0**	0.407
				Spring	**ABE-7S16E2M0E**	0.407

Sub-bases with soldered solid state outputs, plug-in terminal blocks

No. of channels	Isolation PLC/ application	Output voltage V	Output current A	Fault detection signal (1)	Type of connection	Reference	Weight kg
8	No	⎓ 24	0.5	Yes (2)	Screw	**ABE-7S08S2B0**	0.252
					Spring	**ABE-7S08S2B0E**	0.252
			2	Yes (2)	Screw	**ABE-7S08S2B1**	0.448
					Spring	**ABE-7S08S2B1E**	0.448
16	No	⎓ 24	0.5	Yes (2)	Screw	**ABE-7S16S2B0**	0.405
					Spring	**ABE-7S16S2B0E**	0.405
				No	Screw	**ABE-7S16S1B2**	0.400
					Spring	**ABE-7S16S1B2E**	0.400

Sub-bases with soldered electromechanical relays, plug-in terminal blocks

No. of channels	Relay width mm	No. of contacts	Output current A	Polarity distribution/ application	Type of connection	Reference	Weight kg
8	5	1 "N/O"	2	Contact common per group of 4 channels	Screw	**ABE-7R08S111**	0.244
					Spring	**ABE-7R08S111E**	0.244
		Bistable	2	Volt-free	Screw	**ABE-7R08S216**	0.250
					Spring	**ABE-7R08S216E**	0.250
	10	1 "N/O"	5	Volt-free	Screw	**ABE-7R08S210**	0.352
					Spring	**ABE-7R08S210E**	0.352
16	5	1 "N/O"	2	Contact common per group of 8 channels	Screw	**ABE-7R16S11**	0.352
					Spring	**ABE-7R16S111E**	0.352
	10	1 "N/O"	5	Volt-free	Screw	**ABE-7R16S210**	0.547
					Spring	**ABE-7R16S210E**	0.547
				Common per group of 8 chan. on both poles	Screw	**ABE-7R16S212**	0.547
					Spring	**ABE-7R16S212E**	0.547

(1) A fault on a sub-base output Qn will set PLC output Qn to safety mode which will be detected by the PLC.
(2) Can only be used with modules with protected outputs.

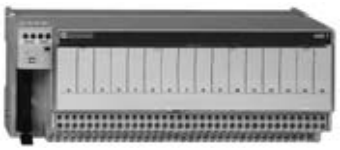
816468

ABE-7R08S216

Modicon TSX Micro automation platform

Telefast® 2 pre-wired system
Plug-in relay sub-bases

816469



ABE-7R16T210

Sub-bases for plug-in solid state input relays (1)

No. of channels	Terminals/ channel	For relay type	Isolation PLC/ application	Input connection	Type of connection	Reference	Weight kg
16	2	ABS-7E ABR-7 ABS-7S33E	Yes	Volt-free	Screw	**ABE-7P16F310**	0.850
					Spring	**ABE-7P16F310E**	0.850
				Polarity distribution	Screw	**ABE-7P16F312**	0.850

816471

ABE-7R16M111

Output sub-bases, equipped with plug-in electromechanical relays (2)

No. of channels	Relay width **mm**	Type of relay	No. and type of contacts	Polarity distribution/ application	Reference	Weight kg
16	5	ABR-7S11	1 N/O	Contact common per group of 4 channels	**ABE-7R16T111**	0.600
				Contact common per group of 4 output channels + 2 input common terminals	**ABE-7R16M111** (3)	0.600
	10	ABR-7S21	1 N/O	Volt-free	**ABE-7R16T210**	0.735
				Common on both poles (4)	**ABE-7R16T212**	0.730
		ABR-7S23	1 C/O	Contact common (4)	**ABE-7R16T231**	0.730
				Volt-free	**ABE-7R16T230**	0.775
	12	ABR-7S33	1 C/O	Volt-free	**ABE-7R16T330**	1.300
				Common on both poles (5)	**ABE-7R16T332**	1.200
		ABR-7S37	2 C/O	Volt-free	**ABE-7R16T370**	1.300

(1) Not equipped with relays.
(2) Both technologies (electromechanical and solid state) may be combined on the same sub-base.
(3) 2 connection methods are available, enabling inputs and outputs to be connected to the same sub-base at the same time.
(4) Per group of 8 channels.
(5) Per group of 4 channels.

Modicon TSX Micro automation platform

Telefast® 2 pre-wired system
Plug-in relay sub-bases

ABE-7P16T2●●

Sub-bases for solid state and/or electromechanical output relays, plug-in (1)

No. of channels	Relay width	For relay type	Isolator per channel	Fuse per channel	Polarity distribution/ application	Type of connection	Reference	Weight
	mm							kg
16	5	ABR-7S11 ABS-7SC1B	No	No	Contact common per group of 4 channels		**ABE-7P16T111**	0.550
					Contact common per group of 4 output channels and 2 common input terminals		**ABE-7P16M111** (2)	0.550
	10	ABR-7S2● ABS-7SA2● ABS-7SC2● ABE-7ACC20	No	No	Volt-free	Screw	**ABE-7P16T210** (3)	0.615
							ABE-7P16T230 (3)	0.655
						Spring	**ABE-7P16T230E** (3)	0.655
				Yes	Volt-free	Screw	**ABE-7P16T214**	0.675
				No	Common on both poles (4)	Screw	**ABE-7P16T212**	0.615
				Yes	Common on both poles (4)	Screw	**ABE-7P16T215**	0.670
8	12	ABR-7S33 ABS-7SA3● ABS-7SC3●● ABE-7ACC21	No	No	Volt-free	Screw	**ABE-7P08T330**	0.450
						Spring	**ABE-7P08T330E**	0.450
16	12	ABR-7S33 ABS-7SA3● ABS-7SC3●● ABE-7ACC21	No	No	Volt-free	Screw	**ABE-7P16T330**	0.900
						Spring	**ABE-7P16T330E**	0.900
					Common on both poles (5)	Screw	**ABE-7P16T332**	0.900
		ABR-7S33 ABS-7SA3M ABS-7SC3E ABE-7ACC21	No	Yes	Volt-free	Screw	**ABE-7P16T334**	0.900
			Yes	Yes	Common on both poles (5)	Screw	**ABE-7P16T318**	1.000
						Spring	**ABE-7P16T318E**	1.000

(1) Not equipped with relays
(2) 2 connection methods are available, enabling inputs and outputs to be connected to the same sub-base at the same time.
(3) With relay ABR-7S21 for sub-base ABE-7P16T210, with relay ABR-7S23 for sub-base ABE-7P16T230●.
(4) Per group of 8 channels.
(5) Per group of 4 channels.

Modicon TSX Micro automation platform

Telefast® 2 pre-wired system
Plug-in relays

816475

ABS-7SC1B

Plug-in solid state relays (Order in multiples of 4)

Relay width	Functions	Input circuit Current	Input circuit Nominal voltage	Output circuit Current (1)	Output circuit Nominal voltage	Unit reference	Weight
mm			**V**	**A**	**V**		kg
5	Output	⎓	24	2	⎓ 24	**ABS-7SC1B**	0.010
10	Output	⎓	24	0.5	⎓ 5…48	**ABS-7SC2E**	0.016
					∿ 24…240	**ABS-7SA2M**	0.016
12	Input	⎓	5 TTL		⎓ 24	**ABS-7EC3AL**	0.014
			24 Type 2	–	⎓ 24	**ABS-7EC3B2**	0.014
			48 Type 2	–	⎓ 24	**ABS-7EC3E2**	0.014
		∿ 50 Hz	48	–	⎓ 24	**ABS-7EA3E5**	0.014
		∿ 60 Hz	110…130	–	⎓ 24	**ABS-7EA3F5**	0.014
		∿ 50 Hz	230…240	–	⎓ 24	**ABS-7EA3M5**	0.014
	Output	⎓	24	2 Self-protected	⎓ 24	**ABS-7SC3BA**	0.016
				1.5	⎓ 5…48	**ABS-7SC3E**	0.016
				1.5	∿ 24…240	**ABS-7SA3MA**	0.016

816476

ABR-7S2●

Plug-in electromechanical relays

Relay width	Control voltage	Output current (1)	No. of contacts	Order in multiples of	Unit reference	Weight
mm	**V**	**A (Ith)**				kg
5	⎓ **24**	5	1 N/O	4	**ABR-7S11**	0.005
10	⎓ **24**	5	1 N/O	4	**ABR-7S21**	0.008
			1 C/O	4	**ABR-7S23**	0.008
12	⎓ **24**	10	1 C/O	4	**ABR-7S33**	0.017
		8	2 C/O	4	**ABR-7S37**	0.017
	⎓ **48**	8	1 C/O	4	**ABR-7S33E**	0.017

816474

ABR-7S3●

Accessory

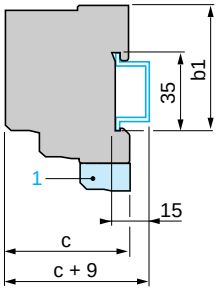
Description	Reference	Weight kg
Extractor for 5 mm miniature relays	**ABE-7ACC12**	0.010

(1) See characterics table for specifications of relays in the sub-bases

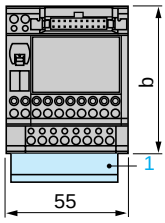
Modicon TSX Micro automation platform

Telefast® 2 pre-wired system

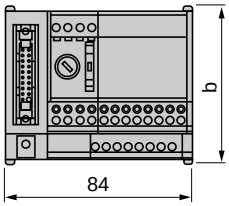
Common side view



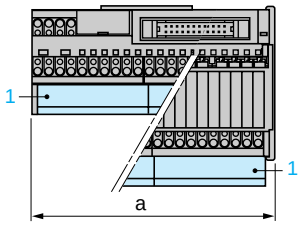
ABE-7H20E●●●
ABE-7H32E●●●



ABE-7H16R50, **ABE-7H12R50**, **ABE-7H08R1●**, **ABE-7H08R21**, **ABE-7R08S111/S111E**, **ABE-7H08S21**, **ABE-7CPA21**



ABE-7H16C●●/ABE-7H16CM●●, **ABE-7●16M111/ABE-7●16T111**

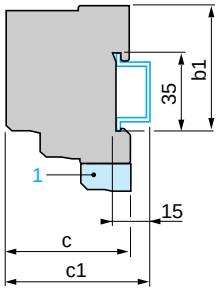


ABE-	7H20E/7H32E●●●	7H●●●●●/CPA21	7R08S111●
b	67	70	77
b1	56	58	58
c	59	58	58

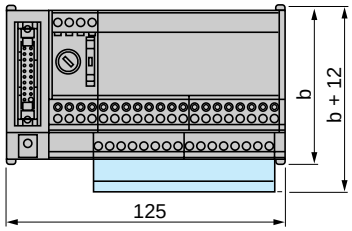
ABE-	7H16C●●/CM●●	7●16M111/T111
a	106	110
b	49	89
b1	41,5	58
c	60	54

1 Additional shunt terminal block ABE-7BV10/7BV20

Common side view

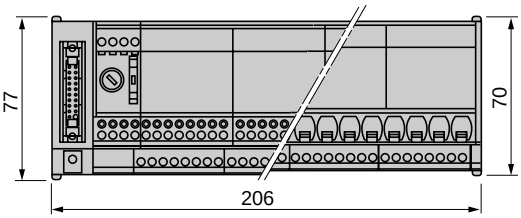


ABE-7H16R2●, **ABE-7H12R2●**, **ABE-7H16R3●**, **ABE-7H16R1●**, **ABE-7H12R1●**, **ABE-7H12S21**, **ABE-7H16S2●**, **ABE-7R16S11●**, **ABE-7R08S210**, **ABE-7S08S2B0**, **ABE-7CPA02**, **ABE-7CPA03** **ABE7S16S1B2**, **ABE-7R08S216**



ABE-7R16S21●, **ABE-7S16S2B0/S2B02E**, **ABE-7S16E2●●/S16E2●●E**, **ABE-7S08S2B1/S08S2B1E** **ABE-7CPA31**

ABE-7H16●43

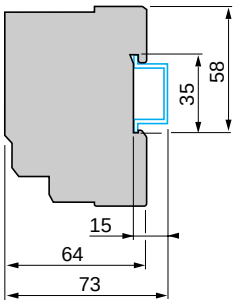


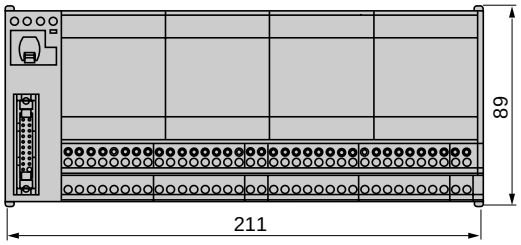
ABE-	7●●●●●●	7●R08S210●, 7S16S1B2●, 7R08S216
b	70	77
b1	58	58
c	58	58

All sub-bases	
b1	58
c	58

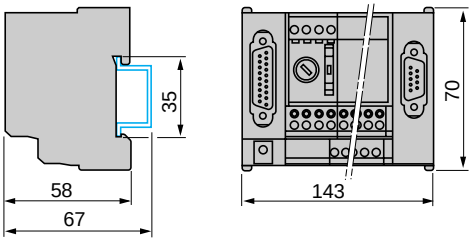
1 Additional shunt terminal block ABE-7BV10/7BV20

ABE-7R16T2●●, **ABE-7P16T2●●**





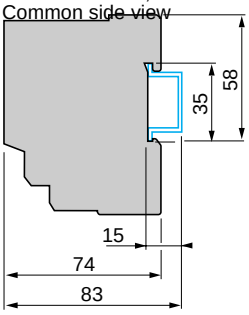
ABE-7CPA01, **ABE-7CPA11/CPA12/CPA13**

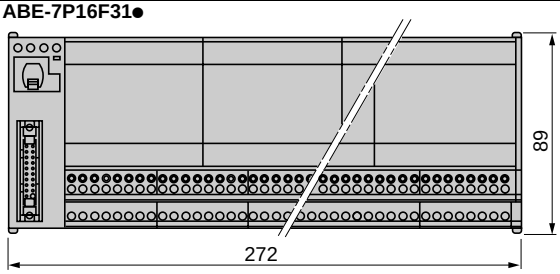


Note :
details of the front view are the same as for the ABE-7CPA01.

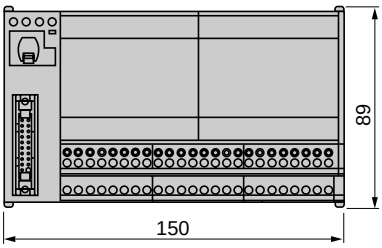
ABE-7R16T3●●, **ABE-7P16T3●●**, **ABE-7P16F31●**

Common side view





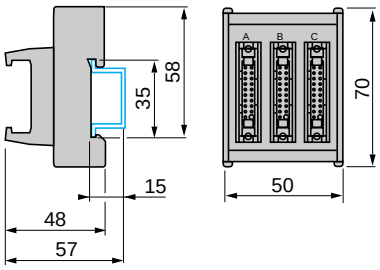
ABE-7P08T330



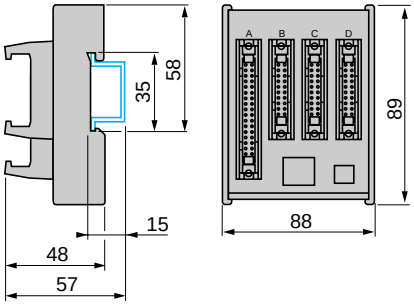
Modicon TSX Micro automation platform

Telefast® 2 pre-wired system

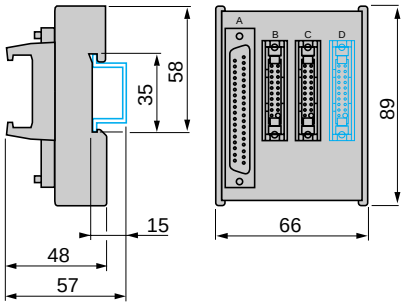
ABE-7ACC02



ABE-7ACC03

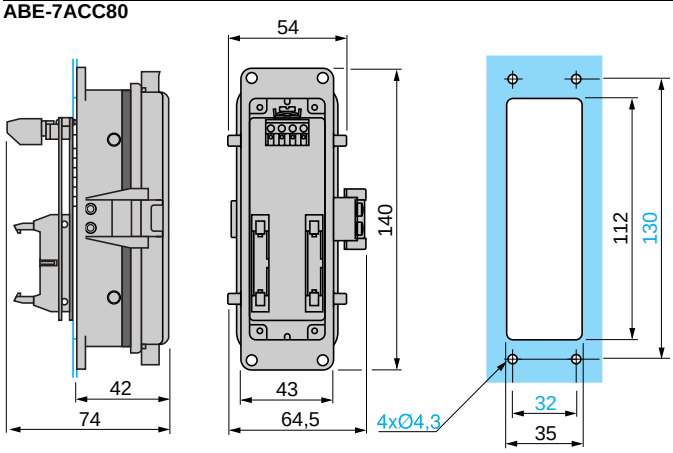


ABE-7ACC04, ABE-7ACC05
ABE-7ACC10, ABE-7ACC11

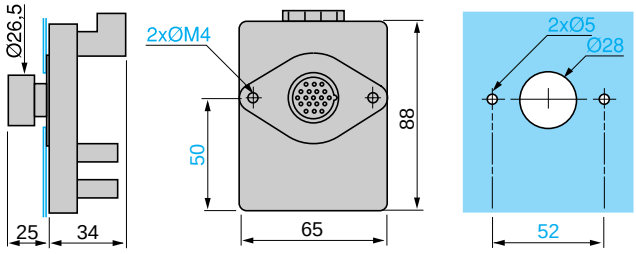


Note : Drawing representing **ABE-7ACC04** and **ABE-7ACC05**

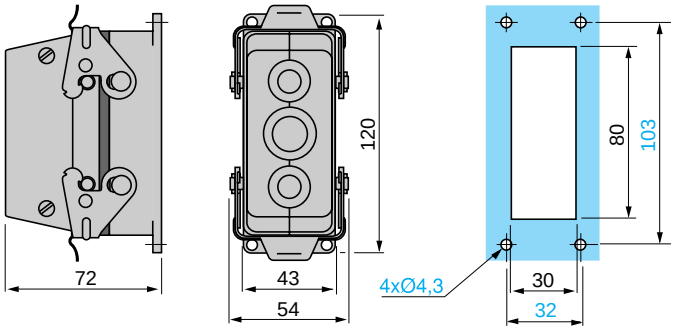
ABE-7ACC80



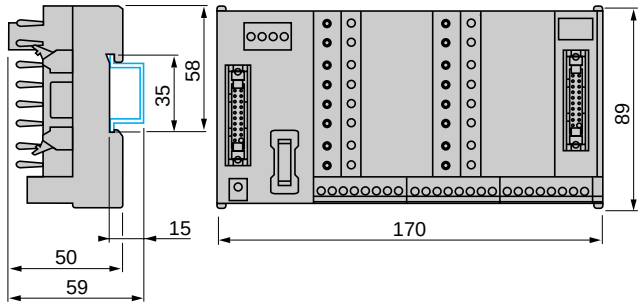
ABE-7ACC82, ABE-7ACC83



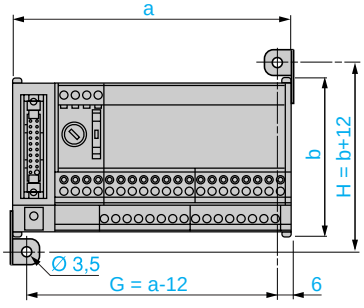
ABE-7ACC84



ABE-7TES160



Fixing centres for sub-bases using mounting kit ABE-7ACC01



ABE-7	G	H
ACC02	38	82
ACC03	53	101
ACC04	53	101
ACC05	53	101
ACC10/11	53	101
H08R●●	72	82
H08S21	72	82
H12R50	72	82
H16R50	72	82
R08S111	72	82
CPA01	131	82
CPA02	113	82
CPA1●	131	82
CPA03	113	82

ABE-7	G	H
H12R1●	113	82
H12R2●	113	82
H16R1●	113	82
H16R2●	113	82
H16R3●	113	82
H12S21	113	82
H16S21	113	82
R08S210	113	82
R16S111	113	82
R16S21●	194	82
S08S2B0	113	82
S08S2B1	194	82

ABE-7	G	H
H16F43	194	82
H16S43	194	82
S16E2●●	194	82
S16S1B2	113	82
S16S2●●	194	82
R16T2●●	199	101
P16T2●●	199	101
R16T3●●	260	101
P08T330	150	101
P16T3●●	260	101
P16F3●●	260	101

Modicon TSX Micro automation platform

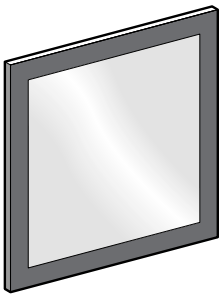
Installation system

Tego Dial for Human-Machine interfaces

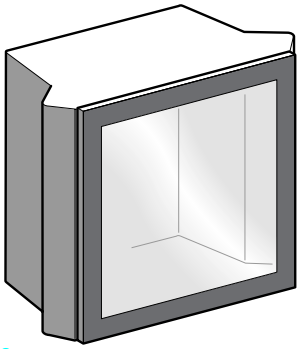
Presentation

The modular Tego Dial system is used to define human-machine interfaces. It facilitates the installation of Ø 22, Ø 16 and Ø 30 mm control and signalling units, DIN format display units, Magelis terminals and display units, XBL keypads and other products.
Tego Dial simplifies an HMI application by :
definition of the application by Tego Dial Design software,
quick assembly of dialogue and display units, through the use of modular elements,
standard connections from the dialogue units to PLCs, bus and other products,
facilitates the integration of the dialogue application into the machine, control panel, enclosure, machine housing or intermediate suspension arm.

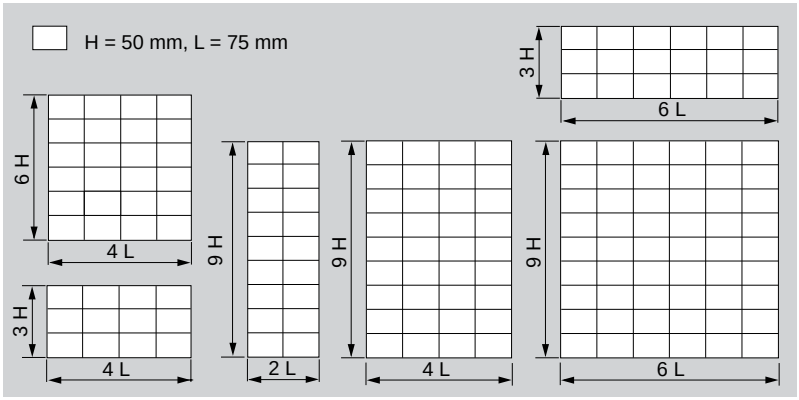
Description



1



3



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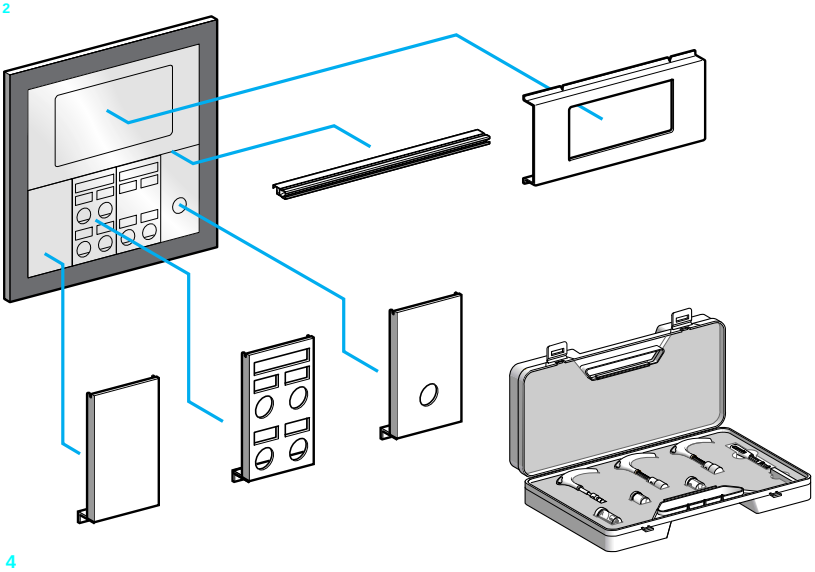


4

5

■ **Tego Dial Design definition software**
This software on CD-ROM facilitates graphical definition of the dialogue application in relation to the control units, pilot lights and display units necessary for the device.
It selects the correct Tego Dial components that are required for the application and also features a legend design and printing function, both for the front panel and the connections.

■ **Dialboard front panels** 1
The front panels basically comprise a grey, RAL 7016, painted aluminium frame which is covered by a polycarbonate film.
Six sizes are available based on a modular pattern of height H = 50 mm and width W = 75 mm 2. The sizes are 3H x 4W, 3H x 6W, 6H x 4W, 9H x 2W, 9H x 4W and 9H x 6W.

■ **Dialpack control console enclosers** 3
Four control consoles are available in the following modular sizes : 3H x 4W, 6H x 4W, 9H x 4W and 9H x 6W.
The Dialpack console is an assembly comprising a Dialboard type front panel and a sheet steel folded and welded enclosure, painted with textured grey RAL 7016.
The front panel is hinged and can be opened to 120°.
Closing is by a 1/4-turn device, with stop, and locking by Ronis key no. 455. Double bar or CNOMO triangular key locks are also available. A customising component in 2 versions - yellow or unpainted - enhances the Dialpack unit and makes it more ergonomic. A Dialpack S version in stainless steel type 304 is available for corrosive environments. This version conforms to enclosure standard EN 50298.

■ **Plates and cross-pieces** 4
A range of modular dimensioned plates facilitates the installation of all combinations of control and signalling units, operator dialogue terminals and other devices.
These plates are attached directly to the framework of the front panel.
The plates, made from sheet steel and painted grey RAL 7016, are designed for the following product ranges :
- Ø 22, Ø 16 and Ø 30 control and signalling units,
- DIN format display units,
- Electronic operator terminals and displays (Magelis and others),
- keypads,
- other units : joystick controllers, cam switches, etc.

Cross-pieces aid vertical mounting of several rows of plates.
Cut-outs in the plates are dimensioned to suit the dialogue or display units that are to be installed. Some plate versions for Ø 22 units are available with knock-outs, which need to be removed before mounting the unit. Other versions incorporate cut-outs for the transparent polycarbonate legend holders (included with the plate).
Alternatively, solid plates are also available for mounting any special equipment required.

■ **Toolkit** 5
The installation of dialogue and display units requires cut-outs to be made through the polycarbonate film. To simplify this operation, the plate is marked with cut-out guides and a toolkit is available, comprising : a mallet, cutting tools and replacement blades.

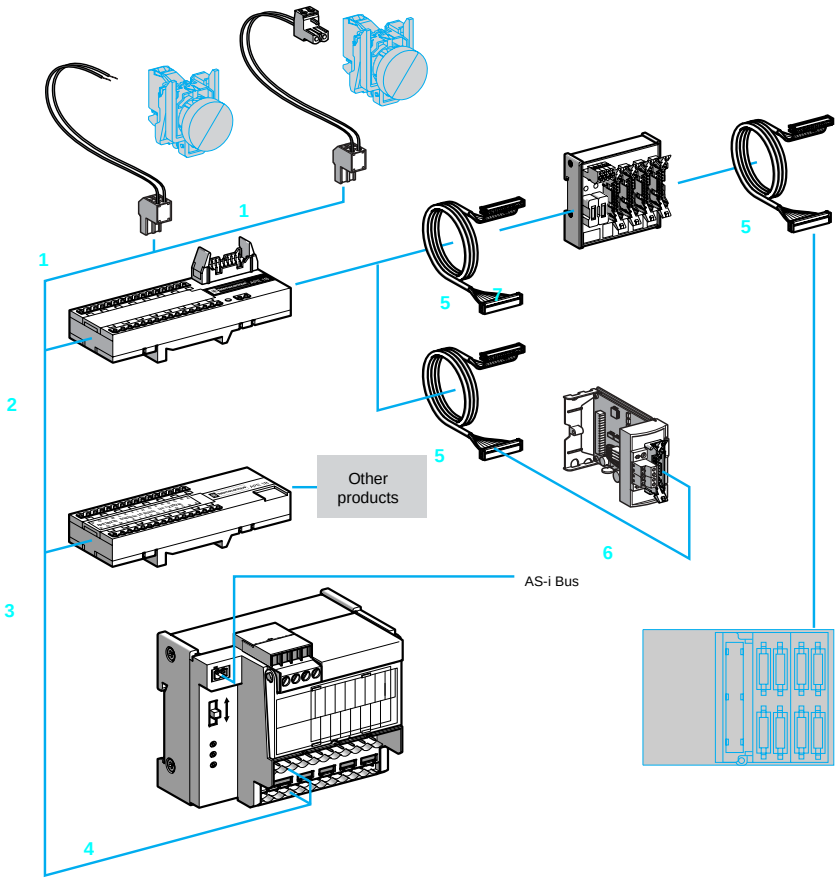
■ **Pre-assembled kits**
Dialboard and Dialpack with pre-assembled plates and cross-pieces are available.

Modicon TSX Micro automation platform

Installation system

Tego Dial for Human-Machine interfaces

Standard connections



Tego Dial offers a range of interface components and cabling accessories that simplify connections between control and signalling units and PLCs, buses and other products.
The main components which make up this range are :

- prefabricated connection cables and insulation displacement connectors 1, 5 mm pitch, for connecting control and signalling units to Dialbase interfaces,
- Dialbase 8I/8O or 16I interfaces 2 with integrated commons, for connecting control and signalling units to PLCs via prefabricated Telefast connection cables 5,
- an active splitter block 7 for connecting a Dialbase 8I/8O interface to PLCs with a connection modularity greater than 8I/8O,
- a Dialbase 230 V interface 3 for connecting control and signalling units to any product up to 230V,
- a Dialbase AS-i 4I/4O interface 4 with integrated commons, for connecting control and signalling units to the AS-i bus.

The selection guide on page 2/40 indicates the type and quantity of components (Dialbase interfaces, active splitter block, Telefast connection cables) required to connect the control and signalling units to the various types of PLC. The most efficient connection is achieved using the Dialbase 8I/8O interface and the Telemecanique TSX Micro PLC TSX DMZ16DTK card 6.

Dialfix and Dialmove suspension arms

Dialpack control consoles can be fitted directly using 4 adjustable lugs, ref. AE3-FX122. However, for improved ergonomy, they are usually mounted on a suspension arm. This can either be fixed (Dialfix) or moving (Dialmove).

Dialfix fixed arms
Two versions are available :

- a straight fixed arm kit, comprising a straight Ø 70 mm tube, 500 or 1000 mm in length, and a pair of clamps (one for each end). Depending on the positioning of the clamps, an inclination of ±15° from the natural position can be achieved,
- an elbowed (90°) fixed arm kit, 500 mm in length. This kit also includes the pair of clamps described above.

Arms for corrosive environments
The arms are in 304 type stainless steel and provide 350° rotation on the Dialpack fixing side. Two models are available:

- straight arm kit, length 1000 mm,
- 90° elbowed arm kit, length 500 mm.

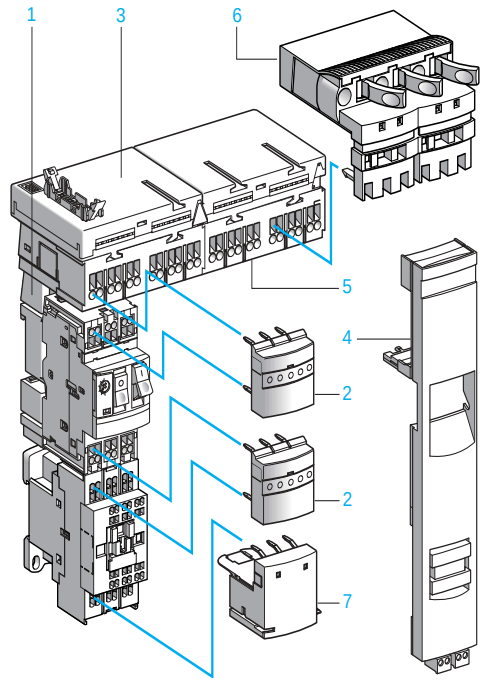
Dialmove moving arm
This arm enables an extensive choice of mounting configurations. The cabling runs through the elements, which have removable side covers for easy access. Numerous configuration possibilities can be achieved by combining the following components:

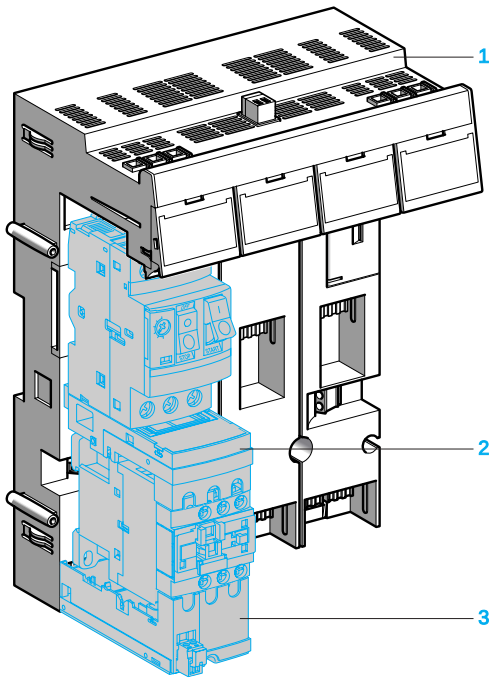
- straight tubes (100 to 1000 mm long),
- fixed 90° joint,
- wall fixing bracket (straight or elbowed, fixed or mobile),
- straight fixing plates (one fixed, other rotating) for Dialpack,
- 15° tilted joints,
- pivoting joint (-90° to +90° in the same plane).

Modicon TSX Micro automation platform

Installation system

Tego Power for motor power-stater components





General presentation

Tego Power is a modular system which standardises and simplifies the implementation of motor power-starters with its prewired control and power circuits. Hence, installation of a motor power-starter is quick, simple, safe and flexible with no wires needed for connection. In addition, this system enables the motor power-starter to be customised at a later date. The system reduces maintenance time and optimises panel space, by reducing the number of terminals, the amount of ducting and intermediate interfaces.
Two solutions are offered :
■ A solution using Quickfit technology for TeSys motor power-starter components with spring terminals : model d contactors (9 to 32 A) and the GV2-ME motor circuit-breaker.
■ A solution for TeSys motor power-starter components with screw terminals : model d (9 to 18 A) and model k (6 to 12 A) contactors and GV2 motor circuit-breakers.

Tego Power Design definition software

This software on CD-ROM enables the motor power-starter application to be graphically defined according to the circuit-breakers and contactors used.
It determines which Tego Power products are required for the application.
Referencing labels can also be created for the starters.

System for Quickfit technology TeSys motor power-starters with spring terminals

The motor power-starters concerned are those formed by combining :
■ GV2-M circuit-breakers,
■ with 9 to 32 A model d (LC1) contactors.
Consisting of simple parts, Tego Power Quickfit technology is used to create motor starter assemblies up to 15 kW/400 V.
The main components which make up this range are :

For the power circuit

■ a **power kit** comprising, for each starter, a plate **1** for mounting the contactor and the circuit-breaker, and the two power connection modules **2**,
■ a **power splitter box** **5** for 2 or 4 starters,
■ an **upstream terminal block** **6** for a power supply up to 63 A (16 mm^2),
■ a **downstream terminal block** **7** for connecting the motor power supply cables and the earth cables (6 mm^2).

For the control circuit

■ a **control splitter box** **3** for 2 or 4 starters, with control-command data on HE 10 connector. The data on 4 to 8 starters can be fed back directly to the PLC via an 8I/8O or 16I/8O Telefast cable or to a fieldbus module (AS-i, Fipio, CANopen, DeviceNet, Interbus, Profibus) (see opposite page).
■ a **control circuit connection module** **4** which plugs directly into the contactor and the circuit-breaker on each starter. This module concentrates the motor starter control-command data. It integrates the circuit-breaker status data in the prewiring of the contactor control circuit.

System for TeSys motor power-starters with screw terminals

The motor power-starters concerned are those formed by combining :
■ GV2 circuit-breakers (mainly GV2-ME and GV2 P),
■ with 6 to 12 A model k contactors (LC1, LP1, LC2, LP2, LP4, LP5) and 9 to 18 A model d contactors (LC1).

The main components which make up this range are :
■ **modular sub-bases** **1** for 2 or 4 direct or reversing contactors, consisting of a prefabricated power busbar system and a control-command circuit. These sub-bases can be combined to form a variable configuration of 2, 4, 6 or 8 direct starters.
■ the **sub-base interconnection kit** to interconnect the control and power circuits on two sub-bases.
■ **connection blocks** **2** and **3** which perform the following three functions :
□ ensure the mechanical fixing of the motor starter to the modular sub-base,
□ connect the power terminals of the contactor and circuit-breaker,
□ connect the auxiliary contact and A1-A2 coil terminals to the modular sub-base.

Modicon TSX Micro automation platform

Installation system

Tego Power for motor power-starter components

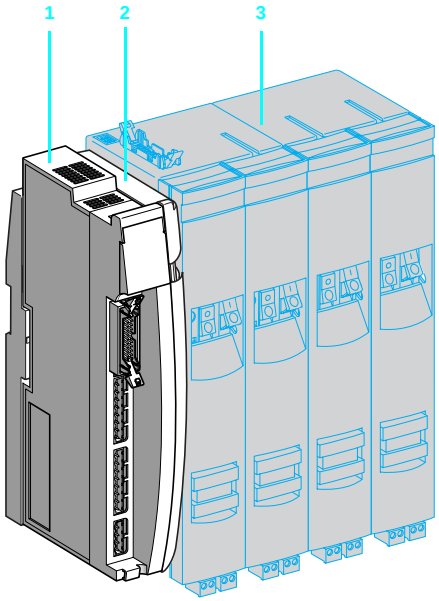
Communication modules

General

Communication modules are used to send I/O data from a Tego Power motor power-starter configuration to the PLC.
The communication modules is selected according to the type of connection required :

- in parallel mode (modules, terminal blocks or HE 10),
- or in serial mode on the bus (AS-i bus, Interbus S, Fipio, Profibus DP, CANopen or DeviceNet modules).

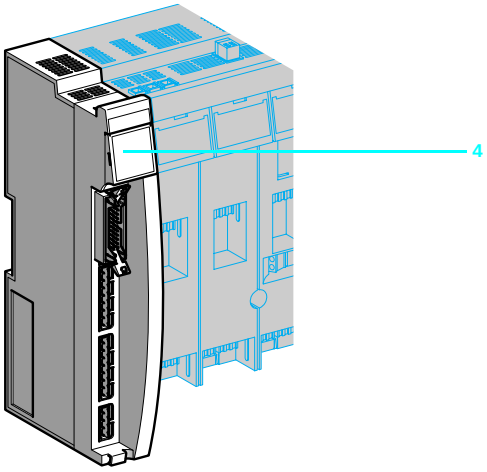
The communication modules are the same, whether the TeSys motor power-starter system uses spring or screw terminals.



Modules in a TeSys motor power-system with spring terminals

Motor power-starters can be connected to a PLC or a bus in two ways :

- by direct connection from the control circuit splitter box 3 with 4 starters, with an HE 10 connector (8I/8O) or two HE 10 connectors (16 I and 8 O),
- by a Tego Power module 1 using an **APP-2CX** adaptor plate 2.



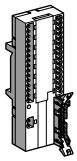
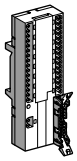
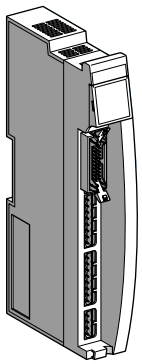
Modules in a TeSys motor power-starter system with screw terminals

A module 4 is mounted by direct mechanical assembly on the modular sub-base , with no screws or accessories.
The electrical connection between the modular sub-base and the communication module is made using an HE 10 connector.

Modicon TSX Micro automation platform
Tego Dial/Tego Power installation system

Tego Dial for Human-Machine interfaces and Tego Power for motor power-starter components

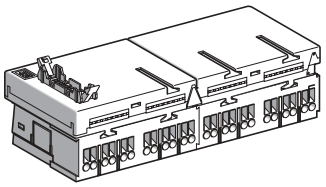
Automation platform | **Tego Dial components** | **Tego Power components**

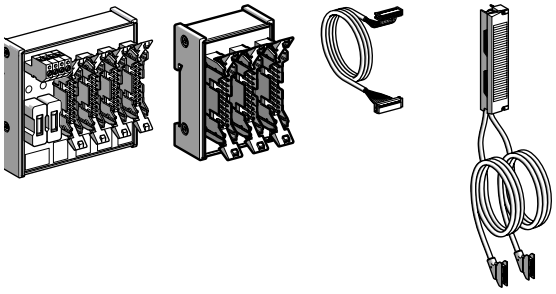




Type	Modularity of connection to the PLC	Compatible I/O modules	Tego Dialbase 8 I/8 O	Tiego Dialbase 16 I	Communication module or control splitter box with 8 I/8 O
			APE 1B24M	APE 1B24E	APP 1CH, APP 2R4H1/H3
TSX Micro platform					
Tego Dial	8 inputs + 8 outputs	TSX DMZ 16DTK	1		
	16 inputs + 16 outputs	TSX DMZ 64DTK	1 *(1)*		
	16 inputs	TSX DMZ 64DTK/28DTK		1	
Tego Power	8 inputs + 8 outputs	TSX DMZ 16DTK			1
	16 inputs + 16 outputs	TSX DMZ 64DTK			1
Premium platform					
Tego Dial	16 inputs + 16 outputs	TSX DEY 16FK/32D2K/64D2K TSX DSY 32T2K/64T2K	1 *(1)*		
	16 inputs	TSX DEY 16FK/32D2K/64D2K			
Tego Power	16 inputs + 16 outputs	TSX DEY 32D2K/64D2K/16FK			1
		TSX DSY 32T2K/64T2K			
Quantum platform					
Tego Dial	32 inputs + 32 outputs	140 DDI 353 00/10, 140 DDI 853 00, 140 DD0 353 00/10	1 *(1)*		
	32 inputs	140 DDI 353 00/10, 140 DDI 853 00		1	
Tego Power	32 inputs + 32 outputs	140 DDI 353 00/10, 140 DDI 853 00,			1
		140 DD0 353 00/10			
Advantys STB discrete I/O					
Tego Power	16 inputs + 8 outputs	STB EPI 1145			

(1) For the connection of a second Dialbase APE 1B24M, use 2 x TSX DP ●●3 connecting cables.

Connection accessories





Control splitter box 16 I/16 O	Control splitter box		Splitter box 16 I + 16 O in 2 x (8E+8S)	Splitter box 16 to 2 x 8	Telefast connecting cables		
APP 2RH2/H4			APE 1R1628	ABE 7ACC 02	TSX CDP ●●3	ABF M32H●●0	STB XCA 300●
					1		
			1		2		
			1				
					1		
			1 *(2)*		3		
1				1 *(3)*	3		
			1		2		
					2		
			1 *(2)*		3		
1				1 *(3)*	3		
			1		1	2	
						1	
			1 *(2)*		1	2	
1				1 *(3)*	1	2	
	APP 2R2E (2 motor-starters)	APP 2R4E (4 motor-starters) *(4)*					1

(2) 8 I + 8 O remain available. To connect a second APP-1CH module or APP-2●●● 8 E + 8 S control splitter box, use a additional TSX CDP ●●4 cable.
(3) 8 O remain available on ABE-7ACC02. To connect them a second AAP-2●●● 16 I/8 O control splitter box, use a additional TSX CDP ●●3 cable.
(4) For 8 motor-starters, to use 2 APP 2R4E *control and power splitters.*

Modicon TSX Micro automation platform

Phaseo power supplies for d.c. control circuits

Functions	Supplies for d.c. control circuits				
Type of product	**Single-phase, modular switch mode power supplies**		**Single-phase, regulated switch mode power supplies**		
Applications	Industrial, commercial or residential applications. Modular format allowing integration into panels.		Simple, low power equipment.	Industrial applications, low and medium power. Machine equipment applications.	Industrial or commercial applications on sites sensitive to mains interference. Protection against accidental restarting.
Nominal power	22 W	30 W	7 W…30 W	48…240 W	60…240 W
Input voltage	∿ 100…240 V single-phase		∿ 100…240 V single-phase ⎓ 110…220 V compatible *(1)*	∿ 100…240 V single-phase	∿ 100…240 V single-phase, ⎓ 110…220 V compatible *(1)*
Output voltage	⎓ 12 V adjustable	⎓ 24 V adjustable	⎓ 24 V adjustable	⎓ 24 V adjustable	⎓ 12, 24 V or 48 V adjustable
Technology	Primary switch mode electronic power supplies.				
Secondary protection	Integrated, against overloads and short-circuits, with automatic reset.				Integrated, against overloads and short-circuits, with manual and automatic reset.
Signalling	Output indicator lamp.			Output and input indicator lamp.	
Other characteristics	–		Connection by lug-clamps possible	–	Anti-harmonic distortion filter
Mounting	Direct on ⎓ rail		Direct, on ⎓ rail and on panel	Direct on ⎓ rail	
Disturbance (conforming to EN55011/22) conducted and radiated	cl.B		cl.A (7/15 W) cl.B (30 W)	cl.B	
Conforming to standards	EN 50081-1, IEC 61000-6-2 (EN 50082-2), IEC 950, EN61131-2/A11		EN 50081-2, IEC 61000-6-2, EN 60950	EN 50081-1, IEC 61000-6-2, (EN 50082-2), IEC 950	EN 50081-1, IEC 61000-6-2, (EN 50082-2), IEC 950, 61000-3-2
Approvals	UL, CSA, TÜV		cULus, TÜV	UL, CSA, TÜV, CTick	
Device type	**ABL 7RM**		**ABL 7CEM**	**ABL 7RE**	**ABL 7RP**
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(1) Compatible input voltage, not indicated on the product.

2-phase regulated switch mode power supplies	3-phase regulated switch mode power supplies			Regulated switch mode power supplies for AS-i		
Industrial applications.	Industrial applications. In-line continuous process equipment, machine tools, injection presses, etc.			Industrial applications. Supply of d.c. voltage necessary for AS-i systems.		
120 and 240 W	240 and 480 W	120 W	240…960 W	72 W	145 W	2 x 72 W
∿ 2 x 380…415 V 2-phase	∿ 3 x 380…415 V 3-phase	∿ 3 x 400…520 V 3-phase	∿ 3 x 400…520 V 3-phase	∿ 100…240 V single-phase		
⎓ 24 V adjustable				⎓ 30 V		⎓ 24 V adjustable
Primary switch mode electronic power supplies.						
Integrated, against overloads and short-circuits, with manual and automatic reset.				Integrated, against overloads and short-circuits, overvoltage and undervoltage.		
Output indicator lamp.				Output and input indicator lamps.		
–	–		Anti-harmonic distortion filter	–		
Direct on ⎓ rail	Direct on ⎓ rail (except ABL-7UPS 24200 and ABL-7UPS24400)			Direct on ⎓ rail		
cl.B	cl.B			cl.B		
EN 50081-1, EN 50082-2, EN 60950	EN 50081-1, EN 50082-2, EN 60950		EN 50081-1, EN 50082-2, EN 60950, IEC 61000-3-2	EN 50081-1, IEC 61000-6-2, EN 55022 class B		
–	–		cULus, c UL us	UL, CSA, TÜV		
ABL 7REQ	**ABL 7UEQ**	**ABL 7UES**	**ABL 7UPS**	**ASI ABL**		
2/52				–		

Modicon TSX Micro automation platform
Power supplies for d.c. control circuits

ABL-7 power supplies

The ABL-7 range of power supplies is designed to provide the d.c. voltage necessary for the control circuits of automation system equipment. Split into three families, this range meets all the needs encountered in industrial, commercial and residential applications. Single-phase or 3-phase, of the electronic switch mode type, they provide a quality of output which is suitable for the loads supplied and compatible with the mains supply available in the equipment. Clear guidelines are given for selecting protection devices which are often used with them and thus a comprehensive solution is provided, which can be used in total safety.

Phaseo switch mode power supplies

These switch mode power supplies are totally electronic and regulated. The use of electronics makes it possible to significantly improve the performance of these power supplies, which offer:
- very compact size,
- integrated overload, short-circuit, overvoltage and undervoltage protection,
- a very wide range of permissible input voltages, without any adjustment,
- a high degree of output voltage stability,
- good performance,
- LED indicators on the front panel.

Phaseo power supplies are available in single-phase and 3-phase versions. They deliver a voltage which is precise to 3%, whatever the load and whatever the type of mains supply, within a range of 85 to 264 V for single-phase, or 360 to 550 V for 3-phase. Conforming to IEC standards and UL and CSA certified, they are suitable for universal use. The inclusion of overload and short-circuit protection makes downstream protection unnecessary if discrimination is not required.

ABL-7 RE and ABL-7 RP supplies are also equipped with an output undervoltage control which causes the product to trip if the output voltage drops below 19 V, in order to ensure that the voltage delivered is always usable by the actuators being supplied. All the products are fitted with an output voltage adjustment potentiometer in order to be able to compensate for any line voltage drops in installations with long cable runs. Most of our power supplies are designed for direct mounting on 35 and 75 mm ⊔ rails.

These power supplies are available in single-phase and 3-phase versions and are split into three families:

Compact single-phase supply ABL-7CEM:
- power less than or equal to 30 W (1.2 A),
- compact size,
- for all low power equipment,
- suitable for use in automation system environments based on the Nano and Twido platforms, or in any automation system configuration requiring a ⎓ 24 V supply.

108700-13-M

ABL 7CEM

Universal single-phase supplies ABL-7RE and ABL-7RP:

■ **ABL-7RE**
- power between 48 W (2 A) and 240 W (10 A),
- compact size,
- for all machine equipment,
- suitable for use in automation system environments based on the Micro and Premium platforms, or in any automation system configuration requiring a ⎓ 24 V supply.

■ **ABL-7RP**
- power between 60 W (2.5 A) and 240 W (10 A),
- output voltage available: ⎓ 12, 24 and 48 V,
- input filter (PFC) for commercial and residential environments (conforming to standard EN 61000-3-2),
- two operating modes possible for handling of overload and short-circuit faults:
  - "AUTO" mode which provides automatic restarting of the power supply on elimination of the fault,
  - "MANU" mode which requires manual resetting of the power supply to restart. Resetting is achieved by switching off the mains power.

43367-15-M

ABL-7RP

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Dimensions : page 2/62
Schemes : page 2/63

Modicon TSX Micro automation platform
Power supplies for d.c. control circuits

108387-25-M

ABL-7UPS

530894

ABL-7REQ

Phaseo switch mode power supplies (continued)

3-phase and single-phase process supplies ABL-7U and ABL-7REQ:

■ **ABL-7UE**

□ power between 120 W (5 A) and 480 W (20 A),
□ compact size,
□ voltages between 3 x 380 V and 3 x 500 V,
□ for use in industrial applications, for all in-line or continuous process equipment, machine tools and injection presses, etc.
□ suitable for use in automation system environments based on the Premium and Quantum platforms, or in any automation system configuration requiring a ⎓ 24 V supply.

■ **ABL-7UPS**

□ power between 120 W (10 A) and 960 W (40 A).

Identical to the **ABL-7UE** range, this power supply differs in that it includes a filter (PFC) which means that it can be connected directly to the public mains supply, in compliance with standard EN 61000-3-2. This product, for world-wide use, is UL certified.

■ **ABL-7 REQ**

□ power between 120 W (5 A) and 240 W (10 A),
□ compact size,
□ can be connected to **2-phase** input voltages between 380 V and 415 V, to replace older power supplies connected by only two wires. Economical, more competitive, yet with a smaller input voltage range it can, in certain cases, be used in place of the 3-phase versions.

Using ⎓ 24 V

■ Using ⎓ 24 V enables so-called protection installations (PELV) to be built. Using PELV is a measure designed to protect people from direct and indirect contact. Measures relating to these installations are defined in publication NF C 12-201 and in standard IEC 364-4-41.

■ The application of these measures to the electrical equipment in machines is defined in standard NF EN 60204-1 and requires:
□ that the voltage used is below 60 V d.c. in dry environments and below 30 V in damp environments,
□ the connection of one side of the PELV circuit, or one point of the source, to the equipotential protection circuit associated with higher voltages,
□ the use of switchgear and control gear on which measures have been taken to ensure "safety separation" between power circuits and control circuits.

■ A safety separation is necessary between power circuits and control circuits in PELV circuits. Its aim is to prevent the appearance of dangerous voltages in ⎓ 24 V safety circuits.

■ The reference standards involved are:
□ IEC 61558-2-6 and EN 61558-2-6 (safety transformers),
□ IEC 664 (coordination of isolation).

Telemecanique power supplies meet these requirements.

■ Moreover, to ensure that these products will operate correctly in relation to the demands of their reinforced isolation, it is recommended that they be mounted and wired as indicated below:
□ they should be placed on an earthed mounting plate or rail,
□ they should be connected using flexible cables, with a maximum of two wires per connection, and tightened to the nominal torque,
□ conductors of the correct insulation class must be used.

■ If the d.c. circuit is not connected to an equipotential protection conductor, an earth leakage detector will indicate any accidental earth faults (please consult your Regional Sales Office).

Operating voltage

■ The permissible tolerances for the operating voltage are listed in publications IEC 1131-2 and DIN 19240.

■ For nominal voltage Un = ⎓ 24 V, the extreme operating values are from - 15 % to + 20 % of Un, whatever the supply fluctuations in the range -10 % to + 6 % (defined by standard IEC 38) and load variations in the range 0-100 % of In.
All Telemecanique ⎓ 24 V power supplies are designed to provide a voltage within this range.

■ It may be necessary to use a voltage measurement relay to detect when the normal voltage limits are being surpassed and to deal with the consequences of this (please consult your Regional Sales Office).

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Schemes : page 2/63

Modicon TSX Micro automation platform
Power supplies for d.c. control circuits

Selection of power supplies

The characteristics to be taken into account when selecting a power supply are:
- the required output voltage and current,
- the mains voltage available in the installation.

An initial selection can be made using the table opposite.
This may however result in several products being selected as suitable.
Other selection criteria must therefore be taken into account.

■ **The quality of the mains power supply**

The Phaseo range is the solution because it guarantees precision to 3% of the output voltage, whatever the load current and the input voltage. In addition, the wide input voltage range of Phaseo power supplies allows them to be connected to all mains supplies within the nominal range, without any adjustment.
The Phaseo RP family can also be connected to ⎓ 110 and 220 V emergency supplies.

■ **Harmonic pollution (power factor)**

The current drawn by a power supply is not sinusoidal. This leads to the existence of harmonic currents which pollute the mains supply. European standard EN 61000-3-2 limits the harmonic currents produced by power supplies. This standard covers all devices between 75 W and 1000 W, drawing up to 16 A per phase, and connected directly to the public mains power supply. Devices connected downstream of a private, low voltage general transformer are therefore excluded.
Regulated switch mode supplies always produce harmonic currents; a filter circuit (Power Factor Correction or PFC) must therefore be added to comply with standard EN 61000-3-2.
Phaseo ABL-7RP and ABL-7UPS power supplies conform to standard EN 61000-3-2 and can therefore be connected directly to public mains power supplies.

■ **Electromagnetic compatibility**

Levels of conducted and radiated emissions are defined in standards EN 55011 and EN 55022.
The majority of products in the Phaseo range have class B certification and can be used without any restrictions due to their low emissions.
ABL-7CEM24003 and ABL-7CEM24006 power supplies have class A certification. It is recommended that they should not be used in the following equipment: trains, aircraft, nuclear applications and in any environment where malfunctioning could cause serious injuries or lead to death. These products are designed for use in industrial equipment and are not suitable for use in residential environments.

■ **Behaviour in the event of short-circuits**

Phaseo power supplies are equipped with an electronic protection device. This protection device resets itself automatically on elimination the fault (around 1 second for ABL-7 RE/RP, around 3 seconds for ABL-7 UE/UP/REQ) which avoids having to take any action or change a fuse. In addition, the Phaseo ABL-7RP/U/REQ ranges allow the user to select the reset mode in the event of a fault:
- in the "AUTO" position, resetting is automatic,
- in the "MANU" position, resetting occurs after elimination of the fault and after switching the mains power off and back on.

This feature allows Phaseo ABL-7RP/U/REQ power supplies to be used in installations where the risks associated with untimely restarting are significant.

■ **Behaviour in the event of phase failure**

In the event of failure of one phase, all Phaseo 3-phase power supplies switch to relaxation mode for as long as the input voltage is < 450 V.
For operation on higher voltages (e.g. 480 V), use of an upstream GV2 type residual current protection device is recommended.

■ **Selection of reset mode**

□ on the ABL-7RP family of products:
By microswitch on the front panel of the product.
□ on the ABL-7U/REQ family of products:
By jumper on the front panel. **Warning: selection of the function is only possible after the mains power supply has been switched off for at least 5 minutes**. The jumper is moved using a pair of insulated, flat-nose pliers.

Modicon TSX Micro automation platform
Power supplies for d.c. control circuits

Selection according to application characteristics

Type of mains supply		Single-phase				2-phase	3-phase		
Rated mains supply voltage		~ 100…240 V 50/60 Hz ⎓ 110… 220 V *(1)* Wide range			100…240 V 50/60 Hz Wide range	2 x 380…415 V 50/60 Hz	3 x 380…415 V 50/60 Hz	3 x 400…520 V 50/60 Hz Wide range	3 x 380…520 V 50/60 Hz Wide range
Permissible variation		85…264 V, 47…63 Hz ⎓ 100...250 V *(1)*, ⎓ 105...370 V *(2)*			85…264 V 47…63 Hz	340…460 V 47…63 Hz	340…460 V 47…63 Hz	360…550 V 47…63 Hz	340…550 V 47…63 Hz
Output voltage		12 V	48 V	24 V	24 V	24 V	24 V	24 V	24 V
Output current	0.3 A			**ABL-7CEM24003**					
	0.6 A			**ABL-7CEM24006**					
	1.2 A			**ABL-7CEM24012**					
	2 A				**ABL-7RE2402**				
	2.5 A		**ABL-7RP4803**						
	3 A			**ABL-7RP2403**	**ABL-7RE2403**				
	5 A	**ABL-7RP1205**		**ABL-7RP2405**	**ABL-7RE2405**	**ABL-7REQ24050**		**ABL-7UES24050**	
	10 A			**ABL-7RP2410**	**ABL-7RE2410**	**ABL-7REQ24100**	**ABL-7UEQ24100**		**ABL-7UPS24100**
	20 A						**ABL-7UEQ24200**		**ABL-7UPS24200**
	40 A								**ABL-7UPS24400**
Conforming to EN 61000-3-2		Yes (not applicable for **ABL-7CEM**)			No	No	No	No	Yes
Integrated automatic protection		Yes Automatic or manual restart on **ABL-7RP** Automatic restart only on **ABL-7CEM**			Yes Automatic restart	Yes Automatic or manual restart			

*(1) Values for **ABL-7RP** power supplies, not indicated on the product.*

*(2) Values for **ABL-7CEM** power supplies, not indicated on the product.*

Modicon TSX Micro automation platform

Power supplies for d.c. control circuits

Phaseo regulated switch mode power supplies

Technical characteristics

Type of power supply			ABL-7CEM	ABL-7RE	ABL-7RP
Product certifications			cULus, TÜV	UL, CSA, TÜV, CTick	
Conforming to standards			UL 508	UL 508, CSA 22.2 n° 950	
	Safety		IEC/EN 60950		IEC/EN 61496-1-2
	EMC		EN 50081-2, EN 50082-2	EN 50081-1, IEC 61000-6-2 (EN 50082-2)	
	Low frequency harmonic currents		–	–	EN 61000-3-2
Input circuit					
LED indication			–	Orange LED	Orange LED
Input voltages	Rated values	**V**	∿ 100…240, ⎓ 110…220 compatible *(1)*	∿ 100…240	∿ 100…240, ⎓ 110…220 compatible *(1)*
	Permissible values	**V**	∿ 85…264, ⎓ 105…370 compatible *(1)*	∿ 85…264 single-phase	∿ 85…264, ⎓ 100…250 compatible *(1)*
	Permissible frequencies	**Hz**	47…63		
	Efficiency at nominal load		> 70 %	> 85 %	
	Current consumption Ue = 240 V	**A**	0.1 (7 W)/0.2 (15 W)/0.45 (30 W)	0.6 (48 W)/0.83 (72 W) 1.2 (120 W)/2.5 (240 W)	0.4 (72 W)/0.6 (120 W) 1.3 (240W)
	Current consumption Ue = 100 V	**A**	0.17 (7 W)/0.3 (15 W)/0.68 (30 W)	1.2 (48 W)/1.46 (72 W) 1.9 (120 W)/3.6 (240 W)	0.8 (72 W)/1 (120 W)/2.8 (240 W)
	Current at switch-on	**A**	< 50	< 30	
	Power factor		0.45 approx.	0.65 approx.	0.98 approx.
Output circuit					
LED indication			Green LED	Green LED	Green LED
Nominal output voltage (U out)		**V**	⎓ 24		12, 24 and 48
Nominal output current		**A**	0.3/0.6/1.2	2/3/5/10	2.5/5/10
Precision	Output voltage		Adjustable from 90 to 110 %	Adjustable from 100 to 120 %	
	Line and load regulation		2 % max	± 3 %	
	Residual ripple - interference	**mV**	< 200 (peak-peak)		
Micro-breaks	Holding time at I max and Ve min	**ms**	> 20	> 10	> 20
Temporary overloads	Permissible inrush current (U out >19V)		See curves page 2/59		
Protection	Short-circuit		Permanent/automatic restart	Permanent/automatic restart	Permanent/automatic restart or restart after switching off mains power
	Overload		1.05 In	1.1 In	
	Overvoltage		U > 1.2	Tripping if U > 1.5 Un	
	Undervoltage		–	Tripping if U < 0.8 Un	
Operating and environmental characteristics					
Connections	Input	**mm²**	2 x 2.5 + earth		
	Output	**mm²**	2 x 2.5	2 x 2.5 + earth, multiple output, depending on model	
Ambient conditions	Storage temperature	**°C**	- 25… + 70		
	Operating temperature	**°C**	- 10… + 60 (derating as from 50° C, mounted vertically)	0… + 60 (derating as from 50° C, mounted vertically)	
	Max. relative humidity		20…90 %	95 % without condensation or dripping water	
	Degree of protection		IP 20 conforming to IEC 529		
	Vibrations		Conforming to IEC 61131-2		
Operating position			Vertical and horizontal (see derating curve, page 2/58)	Vertical	
MTBF at 40°			> 100 000 h		
Connections	Series		Possible (see page 2/59)		
	Parallel		No	Possible (max. temperature 50° C)	
Dielectric strength	Input/output		3000 V/50 and 60 Hz 1 min	3000 V/50 and 60 Hz 1 min	
	Input/earth		2000 V/50 and 60 Hz 1 min	3000 V/50 and 60 Hz 1 min	
	Output/earth (and output/output)		500 V/50 and 60 Hz 1 min	500 V/50 and 60 Hz 1 min	
Input fuse incorporated			Yes (not interchangeable)		
Disturbance			EN 50081-2 (generic)	EN 50081-1	
	Conducted		EN 55011/EN 55022 class A (7 and 15 W) EN 55011/EN 55022 class B (30W)	EN 55011/EN 55022 class B	
	Radiated		EN 55011/EN 55022 class B		
Immunity			IEC 61000-6-2 (generic)		
	Electrostatic discharge		EN 61000-4-2 (4 kV contact/8 kV air)		
	Electromagnetic		EN 61000-4-3 level 3 (10 V/m)		
	Conducted interference		EN 61000-4-4 level 3 (2 kV) , EN 61000-4-5, EN 61000-4-6 level 3, EN 61000-4-8 level 4		
	Mains interference		EN 1000-4-11 (voltage drops and cuts)		

(1) Compatible input voltage, not indicated on the product.

Presentation : pages 2/52 and 2/53 | References : page 2/61 | Dimensions : page 2/62 | Schemes : page 2/63

Modicon TSX Micro automation platform

Power supplies for d.c. control circuits

Phaseo regulated switch mode power supplies

Technical characteristics

Type of power supply			ABL-7REQ24●	ABL-7UEQ24●	ABL-7UES24●	ABL-7UPS24●
Product certifications			–			cULus, c UL us
Conforming to standards						
	Safety		EN 60950			
	EMC		EN 50081-1, EN 50082-2			
	Low frequency harmonic currents		–			EN 61000-3-2
Input circuit						
LED indication			–			
Input voltages						
	Rated values	**V**	∿ 2 x 380…415	∿ 3 x 380…415	∿ 3 x 400…520	∿ 3 x 400…520
	Permissible values	**V**	∿ 2 x 340…460	∿ 3 x 340…460	∿ 3 x 360…550	∿ 3 x 360…550
	Permissible frequencies	**Hz**	50…60			
	Efficiency at nominal load		> 85 %	> 90 %		
	Current consumption					
	Ue = 400 V	**A**	0.65 (120 W)/1.2 (240 W)	0.75 (240 W)/1.5 (480 W)	0.7 (240 W)/1.2 (480 W)/1.7 (960 W)	
	Current at switch-on	**A**	<35			
	Power factor		0.6	0.55	0.7	0.7/0.9 (960 W)
2-phase operating mode		**V**	–	Relaxation if input voltage < ∿ 450		
Output circuit						
LED indication			Green LED			
Nominal output voltage (U out)		**V**	⎓ 24			
Nominal output current		**A**	5/10	10/20	5	10/20/40
Precision						
	Output voltage		Adjustable from 100 to 116%			
	Line and load regulation		1 % max			
	Residual ripple - interference	**mV**	< 200 (peak-peak)			
Micro-breaks						
	Holding time for I max and Ve min	**ms**	15	10		Between 8 and 13
Temporary overloads						
	Permissible inrush current (U out >19V)		See curves, page 2/59			
Protection						
	Short-circuit		Permanent/automatic or normal restart			
	Overload		1.20 In < 50 ms			
	Overvoltage	**V**	28.5 typical			
	Undervoltage	**V**	19 typical			
Operating and environmental characteristics						
Connections	Input	**mm²**	2 x 1.5…2.5 mm² + earth			
	Output	**mm²**	4 x 1.5…2.5 mm²	4 x 4…6 mm²	4 x 1.5…2.5 mm²	4 x 1.5…2.5 mm² + earth (240 W) 4 x 4…6 mm² + earth (480 W) 4 x 4…10 mm² + earth (960 W)
Ambient conditions	Storage temperature	**°C**	- 25…+ 70			
	Operating temperature	**°C**	0° C…+ 60° C			
	Maximum relative humidity		30…90 %			
	Degree of protection		IP 20 or IP XXB			
	Vibrations		Conforming to IEC 61131-2			
Operating position			Vertical			
MTBF			> 100 000 h			
Connections	Series		Possible			
	Parallel		See page 2/58			
Dielectric strength	Input/output		3750 V/50 and 60 Hz 1 min			
	Input/earth		3500 V/50 and 60 Hz 1 min			
	Output/earth (and output/output)		500 V/50 and 60 Hz 1 min			
Input fuse incorporated			No			
Disturbance	Conducted/radiated		EN 55011/EN 5022 - class B			
Immunity	Electrostatic discharge		EN 61000-4-2 (4 kV contact/8 kV air)			
	Electromagnetic		EN 61000-4-3 level 3 (10 V/m)			
	Conducted interference		EN 61000-4-4 level 3 (2 kV) , EN 61000-4-5, EN 61000-4-6 level3, EN 61000-4-8 level 4 (for ABL-7RE/RP)			
	Mains interference		EN 61000-4-11 (voltage drops and cuts)			

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Modicon TSX Micro automation platform

Power supplies for d.c. control circuits

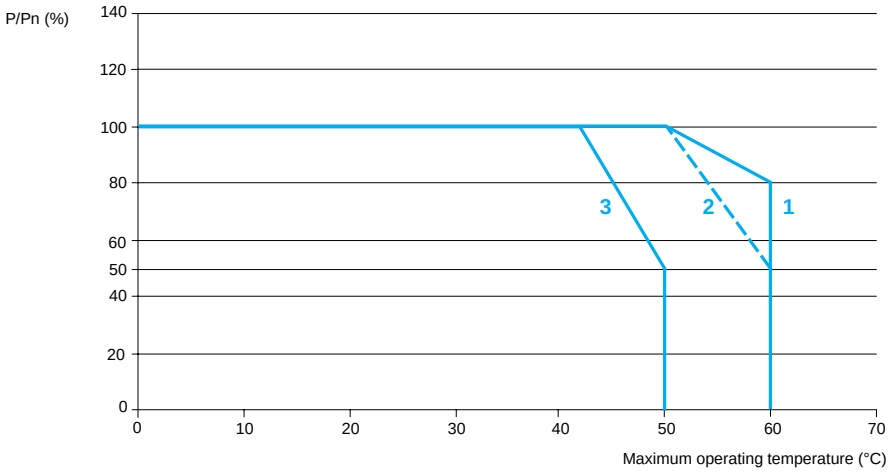
Phaseo regulated switch mode power supplies

Derating

The ambient temperature is a determining factor which limits the power that an electronic power supply can deliver continuously. If the temperature around the electronic components is too high, their life will be significantly reduced. Conversely, a power supply can deliver more than its nominal power if the ambient temperature remains largely below the rated operating temperature.

The rated ambient temperature for Phaseo power supplies is 50 °C. Above this, derating is necessary up to a maximum temperature of 60 °C.

The graph below shows the power (in relation to the nominal power) which the power supply can deliver continuously, according to the ambient temperature.



1 ABL-7RE, ABL-7RP, ABL-7U mounted vertically
2 ABL-7CEM mounted vertically
3 ABL-7CEM mounted horizontally

Derating should be considered in extreme operating conditions:

- intensive operation (output current permanently close to the nominal current, combined with a high ambient temperature),
- output voltage set above 24 V (to compensate for line voltage drops, for example),
- parallel connection to increase the total power.

General rules to be complied with

Intensive operation	See derating on above graph. Example for ABL-7RE: - without derating, from 0 °C to 50 °C, - derating of nominal current by 2%, per additional °C, up to 60 °C.
Rise in output voltage	The nominal power is fixed. Increasing the output voltage means that the current delivered must be reduced
Parallel connection to increase the power (except ABL-7CEM)	The total power is equal to the sum of the power supplies used, but the maximum ambient temperature for operation is 50 °C. To improve heat dissipation, the power supplies must not be in contact with each other

In all cases, there must be adequate convection round the products to ensure easier cooling. There must be a clear space of 50 mm above and below Phaseo power supplies and of 15 mm at the sides.

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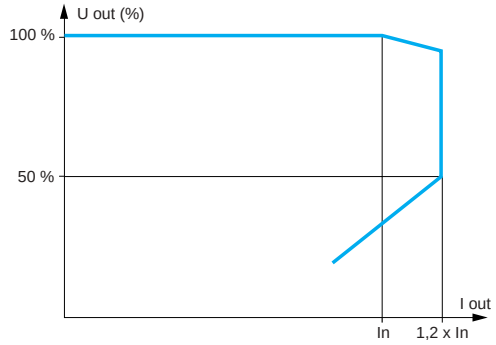
Modicon TSX Micro automation platform

Power supplies for d.c. control circuits

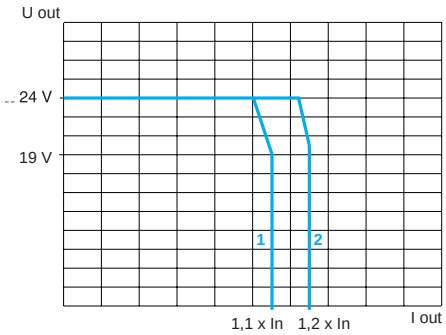
Phaseo regulated switch mode power supplies

Load limit

ABL-7CEM24●●●



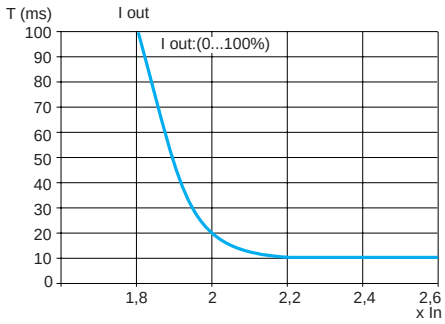
ABL-7RE24●●/ABL-7RP●●●●
ABL-7U●●24●●/ABL-7REQ●●●●



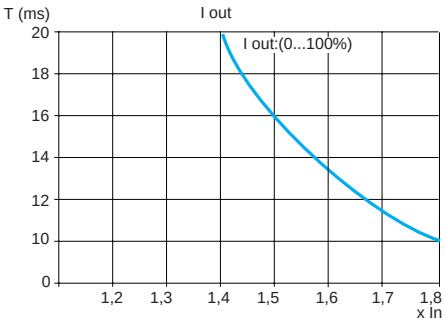
1 ABL-7RE24●●/ABL-7RP●●●●
2 ABL-7U●●24●●/ABL-7REQ●●●●

Temporary overloads

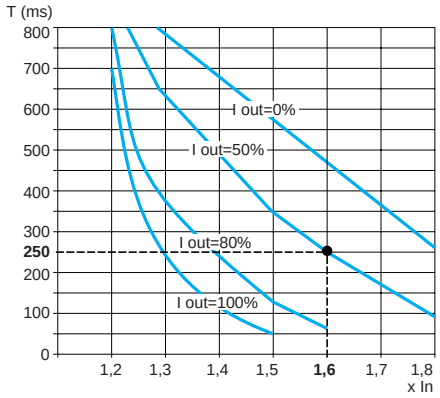
ABL-7CEM



ABL-7RE/ABL-7RP



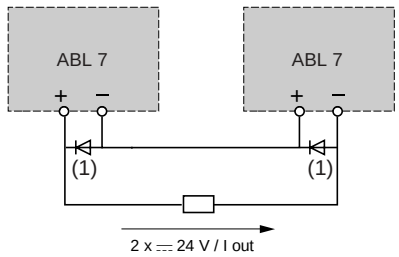
ABL-7U



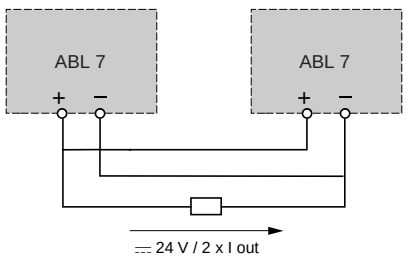
Example: For an ABL-7UPS24●●● power supply with 50 % loading. (I out = 50 %), this power supply can absorb a current peak of 1.6 x In for 250 ms with an output voltage ⩾ 19 V.

Series or parallel connection

Series connection



Parallel connection



Family	Series	Parallel
ABL-7CEM	2 products max *(1)*	No
ABL-7RE/RP	2 products max	2 products max
ABL-7U/REQ	2 products max	2 products max

(1) 2 Shottky diodes 2 A/100 V on ABL-7CEM only.

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Modicon TSX Micro automation platform

Phaseo regulated switch mode power supplies
Upstream protection

ABL-7CEM, ABL-7RE and ABL-7RP power supplies: protection of the power supply line

Type of mains supply	∿ 115 V single-phase			∿ 230 V single-phase		
Type of protection	Thermal-magnetic circuit-breaker		gG fuse	Thermal-magnetic circuit-breaker		gG fuse
	GB2	C60N		GB2	C60N	
ABL-7CEM24003	GB2-CD06	24183 MG24516 *(1)*	2A	GB2-CD07	24184 MG24517 *(1)*	2 A
ABL-7CEM24006	GB2-CD07	24184 MG24517 *(1)*	2A	GB2-CD08	24185 MG24518 *(1)*	2 A
ABL-7CEM24012	GB2-CD07	24184 MG24517 *(1)*	2A	GB2-CD08	24185 MG24518 *(1)*	2 A
ABL-7RE2402	GB2-●B07	MG24517 *(1)*	2A	GB2-DB06	MG24516 *(1)*	2 A
ABL-7RE2403	GB2-●B07	MG24517 *(1)*	2 A	GB2-DB06	MG24516 *(1)*	2 A
ABL-7RE2405	GB2-●B08	MG24518 *(1)*	4 A	GB2-DB07	MG17453 *(1)*	2 A
ABL-7RE2410	GB2-●B12	MG17454 *(1)*	6 A	GB2-DB08	MG24518 *(1)*	4 A
ABL-7RP2403	GB2-●B07	MG24517 *(1)*	2 A	GB2-DB07	MG24516 *(1)*	2 A
ABL-7RP2405	GB2-●B07	MG24517 *(1)*	2 A	GB2-DB07	MG24516 *(1)*	2 A
ABL-7RP2410	GB2-●B09	MG24519 *(1)*	4 A	GB2-DB07	MG24516 *(1)*	2 A
ABL-7RP4803	GB2-●B07	MG24517 *(1)*	2 A	GB2-DB07	MG24516 *(1)*	2 A

ABL-7REQ power supplies: protection of the power supply line

Type of mains supply	∿ 400 V 2-phase		
Type of protection	Thermal-magnetic circuit-breaker		gG fuse
2-pole	GB2-DB●●	C60N	
ABL-7REQ24050	DB07	24100	10 A
ABL-7REQ24100	DB08	24100	10 A

ABL-7UEQ, ABL-7UES and ABL-7UPS power supplies: protection of the power supply line

Type of mains supply	∿ 400…480 V 3-phase		
Type of protection	Thermal-magnetic circuit-breaker		gG fuse
2-pole	GV2-ME●●	C60N	
ABL-7UEQ24100	GV2-ME08 (1)	24212	4 A
ABL-7UEQ24200	GV2-ME08 (1)	24213	6 A
ABL-7UES24050	GV2-ME08 (1)	24210	2 A
ABL-7UPS24100	GV2-ME08 (1)	24210	2 A
ABL-7UPS24200	GV2-ME08 (1)	24211	3 A
ABL-7UPS24400	GV2-ME08 (1)	24212	4 A

(1) UL certified circuit-breaker.

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Modicon TSX Micro automation platform

Power supplies for d.c. control circuits

Phaseo regulated switch mode power supplies

ABL-7CEM

ABL 7CEM single-phase regulated switch mode power supplies

Mains input voltage 47...63 Hz	Output voltage	Nominal power	Nominal current	Auto-protect reset	Conforming to standard EN 61000-3-2	Reference	Weight
V	⎓ V	W	A				kg
∿ **100…240** single-phase wide range ⎓ **110…220** *(1)*	24	7	0.3	auto	no	**ABL-7CEM24003**	0.150
		15	0.6	auto	no	**ABL-7CEM24006**	0.180
		30	1.2	auto	no	**ABL-7CEM24012**	0.220

ABL-7RE2405
ABL-7RP2405
ABL-7RP4803

ABL-7RE single-phase regulated switch mode power supplies

Mains input voltage 47...63 Hz	Output voltage	Nominal power	Nominal current	Auto-protect reset	Conforming to standard EN 61000-3-2	Reference	Weight
V	⎓ V	W	A				kg
∿ **100…240** single-phase wide range	24	48	2	auto	no	**ABL-7RE2402**	0.520
		72	3	auto	no	**ABL-7RE2403**	0.520
		120	5	auto	no	**ABL-7RE2405**	1.000
		240	10	auto	no	**ABL-7RE2410**	2.200

ABL-7RP single-phase regulated switch mode power supplies

Mains input voltage 47...63 Hz	Output voltage	Nominal power	Nominal current	Auto-protect reset	Conforming to standard EN 61000-3-2	Reference	Weight
V	⎓ V	W	A				kg
∿ **100...240** single-phase wide range ⎓ **110...220** *(1)*	12	60	5	auto/man	yes	**ABL-7RP1205**	1.000
	24	72	3	auto/man	yes	**ABL-7RP2403**	0.520
		120	5	auto/man	yes	**ABL-7RP2405**	1.000
		240	10	auto/man	yes	**ABL-7RP2410**	2.200
	48	144	2.5	auto/man	yes	**ABL-7RP4803**	1.000

ABL-7REQ

ABL-7REQ 2-phase regulated switch mode power supplies

Mains input voltage 47...63 Hz	Output voltage	Nominal power	Nominal current	Auto-protect reset	Conforming to standard EN 61000-3-2	Reference	Weight
V	⎓ V	W	A				kg
∿ **380…415**	24	120	5	auto/man	no	**ABL-7REQ24050**	0.850
		240	10	auto/man	no	**ABL-7REQ24100**	1.200

ABL-7UPS

ABL-7U 3-phase regulated switch mode power supplies

Mains input voltage 47...63 Hz	Output voltage	Nominal power	Nominal current	Auto-protect reset	Conforming to standard EN 61000-3-2	Reference	Weight
V	⎓ V	W	A				kg
∿ **3x380…415**	24	240	10	auto/man	no	**ABL-7UEQ24100**	1.200
		480	20	auto/man	no	**ABL-7UEQ24200**	2.100
∿ **3x400…520**	24	120	5	auto/man	no	**ABL-7UES24050**	1.300
		240	10	auto/man	yes	**ABL-7UPS24100**	1.300
		480	20	auto/man	yes	**ABL-7UPS24200**	2.300
		960	40	auto/man	yes	**ABL-7UPS24400**	4.500

(1) Compatible input voltage, not indicated on the product.

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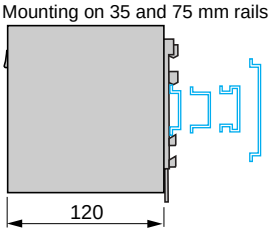
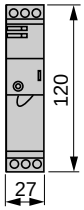
Modicon TSX Micro automation platform
Power supplies for d.c. control circuits

ABL-7RE24●●/ABL-7RP●●●●

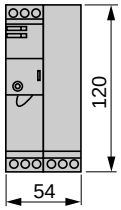
Common side view
Mounting on 35 and 75 mm rails



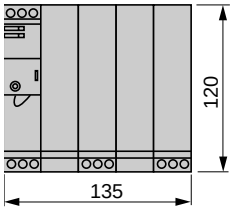
ABL-7RE2402/2403
ABL-7RP2403



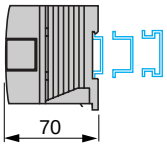
ABL-7RE2405
ABL-7RP1205/2405/4803



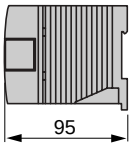
ABL-7RE2410
ABL-7RP2410



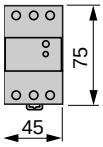
ABL-7CEM24●●●
ABL-7CEM24003



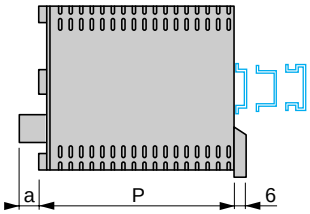
ABL-7CEM24006/
ABL-7CEM24012

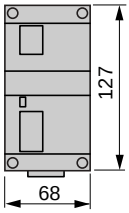


Common front view

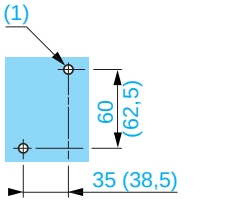


ABL-7REQ24●●●/ABL-7UEQ24100/ABL-7UES24050/
ABL-7UPS24100





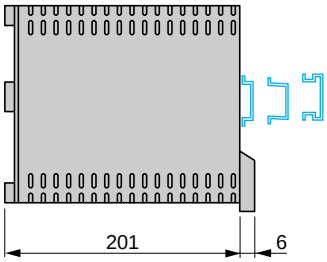
Panel mounting

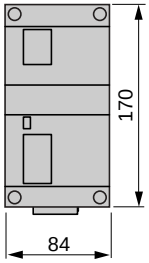


(1) 2 x M4 or 2 x Ø4.5

ABL-	P mm	a mm
7REQ24050	130	–
7REQ24100	154	–
7UEQ24100	154	–
7UES24050	171	15
7UPS24100	171	15

ABL-7UEQ24200





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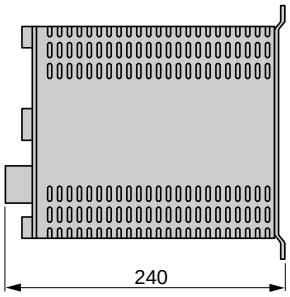

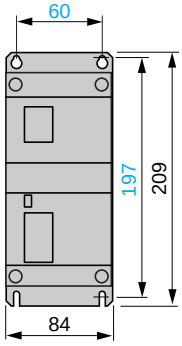

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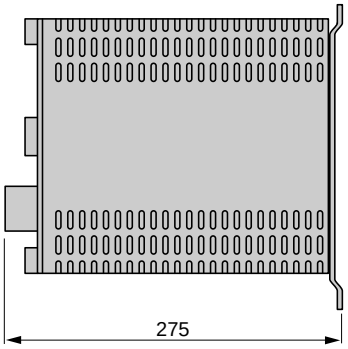

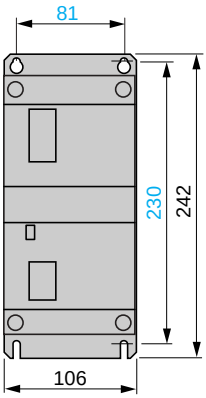

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Characteristics:
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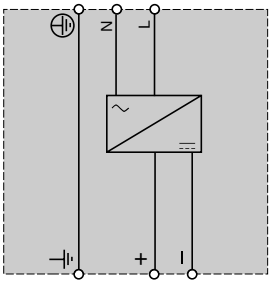
page 2/61

Schemes:
page 2/63

Modicon TSX Micro automation platform
Power supplies for d.c. control circuits

ABL-7RE2402/2403



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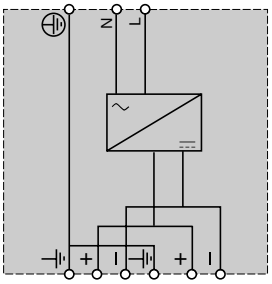

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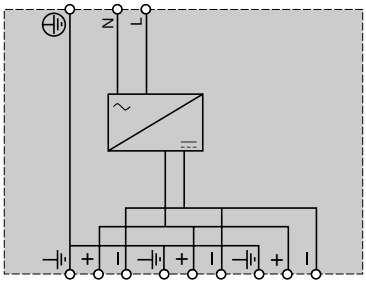

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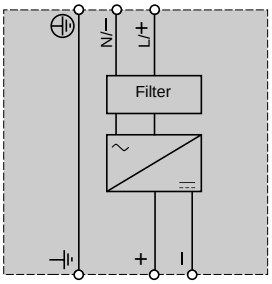

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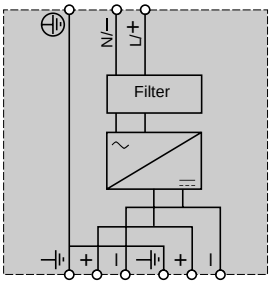

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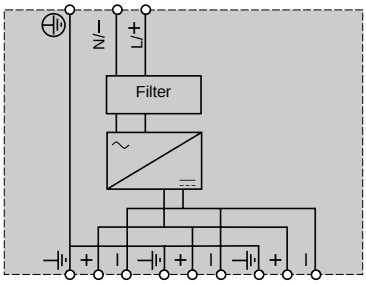
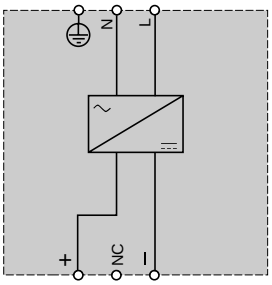
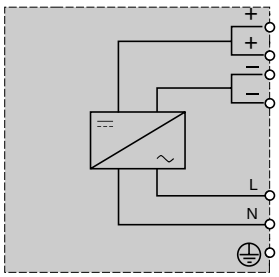


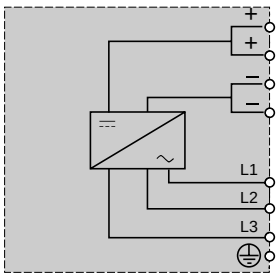
ABL-7CEM24●●●



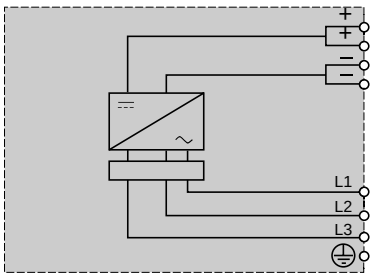
ABL-7REQ24●●●



ABL-7UE●●●●●



ABL-7UP●●●●●



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3 - Application-specific modules

3.1 - Integrated analogue channels and analogue I/O modules

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- TSX A●Z integrated channels and analogue I/O modules . . . . . *page 3/4*
- Process control of semi-continuous processes . . . . . *page 3/10*

3.2 - Integrated counter channels and counter/positioning modules

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- TSX CTZ ●A integrated channels and counter modules . . . . . *page 3/16*
- TSX CTZ 1B absolute encoder positioning module. . . . . *page 3/22*

3

Modicon TSX Micro automation platform

Integrated analogue channels and analogues I/O modules

Applications		Integrated analogue inputs/outputs	Analogue inputs		
		1			
Type on inputs/outputs		High level inputs Voltage outputs	High level inputs		High level inputs thermocouples, temperature probes
Type		Voltage / Current	Voltage	Current	Multirange
Range		0...10 V / 0...20 mA 4...20 mA	± 10 V 0...10 V	0...20 mA 4...20 mA	B, E, J, K, L, N, R, S, T,U, Pt 100 , Ni 1000 (2 or 4 wire) ±10 V, 0...10,V,1...5V 0...20 mA,4...20 mA (external shunt supplied))
Modularity		8 input channels 1 output channel	8 channels		4 channels
Isolation	Between channels	Common point			⎓ 30 V (differential channels)
	Between bus and channels	Common point	∿ 1000 V rms.		∿ 500 V rms.
	Between channels and earth	Common point	∿ 1000 V rms.		∿ 500 V rms.
Acquisition time		32 ms (normal scan), 4 ms per channel used (fast scan)			520 ms
Response time	Inputs	User-definable filtering 0…4.1 s (0 in fast scan)			User-definable filtering 0...66.3 s
	Outputs	50 µs	–		
Resolution		8 bits	11 bits + sign	12 bits	16 bits
Connection		Via 15-pin SUB-D connector or Telefast 2 (ABE 7CPA01)	Via screw terminals (supplied with module)		
Type of modules		1 I/O analogue inputs integrated in **TSX 37 22**	**TSX AEZ 801**	**TSX AEZ 802**	**TSX AEZ 414**
Pages		3/4	3/9		

Analogue outputs			Analogue inputs/outputs		Remote analogue inputs/outputs (200 m)	
Voltage outputs		Voltage outputs/current		High level inputs High level outputs		High level inputs Isolated outputs	
Voltage		Voltage	Current	Voltage	Current	Voltage	Current
± 10 V		± 10 V	0...20 mA 4...20 mA	± 10 V 0...10 V	0...20 mA 4...20 mA	± 10 V 0...10 V	0...20 mA 4...20 mA
4 channels		2 channels		4 inputs/2 outputs		3 input channels/1 output channel, 3 modules max.	
Common point						∿ 1000 V rms. (betwenn inputs and outputs)	
∿ 1000 V rms.		∿ 1500 V rms.		–			
∿ 1000 V rms.		∿ 1500 V rms.		∿ 1000 V rms.		∿ 2000 V rms.	
–				16 ms (normal scan), 4 ms per channel used (fast scan)		1.5 ms per channel	
–				User-definable filtering 0…4.1 s (0 en cycle rapide)		–	
400 µs		300 µs	400 µs	400 µs		–	
11 bits + sign			11 bits	11 bits, + sign (with range ± 10 V)		7 bits + sign/11 bits + sign depending on configuration	
						Via integrated screw terminal block	
TSX ASZ 401		**TSX ASZ 200**		**TSX AMZ 600**		**TSX AMN 400●**	
3/9						–	

Modicon TSX Micro automation platform

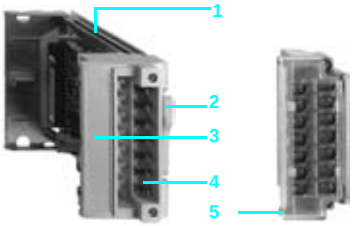
Integrated analogue channels and analogue I/O modules

Presentation

TSX Micro PLCs provide three ways of performing analogue processing:
■ With input half format TSX AEZ ●●● modules, and TSX ASZ ●●● analogue outputs modules and TSX AMZ 600 analogue I/O installed in the available slots (base or mini extension rack).
■ Or by using the analogue I/O integrated into TSX 37 22 PLC bases.
■ Or by using Nano remote analogue I/O extension modules (see pages 2/25 and 2/26).
■ The maximum number of analogue modules in a TSX Micro PLC configuration is:
□ 2, for a TSX 37 05/08/10 configuration,
□ 4, for a TSX 37 21/22 configuration (2 TSX ASZ 200/TSX AMZ 600 modules maximum in the base).
These analogue input or output modules are always connected via screw terminal blocks.

Description

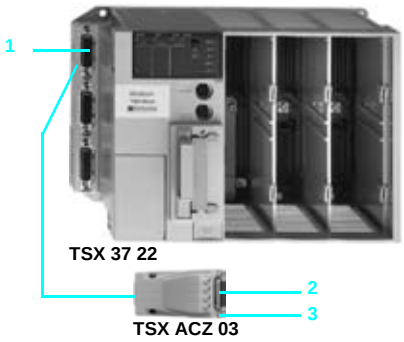
TSX AEZ/ASZ/AMZ analogue I/O modules



TSX AEZ/ASZ/AMZ analogue I/O modules comprise:
1 Rigid metal casing.
2 Locking system for fixing the module in its slot. This system can only be accessed when the screw terminal block is removed.
3 Module reference label.
4 Connector for fitting screw terminal block.

Connection equipment supplied with each module:
5 TSX BLZ H01 removable screw terminal block for connection of analogue sensors and actuators.

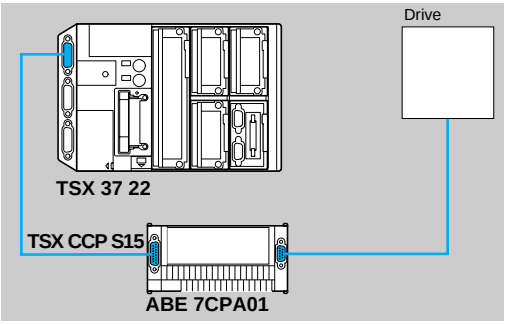
Integrated analogue I/O



Eight 0...10 V inputs and one 0...10 V output are integrated in TSX 37 22 PLC bases. These integrated channels can receive the TSX ACZ 03 adjustment/adaptor module, which enables:
■ The use of 4 potentiometers for the user to adjust the 4 application constants (setpoint, threshold, etc.).
■ Conversion of 0...10 V inputs to 0...20 mA or 4...20 mA inputs.
■ Conversion of 8 0...10 V inputs to 8 ⎓ 24 V discrete inputs.

1 A 15-pin SUB-D type connector for connecting the analogue sensors/pre-actuators or mounting the TSX ACZ 03 adaptor.
2 A 15-way SUB-D type connector for connecting the analogue sensors/preactuators or the discrete sensors.
3 Potentiometers for adjusting the first 4 input channels.

Connection principle for integrated analogue channels using the Telefast 2 pre-wired system



The Telefast 2 pre-wired system facilitates installation of modules by providing access to inputs via screw terminal blocks.
Connection is via a TSX CCP S15 ●●● shielded cable (length 0.5 to 2.5 m) fitted with SUB-D type connectors at each end.

The ABE 7CPA01 wiring connection base is used to connect the following:
■ 8 analogue inputs (or 8 ⎓ 24 V discrete inputs with TSX ACZ 03 adaptor module).
■ 1 analogue output.
■ 1 ⎓ 10 V reference output for using 4 external potentiometers for the last 4 channels (4.7 kΩ, precision ± 20 % maximum), if required.

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Modicon TSX Micro automation platform

Integrated analogue channels and analogue I/O modules

Functions

Analogue I/O modules do not require an external power supply: energy is provided via the TSX Micro PLC power supply. For maximum reliability, these modules do not contain any electromechanical components: there are no multiplexing relays, no configuration switches, and no adjustment potentiometers. These modules only contain solid state components, and are configured using PL7 Micro or PL7 Junior or PL7 Pro software.

TSX AEZ 801/802 analogue input modules

These modules (TSX AEZ 801 and TSX AEZ 802) are analogue input modules, with 8 high level multirange voltage or current channels. For each input, they offer a choice between + 10 V or 0...10 V (TSX AEZ 801) and 0...20 mA or 4...20 mA (TSX AEZ 802) ranges, according to the selection made in the configuration.

The various functions of the TSX AEZ 801/802 analogue input modules are as follows:
- Scanning of input channels used by solid state multiplexing (normal or fast) and acquisition of values.
- Analogue/digital conversion (11 bits + sign or 12 bits) of input signals.

The processing performed by the PLC processor, in addition to these functions:
- Monitoring of input overshoots.
- Filtering measurements.
- Converting input measurements to user format for display in directly readable units.

TSX AEZ 414 analogue input modules

The TSX AEZ 414 module is an analogue input module with 4 different channels. Depending on the selection made in configuration and for each channel, it provides the thermocouple, temperature probe or high level voltage and current ranges via external resistors supplied with the module (see page 3/7 for the various ranges).

The functions of the TSX AEZ 414 analogue input module are as follows:
- Selection of the input range of each channel.
- Scanning of input channels by multiplexing and acquisition of values.
- Analogue/digital conversion (16 bits) of input signals.
- Monitoring of input value overshoots and sensor connections.
- Automatic linearization for Pt 100 and Ni 1000 temperature probes.
- Automatic linearization and internal or external cold junction compensation for thermocouple ranges.
- Converting input measurements to user format for display in directly readable units (physical units or user range).
- Detection of sensor connection faults for thermocouple ranges.

TSX ASZ 401/200 analogue output modules

The TSX ASZ 401 module provides 4 common point analogue outputs (+ 10 V or 0...10 V). The TSX ASZ 200 module offers a choice between + 10 V, 0...20 mA and 4...20 mA ranges for both the common point outputs.

The various functions of the TSX ASZ 401/200 analogue output modules are as follows:
- The acceptance of digital values corresponding to analogue values obtained as output. These values are calculated by the PLC task to which the channels are assigned (MAST or FAST).
- Processing dialog faults with the PLC and setting the outputs to fallback state (value 0 or maintained).
- Selection of the range for each output: voltage or current (module TSX ASZ 200).
- Analogue/digital conversion (11 bits + sign) of output values.

Modicon TSX Micro automation platform

Integrated analogue channels and analogue I/O modules

TSX AMZ 600 analogue mixed I/O module *(1)*

TSX AMZ 600 provides 6 common point channels, high level multirange voltage (0...10 V, ± 10 V)/current (0...20 mA, 4...20 mA) of which:
- 4 input channels.
- 2 output channels.

The 4 input channels guarantee the following functions:
- Scanning of input channels used by solid state multiplexing (normal or fast) and acquisition of values.
- Analogue/digital conversion (11 bits + sign or 12 bits) of input signals.

The processing performed by the PLC processor, in addition to the above functions is:
- Monitoring of input overshoots.
- Filtering measurements.
- Converting input measurements to user format for display in directly readable units.

The 2 output channels guarantee the following functions:
- The acceptance of digital values corresponding to analogue values obtained as output. These values are calculated by the PLC task to which the channels are assigned (MAST or FAST).
- Processing dialog faults with the PLC and setting the outputs to fallback state (value 0 or maintained).
- Selection of the range for each output: voltage or current (module TSX ASZ 200).
- Analogue/digital conversion (11 bits + sign) of output values.

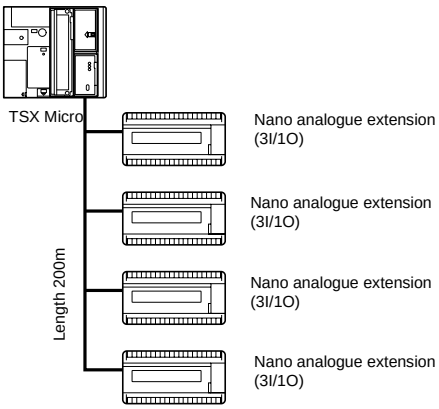
Integrated analogue channels on TSX 37 22 PLC bases

TSX 37 22 PLCs integrate as standard a high level analogue interface with 8 input channels 0...10 V and one 0...10 V output channel. This interface enables the PLC to meet the requirements of applications which require analogue processing but where the performance criteria and characteristics of an analogue input module cannot be justified.

The various functions of integrated analogue channels are as follows:
- Scanning of input channels by solid state multiplexing (normal or fast) and acquisition of values.
- Analogue/digital conversion (8 bits) and filtering of input measurements.
- Updating the digital output value by the processor.
- Analogue/digital conversion of the output value.
- Processing dialog faults with the PLC and in particular setting the output to fallback state.
- Supplying a reference voltage for potentiometers, either external or included in the TSX ACZ 03 adjustment/adaptor module.

Remote extension of analogue I/O modules

It is possible to link the TSX STZ 10 I/O extension module (installed in position 4 of the base) to up to 3 high level Nano analogue I/O modules (3 input channels/1output channel per module).



(1) Requires a PLC with a version ⩾5.0 operating system. Installation of the TSX AMZ 600 involves version ⩾4.2 PL7 Micro/Junior/Pro software.

Presentation, description: page 3/4
Characteristics: pages 3/7 and 3/8
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Modicon TSX Micro automation platform

Integrated analogue channels and analogue I/O modules

Characteristics of I/O modules

Type of input modules			TSX AEZ 801	TSX AEZ 802	TSX AEZ 414
Number of channels			8		4
Input ranges			**± 10 V 0…10 V**	**0…20 mA 4...20 mA**	**Thermocouples, temperature probes, high level (see range below)**
Analogue/digital conversion		**bits**	11 + sign	12	16
Acquisition period	Normal cycle	**ms**	32		520
	Fast cycle	**ms**	4 x No. of channels used		–
Measurement filtering			Digital of the first order with modifiable filtering coefficient		
Hardware filtering	1st order		Cut-off freq. # 33 Hz		Cut-off freq. # 169 Hz (thermocouples) *(1)*
Maximum error	At 25 °C	**% FS**	0.16	0.15	see below
	0...60 °C	**% FS**	0.46	0.4	see below
Maximum temperature drift		**%/10 °C**	0.068	0.054	0.08 (voltage), 0.1 (current)
Input independence			2.2 MΩ	250 MΩ	10 MΩ
Isolation	Betw. chann. and bus	**V rms**	1000		500
	Betw. chann. and earth	**V rms**	1000		500
	Betw. channels		Common point		⎓ 30 V (differential inputs)
Maximum excess -voltage on inputs		**V**	± 30	± 7.5	± 30
Consumption		**mA**	See page 6/4		

Input ranges for TSX AEZ 414

Voltage/current				± 10 V	0...10 V	0...5 V	1...5 V	0…20 mA	4…20 mA				
Maximum error	At 25 °C		**% FS**	0.03	0.03	0.04	0.06	0.18	0.22				
	0...60 °C		**% FS**	0.30	0.30	0.33	0.40	0.47	0.59				
Temperature probe				**Pt 1000**		**Ni 1000**							
Maximum error	At 25 °C		**°C**	0.7 + 7.9 10^{-4} x M *(2)*		0.2							
	0...60 °C		**°C**	1.7 + 37.5 10^{-4} x M *(2)*		0.7							
Thermocouple				**B**	**E**	**J**	**K**	**L**	**N**	**R**	**S**	**T**	**U**
Maximum error *(3)*	At 25 °C	Ext. c.	**°C**	3.6	1.3	1.6	1.7	1.6	1.5	2.6	2.9	1.6	1.3
		Int. c.	**°C**	3.6	3.8	4.6	4.8	4.6	3.7	4.2	4.6	4.6	3.8
	0...60 °C	Ext. c.	**°C**	19.1	4.5	5.4	6.4	5.2	6.1	14.1	16.2	5.5	4.7
		Int. c.	**°C**	19.1	5.5	6.9	7.7	6.8	7	14.5	16.6	7.1	5.9

Analogue output module characteristics

Type of output modules			TSX ASZ 401		TSX ASZ 200	
Number of channels			4		2	
Output ranges			**± 10 V**	**0...10 V**	**± 10 V**	**0…20 mA, 4…20 mA,**
Digital/analogue conversion		**bits**	11 + sign	11	11 + sign	11
Response time		**µs**	400		300	400
Maximum resolution			5 mV		6 mV	6 µA
Output load		**KΩ**	> 2		> 1	< 0.6
Maximum error	At 25 °C	**% FS**	0.25	0.15	0.50	0.57
	At 60 °C	**% FS**	0.65	0.55	0.58	0.83
Type of protection			Permanent short-circuit			Perm. open circuit
Maximum voltage without damage		**V**	± 30			
Maximum temperature drift		**%/10 °C**	0.096		0.083	0.107
Isolation	Betw. chann. and bus	**V rms**	1000		1500	
	Betw. chann. and earth	**V rms**	1000		1500	
	Betw. channels		Common point			
Consumption			See page 6/4			

(1) Cut-off frequency # 10.8 kHz (temperature probes), # 255 Hz (high level).
(2) Precise measurements are given as a function of measurement M for 4-wire temperature probe cabling.
(3) Ext. c: with external cold junction compensation; Int. c: with internal cold junction compensation.

3
3.1

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References: page 3/9

Modicon TSX Micro automation platform

Integrated analogue channels and analogue I/O modules

Analogue input characteristics (mixed module and integrated channels)

Type of input modules			TSX AMZ 600				Integrated in the TSX 37-22	
Number of channels			4				8	
Input ranges			**± 10 V**	**0...10 V**	**0...20 mA**	**4...20 mA**	**0...10 V 0...20 mA/ 4...20 mA** *(1)*	
Analogue/digital conversion		**bits**	11 + sign	11	11	11 (from 0 to 20 mA)	8	
Resolution			6 mV (3800 pts)	6 mV (1900 pts)	12 µA (1900 pts)	12 µA (1500 pts)	–	
Acquisition period	Normal cycle	**ms**	16				32	
	Fast cycle	**ms**	4 x No. of channels used					
Measurement filtering			Digital of the first order with 6 filtering values					
Hardware filtering	1st order		Cut-off freq. # 33 Hz				Cut-off freq. # 600 Hz	
Maximum error							Voltage	Current
	At 25 °C	**% FS**	0.16 (16 mV)	0.10 (10mV)	0.15 (30 µA)	0.15 (20 µA)	1.8	2.8
	0...60 °C	**% FS**	0.46 (46 mV)	0.46 (46 mV)	0.40 (80 µA)	0.40 (80 µA)	4	5.6
Temperature drift		**%/10 °C**	0.068		0.054		0.75	0.8
Input impedance			2.2 MΩ		250 Ω		54 kΩ	499 kΩ
Isolation	Betw. chann. and bus	**V rms**	1000				None	
	Betw. chann. and earth	**V rms**	1000				None (0 V w.r.t. earth)	
	Betw. channels		Common point				Common point	
Maximum excess -voltage on inputs		**V**	± 30		± 7.5		+30/-15	± 15
Consumption		**mA**	See page 6/4					

Analogue output characteristics (mixed module and integrated channel)

Type of output modules			TSX AMZ 600				Integrated in: TSX 37-22
Number of channels			2				1
Output ranges			**± 10 V**	**0...10 V**	**0...20 mA**	**4...20 mA**	**0...10 V**
Analogue/digital conversion		**bits**	11 + sign	11	11	11 (from 0 to 20 mA)	8
Response time		**µs**	400				50
Maximum resolution			6 mV (3800 pts)	6 mV (1900 pts)	12 µA (1900 pts)	12 µA (1500 pts)	40 mV
Output load		**KΩ**	> 2 (10 mA max)		< 0.6 (12 mA max)		> 5
Maximum error	At 25 °C	**% FS**	0.5 (50 mV)		0.57 (114 µA)		1.5
	At 60 °C	**% FS**	0.58 (58 mV)		0.83 (166 µA)		3
Type of protection			Permanent short-circuit		Perm. open circuit		Permanent short-circuit
Maximum voltage without damage		**V**	± 30		± 7.5		Short-circuit on 0 V or on 5 V
Maximum temperature drift		**%/10 °C**	0.083		0.107		0.5
Isolation	Betw. chann. and bus	**V rms**	1000				None
	Betw. chann. and earth	**V rms**	1000				None (0 V w.r.t. earth)
	Betw. channels		Common point				–
Consumption			See page 6/4				

Characteristics of 10 V reference output ⎓ for potentiometers *(2)*

Output current		**mA**	–	10
Maximum error	At 25 °C	**mV**	–	390
	At 60 °C	**mV**	–	600
Maximum temperature drift		**%/10 °C**	–	1
Type of protection			–	Permanent short-circuit

(1) With the **TSX ACZ 03** *adjustment/adaptor module. For specifications of 8 ⎓ 24 V discrete inputs, see page 1/9.*
(2) Output for a maximum of 4 adjustment potentiometers (internal or external).

Presentation, description: page 3/4
Functions: pages 3/5 and 3/6
References: page 3/9

Modicon TSX Micro automation platform

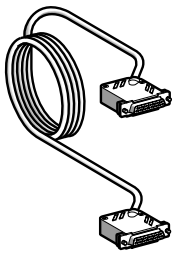
Integrated analogue channels and analogue I/O modules

TSX AEZ 802

TSX ASZ 401

TSX ASZ 200/AMZ 600

ABE 7CPA01



TSX CCP S15

TSX BLZ H01

Analogue input modules

Type of input	Number of channels	Range of input signal	Resolution	Reference (1)	Weight kg
High level analogue with common point	8	± 10 V, 0...10 V	11 bits + signal	**TSX AEZ 801**	0.200
		0...20 mA, 4...20 mA	12 bits	**TSX AEZ 802**	0.200
Isolated high level analogue thermocouples, temperature probes	4	± 10 V, 0...10 V, 0...5 V, 1...5 V, 0...20 mA, 4...20 mA, B, E, J, K, L, N, R, S, T, U, Pt 100, Ni 1000 (2 or 4-wire)	16 bits	**TSX ASZ 414**	0.210

Analogue output modules

Type of outputs	Number of channels	Range of outputs signals	Resolution	Reference (1)	Weight kg
Analogue with common point	4	± 10 V, 0...10 V	11 bits + signal	**TSX ASZ 401**	0.200
	2	± 10 V, 0...20 mA, 4...20 mA	11 bits + signal or 12 bits	**TSX ASZ 200**	0.200

Analogue mixed I/O module

Type of input	Type of outputs	Range of I/O	Resolution	Reference (1)	Weight kg
4 high level analogs with common point	2 high level analogs with common point	± 10 V, 0...10 V 0...20 mA 4...20 mA	11 bits + signal or 12 bits	**TSX AMZ 600**	0.240

Accessories and connection cable

Description	Use	Functions performed	Reference	Weight kg
Adaptation module	Analogue I/O channels integrated in TSX 37 22 (direct connection)	Adjustment of constants using 4 integrated potentiometers. Adaptation to 0...20 mA current, 4...20 mA, adaptation to 8 discrete ⎓ 24 V channels	**TSX ACZ 03**	0.075
SUB-D type connectors (lots of 2)	TSX 37 22 integrated analogue and counter I/O channels	15-pin SUB-D type connector	**TSX CAP S15**	0.050
Telefast 2 connection base	Integrated analogue I/O channels TSX 37 22	Connection via screw terminal block with integrated channels	**ABE 7CPA01**	0.300

Description	For connection		Length m	Reference (1)	Weight kg
	From	to			
Cable (section 0.205 mm ^{2})	Integrated analogue I/O (15-pin SUB-D type connector)	Base ABE 7CPA01 (15- pin SUB-D type connector)	0.5	**TSX CCP S15 050**	0.110
			1	**TSX CCP S15 100**	0.160
			2.5	**TSX CCP S15**	0.300

Replacement parts

Description	Functions performed	Reference	Weight kg
Connection terminal block	Connection to terminal screw block (supplied with module TSX A●Z)	**TSX BLZ H01**	0.060
Batch of 4 resistors (supplied with module TSX AEZ 4 14)	Adaptation for 250 Ω ± 0.1 % current range for TSX AEZ 414 module	**TSX AAK2**	0.020

(1) Product supplied with TSX BLZ H01 screw connection terminal block.

Presentation, description: page 3/4
Functions: pages 3/5 and 3/6
Characteristics: pages 3/7 and 3/8

Modicon TSX Micro automation platform

Process control of semi-continuous processes

Presentation

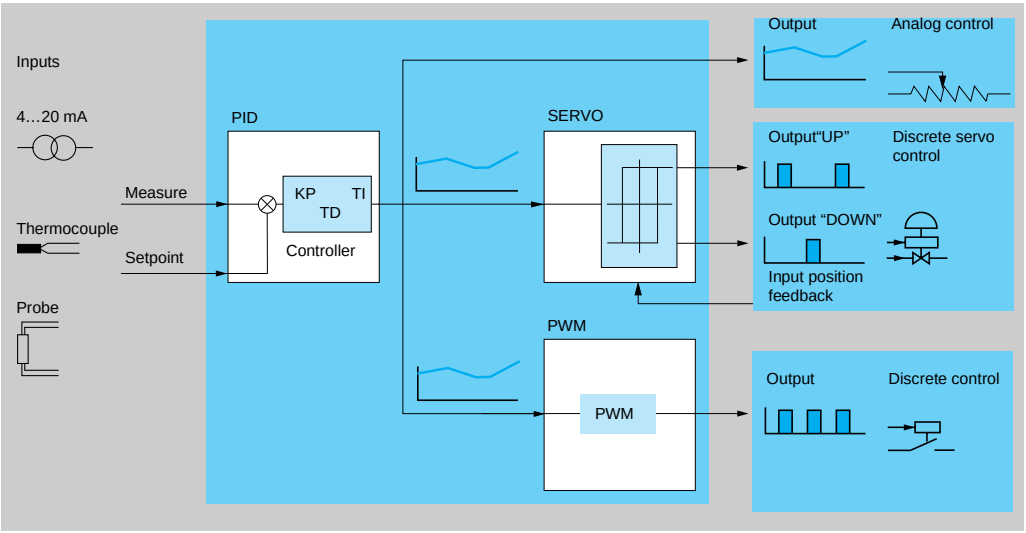
The CCX 17 industrial operator panel displays and controls all the PID controller parameters which can be modified **without having to program the TSX Micro or Premium PLC application program.**

The PID_MMI man-machine interface function, included in the PL7 Junior software, provides an application program on the CCX 17 industrial operator panel for controlling and adjusting PID loops.
It enables the CCX 17 operator panel to manage:
- Selection of a PID loop.
- Display and control of that PID loop.
- Adjustment of the PID loop parameters.

This man-machine interface function is easily installed for any man-machine interface application on the CCX 17 operator panel. The three preconfigured screens enable the required operations to be performed on any PID controller.

Process control function

The CCX 17 operator panel can manage up to 9 PID controllers. Installation of the man-machine interface function is simple and is performed as follows:
- The PID_MMI function is activated on each scan of the TSX Micro or Premium PLC (unconditional call-up).
- A single call-up of the PID_MMI function manages all the PID loops in the TSX Micro or Premium PLC -application.



The **PID** function sets a PID serial/parallel algorithm and works out the control signal on the basis of:
- A measurement sampled by an input module.
- The setpoint value fixed either by the operator or by the program.
- The values of the various controller parameters (KP, TI, TD, sampling period, etc).

The **analogue control** signal from the controller can be processed:
- Either directly by a TSX Micro or Premium PLC analogue output module connected to the actuator.
- Or via the PWM or SERVO adaptations depending on the type of actuator for discrete control.

The **PWM** function provides the required adaptation to control a pulse width modulation actuator via a discrete output.
The **SERVO** function provides the required adaptation to control a motorised actuator with “UP/DOWN” control provided by a discrete output. It has a position feedback input to execute servo control.
These two functions are installed in cascade on the PID controller function.

Description:
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Characteristics:
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References:
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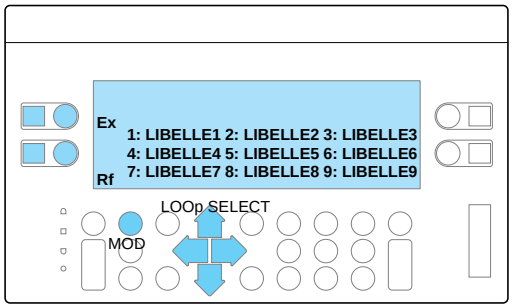
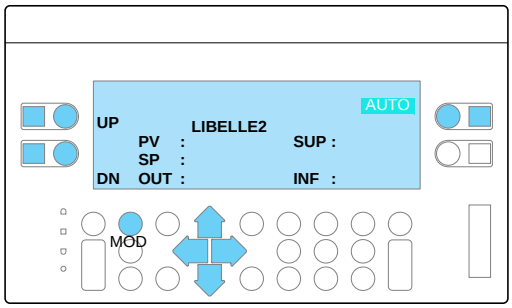
Modicon TSX Micro automation platform

Process control of semi-continuous processes

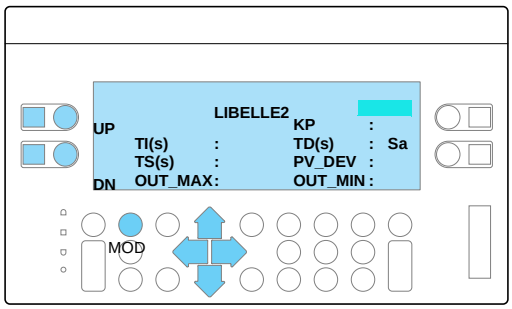
Control and man-machine interface functions



PID loop selection screen



PID loop control screen



PID loop adjustment screen

The CCX 17 industrial operator panel displays and controls all the PID controller parameters which can be modified **without having to program the Micro or Premium PLC application program.**

The PID_MMI man-machine interface function, included in the PL7 Junior software, provides an application program on the CCX 17 industrial operator panel for controlling and adjusting PID loops.
It enables the CCX 17 operator panel to manage:
- Selection of a PID loop.
- Display and control of that PID loop.
- Adjustment of the PID loop parameters.

This man-machine interface function is easily installed for any man-machine interface application on the CCX 17 operator panel. The three preconfigured screens enable the required operations to be performed on any PID controller.

The CCX 17 operator panel can manage up to 9 PID controllers. Installation of the man-machine interface function is simple and is performed as follows:
- The PID_MMI function is activated on each scan of the TSX Micro or Premium PLC (unconditional call-up).
- A single call-up of the PID_MMI function manages all the PID loops in the TSX Micro or Premium PLC -application.

Characteristics

Function PID		Type	Universal, serial/parallel structure				
		Maximum number	Limited by the number of analogue modules and by the memory data capacity				
		Sampling period	Adjustable from 10 ms to 5 min 20 s				
		Operating mode	Smooth changeover manual/automatic				
		Measurement	Direct measurement in 0/10 000 format				
		Control	Continuous output in 0/10 000 format				
		Proportional gain	Adjustable from - 100...+ 100				
		Integral action	Time adjustable from 0…2000 s. Integral saturation. Pure integration operation				
		Derivative action	Time adjustable from 0…1000 s on measurement or deviation				
		Execution time (ms)	**TSX 37 05/08/10**	**TSX 37 21/22**		**TSX 57 10**	**TSX 57 20**	
				Internal RAM	Cartridge		Internal RAM	Cartridge
		No man-machine interface	1.08	0.9	0.96	1.5	0.9	1
		Man-machine interface	1.32	1.1	1.17	1.7	1.1	1.2
Process control functions with pulses outputs	PWM	Type	Pulse width modulation					
		Modulation period	Adjustable from 0…327.67 s					
		Execution time (ms)	0.6	0.5	0.53	0.7	0.5	0.56
	SERVO	Type	Position control of bidirectional motorised actuator (±)					
		Operating mode	□ with position feedback: with discrete servo control with adjustable hysteresis					
			□ without position feedback: pulse widths are proportional to the PID output variation. Setting parameters for valve opening times and minimum pulse duration.					
		Execution time (ms)	0.96	0.8	0.85	1	0.8	0.89

Presentation:
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References:
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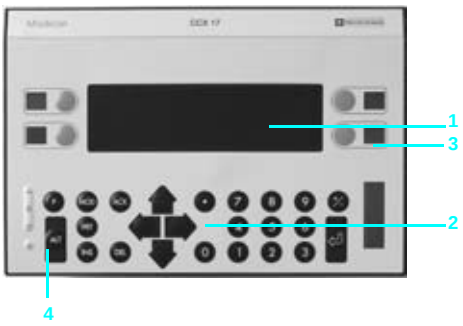
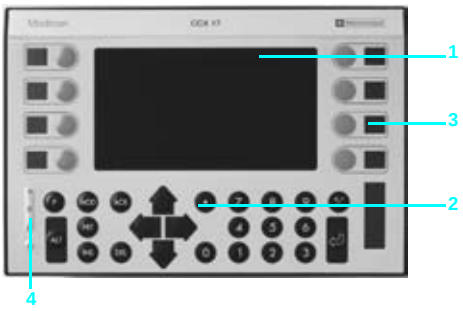
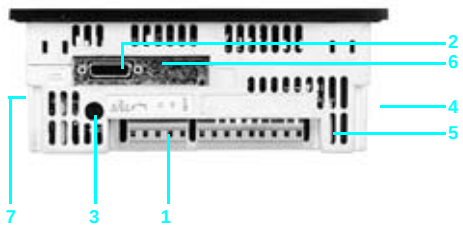
Modicon TSX Micro automation platform

Process control of semi-continuous processes

CCX 17 industrial operator panels







Description

Front of CCX 17 20 panels

CCX 17 20 industrial operator panels comprise:

1 A display screen, back-lit LCD with 2 to 4 lines of 40 characters.
2 A keypad divided into 3 zones:
- system keys,
- cursor movement keys,
- numeric keys.

3 Four control buttons with identification labels.
4 Three signalling lamps activated during self-tests and by the PLC application during operation.

Front of CCX 17 30 panels

CCX 17 30 industrial operator panels comprise:

1 A display screen, back-lit LCD with 4 to 8 lines of 40 characters.
2 A keypad divided into 3 zones:
- system keys,
- cursor movement keys,
- numeric keys.

3 Eight control buttons with identification labels.
4 Three signalling lamps activated during self-tests and by the PLC application during operation

Underside of CCX 17 20/30 panels

Located on the underside of CCX 17 20/30 industrial operator panels are:

1 A removable screw terminal block for the ⎓ 24 V power supply and the alarm relay connector.
2 A 26-way high density SUB-D for the Uni-Telway link to PLCs.
3 A 3.15 A TD5 X 20 fuse carrier.
4 Un emplacement pour pile de sauvegarde.

Depending on the version:

5 A removable screw terminal block for connecting the discrete solid state outputs of the panel.
6 A 9-way SUB-D 9 connector for connecting to a printer.
7 A PCMCIA card slot for connection to the Fipio bus or storing/retrieving the MMI application.

Characteristics

Type of panels			T CCX 17 20 L●	T CCX 17 30 L●
Display	Type of screen		Back-lit LCD	
	Number of lines		4 single height, 2 double height	8 single height, 4 double height
	Nb of characters per line		40 single height, 20 double height	
	Character size	**mm**	5,3 ou 10,6	
Control keys beside screen	Number		2 rows of 2	2 rows of 4
Status messages	Number		150	300
Message groups	Number		50	100
Messages per group	Number		8	16
Alarm messages	Number		150	300
Alarm logs	Number		150	300
Operator action log	Number		50 of eacj	100 of eacj
Connections	PLCs		Integrated Uni-Telway bus, Fipio bus (with PCMCIA card **TSX FPP 10**)	
	Printer		RS 232C link for **T CCX 17●●●PS**	
Supply voltage		**V**	⎓ 24 non-isolated	
Data backup			**TSX PLP 01** battery (annual replacement recommended). See page 1/16	
Discrete inputs/outputs	Number		4	
	Voltage	**V**	⎓ 24, positive logic	
	Current	**mA**	350	
Protection	Front view		IP 65	
	Back view		IP 20	
Temperature	Operating	**°C**	0…45	
	Storage	**°C**	- 20…+ 70	
Standard	Shock resistance		IEC 68-2-27	
	Vibration resistance		IEC 68-2-6	
Certifications			CE, UL	

Presentation:
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References:
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Modicon TSX Micro automation platform

Process control of semi-continuous processes

CCX 17 industrial operator panels

T CCX 1720 L●

T CCX 1730 L●

TSX MRP/MFP ●●●P

CCX 17 operator panel with LCD screen

Number of lines	Number of keys	Connexion bus	Printer port	Nb discrete outputs	Reference (1)	Weight Kg
4	**4**	Uni-Telway	–	–	**T CCX 1720 LW**	1.450
		Uni-Telway, Fipio *(2)*	–	–	**T CCX 1720 L**	1.510
			Yes	4	**T CCX 1720 LPS**	1.510
8	**8**	Uni-Telway	–	–	**T CCX 1730 LW**	1.470
		Uni-Telway, Fipio *(2)*	–	–	**T CCX 1730 L**	1.530
			Yes	4	**T CCX 1730 LPS**	1.560

Separate parts

Description	Use	Capacity of memory	Reference	Weight Kg
Fipio Agent PCMCIA card	Connection to Fipio bus *(3)* (all operator panel except T CCX 17●0 L●W)	–	**TSX FPP 10**	0.110
RAM memory PCMCIA cards	Back up MMI applications	32 Kwords *(4)*	**TSX MRP 032P**	0.060
		64 Kwords	**TSX MRP 064P**	0.060
		128 Kwords	**TSX MRP 0128P**	0.060
Flash EPROM memory PCMCIA cards	Archive MMI applications	64 Kwords	**TSX MFP 064P**	0.060
		128 Kwords	**TSX MFP 0128P**	0.060

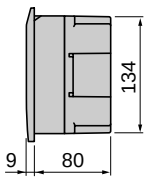
Connecting cables

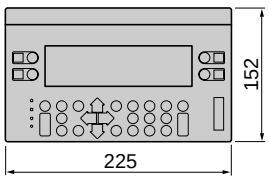
Use from	to	Longueur	Reference	Weight Kg
Uni-Telway CCX 17 20/30	TSX Micro and Premium TER/AUX terminal port	2.5 m	**XTB Z968**	0.180
		5 m	**XTB Z9681**	0.340
	TSX SCA 62 subscriber socket	1.8 m	**XTB Z908**	0.240
	PC via adaptor TSX SCA 72	3 m	**T CCX CB9 030**	0.250
PCMCIA card	Bus Fipio	–	See page 4/56	

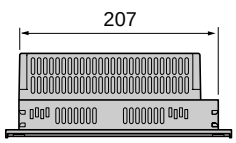
(1) Includes the T CCX CB 10 cable as standard (0.2 m long with 2 2x26-way and 25-way SUB-D connectors). Includes a multilingual quick reference guide as standard (English, French, German, Italian and Spanish).
(2) Includes the MMI application archive and retrieval function on a PCMCIA card.
(3) The CCX 17 operator panel connected on a Fipio bus communicates with the bus arbitrator PLC station.
(4) Only compatible with MMI applications on T CCX 1720 ●●● operator panels.

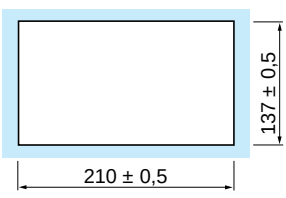
Dimensions, mounting

Dimensions — **Flush-mounted**









Fixed by 4 or 6 locking clips (supplied) pressure mounted (on panel 1 to 6 mm thick)

Presentation: page 3/10
Description: page 3/12
Characteristics: pages 3/11 and 3/12

Modicon TSX Micro automation platform

Integrated counter channels and counter/positionning modules

Applications	Counter channels integrated in TSX Micro PLCs	
	1	1
Number of channels(1)	2 independant channels	2 independant channels (not excluding the 2 upcounter channels on the discrete inputs
Frequency per channels	500 Hz (450 Hz for incremental encoderwith phase-shifted signals)	10 kHz
Response time	8 ms (taking account of an event-triggered input and positionning of a discrete module output in master	
Counter/measurement inputs	Channels 0 and 1: 4 x ⎓ 24 V inputs for proximity sensors and mechanical contacts, compatibles with Totem Pôle incremental encoders	Channel 11: ⎓ 5/24 V for 1 Totem Pole or RS 422 incremental encoders Channels 11 and 12 : ⎓ 24 V inputs for proximity sensors and mechanical contacts
Auxiliary inputs	1 input per channel : preset (using 2nd counter input)	1 ⎓ 24 V input per channel: preset
Counting capacity	24 bits + sign (0 to + 16 777 215 points or ± 16 777 215 points) –	
Functions	Downcounting with preset input, upcounting with reset input. Up/down counting with preset input, configurable counter input: - 1 upcounter input/1 downcounter input, - 1 up/downcounter input and 1direction input, - incremental encoder with phase-shifted signals or proximity sensor.	
Processing	Inputs : Counter enable, counter present. Comparison: Downcounting: to value 0. Upcounting: 2 thresholds and 1setpoint. Up/down counting: 2 thresholds. –	
Events	Events associated with each counter channel, causing activation of the priority event-triggered task	
Connection	Via screw terminals (supplied with module) Via 20-way HE 10 type connectors	Via 15-way SUB-D connectors Via Telefast 2 pre-wired system (ABE 7CPA01)
Type of modules	**1 Counter channels on discrete inputs**	**2 Counter channels integrated in TSX 37 22**
Pages	3/16	

(1) Max. 6 channels with TSX 37 05/08/10, 8 channels with TSX 37 21 and 9 channels with TSX 37 22 (see page 3/16).

Counter modules for incremental encoder		Positionning module for SSI absolute encoder
1 channel	2 independant channels	1 channel
40 kHz	500 kHz	200 kHz or1 MHz
task with cycle time = 5 ms)		–
Per channel : ⎓ 5/24 V inputs for 1 Totem pole or RS 422 incremental encoder or for ⎓ 24 V proximity sensors and mechanical contacts		Channel 0 : ⎓ 5 V or 10 ... 30 V SSI serial absolute encoder, 8 …25 bits or ⎓ 5/10/30 V parallel output absolute encoder 8 …24 bits with Telefast 2base (ABE 7CPA11)
3 x ⎓ 24 V inputs: enable, preset and capture 1 ⎓ 24 V output: line, incremental encoder supply check		2 x ⎓ 24 V input: capture
	In modulo mode, 25 bits (0…33 554 431 points)	In modulo mode, 8 …25 bits (0 … 33 554 431 points)
		- Read of bit number of absolute encoder frame - Modulo and offset functions
Inputs: Counter enable, counter preset, capture current value		Inputs: 2 capture inputs
and 2 setpoints		- Comparison to the position value: 4 thressholds causing activation of priority event-triggered task
Counter outputs (to be applied to discrete output modules: - Downcounting: 1 predefined SET/RESET output. - Upcounting: 2 SET/RESET outputs, 1 predefined and 1 adjustable. - Up/downcounting: 2 adjustable SET/RESET outputs.		- Capture: 2 capture registers on rising or failling edge of the physiqual inputs
crossing a threshold, crossing a setpoint, present done, enable done, capture done		
- Via 15-way SUB-D connectors for incremental encoder inputs - Via 20-way HE 10 connector for auxiliary and power supply inputs - Via Telefast 2 pre-wired system (ABE 7CPA 01/CPA11)		- Via 9-way SUB-D connectos for absolute encodeur - Via 15-way SUB-D 15 for capture et power supply encodeur
TSX CTZ 1A	**TSX CTZ 2A** / **TSX CTZ 2AA**	**TSX CTZ 1B**
3/19		3/25

Modicon TSX Micro automation platform

Integrated counter channels and counter modules

Presentation

Counter functions are required for counting items or events, grouping objects, controlling input and output flow, measuring the length or position of elements and measuring speed, frequency or duration. TSX Micro PLCs provide 3 ways in which these functions of downcounting, upcounting or up/down counting can be performed:
On the inputs of the discrete I/O module located in the first slot of TSX Micro PLCs, or
■ Using the counter channels 11 and 12 integrated in TSX 37 22 PLCs, or
■ With TSX CTZ counter modules installed in the available slots on TSX Micro PLC bases.

Maximum number of counter channels permitted

Counter channels on	TSX 37 05/08/10			TSX 37 21			TSX 37 22								
Discrete input module	0	1	2	0	1	2	0	0	0	1	1	1	2	2	2
Integrated							0	1	2	0	1	2	0	1	2
TSX CTZ modules	4	4	4	7	6	6	7	6	6	6	6	5	6	5	5
Max. no. of channels	4	5	6	7	7	8	7	7	8	7	8	8	8	8	9

Description

Counting (500 Hz) on the inputs of discrete modules

The first 4 inputs of the TSX DEZ/DMZ ●●●● 28, 32 or 64 discrete I/O module located in slot no. 1 enable two counter channels to be used.

1 20-way HE 10 connector (or screw terminal block depending on the model) for connecting:
- Counter sensors or ⎓ 24 V incremental encoder for channel 0,
- Counter sensors for channel 1,
- ⎓ 24 V encoder power supply.

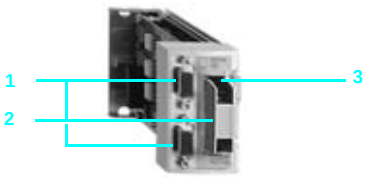
Counter channels (10 kHz) integrated in TSX 37 22 PLCs

TSX 37 22 PLC bases have an integral counter interface (2 channels) which can be accessed via:

1 Two 15-way SUB-D connectors for connecting:
- Counter sensors or incremental encoder for -channel 11,
- Counter sensors for channel 12,
- Auxiliary preselection input,
- Power supplies for auxiliary inputs, sensors and incremental encoder.

The second connector can take the Telefast 2 ABE 7CPA01 wiring system to facilitate installation.

TSX CTZ 1A/2A (40 kHz) and TSX CTZ 2AA (500 kHz) counter modules



The TSX CTZ 1A (1 channel) and TSX CTZ 2A/2AA (2 channels) half-format counter modules have on their front panel:

1 One high-density 15-way SUB-D connector per channel for connecting:
- counter sensors or incremental encoder,
- encoder power supply,
- encoder power supply feedback for checking that this is correctly supplied.

2 20-way HE 10 connector for connecting the following to each channel:
- auxiliary inputs: preselection, counter enable and read,
- power supplies for auxiliary inputs, sensors and -incremental encoder(s).

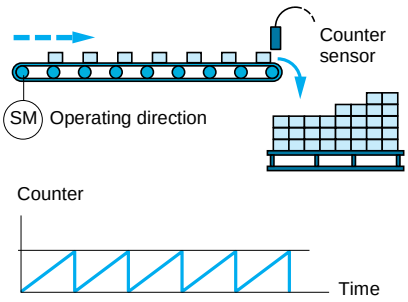
3 Locking system for fixing the module in its slot.

Modicon TSX Micro automation platform

Integrated counter channels and counter modules

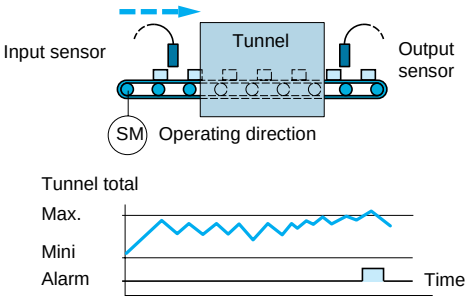
Applications

Example of upcounting or downcounting



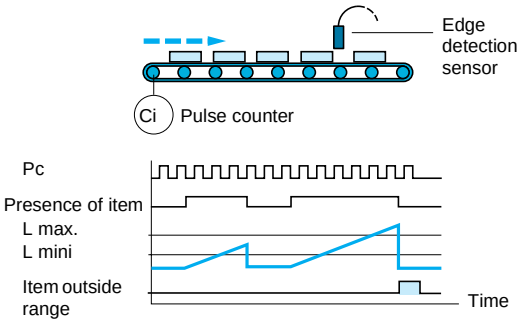
This example shows the grouping of objects supplied by a conveyor belt for packaging.
This simple counting application uses a sensor (proximity sensor, photoelectric sensor) linked to a preset counter. When the preset value is reached the packaging command is activated and the control system initiates a new packaging cycle.

Examples of up/down counting



In this example objects are upcounted or downcounted in a tunnel. The system checks that a critical threshold is not crossed in order to detect any malfunction in the tunnel.

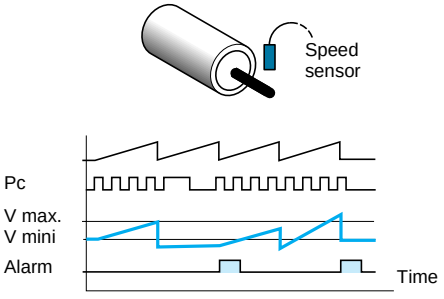
This up/down counting application uses two sensors (proximity sensors or photoelectric sensors) linked to a threshold up/down counter. Each input sensor pulse increments the counter, each output sensor pulse decrements it. Crossing the authorised maximum threshold sets off an alarm.



In this example, the length of objects travelling on a conveyor belt is measured in order to sort them.

This up/down counting application follows this sequence: a sensor detects the presence of the object on the conveyor belt. While the object is on the belt, the pulses from the generator linked to the forward movement of the conveyor belt are counted. The number of pulses represents an image of the length of the object. This measurement can then be compared to various minimum and maximum thresholds.

Example of up/down counting with processing



In this example the correct operation of a pump is checked by taking account of its rotation speed. This speed should lie between a low threshold (pump fault) and a high threshold (pump cut-out).

The speed of the pump is measured by taking account of the pulses supplied by an incremental encoder (or proximity sensor) during a unit of time (time base worked out by the TSX 37 22 PLC system).

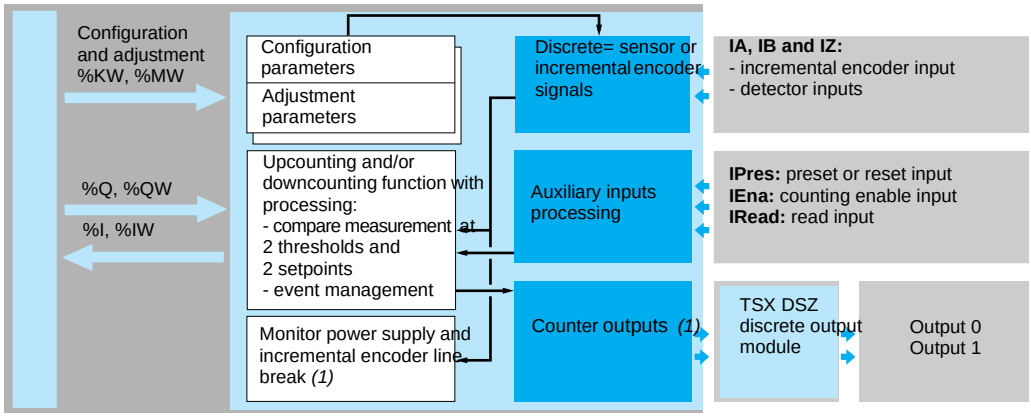
The current value obtained is compared to the two predefined thresholds in order to detect any anomaly.

Modicon TSX Micro automation platform

Integrated counter channels and counter modules

Flowchart of operation

Functional flowchart of a counter channel.



(1) With TSX CTZ 1A/2A/2AA counter module.

Physical inputs		IA	IB	IZ	IPres	IVal	IRead	CO
TSX DSZ discrete module	per chan.		*(2)*		*(2) (3)*	*(3)*		
Integrated counting	chan. 11				*(3)*	*(3)*		
	chan.12				*(3)*	*(3)*		
TSX CTZ modules	per chan.				*(3)*	*(3)*	*(3)*	

Physical input available

Counting functions are configured and installed using PL7 Micro or PL7 Junior software (see page 5/11).

(2) Input IB can be defined by software configuration in input IPres.
(3) Software input possible.

Electrical characteristics

Type of counter module/channel				TSX CTZ 1A	TSX CTZ 2A	TSX CTZ 2AA	Integrated TSX 37 22	Discrete inputs/outputs TSX DEZ/DMZ	
Number of channels				1	2				
Frequency on counter inputs			**kHz**	40		500	10	⎓ 24 V	∿ 100…120 V
								0.5/0.45 *(4)*	0.02
Frequency limitation			**Hz**	100, with ⎓ 24 V sensors with mechanical output (limit switches…)					
Envent processing response time				Taking account of an input and positioning of a discrete module output:					
			ms	1.5				2	
Processing response time in master task (scan time: 5 ms)			**ms**	Taking account of an event-triggered input and positioning of a discrete module output: 8					
Sensor power supply monitoring		Voltage	**V**	⩽ 2.5			–		
		Current	**mA**	⩽ 0.5			–		
Consumption				See page 6/4					

Input characteristics *(5)*

Type of counter module/channel				Counter inputs TSX CTZ 1A/2A/2AA		Integrated channels		Auxiliary inputs	
								TSX CTZ ●●	Integrated chan.
Nominal values		Voltage	**V**	⎓ 5	⎓ 24	⎓ 5	⎓ 24		
		Current	**mA**	18		3	8.7	7	10
Limit values	Voltage		**V**	5.5	19…30 *(6)*	2…5.5	19…30	19…30 *(6)*	19…30
	At state 1	Voltage	**V**	⩾ 2.4	⩾ 11	⩾ 2.1	⩾ 11		
		Current	**mA**	>3.7 (U = 2.4 V) *(7)*	> 6 (U = 11 V)	> 2 (U = 2.4 V)	> 6 (U = 11 V)	> 6	> 2.5
	At state 0	Voltage	**V**	⩽ 1.2	⩽ 5	⩽1	< 5	⩽ 5	< 5
		Current	**mA**	< 1 (U = 1.2 V)	< 2 (U = 5 V)	< 0.65	< 2		< 1.4
Logic				Positive					
Input impedance	For nominal U		**kΩ**	0.270	1.4	0.270	2.7	3.4	2.4
	For U = 2.4 V RS 422 compatibility		**kΩ**	> 0.440 (U = 2.4 V) *(8)*	–	> 0.270	–		
Response time (Immunite avec utilisation de contacts mecaniques)			**ms**	3		4		< 0.250 *(9)*	0.2…1
Type of inputs				–	Resistive	–	Current sink		Resistive
IEC 1131 conformity				–	Type 2	–	Type 1	Type 2	
Proximity sensor compatibility				–	2-wire/3-wire	–	2-wire/3-wire		

(4) 0.45 kHz for an incremental encoder with phase-shifted signals.
(5) For characteristics of TSX DEZ/DMZ ●●●● discrete input modules, see page 2/8.
(6) Up to 34 V for 1 hr in 24 hours.
(7) For TSX CTZ 2AA module: > 6.8 mA (U = 3 V).
(8) For TSX CTZ 2AA module: > 0.350 kÝ (U = 3V).
(9) For TSX CTZ 2AA module: < 25 µs (state 0 to 1), < 50 µs (state 1 to 0).

Description: page 3/16 | Applications: page 3/17 | References: page 3/19 | Connections: pages 3/20 and 3/21 | Dimensions: page 3/21

Modicon TSX Micro automation platform

Integrated counter channels and counter modules

TSX CTZ 1A

TSX CTZ 2A/2AA

References

Counter modules

Type of inputs	Counter frequency	No. on chan.	Reference (1)	Weight kg
2/3 -wire proximity sensors PNP/NPN, ⎓ 24 V, Incremental encoders ⎓ 5 V RS 422, ⎓ 10…30 V Totem Pole	40 kHz	1	**TSX CTZ 1A**	0.200
		2	**TSX CTZ 2A**	0.210
	500 kHz	2	**TSX CTZ 2AA**	0.220

Connection accessories

Description	For connection of	Type of connectors/ connection to	Reference	Weight kg
SUB-D connectors (sold in lots of 2)	TSX CTZ●A module counter sensors or encoder	High-density 15-way SUB-D	**TSX CAP H15**	0.050
	TSX 37 22 integrated counter	15-way SUB-D	**TSX CAP S15**	0.050
Telefast 2 connection sub-bases	Counter sensors and ⎓ 24 V power supply	TSX CTZ ●A/2AA module TSX 37 22 int.counter	**ABE 7CPA01**	0.300
	Auxiliary inputs ⎓ 24 V power supply and ⎓ 5 V/10…30 V encoder power supply	20-way HE 10 TSX CTZ 1 A Totem Pole	**ABE 7H08R10**	0.190
		20-way HE 10 TSX CTZ 2A/2AA module	**ABE 7H16R20**	0.300
Connection interfaces for incremental encoder	⎓ 5 V RS 422 encoder	TSX CTZ ●A/2AA module	**TSX TAP S15 05**	0.260
	⎓ 10...30 V Totem Pole encoder	TSX CTZ ●A/2AA module	**TSX TAP S15 24**	0.260

ABE 7CPA01

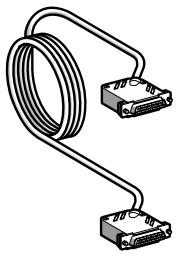
ABE 7H16R20

Connection cables

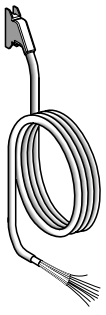
Description	From	To	Length	Reference	Weight kg
Cable (cross-section 0.205 mm²)	Integrated counter (15-way SUB-D connector)	ABE 7CPA01 sub-base (15-way SUB-D connector)	0.5 m	**TSX CCP S15 050**	0.110
			1 m	**TSX CCP S15 100**	0.160
			2.5 m	**TSX CCP S15**	0.300
	TSX CTZ ●A module counter sensors or encoder (high density 15-way SUB-D connector)	ABE 7CPA01 or TSX TAP S15 ●● sub-base(15-way SUB-D connector)	2.5 m	**TSX CCP H15**	0.300
Pre-formed cables with 20 flying leads (500 mA maxi)	Auxiliary inputs, ⎓ 24 V power supply and ⎓ 5 V/10…30 V encoder power supply (moulded 20-way HE 10 connector)	Free end with labelled wires	3 m	**TSX CDP 301**	0.400
			5 m	**TSX CDP 501**	0.660
			10 m	**TSX CDP 1001**	1.210
Pre-formed connection cables (100 mA maxi)	Auxiliary inputs, ⎓ 24 V power supply and ⎓ 5 V/10…30 V encoder power supply (20-way HE 10 connector)	ABE 7H08R10/16R20 Telefast 2 sub-base (20-way HE 10 connector)	1 m	**TSX CDP 102**	0.090
			2 m	**TSX CDP 202**	0.170
			3 m	**TSX CDP 302**	0.250
Connection cables (500 mA maxi)	Auxiliary inputs, ⎓ 24 V power supply and ⎓ 5 V/10…30 V encoder power supply (moulded 20-way HE 10 connector)	ABE 7H08R10/16R20 (20-way HE 10 connector)	0.5 m	**TSX CDP 053**	0.085
			1 m	**TSX CDP 103**	0.150
			2 m	**TSX CDP 203**	0.280
			3 m	**TSX CDP 303**	0.410
			5 m	**TSX CDP 503**	0.670
			10 m	**TSX CDP 1003**	1.230

(1) Module supplied with HE 10 type connector cover.

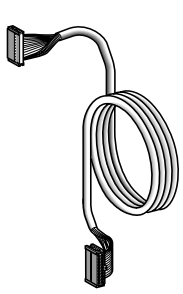
TSX TAP S15●●



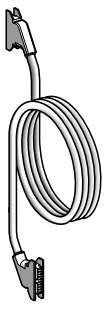
TSX CCP S15



TSX CDP ●01



TSX CDP ●02



TSX CDP ●●3

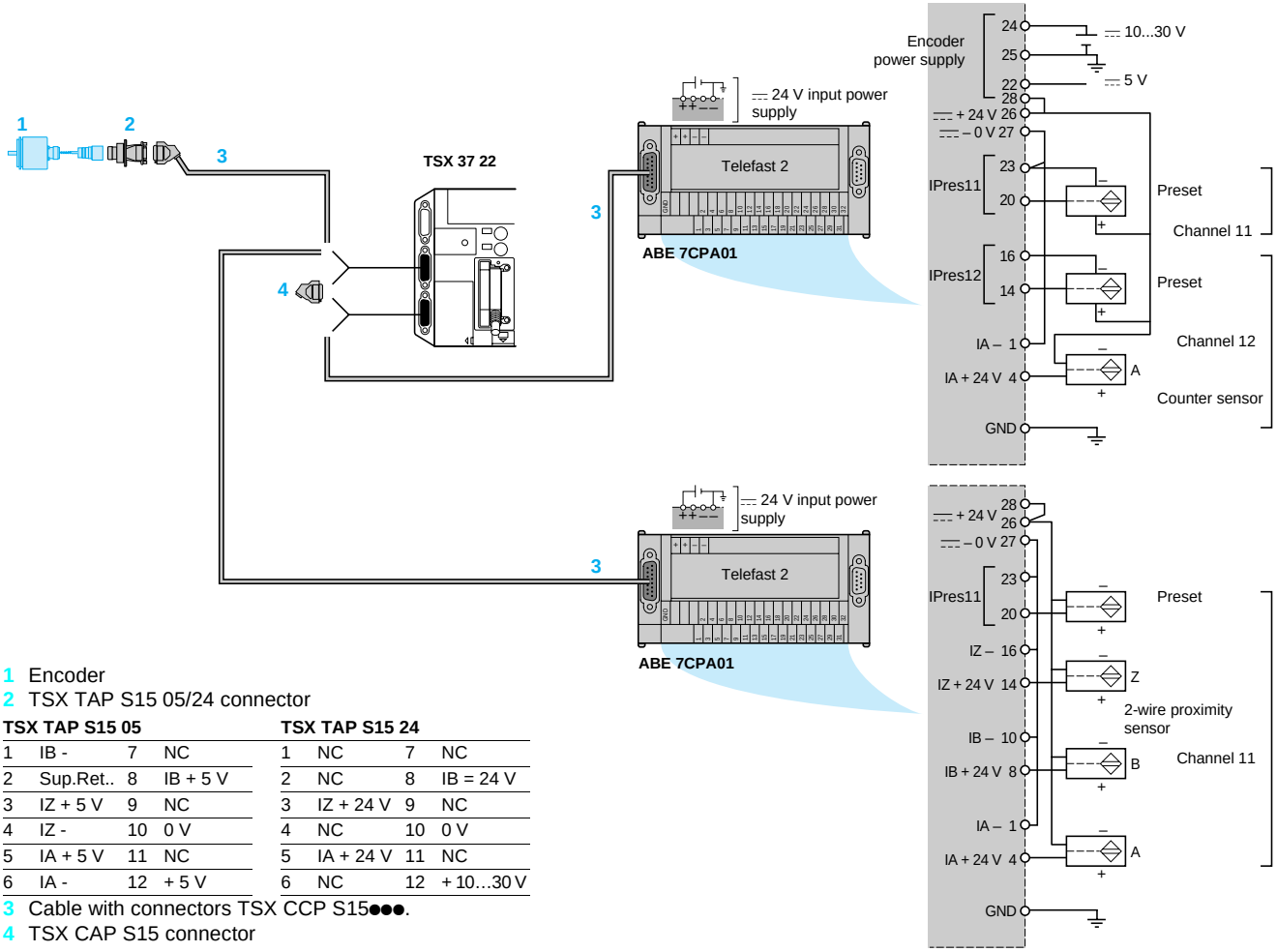
Modicon TSX Micro automation platform

Integrated counter channels and counter modules

Connections

Connection to integrated counter channels

Connection examples for counter and auxiliary inputs



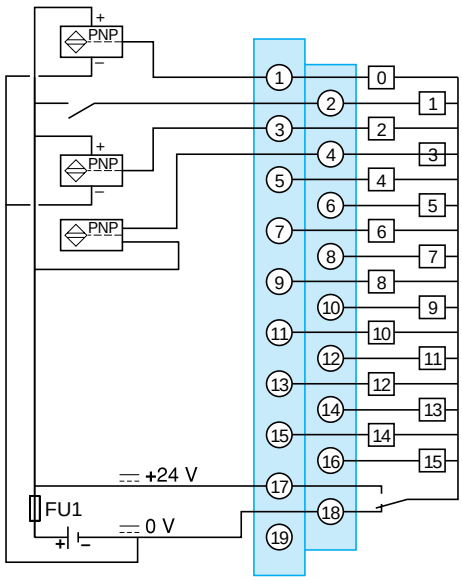
1 Encoder
2 TSX TAP S15 05/24 connector

TSX TAP S15 05				TSX TAP S15 24			
1	IB -	7	NC	1	NC	7	NC
2	Sup.Ret..	8	IB + 5 V	2	NC	8	IB = 24 V
3	IZ + 5 V	9	NC	3	IZ + 24 V	9	NC
4	IZ -	10	0 V	4	NC	10	0 V
5	IA + 5 V	11	NC	5	IA + 24 V	11	NC
6	IA -	12	+ 5 V	6	NC	12	+ 10…30 V

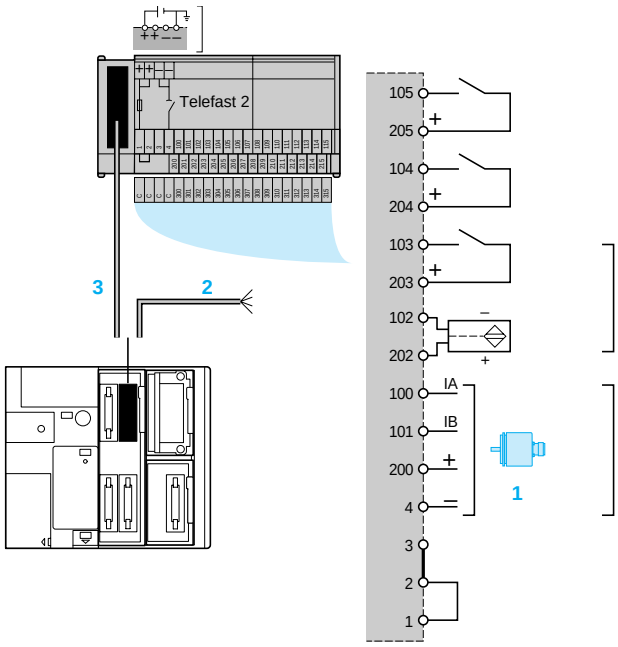
3 Cable with connectors TSX CCP S15●●●.
4 TSX CAP S15 connector

Connection to TSX DEZ/DMZ discrete input module

Example of connecting inputs TSX DMZ 28DR

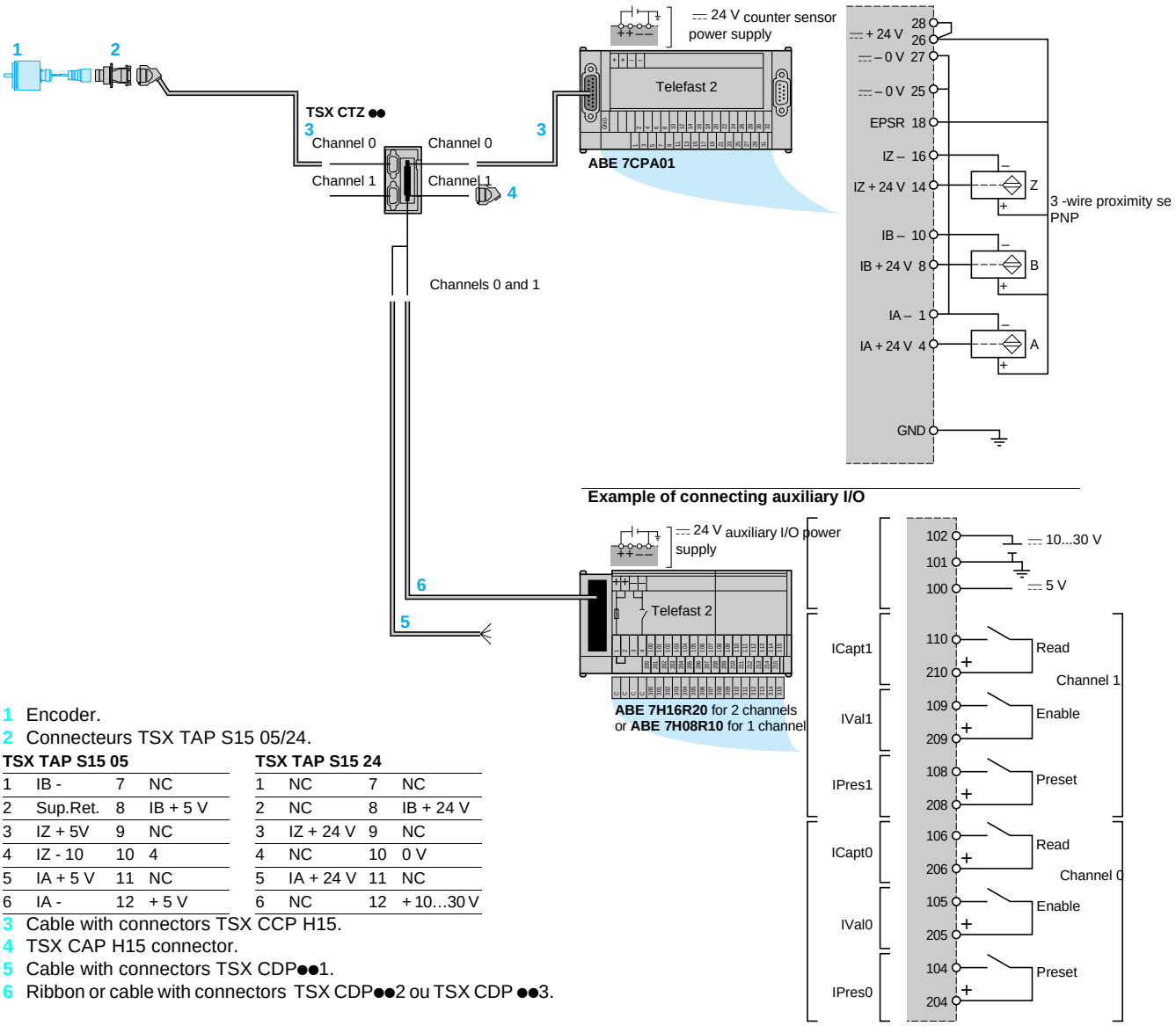


Example of connecting inputs TSX DMZ 64DTK



Connection to module TSX CTZ 1A/2A/2AA

Example of connecting counter inputs



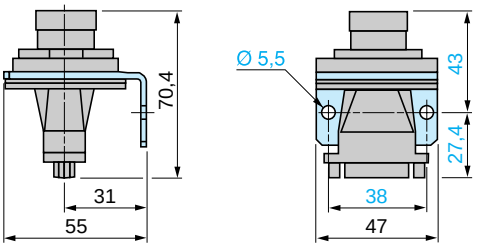
1 Encoder.
2 Connecteurs TSX TAP S15 05/24.

TSX TAP S15 05				TSX TAP S15 24			
1	IB -	7	NC	1	NC	7	NC
2	Sup.Ret.	8	IB + 5 V	2	NC	8	IB + 24 V
3	IZ + 5V	9	NC	3	IZ + 24 V	9	NC
4	IZ - 10	10	4	4	NC	10	0 V
5	IA + 5 V	11	NC	5	IA + 24 V	11	NC
6	IA -	12	+ 5 V	6	NC	12	+ 10…30 V

3 Cable with connectors TSX CCP H15.
4 TSX CAP H15 connector.
5 Cable with connectors TSX CDP●●1.
6 Ribbon or cable with connectors TSX CDP●●2 ou TSX CDP ●●3.

Dimensions

TSX TAP S15 ●●



Mounting through enclosure (dust and damp proof):
- cu-out Ø 37,
- panel with 5 mm maximum.

Modicon TSX Micro automation platform

TSX CTZ 1B absolute encoder positioning module

Presentation

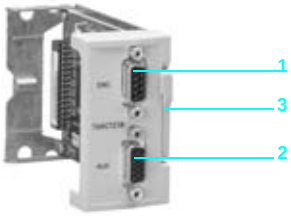
The 1 channel TSX CTZ 1B positioning module completes the TSX Micro platform range in the counting and positioning field through the acquisition of information from a SSI series absolute encoder.

This type of module allows for the following and actual positioning of a moving object, including after a loss of power. This characteristic, linked to the absolute encoder is used to simplify the installation of positioning applications. It also simplifies the input interfaces by suppressing homing, adjustment …

Depending on the model, the TSX Micro PLCs can receive the maximum of:

- TSX 37 05/10, 2 TSX CTZ 1B modules in slots 3 and 4.
- TSX 37 08, 2 TSX CTZ 1B modules in slots 5 and 6.
- TSX 37 21/22, 4 TSX CTZ 1B modules in slots 3, 4, 5 and 6.
- and this within the limit of the number of channels generated by the TSX Micro PLC (see page 3/16).

Description



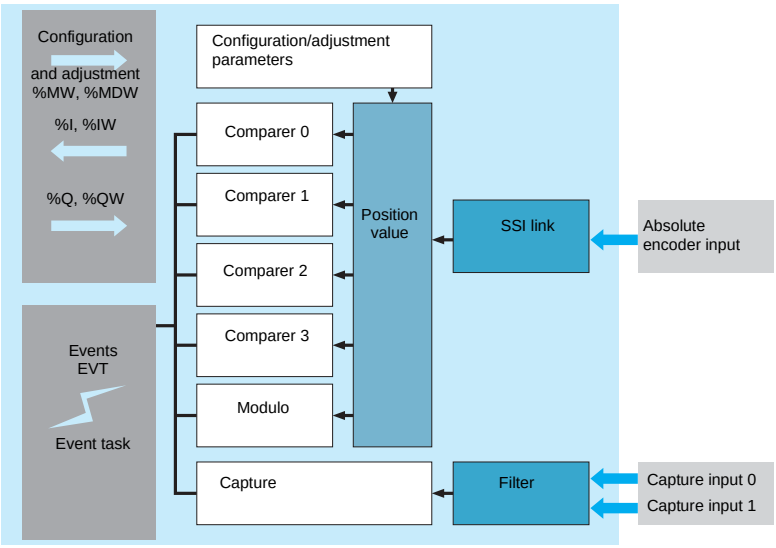
The front panel of the TSX CTZ 1B half-size positioning module (1 channel) includes:

1 A 9-pin SUB-D connector for connecting the SSI absolute encoder.
2 A high density 15-pin SUB-D connector for connecting:
- 2 position value capture sensors ,
- absolute encoder supply.

A latch system for fixing the module in the slot.

Operation

Functional synoptic of the positioning channel:



Implementation of the TSX CTZ 1B requires the use of version ≥ 4.2 of the PL7 Micro/Junior/Pro software. The TSX Micro PLC receiving the module should be equipped with the operating system version ≥ 5.0.

Characteristics: page 3/23
References: page 3/24
Connections: page 3/25

Modicon TSX Micro automation platform

TSX CTZ 1B absolute encoder positioning module

Electrical characteristics

Module type				TSX CTZ 1B	
Channel number				1	
Positioning input	Voltage		⎓ **V**	5, 10...30	
	SSI absolute encoder	Number of bits		8 …25 bits	
		Frequency	**kHz**	200	1000
		Distance	**m**	150 max. (encoder-module)	10 max. (encoder-module)
	Parallel output encoder *(1)*	Number of bits		24	

Capture input characteristics

Number of inputs				2	
Nominal values	Voltage		**V**	24	
	Current		**mA**	8	
Limit values	Voltage		**V**	19...30 (wave included), up to 34 for 1 hour in 24.	
	At state 1	Voltage	**V**	> 11	
		Current	**mA**	> 3 (U = 11 V)	
	At state 0	Voltage	**V**	< 5	
		Current	**mA**	< 1.5	
Input impedance			**k ohms**	3	
Acceptance time	0 to 1 state		µ**s**	< 50	
	1 to 0 state		µ**s**	< 50	
Input type				Resistive	
IEC 1131 conformity				Type 1 sensor	
Detector compatibility				2 wire/3 wire (24 V) with the following specifications: ■ waste voltage at state 1≤7 V ■ switched current ≤ 2.5 mA ■ residual current ≥1.5 mA	

(1) Using an absolute encoder with parallel outputs requires the Telefast 2 ABE 7CPA 11 *adaptation base. This base is used to multiplex up to 4 absolute encoders. This multiplexing is controlled by the TSX Micro PLC discrete outputs.*

Functions

Module type	TSX CTZ 1B
Read frequency	Depending on mode: 200 kHz in slow mode 1 MHz in fast mode
Comparative function	4 thresholds each linked to 1 maskable EVti event (activation upon event tasks) and to 1 position bit in relation to the (upper/lower) threshold
Capture/measure function	2 capture inputs and 2 capture registers (on rising or falling edge)
Modulo function	The number of encoder data bits can be configured, with: ■ The modulo function limits the dynamic of the position value to a number of points defined by the "modulo" parameter value. The "modulo" passage causes an EVti activation event for the event task ■ The reduction function is used to reduce the position value supplied by the absolute encoder
Offset function	Two offset functions for the position measure are available: ■ Correction function for the encoder offset on the "zero" mechanical position ■ Position measure adjustment function: corresponds to the position value adjustment (more or less)
Checks	The checks are of the following type: ■ Detecting the encoder feedback voltage ■ Checking the encoder link ■ Parity check

3

3.2

Description: page 3/22 References: page 3/24 Connections: page 3/25

Modicon TSX Micro automation platform

TSX CTZ 1B absolute encoder positioning module

Positioning module for absolute encoder

TSX CTZ 1B

Input type	Specifications	Channel number	Reference	Weight kg
Parallel or serial absolute SSI encoder *(1)* ⎓ **5 V,** ⎓ **10...30 V**	Acquisition of 200/1000 kHz	1	**TSX CTZ 1B**	0.205

Connection accessories

Designation	Connection	Connector on TSX CTZ 1B module	Add. *(2)*	Reference	Weight kg
SUB-D connectors (batch of 2)	Absolute SSI encoder	9-pin SUB-D type	3	**TSX CAP S9**	0.050
	Capture inputs, encoder supply	High density 15-pin SUB-D type	4	**TSX CAP H15**	0.050
Telefast 2 connection base	Capture inputs, encoder supply	9-pin SUB-D type	–	**ABE 7CPA01**	0.300
Telefast 2 adaptation base	Absolute encoder with parallel outputs (16…24 bits) ⎓ 5 V, ⎓ 10…30 V	High density 15-pin SUB-D type	–	**ABE 7CPA11**	0.300

ABE 7CPA01

Cable equipped with SUB-D type connectors

Designation	From	To	Add. *(2)*	Reference *(1)*	Weight kg
Cable length 2.5 m (0.205 mm2 section)	TSX CTZ 1B module, encoder supply and capture inputs (high density 15-pin SUB-D type)	ABE 7CPA01 base (15-pin SUB-D type connector)	5	**TSX CCP H15**	0.300

(1) Absolute encoder with parallel outputs and ABE 7CPA11 *adaptation base. This base is used to multiplex up to 4 absolute encoders on the encoder input of the* TSX CTZ 1B *module.*

(2) Addresses, see page 3/21.

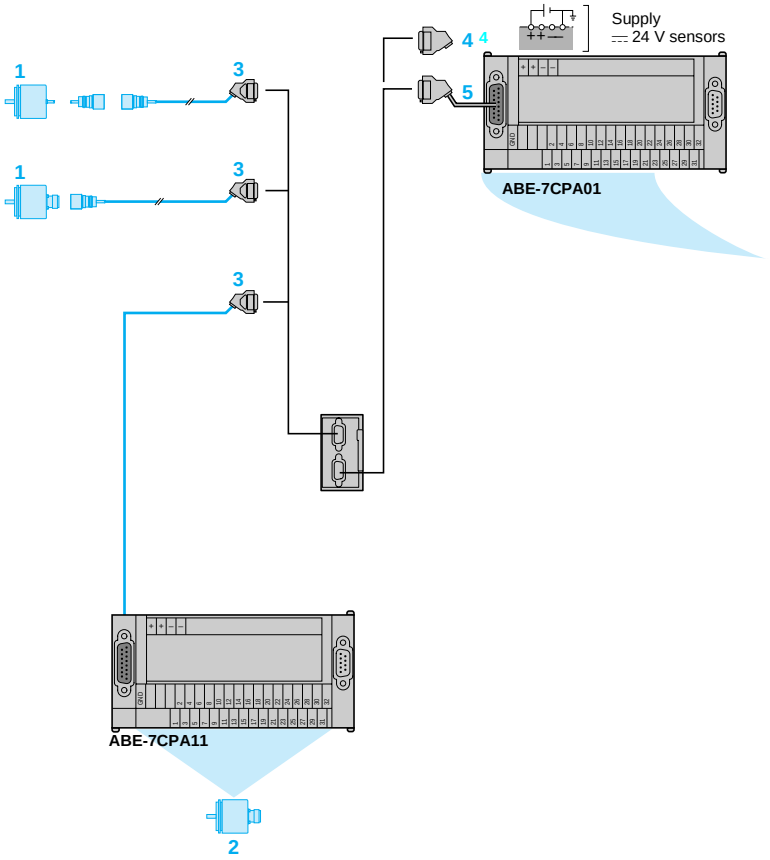
Description: page 3/22 Characteristics: page 3/23 Connections: page 3/25

Modicon TSX Micro automation platform

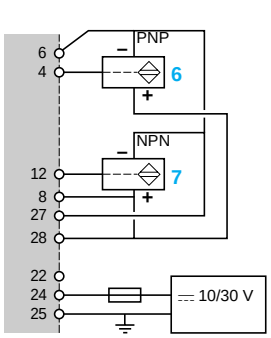
TSX CTZ 1B absolute encoder positioning module

Connections to the TSX CTZ 1B module

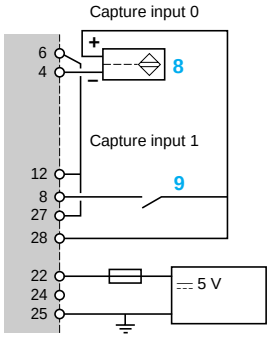
Absolute encoder conection



Sensor/supply connection examples



3 wire detector connection and encoder supply 10/30 V



2 wire detector connection and encoder supply 5 V

1 Serial absolute SSI encoder.
2 Absolute encoder with parallel outputs.
3 TSX CAP S9 9-pin SUB-D type connector.
4 TSX CAP H15 high density 15-pin SUB-D type connector.
5 TSX CCP H15 equipped cable.
6 3 wire PNP detector.
7 3 wire NPN detector.
8 2 wire detector.
9 Mechanical contact.

4

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- Phaseo power supplies for AS-Interface bus . . . . . *page 4/30*

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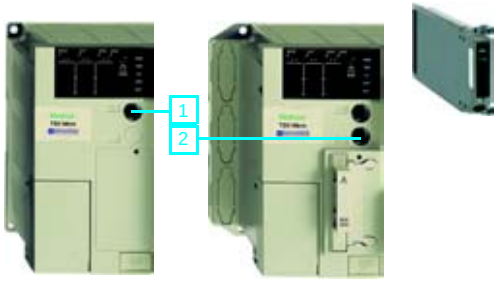
Modicon TSX Micro automation platform
Network and buses

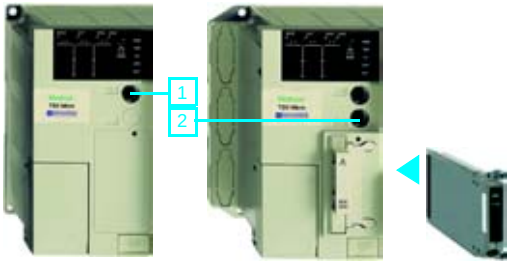
Applications		Local area network conforming to TCP/IP standard	Local area network conforming to Modbus Plus standard
Types of network or bus		**Ethernet TCP/IP or RS 232 Modem (PPP)**	**Modbus Plus**
Structure	Physical interface	10/100BASE-T (RJ45)	Modbus Plus standard
	Access method	CSMA-CD	Rotating token
	Rate	10/100 Mbit/s	1 Mbit/s
Medium		Double twisted shielded pair	Twisted pair
Configuration	Maximum number of devices	64	32 per segment, 64 on all segments
	Maximum length	100 m max. between hub and terminal device	450 m per segment 1800 m with 3 repeaters
	No. of links/station	1 max.	
Services		- TCP/IP ou PPP: Messagerie Uni-TE or Modbus - BOOTP/DHCP server - SNMP Agent service - Tranparency communication on Ethernet or Modem link - Integrated Web server with or without Web user page (8 Mb)	Modbus message handling service: - Write/read variables - Global database - Peer Cop service
Type of TSX Micro PLC base		TSX 37 10/21/22 PLC bases	TSX 37 21/22 PLC bases
Nature of modules		Independent module	Type III PCMCIA card
Type of modules		**TSX ETZ 410/510**	**TSX MBP 100**
Pages		4/15	4/37

Local area network conforming to Fip standard	CAN field bus	Open industrial field bus conforming to AS-i standard
Fipway	**Bus CANopen V4.02**	**AS-Interface**
Fip standard	ISO 11898	AS-Interface standard, M2 profile
Bus managed by bus arbitrator	CSMA/CA, multi-master	Master/slave
	10 Kbit/s...1 Mbit/s according to distance	167 Kbit/s
Twisted shielded pair Fibre optic via transceivers or repeaters	Double twisted shielded pair	2-wire AS-Interface cable
32 per segment, 64 on all segments	127 slaves	31 sensor/actuator devices
1000 m per electrical segment 5000 m max. with repeaters	From 20 m (1 Mbit/s)...2500 m (20 Kbit/s)	100 m 200 m with repeaters
- Uni-TE - COM/shared table - Application-to-application - Telegram	CANopen : - Implicit PDO exchange - Explicit SDO exchange or CAN function block - Explicit PDU CAN exchange	Transparency of exchanges with sensor/actuator devices
		TSX 37 10/21/22 PLC bases
Type III PCMCIA card		Half-format module to be insert in slot 4
TSX FPP 20	**TSX CPP 110**	**TSX SAZ 10**
4/49	4/25	4/27

Modicon TSX Micro automation platform
Network and buses

Applications			Modbus open industrial field bus	Open industrial fiedbus conforming to Fip standard
				
Types of network or bus			**Modbus RTU**	**Fipio (agent)**
Structure	Physical interface		RS 485, isolated via TSX P ACC 01 tap	Norme Fip
	Access method		Slave / Master/slave	Bus managed by bus arbitrator
	Rate		19,2 Kbit/s max.	1 Mbit/s
Médium			Double twisted shielded pair	Twisted shielded pair Fibre optic via transceivers or repeaters
Configuration	Maximum number of devices		28 devices max.	32 per segment, 128 on all segments
			98 slave addresses max. / 248 slave addresses max.	
	Maximum length		1300 m max. for isolated RS 485	From 1000 m to 15,000 m (depending on the medium use) with repeaters
	No. of links/station		1 max.	
Services			Modbus slave RTU / Modbus master/slave RTU 13 Modbus functions (read/write bits and words, diagnostic…)	- Uni-TE - Periodic data exchange - Application-to-application - Transparent exchange of remote I/O
Type of TSX Micro PLC base			TSX 37-05/08/10 PLC bases	TSX 37-21/22 PLC bases
Nature of modules			Built-in link on terminal port	Type III PCMCIA card
Type of modules			1 TER terminal port	2 AUX terminal port / TSX FPP 10
Pages			4/40	4/53

Uni-Telway multicomponent industrial bus



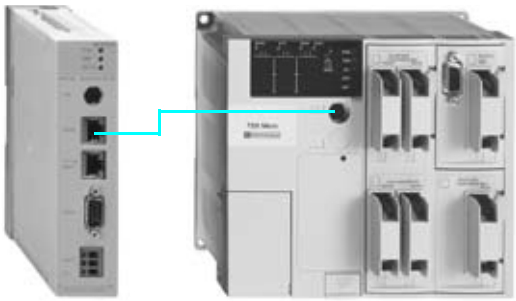
Asynchronous serial links

Uni-Telway			**Character mode**		
RS 485 non-isolated RS 485 isolated via TSX P ACC 01 tap		RS 232D RS 485 isolated 20 mA CL	RS 232D	RS 485 isolated RS 422	20 mA CL
Master/slave			–		
19,2 Kbit/s max.			0,3...19,2 Kbit/s	1,2...19,2 Kbit/s	
Double twisted shielded pair			–	Double twisted shielded pair	
5 (excluding programming terminal)		Point-to-point in RS 232D, 28 in RS 485, 16 in 20 mA CL	Point-to-point	Point-to-point in RS 422 Multipoint in RS 485	Point-to-point Multipoint
10 m non-isolated 1300 m isoled	15 m in point-to-point 1000 m in RS 485 1300 m in 20 mA CL		15 m	1000 m	1300 m
1 max.					
- Uni-TE Client/Server 240 bytes (128 bytes on terminal port) - Application-to-application 240 bytes (128 bytes on terminal port) - Transparency of all devices on X-Way architecture via the master			- 4096 characters max. - 7 or 8 bits, 1or 2 stop bits - Even, odd or none parity		
TSX 37-05/08/10 PLC bases	TSX 37-21/22 PLC bases				
Built-in link on terminal port		Type III PCMCIA card			
1 TER terminal port	**2 AUX terminal port**	**TSX SCP 11p** *(1)*	**TSX SCP 111**	**TSX SCP 114**	**TSX SCP 112**
4/63			4/65		

(1) At the end of reference, replace p *by* **1***: RS 232D, by* **2***: 20 mA CL or by* **4***: isolated RS 485.*

Modicon TSX Micro automation platform

Ethernet network and TCP/IP Modem serial link



TSX Micro platforms connect to the Ethernet TCP/IP network via 2 external and autonomous TSX ETZ 410/510 modules. These modules are also used to link to an external modem.

Ethernet TCP/IP TSX ETZ 410 module

The TSX ETZ 410 module includes:

■ A Modbus/Uni-TE TCP/IP communication profile on Ethernet 10/100 Mbits/s or TCP/IP via RS232 serial link connected to an external 56K bit/s modem.

■ The integrated Web server function. The integrated Web server provides access to:
- the module configuration,
- the PLC diagnostics system function, “Rack Viewer”,
- the communication diagnostics function,
- the access function to the PLC data and variables, “Data Editor”,
- and accepts the scanned input/output function; the TSX ETZ 410 can be scanned by a device which supports the exchange of I/O Scanning input/outputs.

Ethernet TCP/IP TSX ETZ 510 module

The Ethernet TSX ETZ 510 uses all the functions of the TSX ETZ 410 module, and in addition, the following functions on the level of the integrated Web server function.

■ Graphic object editor function to assist in creating Web user pages.

■ Configuration tool for the integrated WEB server.

Integration into structures

The Ethernet TSX ETZ 410/510 modules communicate with the Micro TSX 37 10/21/22 PLCs, which are equipped with the operating system version IE ⩾ 2.0. They connect:

■ Via the:
- TSX 37 10/21/22 PLC terminal port (TER),
- TSX 37 21/22 PLC auxiliary port (AUX),
- TSX SCP114 serial link PCMCIA card inserted into the TSX 37 21/22 PLC.

■ On a Uni-Telway bus, via the TSX SCA 50 derivation box or the TSX P ACC 01 isolation box.

The Ethernet TSX ETZ 410/510 modules are configured with the assistance of a standard browser using:

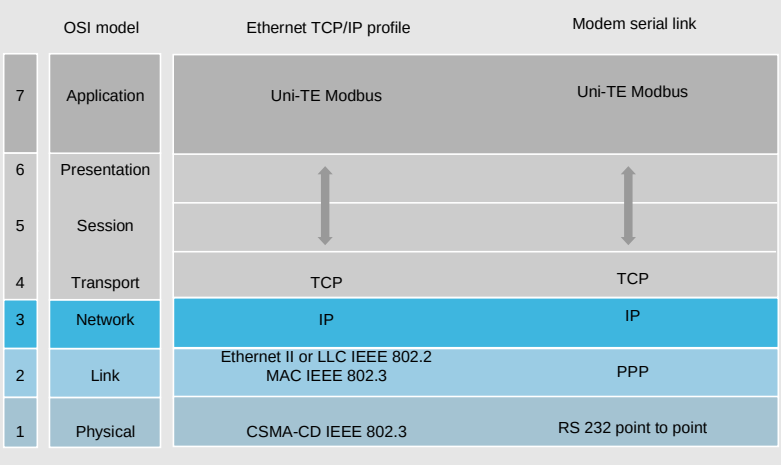
■ The Ethernet network.
■ RS 232C serial link (PPP protocol).

The Ethernet TSX ETZ 410/510 modules ensure that the TSX Micro PLC TER port is duplicated; the PLC connected to the TSX ETZ 410/510 module via this TER port can be accessed locally by a programming terminal equipped with PL7 TSX Micro/ Junior/Pro software.

Functions: pages 4/8 to 4/12 | Description: page 4/13 | Characteristics: page 4/14 | References: page 4/15 | Dimensions: page 4/15

Modicon TSX Micro automation platform
Ethernet network and TCP/IP Modem serial link

TCP/IP profile on Ethernet and on the serial link by modem
Summary of the OSI structure



The distributed automation applications can use a unique communication network which meet:
■ The needs of real-time workshop performance.
■ The open access requirements for the monitoring/commanding software based upon products using standard communication protocols or applications using Internet technology.
Ethernet and the point to point protocol (PPP) via serial link respond to different requirements in terms of data rate, capacity for open access on TCP/IP and flexibility in terms of topology.

Ethernet communication affects essentially the following applications:

■ Co-ordination between programmable PLCs.

■ Local or centralized supervision.

■ Communication with production information management.

■ Communication with remote inputs/outputs.

The various services offered are as follows:

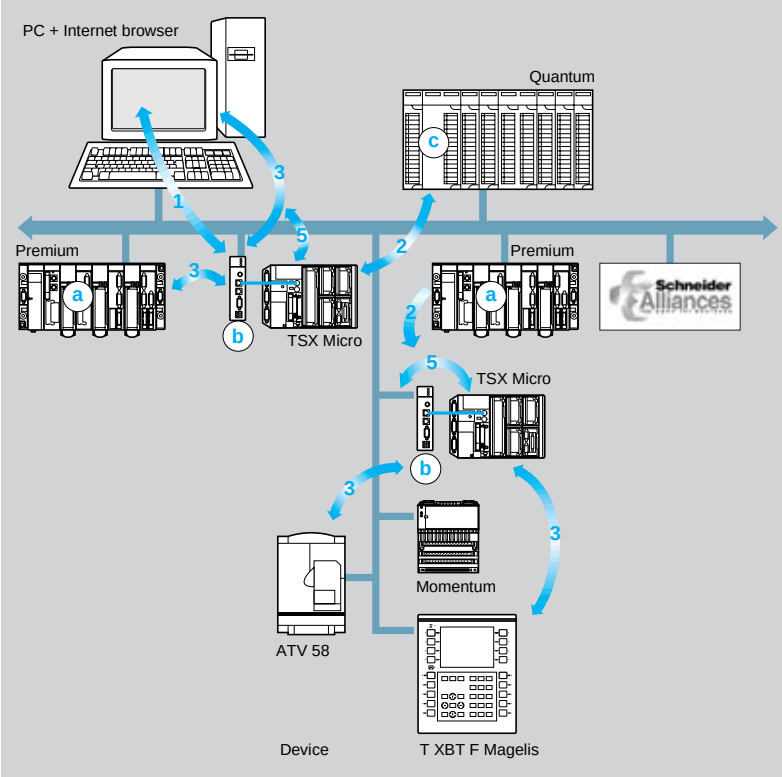
■ The TCP/IP protocol standard permits communication with:
□ the Quantum platforms in the Modbus messaging, with the 140 NOE 771 ●● module,
□ the M1E CPUs associated with the Momentum inputs/outputs I/O base in Modbus messaging,
□ the Premium platforms with TSX ETY 110 module (outside of Ethway profile) or TSX ETY 410●/510● module,
□ a PC terminal, which supports a standard browser for the Ethernet network,
□ a PC terminal, with a modem which supports a standard browser for the serial link,
□ all Uni-TE/Modbus TCP/IP devices (ATV 58 drive, Magelis terminals, etc.).

■ The SNMP V1 network agent function. All Ethernet modules integrate the MIB II standard (Management Information Base RFC 1213) and the Ethernet Transparent Ready private MIB. These are compatible with the main network administration software available on the market.

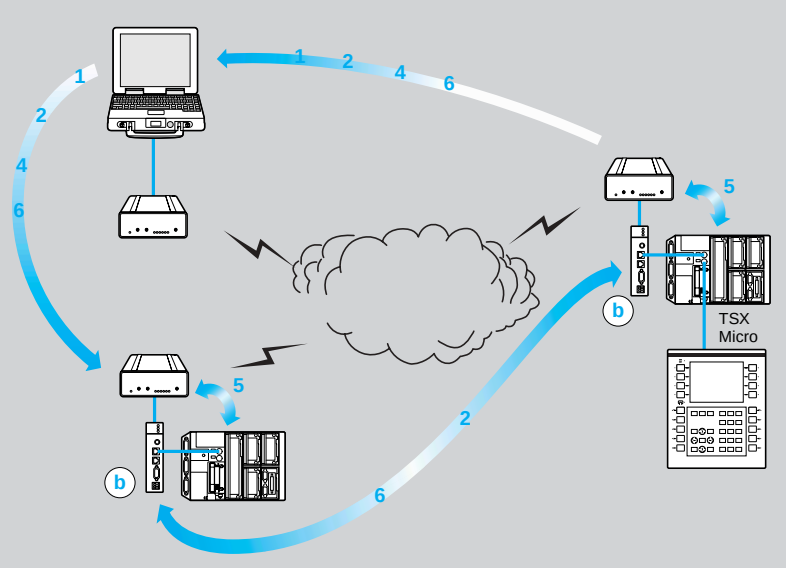
Modicon TSX Micro automation platform

Ethernet network and TCP/IP Modem serial link

Ethernet link



Modem link



1, 2, 3, 4, 5 and 6 See functions on page 4/9.

a Premium Ethernet TSX ETY 410●/510● module.
b TSX Micro Ethernet TSX ETZ 410/510 module.
c Quantum Ethernet 140 NOE 711 ●● module.

Modicon TSX Micro automation platform

Ethernet network and TCP/IP Modem serial link

Services linked to Ethernet applications

The TSX ETZ 410/510 modules integrate the services linked to the Ethernet applications:

1 Integrated Web server services:
- IP configuration for the TSX ETZ 410/510 via standard browser on the Ethernet network or locally,
- Access security,
- PLC diagnostics system Function “RackViewer”,
- Communication diagnostics function,
- Access function to the PLC data and variables, “Data Editor”,
- Download of Uni-TE PL7 applications,
- Graphic object editor (only on TSX ETZ 510),
- display of predefined Web pages,
- User Web pages (only on TSX ETZ 510).

2 Scanned inputs/outputs service performed from the Premium or Quantum PLC (I/O Scanning function).

3 Uni-TE messaging in TCP/IP in Client/Server mode:
- Remote terminal: Terminal transparence (see page 4/45).

4 Un-TE messaging in TCP/IP in Client/Server mode:
- Conversion of Modbus requests to Uni-TE requests going to the TSX Micro PLC and vice versa for the reply.

5 TCP/IP messaging gateway to Uni-TE.

6 API calling/called (only for Modem link).

Standard Ethernet services for TSX ETZ 410/510

The TSX ETZ 410/510 modules conform to the following standard protocols:

■ BOOTP: attribution of IP address via a server (also for addressing by default or from a PC equipped with a standard browser).

■ DHCP *(1)*: automatic reconfiguration by replacing a faulty module (FDR function).

■ SNMP *(2)*: *network management protocol. The TSX ETZ 410/510 modules integrate the standard MIB II and the private Ethernet Transparent Ready MIB*.

(1) Only for Ethernet link:
***Bootstrap Protocol**: protocol for starting up terminals or stations without a disk via centralized management of network parameters.*
***Dynamic Host Configuration Protocol**: protocol, which allows a station connected to a network to dynamically obtain its configuration.*

(2) ***Simple Network Management Protocol**: Network management protocol which is used to monitor a remote network by requesting the status of the stations and modifying their configuration, performing security checks and observing various information linked to data transmission. It can also be used to manage remote data bases and software.*

4
4.1

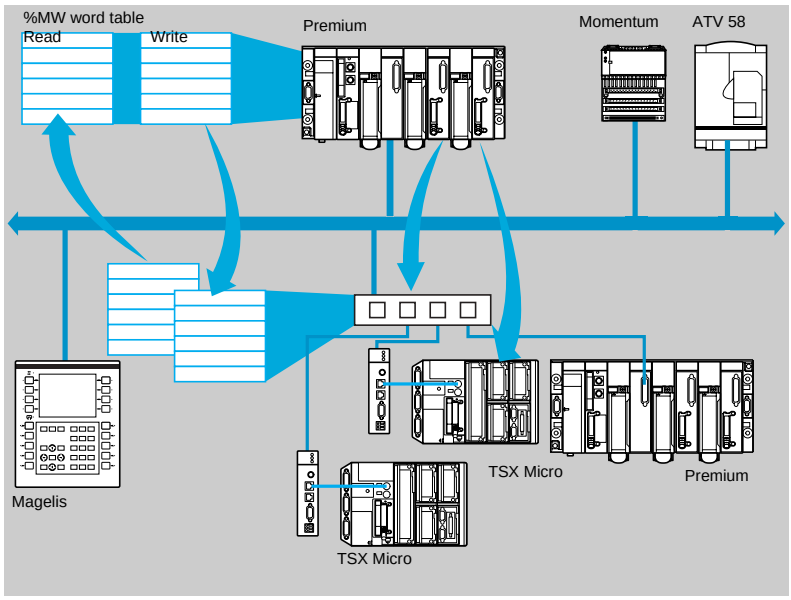
Modicon TSX Micro automation platform

Ethernet network and TCP/IP Modem serial link

Scanned inputs/outputs service

The Ethernet ETZ 410/510 modules for the TSX Micro PLC accept the scanned I/O service, which is performed by the Premium or Quantum modules using the I/O Scanning service (TSX ETY 410●/510●, 140 NOE 771 ●●).

Flow chart



This service is used to manage the exchange of remote inputs/outputs on the Ethernet network after a simple configuration and without the need for specific programming.
Inputs/outputs are scanned transparently with the assistance of read/write requests according to the Modbus protocol on the TCP/IP profile. This principle of scanning via a standard protocol is used to communicate with any device supporting a Modbus server on TCP/IP or with a built-in Modbus/Uni-TE converter on TCP/IP.

Integrated Web server

The Ethernet TSX ETZ 410/510 modules have an integrated Web server. On a TSX Micro PLC level, the functions of the Web server allow:

- configuration,
- diagnostics,
- access to variables,
- graphic editing,
- display of predefined Web pages and
- use of a Web page configuration tool.

This server is a PLC real-time data server. All TSX Micro PLC CPU data which support one of these modules are presented in the form of standard HTML-web pages and can also be accessed by all standard browsers capable of embedded Java or by FactoryCast software (supplied on CD-Rom with each Ethernet module).

All functions from the Web server do not require any configuration or programming, either on the level of the TSX Micro PLC, or on the level of the compatible PC which supports the Internet browser. Furthermore, this module can be used in an existing configuration without any modification to the current program.

Modicon TSX Micro automation platform

Ethernet network and TCP/IP Modem serial link

Configuration function

The configuration function for the module is a predefined function. It allows:

- Altering the user name and password for access to the secure page.
- Configuration of the TCP/IP parameters.
- Configuration of the Uni-Telway parameters.
- Automatic re-configuration.
- Configuration of the SNMP parameters.
- The module reset.

"Rack Viewer" function, TSX Micro PLC diagnostics

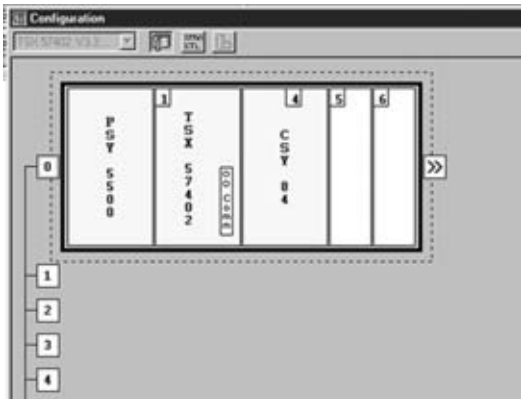
The predefined "Rack Viewer" function (display of PLC rack) is used to diagnose the TSX Micro PLC connected to the network via the Ethernet module. This is a predefined secure function (accessed using a password) which allows real-time display from a standard browser:

- The status of the LEDs on the front panel of the PLC.
- The version type of the PLC.
- The hardware configuration of the PLC with the status of the system words and bits.
- The detailed diagnostics of each I/O module or application share this configuration.

Communication diagnostics function

The communication diagnostics function is a predefined secure function (accessed using a password) which allows real-time display from a standard browser:

- The Ethernet network statistics.
- The Uni-Telway bus statistics.
- The RS 232 Modem serial link diagnostics.



"Data Editor" function, access to the PLC data and variables

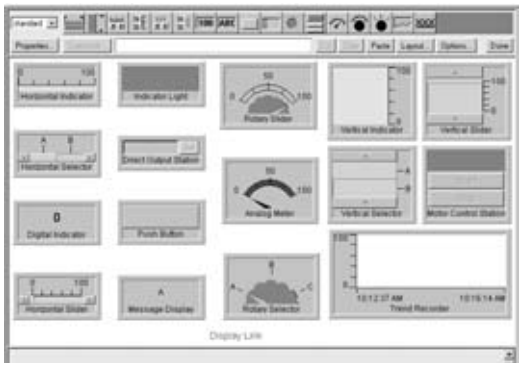
The access to the variables function is a predefined and secure function (accessible by password) allowing the creation of an events table to access the list of PLC variables in read or write.

The variables to be displayed can be entered and displayed as:

- Address (%MW99) for the TSX ETZ 410 module.
- Symbol (S_Pump 234) or address (%MW99) for the TSX ETZ 510 module.

In order to be able to write a value in a variable, you will need to enter and confirm a second password. The animation tables created by the operator can be saved in the Ethernet TSX ETZ 410/510 module.

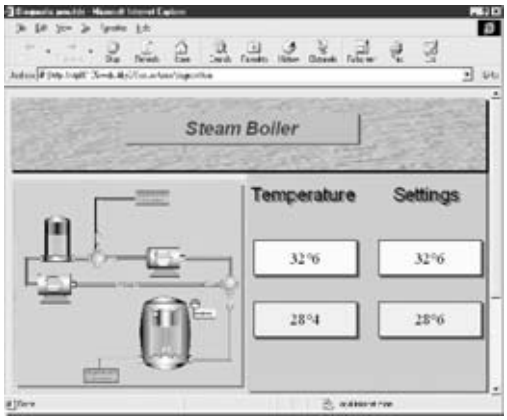
Modicon TSX Micro automation platform
Ethernet network and TCP/IP Modem serial link



Graphic object editor function
(available on the TSX ETZ 510 module)

The graphic object editor function enables you to create graphic designs, including animated graphic objects, linked to PLC variables.
These customized designs can be used in user Web pages created with FactoryCast software.

These designs are created using simple cut/paste operations and the objects are set according to the needs of the user (color, PLC variables, label…). Once the designs have been created, they can be saved in a transparent way in the Ethernet TSX ETZ 510 module.

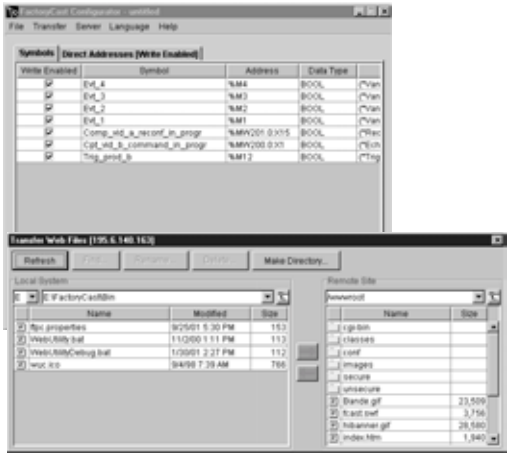


Display of predefined Web pages
(available on the TSX ETZ 510 module)

The TSX ETZ 510 module also has an 8 M bytes *(1)* Flash EPROM type memory, which is accessible as a hard disk and permits the reception (hosting) of Web pages defined by the user.
These Web pages can be created using any standard tool that lets you create and edit in HTML format. Eight pages can be enhanced by inserting animated graphic objects provided by the graphic object editor.

Once created, these Web pages allow you to:
- Display all PLC variables in real time.
- Insert hyperlinks to external servers (documentation, suppliers…).

This function is particularly useful for creating graphics and images intended for:
- Display, monitoring, diagnostics.
- Development of real time production reports.
- Maintenance assistance.
- User guides.



FactoryCast configuration tool for the integrated WEB server
(only available on the TSX ETZ 510 module)

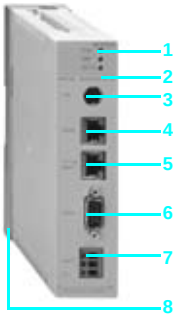
The FactoryCast software, version > 2.2.1 (supplied on the CD-Rom with the TSX ETZ 510 module), allows you to configure and administer the Web server embedded in the module. It is common to the TSX Micro, Premium and Quantum automation platforms.

It provides the following functions:
- Access security.
- Definition of the User names and associated passwords to access the Web pages.
- Definition of the access to the variables authorized in modification.
- Access to the PL7 application and to the TSX Micro PLC data.
- Save/restore a complete Web site.
- Transfer of Web pages created in local mode by the user on a PC-compatible workstation to the TSX ETZ 510 module and vice versa.

(1) Memory that is insensitive to power outages and to PLC resets.

Modicon TSX Micro automation platform

Ethernet network and TCP/IP Modem serial link



Description of the TSX ETY 410/510 modules

The Ethernet TSX ETZ 410/510 modules are autonomous and thus do not fit into a TSX Micro PLC rack, but fix onto a DIN profile or on AM1-PA perforated mounting plate.

The front of the TSX ETZ 410/510 modules are arranged as follows:

1 Three display LEDs indicating the module status (RUN, ERR, RX/TX).
2 A screened-on label indicating the module's MAC address (default address set in the M bit).
3 A mini DIN connector for terminal port (TER address).
4 An RJ45 connector for Uni-Telway auxiliary port RS 485 serial link (RS 485 address).
5 An RJ45 normalized connector for connecting to the Ethernet network (10/100BASE-T address).
6 A 9 pin male SUB-D connector for RS 232 serial link (Modem).
7 A screw terminal block for connecting to the external power supply ⎓ 24 V.
8 A support plate enabling it to be fixed to the module.

Wiring system

The TSX ETZ 410/510 modules support two kinds of exclusive TCP/IP connections:

■ By Ethernet network via 10BASE-T/100BASE-TX (RJ45) interface, see page 4/21 for accessories and connection cables.

■ By Modem via RS 232 serial link, see page 4/66 for accessories and connection cables.

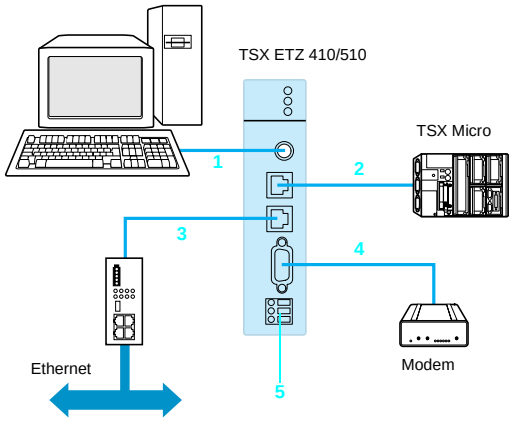
The TSX ETZ 410/510 modules are connected to the TSX Micro PLCs TSX 37 10/21/22 via:

■ The terminal port (TER) or the auxiliary port (AUX).

■ The PCMCIA RS 485 TSX SCP114 serial link.

Flow chart

The wiring chart opposite corresponds to one of the methods of connection.
The TSX ETZ 410/510 module is attached to the TSX Micro PLC via its terminal port (TER or AUX).



1 **TSX PCU 1031**: Uni-Telway connection cable between a compatible PC and the TER port of the TSX ETZ 410/510 module.

2 **TSX ETZ CDN 003**: connection cable (0.35 m cable, supplied with the TSX ETZ 410/510 module) between the module (rep. RS 485) and the TER/AUX port of the TSX Micro PLC. The **TSX CX 100** cable authorizes a connection with longer lengths (up to 10 m).

3 **490 NTW 000●●**: shielded twisted pair cable connection right of the module (rep. 10BASE-T/100BASE-TX) to Ethernet via hub (see page 4/21). Length from 2...80 m.

4 RS 232 cable between the SUB-D 9 connector contacts of the module (rep. RS 232) and the Modem.

5 Connection for external power supply ⎓ 24 V (see Phaseo power supply page 2/61).

Modicon TSX Micro automation platform

Ethernet network and TCP/IP Modem serial link

Characteristics of the TSX ETY 410/510 modules

Type of link			Ethernet	Serial link by Modem
Structure	Nature		Local industrial heterogeneous network which conforms to the IEEE 802.3 standard	Telephone line *(1)*
	Topology		Star-shaped or tree-structure network	–
	Physical interface		–	RTC Link
	Protocol		–	Point-to-point protocol
Transmission	Mode		Manchester-type baseband	Half or full duplex
	Binary data rate		10/100 M bit/s with automatic recognition	RS 232 link to 56 K bit/s max
	Medium		10BASE-T, double shielded twisted pair of type STP, impedance 100 Ω ± 15 Ω 100BASE-T, Ethernet cable category 5 conforms to standard EIA/TIA 568A	Shielded RS 232 cable (crossover DTE/DTE)
Configuration	Number of stations		Point-to-point connection (via normalized RJ45 connector) enabling a star-shaped network to be formed (the stations are linked to hubs or switches). 64 stations max. per network	2 (point to point link)
	Length		100 m max. between terminal device and hubs	–

Services and functions supported by the module

Shared services			Different shared services: - scanned inputs/outputs service performed from the Premium/Quantum PLC with the I/O Scanning function - inter-PLC communication in Uni-TE or Modbus TCP/IP - download of Uni-TE PL7 applications - diagnostics module - remote terminal: Terminal transparence (see page 4/45) - adjustment, debugging and modifications to the program
TCP/IP services			in Uni-TE: - client/server mode (32 simultaneous connections) - 128 byte client/server requests (synchronous mode) - 1Kbyte client/server requests (asynchronous mode)
			In Modbus: - client/server mode (32 simultaneous connections) - 128 byte synchronous requests
Integrated Web server function *(2)*			Different Integrated Web server services: - maximum simultaneous connection of 8 standard browsers - IP configuration for TSX ETZ 410/510 module via standard browser - PLC diagnostics system function “RackViewer” - communication diagnostics function - access function to the PLC data and variables “Data Editor” - graphic objects editor *(3)* - Web pages defined by the user (8 Mb available) *(3)*

Electrical specifications

Supply voltage	Nominal	⎓	24
	Limits	⎓	19.2…30
Wave rate			5% max.
Accepted micro-cuts		**ms**	1
Permitted overvoltage		⎓	34 max. (for 1 hour in 24)
Power consumption	Nominal	**mA**	100
	Limits	**mA**	50…200
Power dissipation		**W**	2.4 (4 max.) without consumption on terminal port

Environment

Conforming to standards			The TSX ETZ 410/510 modules conform to the TSX Micro PLC requirements (see page 1/13), which meet the following standards: ISO/IEC 8802-3, ANSI/IEEE Std 802.3 (4th edition 1993-07-08), conforming to the FCC-B rule for radiated emissions (50082-1)

(1) Transmission via Modem can also be by radio or satellite.
(2) Requires a standard browser on the PC (i.e. Internet Explorer version 4, Netscape version 4.05 or other) which is capable of executing Java code.
(3) Services available on the TSX ETY 510 module.

Presentation: page 4/6 | Description: page 4/13 | Functions: pages 4/8 to 4/12 | References: page 4/15 | Dimensions: page 4/15

Modicon TSX Micro automation platform
Ethernet network and TCP/IP Modem serial link

Ethernet TCP/IP network modules

TSX ETZ 410/510

Designation	Data rate and communication profile	Integrated Web Server		References	Weight
		Diagnostics	Web user pages		kg
Ethernet modules for Micro TSX 37 10/21/22 PLC *(1), (2)*	Ethernet 10/100 Mbps or Modem 56 Kbps Uni-TE on TCP/IP or Modbus on TCP/IP	yes	–	**TSX ETZ 410**	0.280
		yes	8 Mb available	**TSX ETZ 510**	0.280

Connection cables and accessories

Designation	From	To	Use	Length	References *(3)*	Weight kg
Ethernet twisted shielded cables *(3)*	TSX ETZ 410/510 module (RJ45 connector add. ETH)	Ethernet Hub (RJ45 connector) See page 4/21	Link to Ethernet network	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**	–
RS 485 Uni-Telway cables	TSX ETZ 410/510 module (mini DIN connector add. TER)	Compatible PC (female SUB-D 9 pin connector)	Uni-Telway bus link via terminal port	2.5 m	**TSX PCU 1031**	0.140
		TSX SCA 50 connection box	Uni-Telway bus link via terminal port	10 m *(4) (5)*	**TSX CX 100**	–
Terminal port (TER) connection box	Uni-Telway derivation bus	TSX ETZ 410/510 module or TSX Micro PLC (mini DIN connector add. TER)	Uni-Telway bus isolation signals for buses > 10m in length, end of line adaptation, bus cable derivation	1 m (TER port link cable)	**TSX P ACC 01**	0.690
Passive derivation box	Uni-Telway derivation bus	TSX ETZ 410/510 module (mini DIN connector add. TER)	Derivation and prolonging of bus cable, end of line adaptation	–	**TSX SCA 50**	0.520

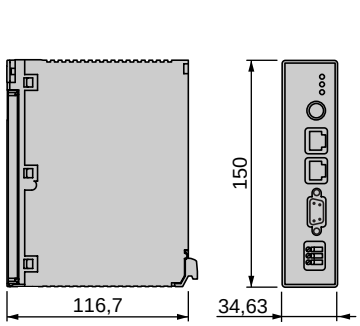
TSX P ACC 01

TSX SCA 50

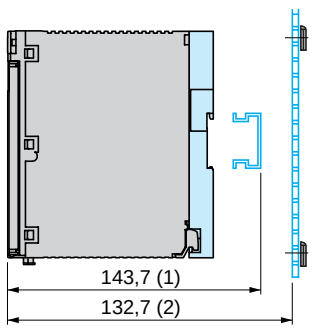
(1) Requires a TSX 37 10/20/21 PLC with a version ≥ 2.0 operating system, supplied with a TSX ETZ CDN 003 link cable (0.35 m in length). These modules should be supplied with ⎓ 24 V. (See supply process page 2/61).
(2) Supplied with CD-Rom including the FactoryCast V2.2.1 software, the Ethernet Transparent Ready Part A, the user manual for the Ethernet TSX ETZ 410/510 modules.
*(3) Add the letter **U** to the end of the reference for CSA 22.1, NFPA 70 and UL approved cables (flame-retardant).*
(4) Free wire on the side of the TSX SCA 50 connection box.
(5) If the 0.35 m of TSX ETZ CDN 003 cable, supplied with the TSX ETZ 410/510 modules, is not suitable, it is possible to use the TSX CX 100 cable (10 m in length). In this case, attach an 8 pin RJ45 connector (category 5) to the end of the free wire.

Dimensions, mounting

TSX ETZ 410/510 modules



Mounting on profiled AM1 DE200 or AM1 DP200 or on AM1 PA mounting plate



(1) 136.2 mm with profiled AM1 DP200
(2) Assembly on AM1 PA mounting plate

Modicon TSX Micro automation platform
ConneXium industrial Ethernet

Presentation

As part of its Transparent Ready family of products, Schneider Electric offers a range of industrially hardened network hubs, switches, transceivers, bridges, and cables. These Ethernet-standard communication components enable you to integrate Ethernet solutions from the device level to the control network, and beyond to the corporate intranet. Each ConneXium Industrial Ethernet product is designed with compliance to Ethernet standards, and with third-party compatibility in mind.

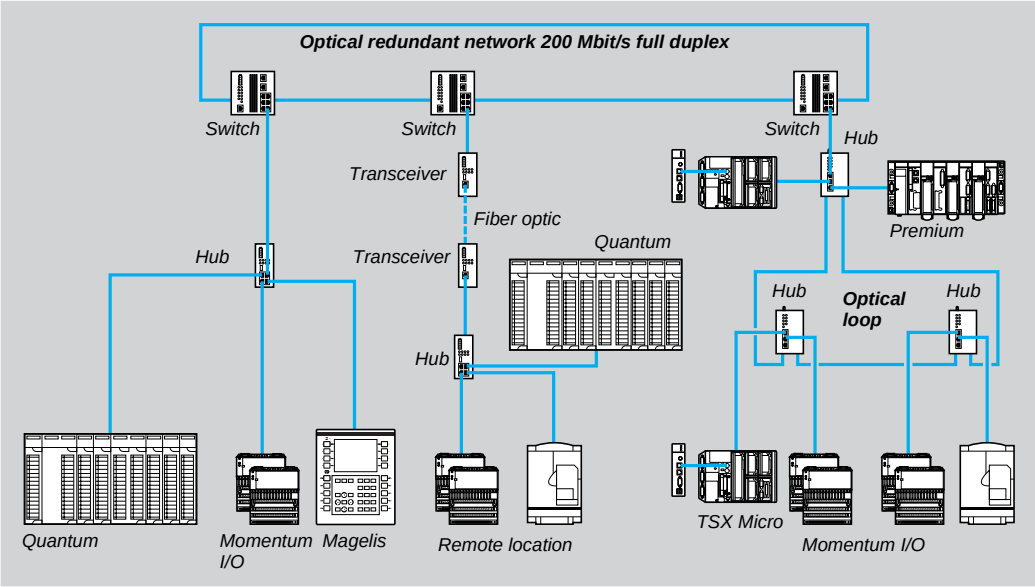
■ ConneXium Hubs connect devices and provide segments to shared communication among PLCs. TF Hubs are low-cost solutions which enable communications with devices, such as Momentum I/O, to Ethernet networks.

■ ConneXium Switches segment the application in different zones, groups, or cells/machines. The proper placement of switches can increase network performance by relieving network congestion. TF switches implement SNMP protocol, allowing standard network management tools to monitor and diagnose the network, and thus are a key architectural component for real-time and deterministic network communication.

■ ConneXium Transceivers provide connections to fiber optic networks in areas of high electromagnetic interference. The use of multiple transceivers enables long distances between process areas.

■ ConneXium Bridges enable Modbus to Ethernet and Modbus Plus to Ethernet communications, with multiple ports allowing flexibility among network components.

■ ConneXium Cables connect each automation device to the attached hub, switch, transceiver, or bridge. Cables are available in fiber optic and twisted pair options, with a wide variety of connectors and cable lengths.



All Ethernet cabling system components are built to rigorous industrial standards, and are designed to perform in harsh environments. ConneXium Switches and Hubs support a high level of resilience. Their scalable redundant features - from single to double ring structure - make it easy to build the kind of fault-tolerant network that fits the specific requirements of your environment.

Characteristics:
pages 4/17 to 4/20

References:
page 4/21

Modicon TSX Micro automation platform
ConneXium industrial Ethernet

Characteristics of hubs

Mechanical characteristics

Models		499 NEH 104 10	499 NEH 141 00	499 NOH 105 10
Operating temperature	**° C (F)**	0...60 (32...140)		
Relative humidity		10...95 % (non-condensing)		
Dimensions (W x H x D)	**mm (in)**	40 x 125 x 80 (1.58 x 4.92 x 3.15)	47 x 135 x 111 (1.85 x 5.31 x 4.37)	80 x 140 x 80 (3.15 x 5.51 x 3.15)
Weight	**g (Lb)**	520 (1.2)	240 (0.529)	900 (2)
Enclosure		IP 30	IP 20	IP 30
Agency approvals and compliance		cUL 1950 ; FM 3810 ; FM 3611 Class 1, Div. 2; CE ; Germanischer Lloyd ; IEC 61131 2		

Electrical characteristics

Models		499 NEH 104 10	499 NEH 141 00	499 NOH 105 10
Technology		Ethernet 10 Mbit/s	Ethernet 100 Mbit/s, class 2	Ethernet 10 Mbit/s
Interfaces		4 10BASE-T ports with RJ45 shielded connectors	4 100BASE-TX ports with RJ45 shielded connectors	- 3 10BASE-T ports with RJ45 shielded connectors - 2 10BASE-FL ports with BFOC connectors
Connection type		Twisted pair cable	–	Twisted pair cables or redundant fiber optic ring
Operating voltage	**VDC**	18...32, safety low voltage		
Terminal block		1 x 5-pin, pluggable		
Redundancy		Power supply		Power supply and optical ring
Power consumption at 24 VDC	**mA**	80 typical, 130 maximum	210 typical, 270 maximum	160 typical, 350 maximum
Maximum range	**m (ft)**	Twisted pair line length, max 100 (max 330)		Fiber optic: max 3100 (max 10.000) Twisted pair: max 100 (max 330)
Number of hubs cascaded		4 max	2 max	4 max
in a ring		–		11 max
Fault indicator		Power supply failure, permanent fault in hub, faulty link status of TP port (volt-free contact 1 A max. under ⎓ 24 V)		
LED indicators		P1, P2 power, DA/STAT, data collision, segmentation, and link status per port		

References:
page 4/21

Characteristics of switches

Mechanical characteristics

Models		499 NES 181 00	499 NES 171 00	499 NOS 171 00	499 NES 251 00
Operating temperature	**° C (F)**	0…60 (32...140)	0...50 (32...122)		0…60 (32...140) (- 20…85 on storage)
Relative humidity		10…95 % (non-condensing)			
Dimensions W x H x D	**mm (in)**	47 x 135 x 111	110 x 131 x 111		43 x 143,8 x 75,2 (mounting on panel or DIN rail)
Weight	**g (Lb)**	230	850		190
Enclosure		IP 20			
Agency approvals and compliance		cUl 1950, cUL 308 ; cUL 1604 ; FM 3810 Classe 1, Div.2 ; Germanischer Lloyd ; IEC 61131 2, CE			UL 508, CSA 1010, 89/336/EEC, 73/23 EEC (EN 61131 2)

Electrical characteristics

Models		499 NES 181 00	499 NES 171 00	499 NOS 171 00	499 NES 251 00
Technology		Ethernet 10 Mbit/s and Fast Ethernet 100 Mbit/s			
Interfaces		- 8 10BASE-T/ 100BASE-TX ports with shielded RJ45 connectors	- 5 10BASE-T/ 100BASE-TX ports with shielded RJ45 connectors - 2 100BASE-TX ports with RJ45 connectors	- 5 10BASE-T/ 100BASE-TX ports with shielded RJ45 connectors 2 100BASE-FX ports with SC connectors	- 5 10BASE-T/ 100BASE-TX ports with shielded RJ45 connectors
Connection type		Twisted pair cable		Twisted pair cables and redundant fiber optic ring	Twisted pair cable
Operating voltage	**VDC**	18...32, safety low voltage			19,2…30, safety low voltage
Terminal block		1 x 5 contacts			1 x 3 contacts
Power consumption at 24 VDC	**mA**	125 typical 290 max	800 max		100 (120 to 19,2 V)
Redundancy		- Power supply	- Power supply - Optical and/or copper ring structure - Fast media redundancy < 0.3 s - Redundant manager		–
Maximum range	**m (ft)**	100	Twisted pair line length, max 100 (max 330)	Fiber optic: 3100 maxi Twisted pair: 100 maxi	100
Number of hubs cascaded		–	2 max		
in a ring		–	Maximum 50 @ 100 Mbit/s		–
Fault indicator		Power supply failure, permanent fault in switch; faulty link status of TP port; at least one port has auto-partitioned (volt-free contact 1 A max. under ⎓ 24 V), self-test error, ring monitoring not possible			–
LED indicators		P1, P2 power, redundancy manager, data exchange/port			Power: OK power supply, LINK/Active: Ethernet link, 100MB: self commutable data rate

4
4.1

References:
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Characteristics of transceivers

Mechanical characteristics

Models		499 NTR 100 10	499 NTR 101 00
Operating temperature	**° C (F)**	0...60 (32...140)	
Relative humidity		10...95 % (non-condensing)	
Dimensions (W x H x D)	**mm (in)**	40 x 134 x 80 (1.58 x 5.28 x 3.15)	47 x 135 x 111 (1.9 x 5.3 x 4.4)
Enclosure		IP 30	IP 20
Agency approvals and compliance		cUL 1950 ; FM 3810 Class 1, Div. 2 ; CE ; Germanischer Lloyd ; IEC 61131 2	cUL 1950 ; cUL 508 ; cUL 1604 ; FM 3810 Class 1, Div. 2 ; CE ; Germanischer Lloyd ; IEC 61131 2

Electrical characteristics

Models		499 NTR 100 10	499 NTR 101 00
Technology		Ethernet 10 Mbit/s	Ethernet 100 Mbit/s
Interfaces		1 10BASE-T port with shielded RJ45 connector 1 10BASE-FL port with BFOC connector	1 100BASE-TX port with shielded RJ45 connector 1 100BASE-FX ports with SC connector
Connection type		Twisted pair cable and fiber optic Ethernet cable	
Operating voltage	**VDC**	18...32, safety low voltage	
Terminal block		1 x 5-pin, pluggable	
Power consumption at 24 VDC	**mA**	80 typical 100 maximum	160 typical 190 maximum
Redundancy		Power supply	
Maximum range	**m (ft)**	10BASE-T 100 (328) 10BASE-FL 3100 (1070)	10BASE-TX 100 (328) 10BASE-FX 3100 (1070)
Link budget	**dB**	11.5 db for 50/125 and 62.5/125 µm fiber	8 db for 50/125 µm fiber, 11 db for 62.5/125 µm fiber
LED indicators		P1, P2 power, redundancy manager, data exchange/port	

References:
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Characteristiques of bridges

Mechanical characteristics

Type of bridges		174 CEV 200 30	174 CEV 300 20
Operating temperature	°C	0…50	0…60
Relative humidity		10…95 % (non-condensing)	20…90% (non-condensing)
Dimensions (W x H x D)	mm	122 x 229 x 248	35 x 95 x 60
Weight	g	4263	500
Enclosure		IP 20	
Agency approvals and compliance		UL, CSA, CE	

Electrical characteristics

Type of modules		174 CEV 200 30	174 CEV 300 20
Networks link		Modbus Plus to Ethernet	Modbus to Ethernet
Technology		Ethernet 10 Mbit/s	
Interfaces		- 1 10BASE-T port with shielded RJ45 connector; 10BASE2 (type BNC) ; 10BASE5 (type AUI) - 1 dual/simple pair cable Modbus Plus	- 1 10BASE-T/100BASE-TX port with shielded RJ45 connector - 1 RS 232/RS 485 serial port with shielded RJ45 connector
Connection type		1 RJ45, AUI, BNC cable	Twisted pair blinded cable
Operating power	V	110/220 AC (- 15 %/10 %), 47…63 Hz	24 DC
Power consumption		1 A typical	125 mA max
Redundancy		–	Power supply
Max. length of segments	m	10BASE-T: 100 10BASE2: 100 10BASE5: 100 Modbus Plus: 450	10BASE-T: 100

References:
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Modicon TSX Micro automation platform
ConneXium industrial Ethernet

References

Industrial ConneXium

499 NEH 104 10

499 NES 251 00

499 NES 171 00

499 NTR 100 10

Description	Type of Ethernet network	Available ports	Reference	Weight kg
Hubs	10 Mbit/s	8 10BASE-T/100BASE-TX ports	**499 NES 181 00**	1,450
		4 10BASE-T ports	**499 NEH 104 10**	0,520
		3 10BASE-T ports 2 10BASEFL ports	**499 NOH 105 10**	0,900
	100 Mbit/s	4 100BASE-TX ports	**499 NEH 141 00**	0,520
Switches	10/100 Mbit/s	5 10BASE-T/100BASE-TX ports	**499 NES 251 00**	0,190
		5 10BASE-T/100BASE-TX ports and 2 100BASE-TX ports	**499 NES 171 00**	1,450
		5 100BASE-TX ports and 2 100BASE-FX ports	**499 NOS 171 00**	1,450
Tranceivers	10 Mbit/s	1 10BASE-T port and 1 10BASE-FL port	**499 NTR 100 10**	0,520
	100 Mbit/s	1 100BASE-TX port and 1 100BASE-FX port	**499 NTR 101 00**	0,520

Description	Type of connection	Available ports	Reference	Weight kg
Bridges	Modbus Plus/Ethernet (dual/simple pair Modbus)	1 10BASE-T (type RJ45) port or 10BASE2 (type BNC) or 10BASE5 (type AUI)	**174 CEV 200 30**	4,260
	Modbus/Ethernet	1 10BASE-T/10BASE-TX port (type RJ45)	**174 CEV 300 20**	0,500

Accessoires de raccordement

Description	Utilisation	Ports Ethernet disponibles	Reference	Weight kg
Mini transceiver	For connecting a10BASE-5 interface device (2) to a 10BASE-T Ethernet network segment (twisted pair)	1 10BASE-5 (type AUI) port and 1 10BASE-T (type RJ 45) port	**TSX ETH NTR1**	–

174 CEV 300 10

490 NTW 000●●

490 NOC 000 0●

Câbles de raccordement

Description	Preformed at each end	Length	Reference	Weight kg
Shielded and foil twisted pair cord cable	2 connectors RJ45 type For connection to DTE terminal	2 m	**490 NTW 000 02** *(1)*	–
		5 m	**490 NTW 000 05** *(1)*	–
		12 m	**490 NTW 000 12** *(1)*	–
		40 m	**490 NTW 000 40** *(1)*	–
		80 m	**490 NTW 000 80** *(1)*	–
Shielded and foil twisted pair crossed cord cable	2 connectors RJ45 type For connection between hubs, switches and transceivers	5 m	**490 NTC 000 05** *(1)*	–
		15 m	**490 NTC 000 15** *(1)*	–
		40 m	**490 NTC 000 40** *(1)*	–
		80 m	**490 NTC 000 80** *(1)*	–
Fiber optic cable for terminal equipment to optical cross connecting bay	1 connector SC type and 1 connector MT/RJ	5 m	**490 NOC 000 05**	–
	1 connector ST type (BFOC) and 1 connector MT/RJ	5 m	**490 NOT 000 05**	–
	2 connectors MT/RJ type	5 m	**490 NOR 000 05**	–

(1) Category 5 of the EIA/TIA-568 international wiring-standard, class D of IEC 11801/EN50173 approved cables. Add the letter U to the end of the reference for CSA 22.1, NFPA 70 and UL approved cables.
(2) For example, a TSX Series 7 PLC equipped with a TSX ETH 107 Ethernet module.

Characteristics:
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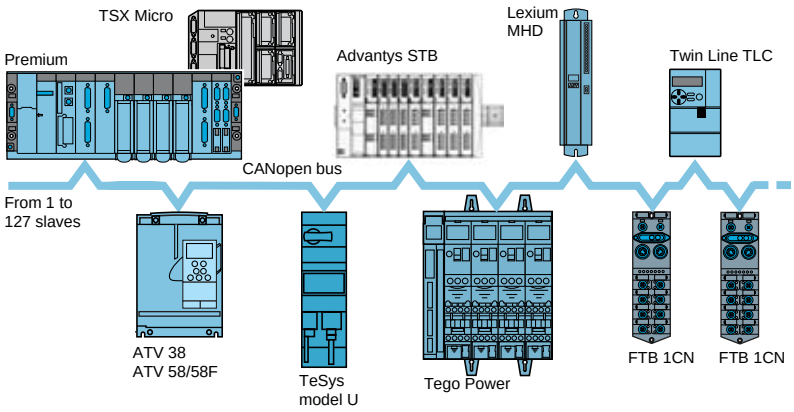
Modicon TSX Micro automation platform
CANopen machine bus

Presentation

Originally used in the automotive industry, CAN is increasingly used in general industry. Several fieldbuses based on CAN lower layers and components are available. The CANopen machine bus conforms to the ISO 11898 international standard, promoted by the CAN In Automation association, which consists of users and manufacturers and offers an excellent assurance of open access and interoperability due to its standardised devices and communication profiles.



The CANopen bus is a multimaster bus which ensures reliable deterministic access to realtime data in control system devices. The CSMA/CA protocol is based on broadcast exchanges, sent cyclically or on an event, which ensures optimum use of the passband. A message handling channel can also be used to define slave parameters.

The bus uses a double shielded twisted pair, on which 127 devices maximum are connected by daisy chaining. The variable data rate between 20 Kbps and 1 Mbps depends on the length of the bus (between 30 and 5000 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.
- Standardised configuration of networks.
- Access to all device parameters.
- Synchronisation and circulation of data from cyclic and/or event-controlled processes (short system response time).
- Interoperability between numerous international manufacturers.

Description:
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Characteristics:
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References:
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Modicon TSX Micro automation platform
CANopen machine bus

TeSys model U

Advantys FTB

Altivar ATV 31

Twin Line TLC

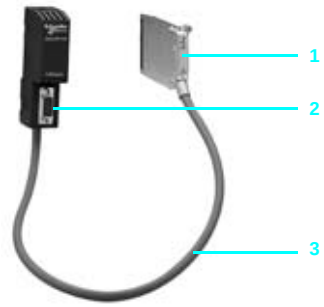
Example of connectable devices on the CANopen bus

Connectable devices

The TSX CPP 110 module performs the role of the master on the CANopen bus, and other Telemecanique devices (slaves) which can be connected on the bus are:
- TeSys model U starter-controllers.
- TeSys model d using the Tego Power installation assistance system.
- Advantys STB distributed I/O.
- Advantys FTB, IP 67 monobloc I/O splitter boxes.
- Advantys FTM, IP 67 modular I/O splitter boxes.
- Altivar 31, variable speed drives for asynchronous motors 0.18…15 kW.
- Altivar 58, variable speed drives for asynchronous motors 0.37…75 kW.
- Altivar 58F, variable speed drives with flux vector control for asynchronous motors 0.75…55 kW.
- Twin Line TLC servodrives for brushless motors 3…16 A.
- Lexium MHDA servodrives for brushless motors 1.5…70 A.

Are also compatible:
- Any third-party device which conforms to the CANopen standard profile.
- Any CAN device which uses CAN V2.0B identifiers on the ISO 11898 physical layer.

The TSX CPP 110 PCMCIA card supports the V4.02 CANopen standard with in particular the heartbeat network management.



TSX CPP 110

Description

The Modicon TSX Micro/Premium platforms connect to the CANopen bus by means of the TSX CPP 110 type III PCMCIA card inserted in the processor or coprocessor communication port slot.

The TSX CPP 110 machine bus CANopen set comprises:
1. A PCMCIA card, type III with fixing screws.
2. A tap junction equipped with one 9-way SUB-D connector for connecting the CANopen bus.
3. A connection cable length 0.5 m, interdependent of the PCMCIA card and the tap junction.

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Characteristics: page 4/24
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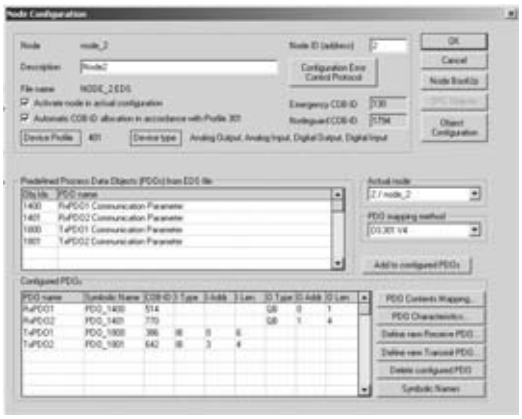
Modicon TSX Micro/Premium automation platform
CANopen machine bus

Software setup



Example of SyCon configuration devices screen

The CANopen bus is configured using dedicated SyCon *(1)* software, which should be ordered separately, reference SYS SPU LF● CD28M.
This software is used:
- To describe all devices connected on the bus.
- To generate the ".CO" file including the informations relating to the devices connected. This extension file is imported into the PLC application via the PL7 Micro/Junior/Pro programming software.

If the configuration file is too large in relation to the TSX Micro/Premium processor capacity (see characteristics table), it is possible to load the master configuration directly by inserting the TSX CPP 110 card in a PCMCIA port (type III) on the PC on which SyCon software has been installed.

In PL7, it is possible to configure the CANopen bus card so that the PLC processor/TSX CPP 110 card exchanges are executed at the same rate as the master task or the fast task.
The process data exchanged with the slaves can be accessed by %MW standard words, the number of which depends on the type of processor and the task in which the module has been declared. PL7 standard function blocks are used to define the device parameters.

Nota : *In addition to supporting the CANopen protocol which uses V2.0A standard CAN identifiers on 11 bits, the card enables direct access to the CAN link layer via CAN V2.0B identifiers on 29 bits, used by the majority of CAN devices. In certain applications this enables simultaneous control of CANopen devices and dedicated CAN products.*

(1) The SyCon field bus configurator software also makes it possible to describre the I/O configuration of Profibus DP bus for Modicon Premium and Modicon Quantum platforms and the I/O configuration of INTERBUS bus for Modicon Quantum platform.

Characteristics

Type of bus				CANopen						
Structure	Type			Industrial bus						
	Physical interface			ISO 11898						
	Topology			Devices linked by daisy-chaining						
	Access method			CSMA/CA, multimaster, producer/consumer, prioity information						
Transmission	Data rate			20 Kbit/s…1 Mbit/s depending on the length of bus						
	Medium			Double shielded twisted pair						
Physical configuration	Number of devices			127 max.						
	Length of bus according to data rate			1 Mbit/s	800 Kbit/s	500 Kbit/s	250 Kbit/s	125 Kbit/s	50 Kbit/s	20 Kbit/s
			m	20	45	100	250	500	1000	2500
	Segments	Number		5 maxi (4 repeaters)						
		No. of devices per segment		64 devices		32 devices		16 devices		
		Max. length of segment	**m**	170		190		210		
		Equivalent length of a repeater	**m**	15						
Software configuration				**Micro TSX 37 21 001/101 22 001/101**		**Premium TSX P57 and Atrium T PCX 57**				
						103 M	**2●3M/ 2●23M**	**3●3M/ 363M**	**453M 4823M**	
	Size of configuration data *(1)*		**Ko**	0…8		0…12	16	32	64	
	Max. size of CANopen I/O data	Master task	**words**	256 %MW		384 %MW	512 %MW	1024 %MW	3584 %MW	
		Fast task	**words**	32 %MW		48 %MW	64 %MW	128 %MW	256 %MW	

(1) This size can be exceeded if the configuration is loaded in the memory of CANopen PCMCIA card via the SyCon software.

Presentation: page 4/22 Description: page 4/23 References: page 4/25

Modicon TSX Micro automation platform
CANopen machine bus

TSX CPP 110

References

CANopen machine bus set

Description	Services	No. of module per PLC/PC	Use	Reference	Weight kg
CANopen master V4.02 PCMCIA card (type III)	- PDO cyclic exchanges - CMS message handling (SDO) - management of bus operating modes	1 on Micro TSX 37 21/22 1 on Premium TSX P57 *(1)* 1 on Atrium TPCX	Supplied with a tap junction and cable length 0.5 m	**TSX CPP 110**	0.230

Sycon configuration softwares

The SyCon software is the configurator for machine bus and field bus of Telemecanique.
It supports the buses:
- CANopen for TSX Micro et Premium platforms.
- Profibus DP for Premium et Quantum platforms.
- INTERBUS for Quantum platform.

The SyCon tool includes also the device description for Telemecanique I/O modules.

Description	Type	Reference	Weight kg
SyCon V2.8 configuration software licenses (2)	Single (1station)	**SYS SPU LFU CD28M**	–
	Group (3 stations)	**SYS SPU LFG CD28M**	–
	Team (10 stations)	**SYS SPU LFT CD28M**	–
	Site (up to 10 stations)	**SYS SPU LFF CD28M**	–
SyCon V2.8 configuration software update	Single (1station)	**SYS SPU LRU CD28M**	–
SyCon V2.8 configuration software upgrade for previous version	Group (3 stations)	**SYS SPU LUG CD28M**	–
	Team (10 stations)	**SYS SPU LUT CD28M**	–
	Site (up to 10 stations)	**SYS SPU LUF CD28M**	–

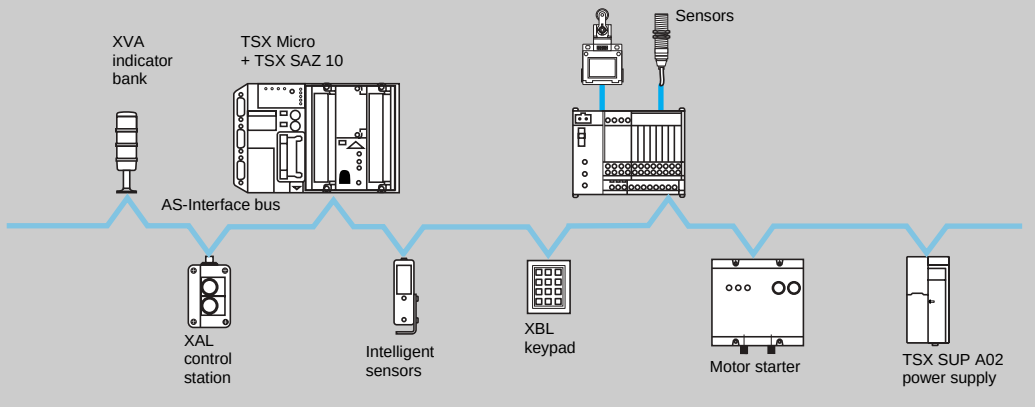
(1) Unauthorized on TSX P57 153M *Premium processor.*
(1) A software kit of single type (1 station) including PL7 Micro et Sycon softwares is also available, see page 5/18.

Modicon TSX Micro automation platform

TSX SAZ master module for AS-Interface bus

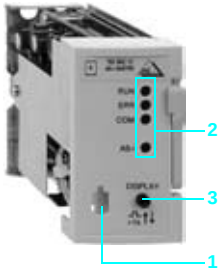
Presentation

The TSX SAZ 10 AS-Interface bus module enables the TSX Micro PLC to act as the AS-Interface bus master. In this way up to 31 sensor/actuator type devices may be managed on the one AS-Interface bus. Up to 4 inputs and/or outputs can be connected to each device, giving a maximum of 248 I/O on one segment.



The AS-Interface bus comprises a master station (TSX Micro PLC) and slave stations. The TSX SAZ 10 module supports the AS-Interface M2 profile, interrogates the device connected on the AS-Interface bus in turn and stores the data (state of sensors/actuators, operational status of devices) in the PLC memory.
Communication management on the AS-Interface bus is completely transparent with regard to the PLC application program.
An AS-Interface power supply for bus must be used for powering the various components on the AS-Interface bus. Ideally this PSU should be situated nearest to the stations with the largest current demands.
See page 2/51, Phaseo power supplies.

Description

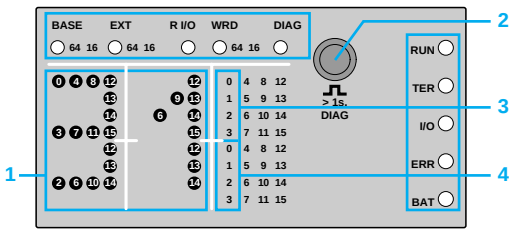


The TSX SAZ 10 AS-Interface bus master is a half-format module designed to slot into the basic configurations of TSX 37 10/21/22 TSX Micro PLCs, in position 4 (one TSX SAZ 10 module per configuration) *(1)*.

The front panel comprises:
1 An opening with locating device for routing AS-Interface bus ribbon or round cable (to be connected to a terminal block inside the module).
2 Four indicator lamps:
- RUN: the module is active,
- ERR: module fault or bus connection fault,
- COM: AS-Interface bus communication is active,
- AS-Interface: bus configuration error.

3 A pushbutton to transfer the AS-Interface bus display to the PLC front panel.

Diagnostics



The TSX Micro PLC centralised display block enables the display of the status of all the I/O channels, and the diagnostics for devices on the AS-Interface bus (present, missing, faulty, not conforming to the configuration):

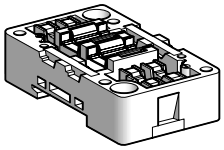
1 Device number.
2 Control pushbutton for accessing the various operating modes of the display block.
3 State of the 4 device inputs.
4 State of the 4 device outputs.

(1) When the TSX SAZ 10 module is in position 4, the upper position 3 can only receive a TSX A●Z ●●●● analogue or TSX CTZ ●●● counter half-format module.

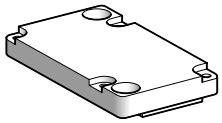
Modicon TSX Micro automation platform

TSX SAZ master module for AS-Interface bus

TSX SAZ 10



XZ SDE11●3



XZ SDP

XZ CB1●●0●

References

AS-Interface bus module

Description	Protocol	Number of I/O	Reference	Weight kg
AS-Interface bus master module for TSX 37 10/21/22 PLCs	AS-Interface V1	31 devices, thus 248 I/O maximum	**TSX SAZ 10**	0.180

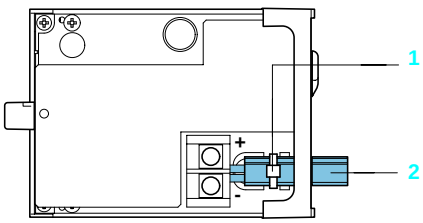
Connection accessories

Description	Connection to cable	Type and number of connectable cables	Reference	Weight kg
Connection modules for ribbon cable	Via vampire clip	2 ribbon cables for AS-Interface bus (yellow)	**XZ SDE1113**	0.070
		2 ribbon cables: - 1 for AS-Interface bus (yellow) - 1 for separate supply (black)	**XZ SDE1133**	0.070
Cover for connection module	–	–	**XZ SDP**	0.030

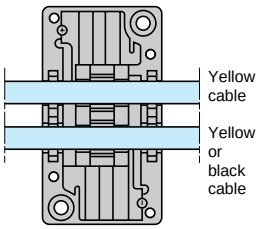
Description	Supply	Length	Reference	Weight kg
Ribbon cables for AS-Interface bus	For AS-Interface bus (yellow)	20 m	**XZ CB10201**	1.400
		50 m	**XZ CB10501**	3.500
		100 m	**XZ CB11001**	7.000
Other AS-Interface accessories		–	Please consult our “AS-Interface cabling system” catalogue	

Connections

TSX SAZ 10 module



XZ SDE11●3



1 AS-Interface cable locking collar.
2 AS-Interface bus cable (ribbon with locating device or round) (+ brown, - blue).

Modicon TSX Micro automation platform
Master modules for AS-Interface bus

Software setup

The AS-Interface bus is configured using PL7 Micro/Junior/Pro software. The services offered are based on the principle of simplicity:
- Management of profile tables, parameters and data by the master (this management is transparent to the user).
- Topological I/O addressing: each AS-Interface slave declared on the bus is assigned a topological address on the bus. This is transparent to the user.
- Each sensor/actuator for the AS-Interface bus interfaces is treated as an in-rack I/O by the TSX Micro/Premium PLC.

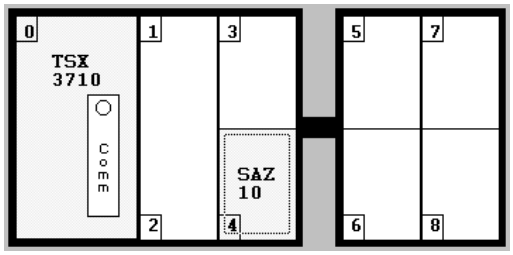
AS-Interface bus configuration

All devices on the AS-Interface bus are configured implicitly using the following sequence of screens:

■ Declaration of the AS-Interface bus master module

□ The TSX SAZ 10 module is always inserted and declared in position no. 4 on TSX 37 10/21/22 TSX Micro automation platforms.

□ TSX SAY 100/1000 modules can be inserted into any position on TSX/PCX 57 Premium automation platforms (except positions reserved for processors and power supplies).



Declaration of the TSX SAZ 10 TSX Micro module

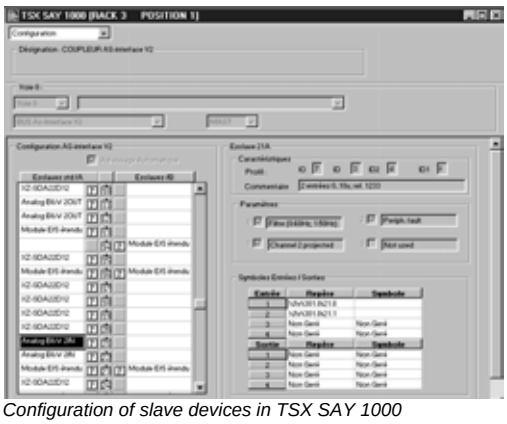
■ Configuration of AS-Interface slave devices

Using the configuration screen, it is possible to configure all the slave devices corresponding to all interface I/Os on the AS-Interface bus. Depending on its type, the configuration for each device consists of defining, as appropriate:

□ Schneider Electric AS-Interface devices.
The user selects the AS-Interface device catalog reference from the various discrete, analog, or safety interfaces listed. This selection automatically determines the AS-Interface profile and the parameters associated with each interface.

□ Third-party AS-Interface device.
The user can use PL7 Micro/Junior software to manage a “customized” list of sensors/actuators of different brands. This list, specifying the AS-Interface profile and parameters, is compiled to meet the needs of the user.

Configuration of slave devices for TSX SAY 100



Configuration of slave devices in TSX SAY 1000

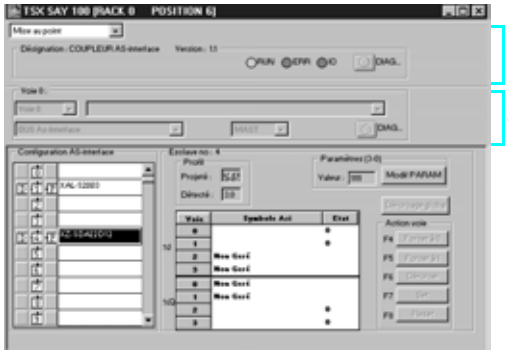
Programming

After configuration, the I/Os connected on the AS-Interface bus are processed by the application program in the same way as an in-rack I/O of the PLC, using either the address (e.g. %I\4.0\16.2, input 2 of slave 16 of the AS-Interface bus), or the associated symbol (e.g. Start_conveyor).

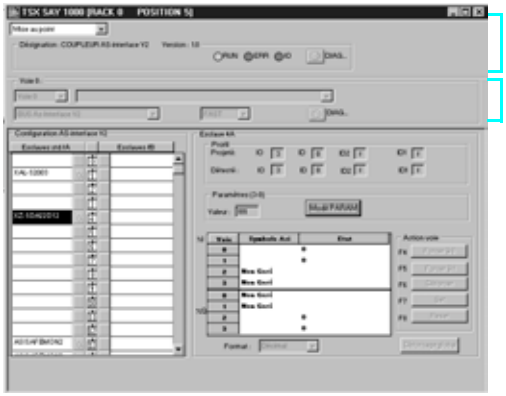
PL7 Junior/Pro software has an integrated function block library containing the specific diagnostic DFBs for AS-Interface bus. Its check for the appearance of any error on the AS-Interface (bus or slaves).

Modicon TSX Micro automation platform

Master modules for AS-Interface bus



Diagnostics of the TSX SAY 100 module using PL7



Diagnostics of the TSX SAY 1000 module using PL7

Diagnostics

Diagnostics performed using the centralized display unit of the TSX Micro platform or using the display unit of TSX SAY 100/1000 modules can be completed using a PC terminal on which PL7 Micro/Junior/Pro software has been installed.

The terminal connected to the TSX Micro/Premium PLC is used to perform diagnostics of the operating state of the AS-Interface V1 TSX SAZ 10 and TSX SAY 100 master modules, the bus and the slave devices on the bus.

For the AS-Interface V2 TSX SAY 1000 master module, the diagnostics are identical to those of the AS-Interface V1 module, and in addition, take into account developments in the M2E standard.

Diagnostics are performed using a single screen divided into four sections providing information on:

1 Status of the TSX SAZ 10 or TSX SAY 100/1000 module (RUN, ERR, I/O).
2 Status of the AS-Interface channel connected to the module.
3 Faulty interface (or slave).
4 Data relating to any selected interface (profile, parameters, forcing, etc).

In the event of an AS-Interface module or channel fault, a second screen can be accessed, which clearly shows the type of fault, which may be at internal or external level.

Characteristics

Type of module		TSX SAZ 10	TSX SAY 100	TSX SAY 1000
AS-Interface profile		M2(AS-Interface V1)		M2E (AS-Interface V2)
Type of addressing		Standard		Standard and extended
Product certification		AS-Interface No. 12001, IEC 61131 2	AS-Interface No. 18801, IEC 61131 2	Pending
Ambient air temperature	Operation	0…+60 °C.		
	Storage	-25…+70 °C.		
Degree of protection		IP 20		
Vibration resistance		Conforming to IEC 68 2 6. Fc tests.		
Shock resistance		Conforming to IEC 68 2 27. EA tests.		
Number of connectable interfaces (or slaves)	With standard addressing	31 slaves		
	With extended addressing	–		31 slaves
Type of connectable interfaces	With standard addressing	Discrete I/Os (4I/4O)		Discrete I/Os (4I/4O) *(1)* Analog I/Os (a maximum of 4 channels) Safety interfaces
	With extended addressing	–		Discrete I/Os (4I/3O)
Bus connection		By terminal block inside module (polarity locating device)	By 3-way SUB-D connector (included with the module)	
Module power supply		Via power supply integrated into the host platform of the module		
Display/diagnostics		Via: □ centralized display unit on TSX Micro PLC or via the display unit of TSX SAY 100/1000 modules □ use of the PL7 Micro/Junior/Pro software diagnostics function □ use of the ASI-TERV1 adjustment console (infrared link)		

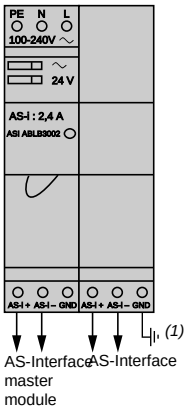
(1) If the interfaces are connected using extended addressing, the type of discrete I/Os is 4I/3O (instead of 4I/4O).

Modicon TSX Micro automation platform

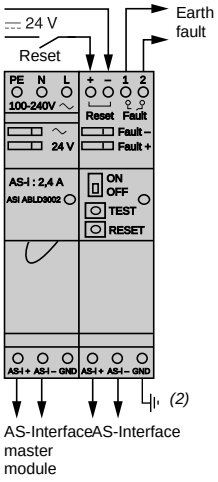
Phaseo regulated switch mode power supplies for AS-Interface

Power supplies for AS-Interface

Consistent with the standard Phaseo line, the range of ASI ABL power supplies is designed to deliver a d.c. voltage, as required by networks operating under the AS-Interface protocol. Three versions are available to meet all needs encountered in industrial applications, in enclosures, cells or floor-standing enclosures. These single-phase, electronic, switch mode power supplies guarantee the quality of the output current, in accordance with the electrical characteristics and conforming to standard EN 50295.

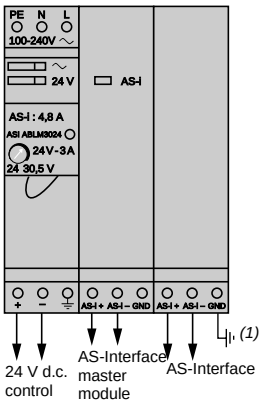


■ ASI ABLB300●
Operating on a 100 to 240 V a.c. supply, this power supply delivers a voltage of 30 V d.c. Available in 2.4 and 4.8 A ratings, the parallel output terminal blocks allow the bus to be connected separately to the slaves and the master. Input and output LEDs allow fast and continuous diagnostics.



■ ASI ABLD300●
Operating on a 100 to 240 V a.c. supply, this power supply delivers a voltage of 30 V d.c. Available in 2.4 and 4.8 A ratings, it allows diagnosis and management of earth faults on AS-Interface networks. In the event of an earth fault, the Phaseo power supply trips out, thus stopping dialogue on the bus. Restarting is only possible after deliberate acknowledgement of the fault. Two I/O are provided, which may be used to monitor status. The parallel output terminal blocks are used to connect the bus separately to the slaves and the AS-Interface master. Input, output and fault LED's allow fast and continuous diagnostics.

Warning: the earth (GND) (2) connection must be made. In the event of disconnection, the built-in detector becomes inoperative. To obtain earth connection diagnostics, it is recommended that an ASI ABLB300● power supply be used together with insulation relay RMO PAS 101.



■ ASI ABLM3024
Operating on a 100 to 240 V a.c. supply, this product delivers two d.c. outputs which are totally independent in the way they operate.
Two output voltages - 30 V d.c./2.4 A (AS-Interface supply) and 24 V d.c./3 A - are available, so making it possible to supply the control equipment without an additional power supply. Input and output LEDs allow fast and continuous diagnostics.

(1) Recommended connection.
(2) Compulsory connection.

Characteristics: page 4/31
References: page 4/33
Dimensions: page 4/33

Modicon TSX Micro automation platform

Phaseo regulated switch mode power supplies for AS-Interface

Technical characteristics

Type of power supply			**ASI ABLB3002**	**ASI ABLB3004**	**ASI ABLD3002**	**ASI ABLD3004**	**ASI ABLM3024**	
Functions			Supply to the AS-Interface system					24 V ⎓ supply
Product certifications			UL 508, CSA 22-2 n° 950					
Conforming to standards	Safety		EN 60950, TÜV					
	EMC		EN 50081-1, IEC 61000-6-2, EN 55022 class B					
	Low frequency harmonic currents		No					

Input circuit

LED indication			Orange LED					
Input voltage	Rated values	**V**	∿ 100…240					
	Permissible values	**V**	∿ 85…264					
	Permissible frequencies	**Hz**	47…63					
	Efficiency at nominal load	**%**	> 83					> 80
	Current consumption		0.5	1	0.5	1		
	Current at switch-on	**A**	< 30					
	Power factor		> 0.65					

Output circuit

LED indication			Green LED					
Nominal output voltage		**V**	⎓ 30 (AS-Interface)					⎓ 24
Nominal output current		**A**	2.4	4.8	2.4	4.8	2.4	3
Precision	Adjustable output voltage	**V**	–					100 to 120 %
	Line and load regulation		3 %					
	Residual ripple - interference	**mV**	300 - 50					
Micro-breaks	Holding time for I max and Ve min	**ms**	10					
Protection	Short-circuit		Permanent/automatic restart after elimination of the fault					
	Overload		1.1 In					
	Overvoltage		Tripping if U > 1.2 Un					U > 1.5 Un
	Undervoltage		Tripping if U < 0.95 Un					U < 0.8 Un

Operating characteristics

Connections	Input	**mm²**	2 x 2.5 screw terminals + earth
	Output	**mm²**	2 x 2.5 screw terminals + earth, multiple output
Environment	Storage temperature	**°C**	- 25 to + 70
	Operating temperature	**°C**	0 to + 60 (derating from 50)
	Maximum relative humidity		95 % (without condensation or dripping water)
	Degree of protection		IP 20 (conforming to IEC 529)
	Vibration		EN 61131-2
Operating position			Vertical
MTBF		**h**	> 100000 (conforming to Bell core, at 40 °C)
Dielectric strength	Input/output		3000 V/50 Hz/1 mm
	Input/earth		3000 V/50 Hz/1 mm
	Output/earth (and input/output)		500 V/50 Hz/1 mm
Input fuse incorporated			Yes (not interchangeable)
Emissions	Conducted/radiated		Class B (conforming to EN 55022)
Immunity	Electrostatic discharge		EN 61000-4-2 (4 kV contact/8 kV air)
	Electromagnetic		EN 61000-4-3 level 3 (10 V/m)
	Conducted interference		EN 61000-4-4 level 3 (2 kV), EN 61000-4-6 (10 V)
	Mains interference		EN 61000-4-11

Presentation: page 4/30 References: page 4/33 Dimensions: page 4/33

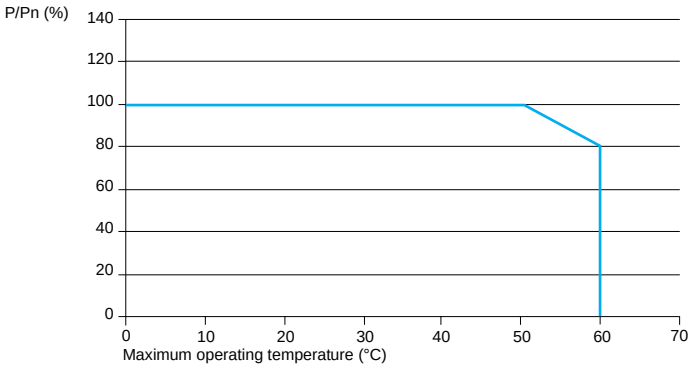
Modicon TSX Micro automation platform

Phaseo regulated switch mode power supplies for AS-Interface

Output characteristics

Derating

The ambient temperature is a determining factor which limits the power that an electronic power supply can deliver continuously. If the temperature around the electronic components is too high, their life will be significantly reduced.
The graph below shows the power (in relation to the nominal power) which the power supply can deliver continuously, according to the ambient temperature.



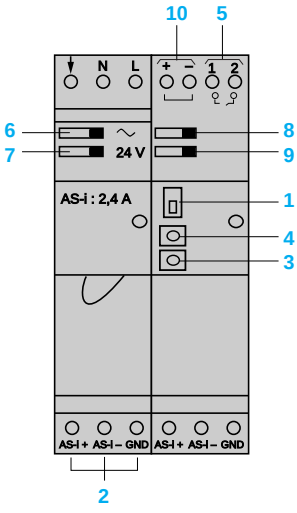
Selection

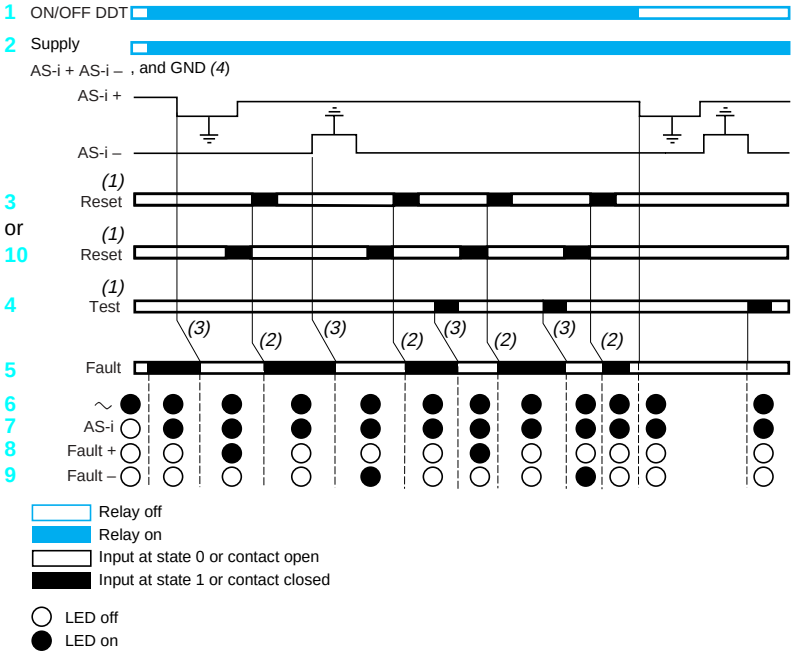
Upstream protection of power supplies for use on the AS-Interface system

Mains supply	∿ 115 V single-phase			∿ 230 V single-phase		
Type of protection	Thermal-magnetic circuit-breaker		Gg fuse	Thermal-magnetic circuit-breaker		Gg fuse
Single-pole	GB2 CB●●					
2-pole	GB2 DB●●	C60N		GB2 DB●●	C60N	
ASI ABLB3002	GB2 ●B07	MG24517 *(1)*	2 A	GB2 DB06	MG24516 *(1)*	2 A
ASI ABLB3004	GB2 ●B08	MG24518 *(1)*	4 A	GB2 DB07	MG17453 *(1)*	2 A
ASI ABLD3002	GB2 ●B07	MG24517 *(1)*	2 A	GB2 DB06	MG24516 *(1)*	2 A
ASI ABLD3004	GB2 ●B08	MG24518 *(1)*	4 A	GB2 DB07	MG17453 *(1)*	2 A
ASI ABLM3024	GB2 ●B07	MG24517 *(1)*	2 A	GB2 DB06	MG17453 *(1)*	2 A

(1) UL certified circuit-breaker.

Function diagram





(1) 30 ms min.
(2) 15 ms.
(3) 20 ms.
(4) Warning: the earth fault detector will only operate if the earth (GND) terminal is connected.

Presentation: page 4/30
Characteristics: page 4/31
References: page 4/33
Dimensions: page 4/33

Modicon TSX Micro automation platform

Phaseo regulated switch mode power supplies for AS-Interface

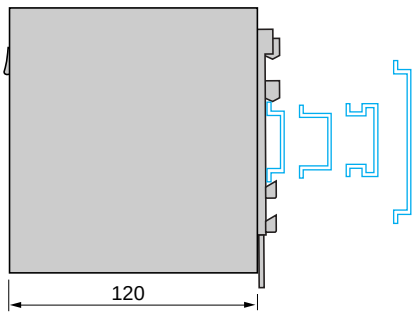
ASI ABL regulated switch mode power supplies

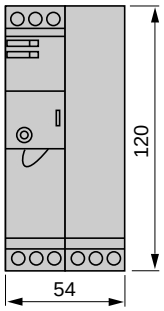
Mains input voltage 47…63 Hz	Output voltage	Nominal power	Nominal current	Auto-protect reset	Earth fault detection	Reference	Weight
V	⎓ V	W	A				kg
100…240 single-phase wide range	30	72	2.4	auto	no	**ASI ABLB3002**	0.800
		145	4.8	auto	no	**ASI ABLB3004**	1.300
		72	2.4	auto	yes	**ASI ABLD3002**	0.800
		145	4.8	auto	yes	**ASI ABLD3004**	1.300
	30 + 24	2 x 72	2.4 + 3	auto	no	**ASI ABLM3024**	1.300

Dimensions

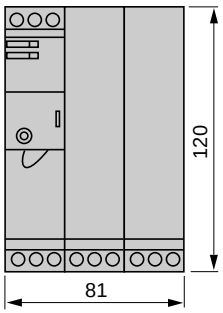
Common side view
Mounting on 35 and 75 mm rails

ASI ABLB3002
ASI ABLD3002



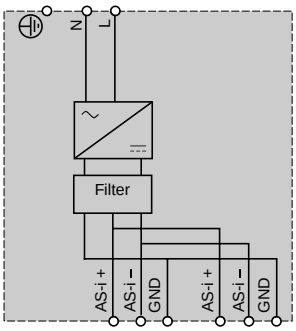


ASI ABLM3024
ASI ABL●3004

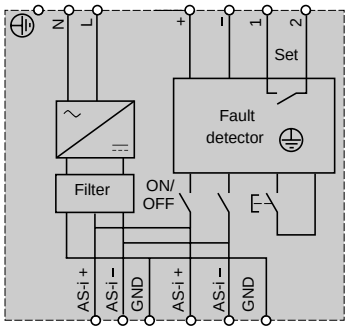


Schemes

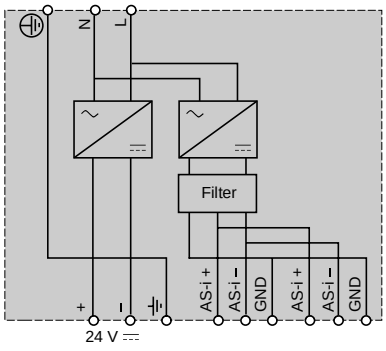
ASI ABLB300●



ASI ABLD300●



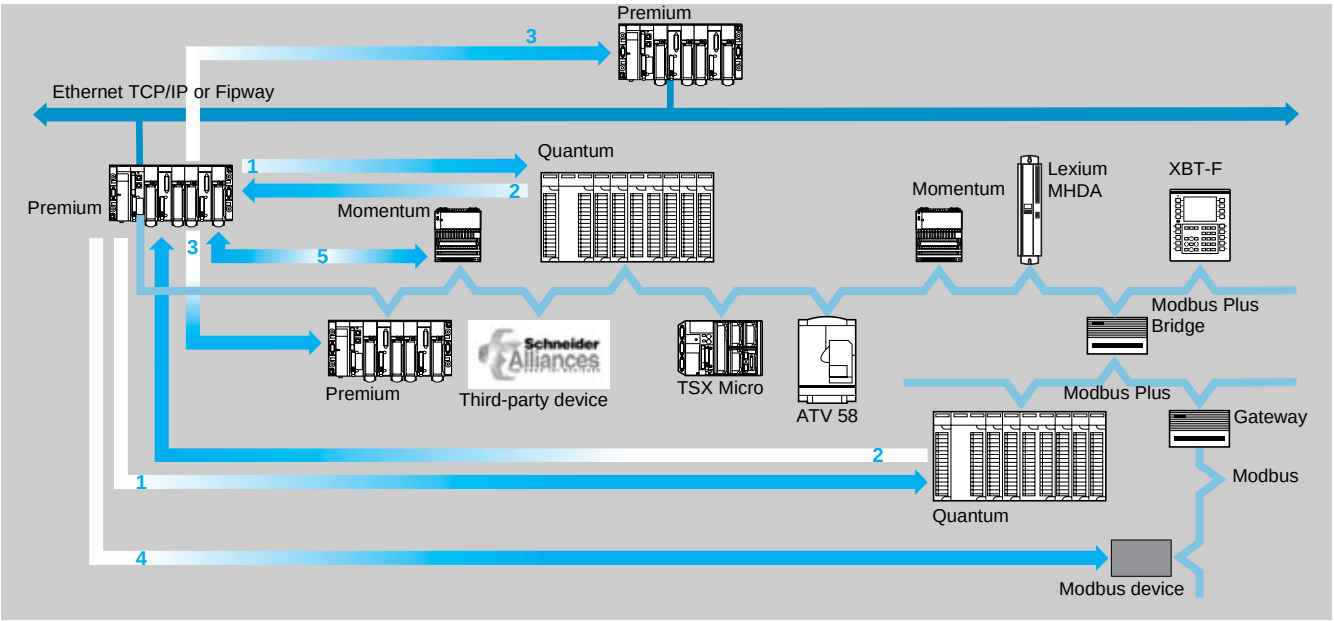
ASI ABLM3024



Presentation: page 4/30
Characteristics: page 4/31

Modicon TSX Micro automation platform
Modbus Plus network

Presentation



The Modbus Plus network is a high-performance industrial local network which can respond to Client/Server type extended architectures,combining a high data rate (1 Mbit/s), simple and economical transmission support and several message handling services.

The main data exchange functions between all devices connected to the network are:

■ The message exchange function according to the Modbus protocol.

■ The “global database” function (Shared Table service, periodic, controlled by the application: a station with the token can send 32 words to a maximum of 63 other stations connected on the network).

1 The Premium (or TSX Micro) client communicates with the Quantum server on the Modbus Plus network via function block (communication function).

2 The Quantum client communicates with the Premium server on the Modbus Plus network via MSTR function blocks.

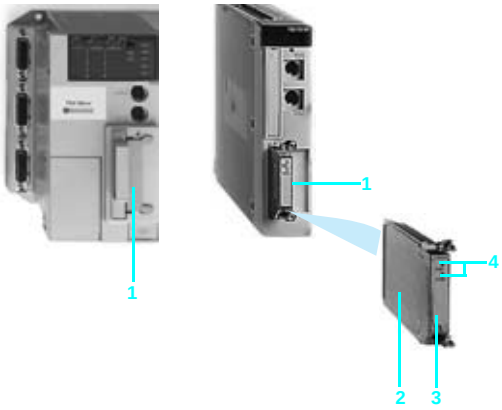
3 A Premium (or TSX Micro) client connected to the Ethernet TCP/IP or Fipway network can communicate in read/write mode with a Modbus Plus station (the Premium PLC therefore acts as a gateway).

4 A Premium (or TSX Micro) client connected to the Modbus Plus network can access a remote station via the Modbus Plus/Modbus gateway.

5 A Premium client connected to the Modbus Plus network can make exchanges with the Momentum distributed inputs/outputs via the Peer cop function.

Modicon TSX Micro automation platform
Modbus Plus network

Description



The type III TSX MBP 100 card is used to connect the Premium/TSX Micro PLCs and Atrium coprocessor to the Modbus Plus network. This card is installed in the slot reserved for processors or coprocessors:

1 A host slot on processors or coprocessors.

2 A protective cover.

3 A removable cover with fixing screw (access to 20-way miniature connector).

4 Two indicator lamps:
- ERR: card or link fault,
- COM: activity on the line.

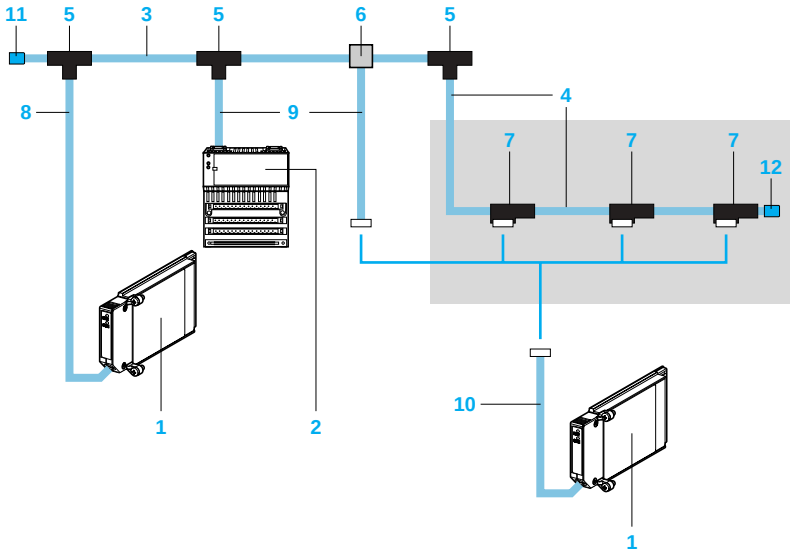
Connectors to be ordered separately:
- TSX MBP CE 0●● drop cables.

Characteristics

Structure	Type	Industrial bus
	Physical interface	RS 485
	Method of access	Token bus
Transmission	Mode	Synchronous HDLC
	Data rate	1 Mbit/s
	Medium	Twisted pair
Configuration	Number of devices	32 per segment, 64 maximum on all segments (1,800 m maximum)
	Number of addresses	64 devices maximum per segment
	Length of bus	450 m maximum per segment, 1,800 m maximum with 3 repeaters
	Number of segments	Cascaded: 5 maximum using Modbus Plus BP85 bridges
Services	Global database	- 4096 byte common database - cyclical exchange of 32 broadcast words
	"Peer to peer" dialogue	Read/write services (number of requests: 100 registers per transaction)
	Peer Cop	Cyclical exchange service (on Premium only): 500 words per station (broadcast or point-to-point)

Modicon TSX Micro automation platform
Modbus Plus network

Wiring system



1 **TSX MBP 100:** Modbus Plus PCMCIA card, for type III processor slot on TSX Micro or Premium platforms.
2 **170 PNT 110 20:** communication module for Momentum I/O base unit.
3 **490 NAA 271 0●:** trunk cable, shielded twisted pair with shielding drain (flying leads). In lengths of 30, 150, 300, 450 or 1,500 m.
4 **170 MCI 020/021 ●●:** drop cable equipped at each end with an RJ45 connector (baseT interface). In lengths of 0.25, 0.75, 3 or 10 m.
5 **990 NAD 230 00:** IP 20 local site tap, provides a tap link from the trunk cable for connecting 1 device (connection of conductors requires wiring tool 043 509 383). Integrates the line terminal.
6 **990 NAD 230 10:** IP 65 zamac local site tap, provides a tap link from the trunk cable for connecting 1 device (screw terminal connection). It also has an RJ45 connector for connecting a programming and maintenance terminal.
7 **170 XTS 020 00:** IP 20 tee, provides a tap link from the Modbus Plus cable (cable with connectors at each end of an RJ45 connector). It has a 9-way SUB-D female connector for connecting the device.
8 **TSX MBP CE 030/060:** drop cable for Modbus Plus PCMCIA card, equipped on the PCMCIA side with a 20-way miniature connector and with flying leads on the 990 NAD 230 00/010 local site tap side. In lengths of 3 or 6 m.
9 **990 NAD 211 10/30:** drop cable equipped on the device side with a 9-way SUB-D male connector and with flying leads on the 990 NAD 230 00/010 local site tap side. In lengths of 2, 4 or 6 m.
10 **TSX MBP CE 002:** drop cable for Modbus Plus PCMCIA card, equipped on the PCMCIA side with a 20-way miniature connector and on the network side with a 9-way SUB-D female connector. Can be used as an extension for cable 990 NAD 211 10/30. In lengths of 0.2 m.
11 **AS MBKT 185:** set of 2 line terminators (impedance adapter) to be placed at each end of the segment. The AS MBKT 185 terminators are placed directly at the end of the cable (without a tap or tee).
990 NAD 230 11: set of 2 line terminators (impedance adapter) for IP 65 local site tap 990 NAD 230 10, to be placed at each end of the segment.
12 **170 XTS 021 00:** set of 2 line terminators (impedance adapter) for tee 170 XTS 020 00, to be placed at each end of the segment.

For wiring system:

■ Quantum platform: please refer to our catalog.
■ Lexium drive for brushless motors: please refer to our catalog “Lexium movement command”.
■ Altivar drive for asynchronous motors: please refer to our catalog “Progressive starters and speed controllers”.

Modicon TSX Micro automation platform
Modbus Plus network

Reference

TSX MBP 100

170 PNT 110 20

Description	Number per PLC	Use	Addr.	Composition	Reference	Weight kg
Modbus Plus PCMCIA card	1 with TSX Micro TSX 37 21/22 1 with Premium/Atrium	Type III slot on: TSX 37 21/22 PLC Premium processor TSX 57 10/20/30/40 Atrium T PCX 57 20/30 coprocessor	1	1 PCMCIA type III card	**TSX MBP 100**	0.110

Description	Connection	Addr.	Reference *(1)*	Weight kg
Communication module for Momentum I/O base units	Modbus Plus network on Momentum I/O base units	2	**170 PNT 110 20**	0.110

Connection accessories *(1)*

Description	Use	Mounting	Addr.	Reference	Weight kg
Modbus Plus taps	IP 20 tee, requires the wiring tool 043 509 283	–	5	**990 NAD 230 00**	0.230
	IP 20 tap for tap link connection (screw terminal connection), supports 1 RJ45 connector on front panel	DIN rail	6	**990 NAD 230 20**	–
		Mounting plate	6	**990 NAD 230 21**	–
	IP 65 tap for tap link connection (tee), supports 1 RJ45 connector on front panel		6	**990 NAD 230 10**	0.650
	IP 20 tee with 2 RJ45 connectors for Modbus Plus cable and 1 9-way SUB-D connector for tap link devices		7	**170 XTS 020 00**	0.260
Line terminators (set of 2)	2 impedance adapters for local site tap (IP 20) 990 NAD 230 00		11	**AS MBKT 185**	–
	2 impedance adapters for tap (IP 20) 990 NAD 230 20/21		11	**990 NAD 230 22**	–
	2 impedance adapters for local site tap (IP 65) 990 NAD 230 10		11	**990 NAD 230 11**	–
	2 impedance adapters for tee (IP 20) 170 XTS 020 00		12	**170 XTS 021 00**	–
Mounting kit for IP 65 tee	DIN rail mounting for 990 NAD 230 10 local site tap		–	**990 NAD 230 12**	–
Protector pack	Replacement port protectors to prevent ingress into the RJ45 quick connect programming port of 990 NAD 230 10 tap		Sold in lot of 4	**990 NAD 230 23**	–
Wiring tool	Mounting trunk and tap wires in the local site tap.		–	**043 509 383**	–

Connection cables *(1)*

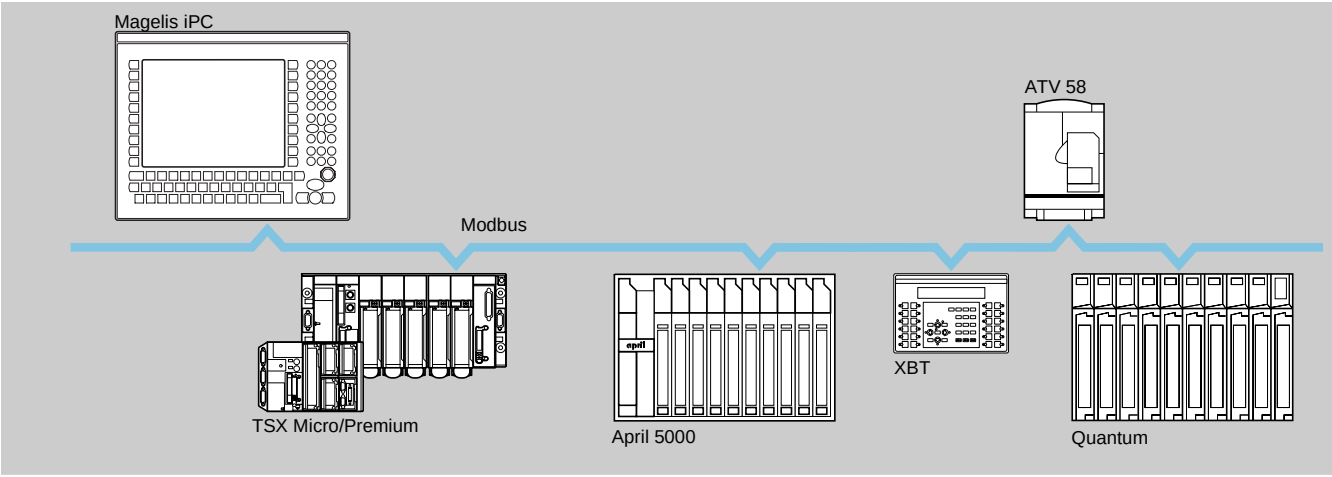
Description	Use		Addr.	Length	Reference	Weight kg
	From	To				
Modbus Plus trunk cables	Local site tap	Local site tap 990 NAD 230 00/10	3	30 m	**490 NAA 271 01**	–
				150 m	**490 NAA 271 02**	–
				300 m	**490 NAA 271 03**	–
				450 m	**490 NAA 271 04**	–
				1,500 m	**490 NAA 271 06**	–
Drop cables	IP 20 170 XTS 020 00 tee	IP 20 170 XTS 020 00 tee	4	0.25 m	**170 MCI 020 10**	–
				1 m	**170 MCI 020 36**	–
				3 m	**170 MCI 021 20**	–
				10 m	**170 MCI 020 80**	–
	PCMCIA card TSX MBP 100 (miniature connector)	Drop cable with 9 way male SUB-D connector	10	0.2 m	**TSX MBP CE 002**	–
		Local site tap 990 NAD 230 00/10	8	3 m	**TSX MBP CE 030**	0.340
				6 m	**TSX MBP CE 060**	0.530
	Communication module for Momentum I/O base units	Local site tap 990 NAD 230 00/10	9	2.4 m	**990 NAD 211 10**	0.530
				6 m	**990 NAD 211 30**	0.530

(1) For other Modbus Plus network connecting cables and accessories, please consult your Regional Sales Office.
(2) DIN rail mounting with the kit 990 NAD 230 12.

TSX MBP CE 030/060

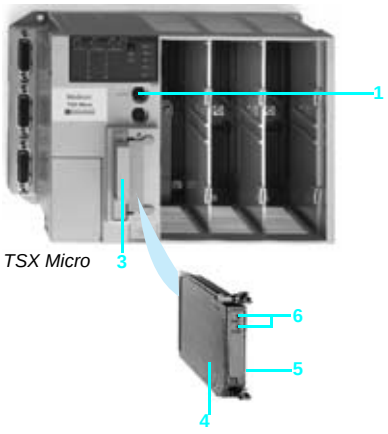
Modicon TSX Micro automation platform
Modbus Bus

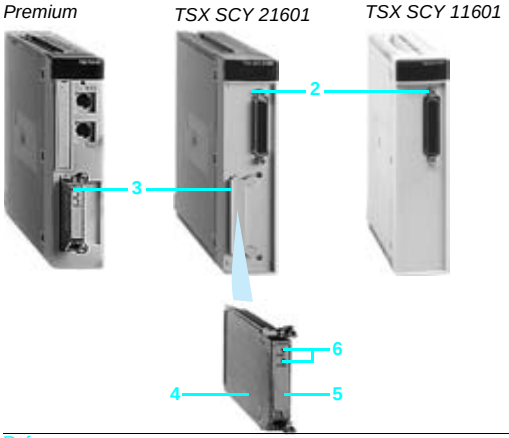
Presentation



The Modbus bus is used for master/slave architectures (it is necessary, however, to check that the Modbus services used by the application are implemented on the devices concerned).
The bus comprises one master station and several slave stations. Only the master station can initiate the exchange (direct communication between slave stations is not possible). Two exchange mechanisms are possible:
- Question/answer, where the requests from the master are addressed to a given slave. The master then waits for the response from the slave which has been interrogated.
- Broadcasting, the master broadcasts a message to all the slave stations on the bus. These stations execute the order without transmitting a response.

Description





The TSX Micro/Premium PLCs or Atrium coprocessors offer various Modbus bus connection possibilities.

Built-in links to the TSX Micro processor or to the TSX SCY ●1601 Premium module

1 Via integrated port on the TSX Micro processor.
The TER port (8-way mini DIN) has Modbus RTU master/slave *(1)* protocol.

2 Via integrated port on the TSX SCY 11601/21601 module for Premium PLCs.
This module has an isolated Half-duplex RS 485 serial link channel (25-way SUB-D connector) with multiprotocol (including Modbus); (for the TSX SCY 11601 module, only the Modbus protocol is supported).

TSX SCP 11 multiprotocol PCMCIA cards●

3 A slot on the TSX Micro/Premium processors, the Atrium coprocessor and the TSX SCY 21601 module*(2)* exists for the multiprotocol TSX SCP11● cards, including Modbus, featuring:

4 A protective cover.

5 A removable cover with fixing screws (to access a 20-way miniature connector).

6 Two LEDs:
- ERR lamp: card or link fault,
- COM lamp: data transmission or reception.

Cable connector to be ordered separately: TSX SCP/SCY cable.

(1) Modbus RTU slave Protocol with TSX 37 05/08.
(2) This slot is also designed for Fipway TSX FPP 20 or Jnet TSX JNP 112/114 PCMCIA network cards.

References:
pages 4/40 and 4/41

Modicon TSX Micro automation platform
Modbus Bus

Characteristics

Physical Interface		TSX Micro terminal port Non-isolated RS 485		PCMCIA card			TSX SCY integrated port for integrated Premium RS 485	
		TSX 37 05/08	TSX 37 10/21/22	Isolated RS 485 *(1)*	20 mA CL	Non-isolated RS 232D	TSX SCY 11601	TSX SCY 21601
Structure	Type	Heterogeneous industrial bus						
	Method of access	Slave	Master/slave	Master/slave Type				
Transmission	Mode	Asynchronous in baseband						
	Frame	RTU		RTU/ASCII				
	Data rate	1.2...14.2 Kbps		0.6..19.2 Kbps (for **TSX SCP 111**) 1.2... 19.2 Kbps (for **TSX SCP 112/114**)			1.2...19.2 Kbps	
	Medium	Double shielded twisted pair			Double shielded twisted pair, doubled	Quintuple shielded twisted pair	Double shielded twisted pair	
Configuration	Number of devices	28 max. in RS 485 Point-to-point in RS 422			16 max.	2 (point-to-point)	32	
	Max. number of link addresses	98	248	98			248	98
	Length of bus	10 m max. non isolated link 1,300 m max. on isolated link *(2)*		1,300 m excluding tap links	100 to 1,000 m according to rate	15 m max.	1,300 m excluding C	
	Tap links	–		15 m max.	–	–	15 m	
Services	Requests	Bits: 1,920 bits per request Words: 120 words per request						
	Security	One CRC 16 check parameter on each frame						
	Monitoring	No flow control		Diagnostic counters, event counters				

Modbus functions available on Premium/TSX Micro PLCs or on Atrium coprocessor	Code	Modbus slave	Modbus master
	01	Read n output bits	Read bits
	02	Read n input bits	Read input bits *(3)*
	03	Read n output words	Read words
	04	Read n input words	Read input words *(3)*
	05	Write 1 output bit	Write 1 bit or n bits
	06	Write 1 output word	Write 1 word or n words
	07	Exceptional read status	Exceptional read status
	08	Diagnostic	Diagnostic
	0B	Event counter	Event counter
	0C	Event connection	Event connection
	0F	Write n output bits	–
	10	Write n output words	–
	11	Identification	Slave identification
	–	–	Other requests accessible via SEND_REQ generic function blocks

(1) Point-to-point RS 422 compatible connection.
(2) For an isolated link, you must use the TSX P ACC 01 terminal port cable connector.
(3) Requests not available on TSX 37 10/21/22 terminal port.

References:
pages 4/40 and 4/41

Modicon TSX Micro automation platform
Modbus Bus

Modbus bus connection elements

TSX Micro

TSX SCY 21601

TSX SCY 11601

TSX SCP 11●

Description	Protocol	Physical layer	Reference	Weight kg
TSX Micro PLC integrated link (TER port)	Modbus (RTU) Uni-Telway character mode	Non-isolated RS 485	**Refer to our catalog "TSX Micro automation platform"**	–
Communication module for Premium/Atrium	Modbus Character mode Uni-Telway	- 1 RS 485 isolated integrated channel (channel 0), (1 to 97 slaves) - 1 slot for PCMCIA card (channel 1) *(1)*	**TSX SCY 21601**	0.360
	Modbus	1 RS 485 isolated integrated channel (channel 0), 1.2...19.2 Kbps (1 to 247 slaves)	**TSX SCY 11601**	0.340
PCMCIA cards type III for Premium processor, Atrium coprocessor, PLC TSX 37 21/22 or TSX SCY 21601 module	Modbus Character mode Uni-Telway	RS 485 (RS 422 compatible) 1.2...19.2. Kbps	**TSX SCP 114**	0.105
		RS 232D (9 signals) 0.6...19.2. Kbps	**TSX SCP 111**	0.105
		20 mA CL 1.2...19.2. Kbps	**TSX SCP 112**	0.105

Modbus connection accessories

TSX SCA 50

TSX SCA 64

Description	Use	Reference	Weight kg
Passive junction box	Bus tap link and extension, line termination adaptation	**TSX SCA 50**	0.520
2 channel passive subscriber socket (2 or 4 wire) *(2)*	Tap link of 2 devices with 2 wires Tap link of 1 master device and/or 1 slave device with 4 wires Fitted with 2 female 15-pin SUB-D connectors	**TSX SCA 64**	0.570
Active adapter RS 232C/RS 485	Connection of an RS 232C device as RS 485 Isolation of signals and line termination adaptation	**TSX SCA 72**	0.520
TSX Micro PLC TER terminal port cable connector	Bus tap link cable (2 or 4-wire) Isolation of Modbus signals Line termination adaptation Supplied with cable (length 1 m) fitted with a mini-DIN connector (TER port)	**TSX P ACC 01**	0.690
Line terminators (sold in lot of 2)	2/4-wire cabling Can be connected to the front panel of the TSX SCA 64 subscriber socket	**TSX SCA 10**	0.030

(1) PCMCIA type III slot for 1 TSX SCP 111/112/114, TSX FPP 20 or TSX JNP 112/114 card.
(2) 2 or 4 wire cabling, compatible with the TSX SCA 64 subscriber socket requires a max. 10 mm external diameter Modbus cable.

Characteristics:
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Modicon TSX Micro automation platform
Modbus Bus

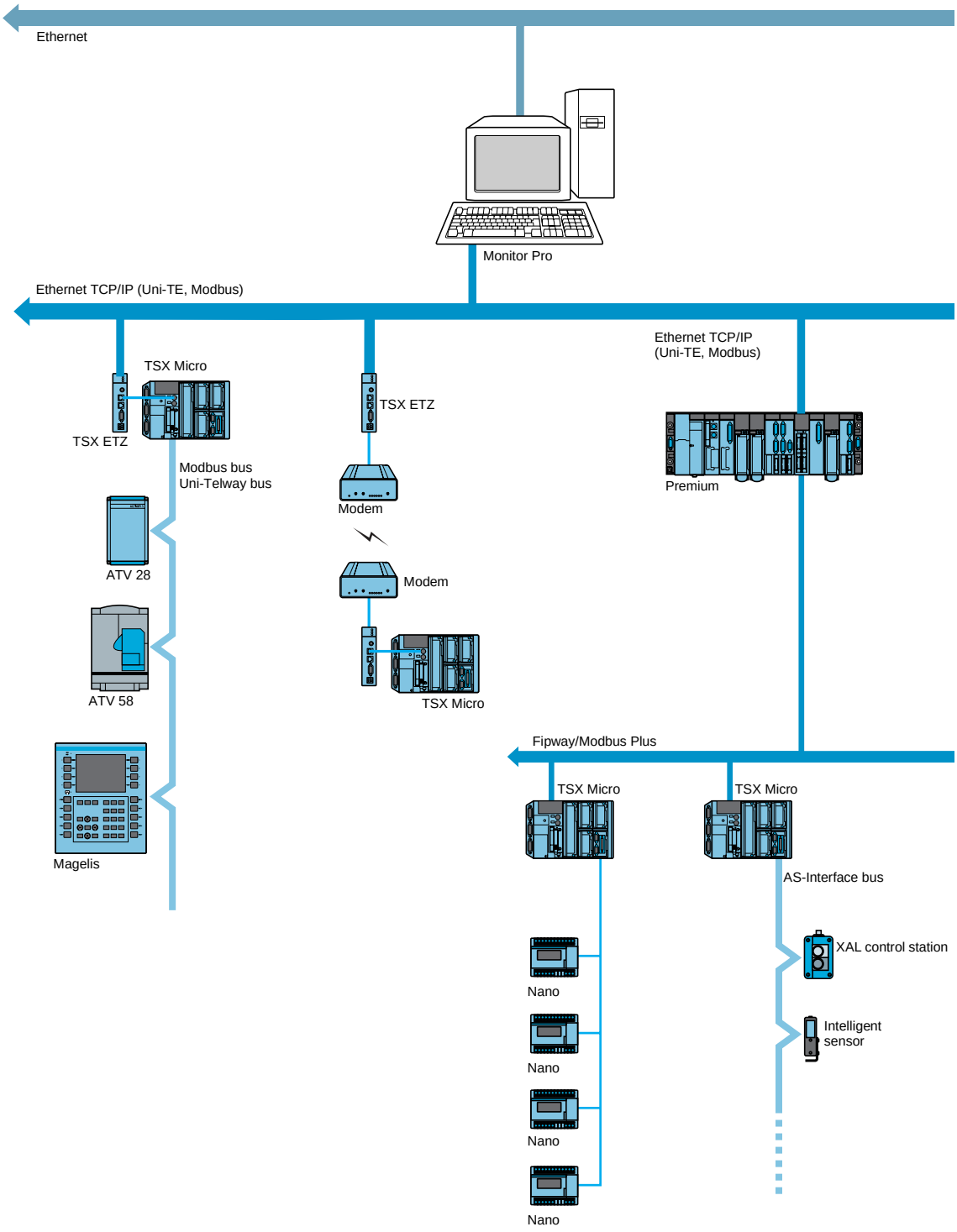
Modbus connection cables

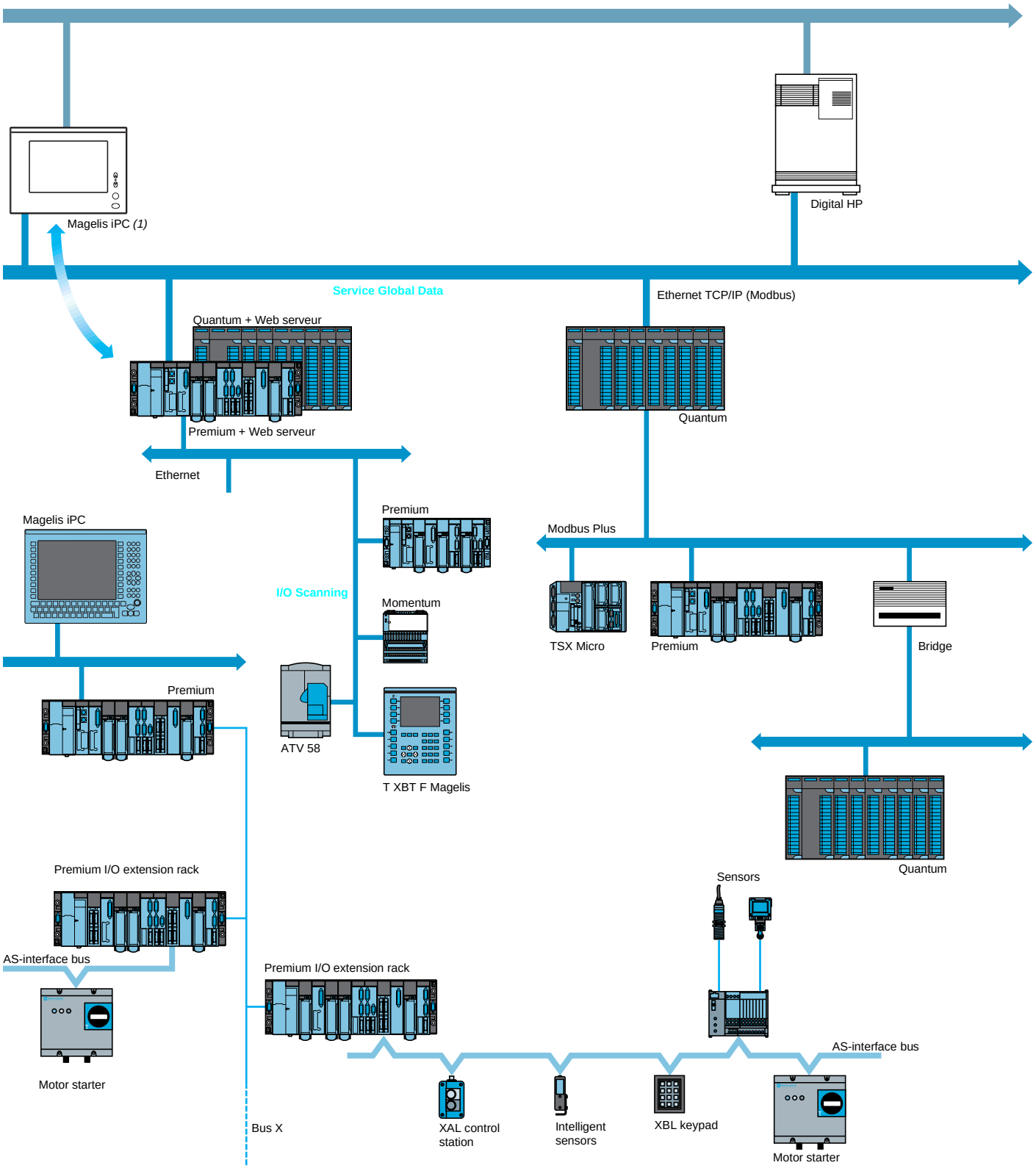
Description	Use From	To	Length	Reference	Weight kg
RS 485 double shielded twisted pair trunk cables	Modbus Bus	–	100 m	**TSX CSA 100**	5.680
			200 m	**TSX CSA 200**	10.920
			500 m	**TSX CSA 500**	30.000
Cables for isolated RS 422/485 tap link	TSX SCP 114 card	TSX SCA 50 housing 2 wires *(1)*	3 m	**TSX SCP CM 4030**	0.160
		TSX SCA 64 subscriber socket, 2/4 wires	3 m	**TSX SCP CM 4530**	0,180
		Modbus standard device, 4 wires *(1)* (point-to-point)	3 m	**TSX SCP CX 4030**	0.160
	Built-in channel (channel 0) Premium TSX SCY 11601, TSX SCY 21601 module	TSX SCA 50 housing, 2 wires *(1)*	3 m	**TSX SCY CM 6030**	0.160
		TSX SCA 64 subscriber socket, 2 wires	3 m	**TSX SCY CM 6530**	0.160
RS 232D tap link cables	TSX SCP 111 card	Communication device (Modem, converter, etc) (DCE) *(2)*	3 m	**TSX SCP CC 1030**	0.190
		Terminal device with point-to-point (DTE) *(2)*	3 m	**TSX SCP CD 1030**	0.190
			10 m	**TSX SCP CD 1100**	0.620
Cable for tap link 20 mA CL	TSX SCP 112 card	Multidrop Modbus *(1)*	3 m	**TSX SCP CX 2030**	0.160
Other connecting cables	–	–	–	See page 4/66	–

(1) End of cable fitted with free wires.
(2) End of cable fitted with a male 25-pin SUB-D connector.

Characteristics: page 4/39

Modicon TSX Micro automation platform

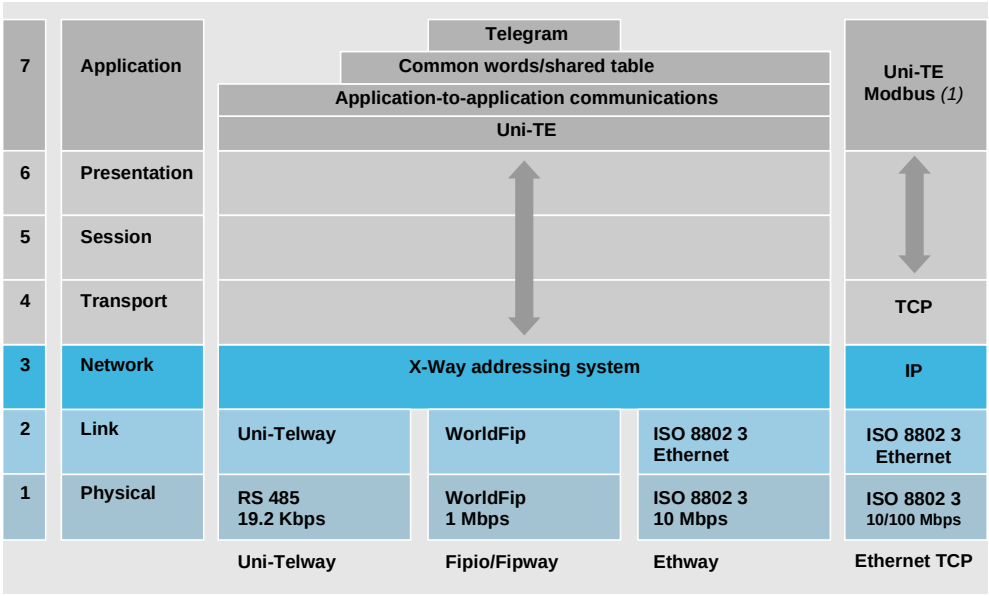




(1) PC industriel Magelis iPC in configuration "Thin Client" : PC having only Windows and an Internet browser.

X-Way and the OSI model

The communication architecture of the programmable TSX Micro/Premium PLCs, like that of TSX 17 or TSX model 40 PLCs, is compliant with the OSI model.



The physical layer enables the physical transmission of data signals between 2 systems via a medium. In order for a network to operate correctly, and to ensure full security of personnel in compliance with IEC 1131 2, it is necessary to implement the wiring recommendations described in the reference manual TSX DR NET F "X-Way communication" (or in the TSX CD DMTE 13E CD-ROM "Technical documentation").

The application layer concerns application programs, data exchange and cooperation conventions.
This layer provides the following services:
- Industrial Uni-TE message, available on TSX Micro/Premium/TSX PLCs.
- Distributed COM database available on TSX Micro/Premium/TSX PLCs, or Shared Table service available on TSX Micro/Premium PLCs.
- Periodical data exchange on Fipio bus, see page 4/50.
- Application-to-application communication.
- Telegram.

Size of requests	Ethway, Ethernet TCP/IP *(1)*	Fipway	Fipio	Uni-Telway
Uni-TE service	256 bytes *(2)*	128 bytes	128 bytes	240 bytes *(3)*
COM service	256 word database *(4)*	128 word database	–	–
Application-to-application	256 bytes	128 bytes	128 bytes	240 bytes *(3)*
Telegram	–	16 bytes	–	–

(1) Ethway not available on TSX Micro PLC.
(2) 1 K bytes with requests executed as a background task.
(3) 128 bytes on TSX Micro/Premium/TSX model 40 terminal port, 32 bytes on TSX 17 20/47 20/25.
(4) COM service not available with Ethernet TCP/IP.

Uni-TE services

The Uni-TE protocol is the industrial message handling system supported by the X-Way communication architecture. It operates on the question/answer or request/confirmation principle. A device which supports the Uni-TE protocol can be a:
- Client: this device initiates communication. It asks a question (reads), transmits data (writes) or sends an instruction (Run, Stop, etc.).
- Server: this device executes the service requested by the client and sends a confirmation after execution.

The services provided depend on the type of device (PLC, numerical controller, programming terminal, supervision station, etc.). Depending on its function, each device can be Client and/or Server. A Client PLC can access other devices on the architecture via its application program: It can read/write objects on another PLC or numerical controller, select programs on a numerical controller, etc.

Network transparency

When connected to any station in the network or directly connected to the Fipway/ Ethernet TCP/IP network, a programming terminal can communicate with any other station in the network (as if the terminal were physically connected to the PLC with which it is dialoguing).
Network transparency also applies between stations connected to different segments of the same multinetwork architecture.

COM service and Shared Table service (exclusive services one from another)

The COM service is made up of a set of dedicated words called common words. Each Fipway/Ethway network station may or may not access the database (in read only or read/write mode).
All PLC stations exchanging common words (32 stations on Fipway, 64 stations on Ethway) are allocated, in a dedicated database (128 words for Fipway, 256 words for Ethway), a write zone (set at 4 words for the Fipway network, and variable from 4 to 64 words for the Ethway network) per TSX Micro/Premium station.
COM words are updated automatically during each scan of the general sequential program (master task) without the intervention of the application program.

The Shared Table service can be used to exchange a table of internal words divided into as many zones as there are TSX Micro/Premium PLCs which comprise the Fipway network. The exchange principle is based on the broadcasting, by each PLC, of a word memory zone (broadcast zone) to the other PLCs on the network. Each network station is allocated an exchange table comprising 128 internal words for the 32 PLCs that share the service, with a broadcast zone assigned to each PLC, variable from 1 to 32 internal words.

Application-to-application communication

This consists of using the user application program to send word tables between 2 devices, which may be TSX Micro/Premium and TSX PLCs.
This service is particularly suitable for:
- Sending alarm messages from a PLC to a supervision station.
- Exchanging data tables between two PLCs controlled by the application programs of the transmission and destination device.
- Sending broadcast messages to all stations and devices.

Telegram

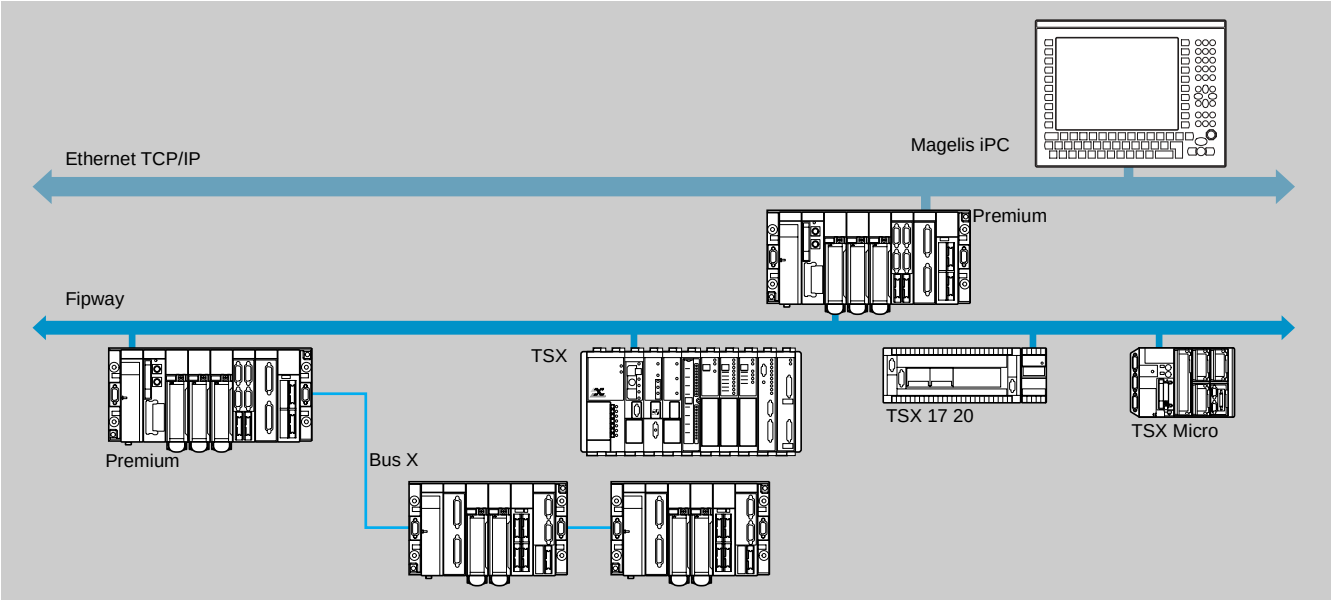
The telegram service available on Fipway is a special case of application-to-application messages. It enables short messages to be sent and received on a priority basis (maximum 16 characters).
A telegram from a TSX Micro/Premium PLC is sent immediately without waiting for the end of the cycle. The telegram is received by the TSX Micro/Premium PLC in:
- The event-triggered task (processed as soon as the message arrives in the network card).
- The fast task or master task (when scanning the reception function).
- A PLC can only process one telegram at a time.

Use in a multinetwork

The X-Way communication architecture is designed to cover multinetwork applications capable of dealing with problems of:
- Concentration, the architecture is particularly suitable for feedback of supervision data to a higher level.
- Redundancy, each PLC monitors the correct operation of both networks to which it is connected. If one of the networks should fail, all traffic could be transferred to the valid network.
- Inter-network communication. These architectures comprise several network segments which are interconnected by “bridge PLC” stations. Transparent communication is then offered between the entire architecture.

Modicon TSX Micro automation platform
Fipway network

Presentation



The Fipway network is an open local area network for communication between the various TSX Micro, Premium and TSX Series 7 PLCs using the X-Way services. Communication conforms to the FIP standard with access via a bus arbitrator.

TSX Micro (TSX 37 21/22) and Premium PLCs can be connected to a Fipway network using a Fipway PCMCIA card which is inserted in each processor or into the TSX SCY 21601 (Premium) communication module. Supported X-Way services (see pages 4/44 to 4/45) are:
- Uni-TE services.
- Distributed database (COM) or Shared Table.
- Telegram (service only available when the PCMCIA card is inserted in the processor).
- Application-to-application communication.

For characteristics, Fipway network wiring and connection accessories, see pages 4/56 to 4/59.

Modicon TSX Micro automation platform
Fipway network

Characteristics

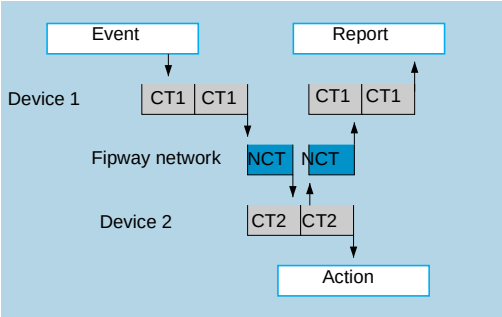
The Fipio industrial fieldbus is standard of communication between various control system components. It conforms to the WorldFip standard.

Type of bus/network				Fipway network
Structure	Type			Open industrial fieldbus conforming to WordFip standard
	Topology			Devices linked by daisy-chaining or tap link connections
	Maximum length		**m**	5 000
	Access method			Producer/consummer principal Management by fixed arbitrator
Transmission	Mode			Physical layer in baseband on shielded twisted pair, conforming to NF C 46 604
	Data rate		**Mbit/s**	1
	Medium			150 Ω shielded twisted pair, 62.5/125 ou 50/125 fibre optic using electrical/fibre optic repeaters
Configuration	Number of devices	Per segment		32 stations
		Maxi		64 stations
	Segments	Number		Unlimited
		Length	**m**	1 000 maximum per electrical segment 3 000 maximum per optical segment
Services	COM *(1)*			Distributed database: 128 mots maximum 0 or 4 % NWi words for TSX Micro and Premium station with addresses 0 to 31
	Shared table*(1)*			Shared table of internal words: 128 words maximum 1 to 32 % MWi words per TSX Micro and Premium station with addresses 0 to 3 *(2)*
	Uni-TE			Point-to-point requests with confirmation report: 128 bytes maximum, can be used by all devices connected to the same X-Way architecture (access by the Client device to the Server device system functions)
	Application-to-application			Point-to-point messages: 128 bytes maximum between 2 devices, can be used by all TSX Micro *(1)*/Premium/TSX Serie 7
	Telegram			Point-to-point priority messages: 16 bytes maximum between 2 Premium *(3)* or TSX Series 7 stations with addresses 0 to 15
	Security			Control characters in each frame and acknowledgement of point-to-point messages conforming to standard NF C 46 603

(1) The COM and Shared table service are mutualy exclusive.
(2) Service reserved for TSX Micro and Premium PLCs.
(3) Service only available when Fipway PCMCIA card is installed in the processor.

Presentation: page 4/40
References: page 4/42
Performances: page 4/43

Modicon TSX Micro automation platform
Fipway network



Performances

The operating principle of a Fipway network gives ensured, constant network cycle times whatever the traffic and number of stations (2 to 64). This enables the Fipway network to be updated (addition or removal of stations) without changing the performance.

Maximum transmission time

- Telegram (TLG): priority application messages are transmitted in less than 10 ms (one telegram per station).
- Common words (COM): the database of common words is updated every 40 ms.
- Shared Table: the exchange table is updated every 40 ms.

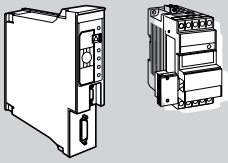
Uni-TE message handling system: Uni-TE or standard application-to-application messages are normally transmitted in less than 80 ms (40 ms for stations with addresses below 32). Where there is a large amount of traffic, some messages can wait for several cycles before being transmitted. The network characteristics enable a maximum of 210 messages of 128 bytes per second to be transmitted.

The performance can be improved by inhibiting the Telegram service in the network. With such network characteristics, the response time at application level depends almost exclusively on the processing capacity of the devices which are connected. For example, the remote loading of a 50 K word program takes less than two minutes on a network with normal load.
CT1 = Cycle time of device 1.
NCT = Cycle time of Fipway network.
CT2 = Cycle time of device 2.

The response time must be evaluated by the designer of each application in relation to the devices connected.
The processing time of a device can vary from one to two cycle times as a function of asynchronous operation.

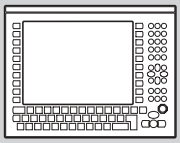
Connectable devices

TSX 7 PLCs



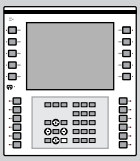
Connection via Fipio/Fipway integrated link or via the TSX FPM 100 module of TSX/PMX model 40 PLCs. Connection via the TSX FPG 10 module of TSX 17 20 TSX Micro PLCs.

Magelis iPC industrial PC



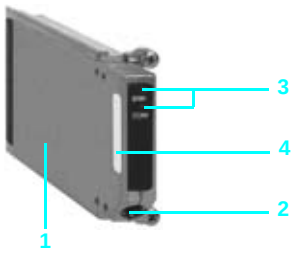
Equipped with TSX FPC 10M for PC compatible (ISA bus). They access all devices in the X-Way architecture. The various X-Way drivers are available on CD-ROM, see page 5/19.

Magelis operator dialogue terminals



Connection via the TSX FPP 20 PCMCIA card.

Modicon TSX Micro automation platform
Fipway network



TSX FPP 20

TSX SCY 21601

TSX FP CG 010/030

Description

TSX Micro/Premium PLCs have a slot on the processor for a type III PCMCIA communication card. This can be fitted with the TSX FPP 20 fipway network connection card, which is also inserted into the TSX SCY 21601 communication module slot.
The TSX FPP 20 card comprises:
1 Protective cover
2 Removable cover with fixing screws for access to the 20-way miniature connector
3 Two indicator lamps:
- ERR lamp: card fault, link fault,
- COM lamp: data transmission or reception.

Connector to be ordered separately:
TSX FP CG 010/030, 1 or 3 m cable for connection to the TSX FP ACC 3/ACC 4 T-junction box (on 9-way SUB-D connector).

References

Description	Number per Premium PLC	Use	Compo-sition	Reference	Weight kg
Fipway card	1 with 37 20 1 with 57 10 1 with 57 20 3 with 57 30 4 with 57 40	Type III slot on, - TSX Micro/ Premium processor - TPCX 57 10/30 coprocessor - TSX SCY 21601 module	1 type III PCMCIA card	**TSX FPP 20**	0.110
Communication module	See page 4/47	For Premium PLC - 1 isolated 2 wire RS 485 integrated channel (Half-duplex) - 1 slot for type III PCMCIA card	2 channels	**TSX SCY 21601**	0.360
Set of X-Way drivers for PC compatible	Includes all X-Way drivers		1 CD-Rom	See page 5/19	–

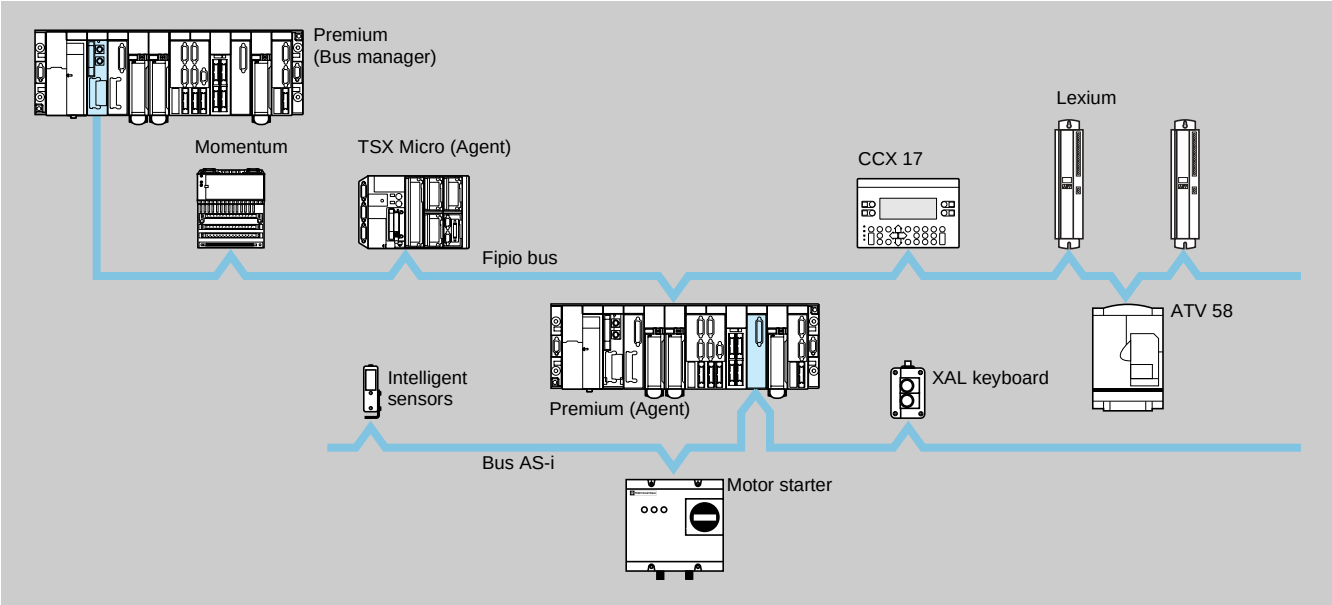
Connection cables and accessories *(1)*

Description	Use From	To	Length	Reference	Weight kg
Cables for PCMCIA	TSX FPP 20 card (miniature connector)	TSX FP ACC 3/4 box (SUB-D 9-way connector)	1 m	**TSX FP CG 010**	0.210
			3 m	**TSX FP CG 030**	0.410

(1) For other Fipway network accessories and connection cables, see pages 4/58 and 4/59.

Modicon TSX Micro automation platform
Fipio bus Agent function

Presentation



TSX Micro (TSX 37 21/22) or Premium PLCs, fitted with a TSX FPP 10 PCMCIA card on their integrated communication channel, are agents on the Fipio bus. The bus manager is a TSX P 57 153/253/2823/353/453/4823, Atrium coprocessor T PCX 57 203/353.

The Fipio bus enables I/O to be remotely located close to the devices to be controlled (Momentum, Altivar, etc). The Agent function enables offline processing, by locating a TSX Micro PLC close to the machine.

In addition to the standard Fipio services (see pages 4/39 to 4/45), TSX Micro (TSX 37 21/22) and Premium PLCs allow exchanges of input and output variables with the bus manager PLC. These exchanges are performed cyclically, automatically and without the involvement of the application program at the same rate as the task for which the agent PLC has been configured.

For characteristics, Fipio bus wiring system and connection accessories, see pages 4/50 to 4/59.

Application services

The application services supported by TSX Micro (TSX 37 21/22) and Premium Agent function PLCs are:

■ Uni-TE service, X-Way industrial message handling service suitable for operator dialogue, diagnostics and control functions (requests of up to 128 bytes).

■ Application-to-application communication service, which consists of the transmission of tables between 2 devices controlled by their respective application programs (messages of up to 128 bytes).

■ New periodic data exchange service for exchanging a 64 word table between the bus manager PLC and the Premium Agent PLC. Sofware setup see page 4/52.

Characteristics: page 4/51
References: page 4/52
Description: page 4/53

Modicon TSX Micro automation platform
Fipio bus Agent function

Characteristics

The Fipio industrial fieldbus is standard of communication between various control system components. It conforms to the WorldFip standard.

Type of bus/network				Fipio bus
Structure	Type			Open industrial fieldbus conforming to WordFip standard
	Topology			Devices linked by daisy-chaining or tap link connections
	Maximum length		**m**	15 000
	Access method			Producer/consummer principal Management by fixed arbitrator
Transmission	Mode			Physical layer in baseband on shielded twisted pair, conforming to NF C 46 604
	Data rate		**Mbit/s**	1
	Medium			150 Ω shielded twisted pair, 62.5/125 ou 50/125 fibre optic using electrical/fibre optic repeaters
Configuration	Number of devices	Per segment		32 connexion points per segment
		Maxi		128 on all segments
	Segments	Number		Unlimited
		Length	**m**	1 000 maxi per electric segment 3 000 maxi per optical segment
Services	Input/output exchanges			Periodic and deterministic exchanges of variables between bus manager PLC and Agent PLC (64 %MWi consecutive words: 32 %MWi for transmmission and 32 %MWi for reception)
	Uni-TE			Point-to-point requests with confirmation report: 128 bytes maximum, can be used by all devices connected to the same X-Way architecture (access by the Client device to the Server device system functions)
	Application-to-application			Point-to-point messages: 128 bytes maximum between 2 devices, can be used by all TSX Micro*(1)*/Premium/TSX Serie 7
	Security			Control characters in each frame and acknowledgement of point-to-point messages conforming to standard NF C 46 603

(1) TSX 37 21/22 only.

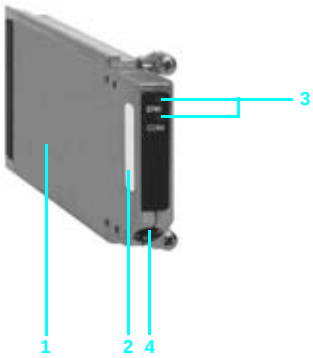
Modicon TSX Micro automation platform
Fipio bus Agent function

Software setup

Each TSX Micro/Premium PLC Fipio Agent uses 64 %MWi consecutive internal words to exchange periodic data. The first 32 words are reserved for sending data to the manager, and the remaining 32 are reserved for receiving data from the manager.

PL7 Micro/Junior/Pro application-specific screens allow the configuration of the Fipio Agent PCMCIA card. This consists of:

- Indicating the connection point number (1 to 127).
- Indicating the address at the beginning of the 64 %MW word table reserved for sending data to and receiving data from the manager.



Description

TSX Micro (TSX 37 21/22)/Premium PLCs have a slot in the processor for a type III PCMCIA communication card. This can be fitted with a TSX FPP 10 Fipio bus connection card.

The TSX FPP 10 card comprises:

1 A protective cover.

2 A removable cover with fixing screws giving access to the 20 way miniature connector.

3 Two indicator lamps:
- ERR lamp: card fault, link fault,
- COM lamp: transmission or reception of data.

Connector to be ordered separately:
4 TSX FP CG 010/030, 1 or 3 m cable for connecting the TSX FP ACC 4 tap junction (on 9-way SUB-D connector).

Presentation: page 4/50
Characteristics: page 4/51
Description: page 4/53

Modicon TSX Micro automation platform
Fipio bus Agent function

TSX FPP 10

TSX FP ACC 3

TSX FP ACC 4

TSX FP CG 010/030

References

Fipio bus connection component

Description	Composition	Use	Reference	Weight kg
Fipio Agent function card	1 type III PCMCIA Version V1.8	On TSX Micro processors (TSX 37 21/22), Premium/ Atrium processors	**TSX FPP 10**	0.110

Fipio bus connection accessories *(1)*

Description	Use	Reference	Weight kg
Insulated bus cable connector (in black polycarbonate, IP 20)	Trunk cable tap link, supports 2 x 9-way female SUB-D connectors (for TSX FP CG 010/030 PCMCIA card cable), for connection of TBX dust and damp proof module ⎓ 24 V supply	**TSX FP ACC 3**	0.090
Dust and damp proof bus cable connector	Trunk cable tap link	**TSX FP ACC 4**	0.660

Fipio bus connection cables *(1)*

Description	Use From	To	Length	Reference	Weight kg
Cables for PCMCIA card	TSX FPP 10 card (miniature connector)	TSX FP ACC 4 cable connector (9-way SUB-D connector)	1 m	**TSX FP CG 010**	0.210
			3	**TSX FP CG 030**	0.410

(1) For other Fipio bus accessories and connection cables, see pages 4/52 and 4/53.

Modicon TSX Micro platform automation
Fipio/Fipway optic transceiver

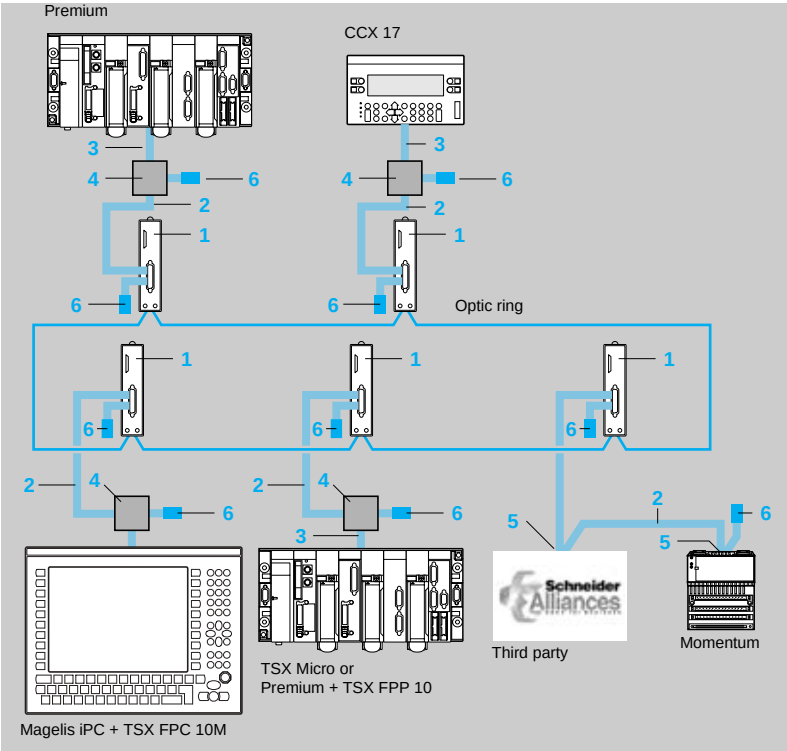
Presentation

The OZD FIP G3 optic transceivers are particularly adapted for use with applications which are subject to harsh electrical environments or which are distributed over large areas:
- Public buildings.
- Large-scale industrial sites.
- Water treatment and distribution.
- Transport and highway tunnel infrastructures, etc.

The OZD FIP G3 optic transceiver enables conversion of a FIP electric interface to 2 FIP optic interfaces and vice versa. As a result, it allows redundant ring topologies to exist; these improve installation availability even when a line is broken at a point in the medium.

In these situations, the length of the bus or the Fipio/Fipway ring can reach 20 Km, with a maximum of 32 Fipio or 20 Fipway transceivers. See characteristics on page 4/49. These characteristics may be increased using mixed topologies such as 2 serial optic rings or 2 serial optic buses; please consult our regional office.

Wiring system



1 **OZD FIF GG3:** Fipio/Fipway optic transceiver.
2 **TSX FP CA●00:** 150 Ω shielded twisted pair trunk cable (diameter 8 mm) for use in standard environments and inside buildings.
3 **TSX FP CG 0●0:** tap-off connection cable for TSX FPP 10/20 PCMCIA module card for TSX Micro/Premium PLCs.
4 **TSX FP ACC 3/4:** T-junction box. It also has two 9-way female SUB-D connectors for connecting any device which connects to the bus by a PCMCIA card.
5 **TSX FP ACC 2/12:** 9-way female SUB-D connector for Fipway/Fipio connection using daisy chaining or tap link connection.
6 **TSX FP ACC 7:** line terminator to be placed at each segment end.
TSX LES 65: terminal block for TSX Series 7 PLC, which performs the address coding.

Characteristics: page 4/55
References: page 4/55

Modicon TSX Micro platform automation
Fipio/Fipway optic transceiver

Performances

Fipio bus operating mode and performance on fiber optics
After configuration in Fipio mode, the processor scans the various application devices according to the software configuration:
■ Image variables of the input values and of the output command values of a configured device are scanned as quickly as possible on the bus, whilst respecting the existing relationships between periods of different tasks which use these devices.
■ Appearance or disappearance of a configured device is detected on the bus within a maximum time of 200 ms.
■ Exchanges occur at the rate defined by the programmer, from 10 to 20 Uni-TE messages per second.
The network cycle time is double that of the electrical bus when OZD FIP G3 transceivers are used.

Fipway bus operating mode and performance on fiber optics
The operating principle is identical to that on an electrical network, in that the number of stations is limited to 32 and the transmission time is as follows:
■ For the Common words and Shared Table services, updating of the entire database is carried out every 40 ms maximum.
For Uni-TE message handling, the network characteristics are used to transmit a maximum of 230 messages of 128 bytes per second.

Characteristics (with OZD FIP G3 optic transceivers) *(1)*

Type of bus/network		Fipio bus	Fipway network
Structure	Type	Open industrial support conforming to Fip standard	
	Topology	In redundant rings or in a line with simple redundant links	
	Access method	Producer/consumer principle Management by a fixed arbitrator	Producer/consumer principle Management by an automatically elected arbitrator
Transmission	Mode	Multimode (860 nanometres)	
	Data rate	1 Mbit/s	
	Medium *(2)*	Fiber optic 50/125 - 17 dBm or 62.5/125 - 15 dBm	
	Inter-repeater distance	2,500 m for 50/125 and 2,800 m for 62.5/125	
Configuration	No. of connection points	32 optic transceivers	20 optic transceivers
	Maximum no. of devices	16 Fipio devices can be connected to the same fiber optic transceiver	16 stations can be connected to the same fiber optic transceiver but the maximum number of stations is 32
	No. of segments	The loop (or fiber optic line) is similar to a non cascadable segment	
	Length	Maximum circumference of the ring (or length of the line): 20 km	
	Maximum optic distance between 2 OZD FIP G3 transceivers	1,500 m, with the following on the ring or the line: 32 optic transceivers 2,000 m, with the following on the ring or the line: < 32 optic transceivers 3,000 m, with the following on the ring or the line: 2 optic transceivers	
	Tap links	From the **OZD FIP G3** fiber optic transceiver, the maximum length of the electrical tap link is 100 m	
Services		Same as page 4/56 except for the Telegram service, which is not available with OZD FIP G3 fiber optic transceiver.	

References

OZD FIP G3

TSX FPP 20/10

Description	Max. number of transceivers	Connectable devices Fipio bus	Fipway network	Reference	Weight kg
Optic transceiver Fipio/Fipway *(3)*	32 with Fipio 20 with Fipway	- TSX Micro/Premium - TBX remote I/Os with TBX LEP 30 - Remote Momentum I/O - CCX 17 panels (version 2.4) - Magelis iPC industrial PCs - Lexium drives, etc.	TSX Micro, Premium (with TSX FPP 20 PCMCIA card)	**OZD FIP G3**	0.500

TSX Micro/Premium PLC connection components *(4)*

Description	Use	Composition	Reference	Weight kg
Fipway card	TSX 37 21/22 Micro PLC, Premium processor, Atrium coprocessor	1 type III PCMCIA card	**TSX FPP OZD 200**	0.110
Fipio card agent function	TSX 37 21/22 Micro PLC, Premium processor, Atrium coprocessor	1 type III PCMCIA card	**TSX FPP 10**	0.110

(1) These characteristics can be increased using mixed topologies; please consult our regional office.
(2) Devices connected on electrical tap links are compatible with the WorldFip physical layer.
(3) For TSX FP ACC 8M fiber optic electrical repeater, see page 4/58.
(4) For accessories and connection cables, see pages 4/58 and 4/59.

Presentation:
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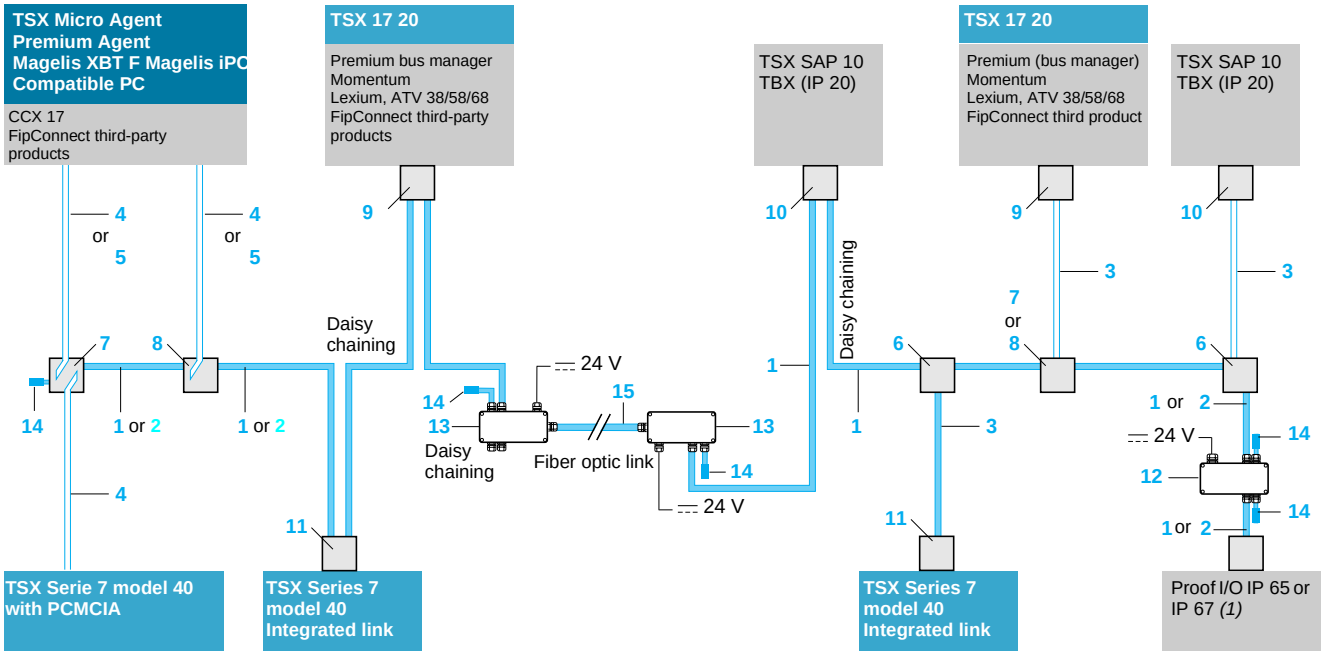
Modicon TSX Micro automation platform
Fipio bus and Fipway network

Fipio bus and Fipway network wiring system



F Connection to Fipway network and Fipio bus Connection to Fipway bus Connection to Fipio bus

(1) Dust and damp proof I/O modules on Fipio bus for IP 65 modules: TBX EEP/ESP modules and connections, see pages 4/6 to 4/11, IP 67 modules: TSX EEF/ESF/EMF modules and connections, consult our Modicon Premium automation platform catalogue.

Connectable devices

Devices to be connected on Fipio	Boxes					Connectors				
	TSX FP ACC4 8	TSX FP ACC14 6	TSX FP ACC3 7	TBX FP ACC10	TSX EF ACC99	TSX FP ACC 2 9	TSX FP ACC12 9	TBX BLP01 10	TBX BLP10	TBX BAS10
Premium Fipio Agent	D		D							
Premium bus manager	D	D				C/D	C/D			
TSX Micro Fipio Agent	D		D							
Lexium	D		D			C/D	C/D			
ATV 58E	D		D			C/D				
ATV 58H/P/F, ATV 68/68F	D		D				C/D			
CCX 17	D		D							
Industrial Magelis iPC PCs	D		D							
XBT-F, TXBT-F Magelis terminals	D		D							
PC compatible	D		D							
Momentum	D	D				C/D	C/D			
TBX IP 20	D	D						C/D		
TBX IP 65 with telealimentation				C/D *(2)*					C/D	C/D *(3)*
TBX IP 65 without telealimentation	D *(1)*								D	D *(3)*
IP 67 I/O					C/D					
TBX SAP 10 AS-i gateway	D	D						C/D		
Devices to be connected on Fipway	**Boxes**					**Connectors**				
	TSX FP ACC4 8	TSX FP ACC14 6	TSX FP ACC3 7	TBX FP ACC10	TSX EF ACC99	TSX FP ACC2 9	TSX FP ACC12 9	TBX BLP01	TBX BLP10	TBX BAS10
Premium	D		D							
TSX Micro	D		D							
TSX Series 7 model 40 (integrated link)	D	D								C/D
TSX Series 7 model 40 (PCMCIA)	D		D							
TSX 17 20	D	D				C/D	C/D			
XBT-F, TXBT-F Magelis terminals	D		D							
Magelis iPC industrial PC	D		D							
PC compatible	D		D							
LUF P1 Modbus gateway	D		D			C/D	C/D			

recommended connection
possible connection

C: connection by daisy chaining
D: connection by tap link

(1) Possible if only one TBX IP 65 module is used.
(2) The connection by daisy chaining with the TBX FP ACC 10 connection box is only possible with the first TBX module on Fipio bus.
(3) The TBX BAS connector is only used for TBX IP 65 output modules.

Characteristics:
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Modicon TSX Micro automation platform
Fipio bus and Fipway network

Cables

1 **TSX FP CA●00**: trunk cable, shielded twisted pair 150 Ω (8 mm diameter) for normal environments and use inside buildings.

2 **TSX FP CR●00**: trunk cable, shielded twisted pair 150 Ω and 1 x 1.5 mm^2 pair for remote supply (9.5 mm diameter) for harsh environments and use outside buildings.

3 **TSX FP CC●00**: tap link cable, shielded twisted pair 150 Ω (8 mm diameter) for normal environments and use inside buildings.

4 **TSX FP CG0●0**: tap link connecting cable for PCMCIA TSX FPP 10/20 communication card for TSX Micro/Premium/TSX Series 7 PLCs, FT 2100 terminals and PC compatibles. Connection to the bus is via a 9-way SUB-D connector on the TSX FP ACC3/ACC4 junction box.

5 **TSX FP CE030**: tap link connecting cable for TSX FPC 10 or FCP FPC 10 PC communication card (ISA bus) for FTX 517, CCX 77/87 terminals and PC compatibles. Connection to the bus is via a 9-way SUB-D connector on the TSX FP ACC 3/ACC 4 junction box.

Connection boxes

6 **TSX FP ACC14**: Polycarbonate IP 20 junction box: provides tap link from the trunk cable to connect 1 device via TSX FP CC●00 tap link cable or several devices in a daisy chain.

7 **TSX FP ACC3**: IP 20 box for connecting 2 PC or PCMCIA cards (TSX FPP 10, TSX FPC 10, TSX FPP 20/200, FCP FPP 10) on a 9-way SUB-D connector.

8 **TSX FP ACC4**: IP 65 junction box. It also has a 9-way female SUB-D connector for any device which is connected to the bus via a PCMCIA card (in this case, the box is IP 20).
TSX EF ACC99: IP 65 junction box for IP 67 I/O modules, consult our Modicon Premium automation platform catalogue.

Connectors

9 **TSX FP ACC2** and **TSX FP ACC12:** 9-way female SUB-D connector for Fipway/Fipio connection (TSX FP ACC 2 connector for TSX 17 20 micro-PLC for example). Used for daisy chain or tap link connection (90° output high or low, 45° output high or low).

10 **TBX BLP01**: connector for TBX I/O modules (IP 20).

11 **TSX LES65**: connecting cable for TSX/PMX model 40 PLCs. Used for address coding.

12 **TSX FP ACC6**: electrical repeater: used to increase the number of stations (max 64) and the length of the network by creating an additional segment of up to 1000 m (a maximum of 4 repeaters in cascade giving a network length of 5000 m).
TSX EF C●●●: dust and damp proof connectors for IP 67 I/O modules, consult our Modicon Premium automation platform catalogue.

Other elements

13 **TSX FP ACC8M:** fibre optic/electrical repeater: used to connect electrical segments via a fibre optic link (particularly suitable for zones with a high level of interference) or to connect a fibre optic device.

14 **TSX FP ACC7**: Line terminator, to be installed at both ends of a segment.

15 **TSX FP JF020**: fibre optic jumper (length 2 m). For fibre optic connection of the TSX FP ACC 8M repeater to a patch panel. The maximum length of the fibre optic cable (62.5/125) between 2 repeaters is 3000 m.
TSX EF ACC7: line terminator, to be installed at both ends of a segment requiring IP 67 protection, consult our Modicon Premium automation platform catalogue.
TSX FP ACC9: network wiring test tool. This is used for testing the continuity of segments, the connections of the various devices and the installation of line terminators.

Modicon TSX Micro automation platform
Fipio bus and Fipway network

Fipway network/Fipio bus connection accessories *(1)*

	Description	Use	Rep.	Reference	Weight kg
TSX FP ACC 12	**Female connector for TSX FPG10● module** (TSX 17 micro-PLCs)	Connection by daisy chaining Zamac material	9	**TSX FP ACC2**	0.080
	Female isolating connector for devices with 9-way SUB-D connectors	Connection by daisy chaining or tap link black polycarbonate material IP 20	10	**TSX FP ACC12**	0.040
TSX FP ACC14	**Insulated bus connection box** (black polycarbonate, IP 20)	Trunk cable tap link (for connecting the ⎓ 24 V power supply of TBX dust and damp proof modules)	6	**TSX FP ACC14**	0.120
		Trunk cable tap link supports 2 x 9-way SUB-D female connectors (for PCMCIA card cable TSX FP CG 010/030) For connecting ⎓ 24 V power supply of TBX dust and damp proof modules	7	**TSX FP ACC3**	0.090
TSX FP ACC3	**Dust and damp proof bus connection box** (Zamac material, IP 65)	Trunk cable tap link, supports 1 x 9-way female SUB-D connector (for PCMCIA card cable TSX FP CG 010/030)	8	**TSX FP ACC4**	0.660
		Trunk cable tap link via 2 M23 connectors Remote ⎓ 24 V power distribution via 7/8" connector PC compatible terminal connection via 9-way female SUB-D connector		**TSX EF ACC99**	0.715
TSX FP ACC4	**Line terminators** (sold in lots of 2)	2 impedance adaptors	14	**TSX EF ACC7**	0.020
	Electrical repeater (IP 65)	Increases the length of the network or bus by allowing the connection of 2 segments of up to 1000 m each	12	**TSX FP ACC6**	0.520
TSX EF ACC99	**Electrical/fibre optic repeater** (IP 65)	Used to connect (via patch panel) an electrical segment (1000 m max.) and a fibre optic segment (3000 m max.)	13	**TSX FP ACC8M**	0.620
	FIP wiring test tool	Used to test each cable segment of the network		**TSX FP ACC9**	0.050

Fipio/Fipway communication cards

PCMCIA cards	Type III cards	See pages 4/49 and 4/53	
ISA bus PC card	Fipio/Fipway connection card for PC compatible Card with short format on ISA bus Windows 95/98 and Windows NT4 compatible	**TSX FPC10M**	0.140

(1) The characteristics and performances of the Fipio bus or Fipway network are dependent on the above TSX FP accessories being used.

Fipway network/Fipio bus connecting cables (1)

Description	Type	Conditions of use	Rep.	Length	Reference	Weight kg
Trunk cables	8 mm 1 shielded twisted pair 150 Ω	In normal environment (2) and inside building	1	100 m	**TSX FP CA100**	5.680
				200 m	**TSX FP CA200**	10.920
				500 m	**TSX FP CA500**	30.000
	9.5 mm, 1 shielded twisted pair 150 Ω	In harsh environment (3) outside building or in garland (4)		100 m	**TSX FP CR100**	7.680
				200 m	**TSX FP CR200**	14.920
				500 m	**TSX FP CR500**	30.000
	9.5 mm, 1 shielded twisted pair 150 Ω and 1 x 1.5 mm² pair for remote supply	I/O IP 67, in normal environment (2) and inside building		100 m	**TSX FP CP 100**	7.680
				500 m	**TSX FP CP 500**	30.000
Tap link cables	8 mm, 2 shielded twisted pairs 150 Ω	In normal environment(2) and inside building	3	100 m	**TSX FP CC100**	5.680
				200 m	**TSX FP CC200**	10.920
				500 m	**TSX FP CC500**	30.000
Cable for PCs card	2 shielded twisted pairs	From TSX FPC10M card to TSX FP ACC3/4 box	5	3 m	**TSX FP CE030**	0.410
Fibre optic jumper	Double fibre optic 62.5/125	For electrical/fibre optic repeater	15	2 m	**TSX FP JF020**	0.550

(1) The characteristics and performances of the Fipio bus/Fipway network are dependent on the above TSX FP accessories being used.

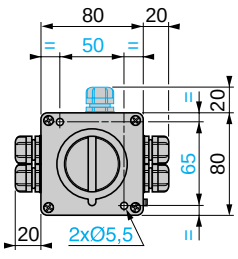
(2) Normal environment:
- *without special environmental restrictions,*
- *operating temperature between + 5 °C and + 60 °C,*
- *fixed installations.*

(3) Harsh environment:
- *resistance to hydrocarbons, industrial oils, detergents, solder chips,*
- *up to 100% humidity,*
- *saline environment,*
- *extreme variations in temperature,*
- *operating temperature between - 10 °C and + 70 °C,*
- *mobile installations.*

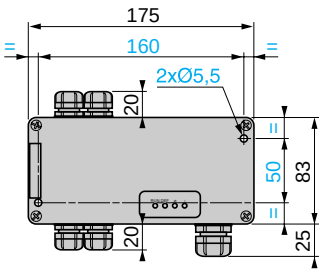
(4) Mobile installations: cables as per VDE 472, part 603/H:
- *for use on cable drag chain with minimum bend radius of 75 mm,*
- *for use on gantry crane (strikethrough: portal support), subject to compliance with conditions for use such as acceleration, speed, length etc: contact our regional branch office for further information.*
- *not authorized for use on robots, or multi-axis applications.*

Dimensions

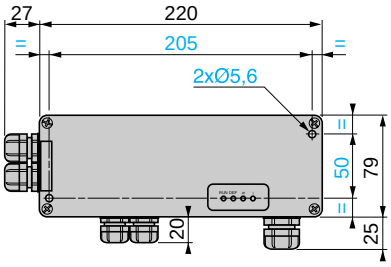
TSX FP ACC4



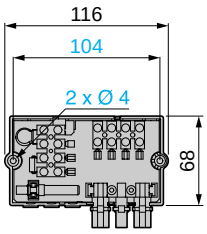
TSX FP ACC6



TSX FP ACC8M

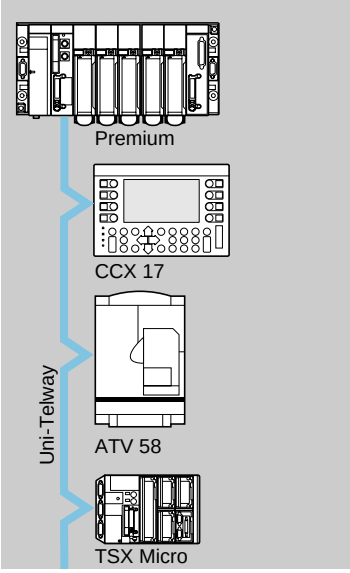


TSX FP ACC14



Modicon TSX Micro automation platform
Uni-Telway bus

Presentation



The Uni-Telway bus is a standard means of communication between control system components (PLCs, MMI terminals, supervisors, variable speed drives, numerical controllers, weighing equipment, etc.).

It is suitable for architectures designed to manage control and monitoring devices via a PLC, or architectures used for MMI (supervision, etc.).

The Uni-Telway bus requires a master station which manages the allocation of bus access rights to the various connected stations (known as slave stations).

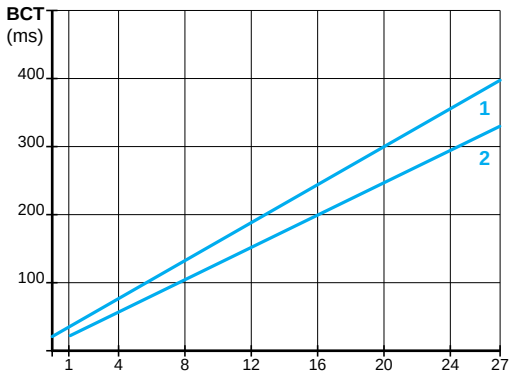
Characteristics

Physical interface		RS 485 non isolated terminal port (TER/AUX)	Premium RS 485 isolated module integrated port *(1)*	Isolated RS 485/ RS 422 PCMCIA card	20 mA CL PCMCIA card	Non-isolated RS 232D PCMCIA card
Structure	Type	Heterogeneous industrial bus				
	Link	Multidrop				Point-to-point
	Method of access	Master/Slave principle				
Transmission	Mode	Asynchronous transmission in baseband				
	Data rate	1.2…19.2 Kbit/s				0.3…19.2 Kbit/s
	Medium	Shielded double twisted pair				
Configuration	Number of devices	5 max.	28 max.		16 max.	2
	Number of connection addresses	8 max.	96 max.(1 device can occupy several datalink addresses)			
	Length of bus	10 m max., 1,000 m with **TSX P ACC 01**	1,000 m max. excluding tap links		1300 m max., excluding tap links	15 m (unlimited via modem)
	Tap links	–	20 m	20 m	15 m	–
Service	Uni-TE	Point-to-point requests with confirmation (question/response), of up to 240 bytes *(2)* initiated by any connected device				
		Unsolicited point-to-point data, without confirmation, of up to 240 bytes*(2)* initiated by any connected device				
		Broadcast messages of up to 240 bytes *(2)* initiated by the master device				
	Other functions	Transparent communication, via the master, with any device in an X-Way architecture				
		Diagnostics, debugging, adjustment and programming of PLCs				
	Security	Check character on each frame, acknowledgement and, if required, repetition of messages ensure security of transmission				
	Monitoring	Bus status table, transmission error counters and device status can be accessed by program in each device				
		Status of the bus and devices connected from the master PLC accessible using PL7 software.				

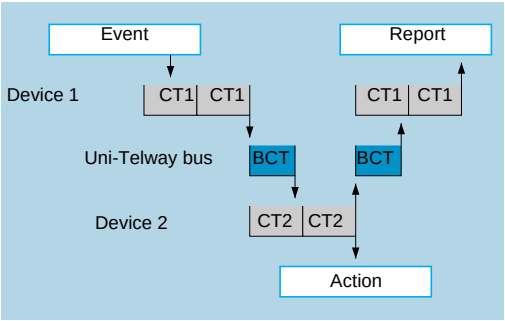
(1) TSX SCY 21601 single format module.
(2) Limited to 128 bytes with TSX Micro/Premium PLC terminal port.

Connections: page 4/62
References: page 4/63

Performances



1 = 9.6 Kbit/s
2 = 19.2 Kbit/s



BCT = Uni-Telway bus cycle time
CT1 = Device 1 bus cycle time
CT2 = Device 2 bus cycle time

The Uni-Telway bus cycle time depends on:
- The number of devices polled (datalink addresses).
- The data rate.
- The turnaround time of each device.
- The number, length and type of messages.

BCT = Bus Cycle Time, is the interval between two polls from the same device.

The curves opposite give the Uni-Telway cycle time as a function of the number of slaves operating at 9.6 Kbit/s or 19.2 Kbit/s, with a typical turnaround time of 5 ms per device (excluding messages).

The following table shows the time to be added (in ms) to obtain the true BCT value as a function of the traffic (N = Number of usable characters):

	Time (ms)	
Exchanges	at 9.6 Kbit/s	at 19.2 Kbit/s
Master to slave	24 + 1.2 N *(1)*	17 + 0.6 N *(1)*
Slave to Master	19 + 1.2 N *(1)*	12 + 0.6 N *(1)*
Slave to slave	44 + 2.3 N *(1)*	29 + 1.15 N *(1)*

In a distributed control system architecture the application-to-application response time depends not only on the communication system, but also on:

- The processing times of the message source and destination devices.
- The degree of asynchronism between the bus and processor cycle times.

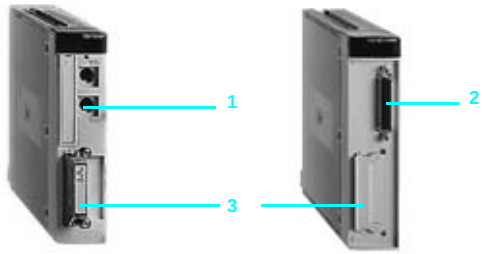
This response time must be evaluated by the designer of each application according to the devices which are connected.

The processing time of a device may vary from one to two cycle times depending on the degrees of asynchronism.

Description

TSX Micro/Premium PLCs

TSX Micro



Premium *TSX SCY 21601*

TSX Micro/Premium PLCs provide various ways of connecting to the Uni-Telway bus.

1 **By integrated TSX Micro/Premium processor or Atrium coprocessor port**
The AUX port *(2)* (8-way mini-DIN) has one non-isolated RS 485 serial link channel (maximum distance 10 m).

2 **By TSX SCY 21601 integrated port for Premium PLC or Atrium coprocessor**
This module has one Half-duplex isolated RS 485 serial link channel, which is multiprotocol, including Uni-Telway.

3 **Via multiprotocol PCMCIA card**
A slot on the TSX 37 21/22/Premium PLC processors, the Atrium coprocessor and the TSX SCY 21601 module *(3)* accepts the following multiprotocol cards:

□ TSX SCP 114 PCMCIA card
Isolated RS 485/RS 422 link. This type of card corresponds to the Uni-Telway standard.

□ TSX SCP 111 PCMCIA card
Non isolated RS 232D link. This type of card can be used for direct point-to-point links or via Modem.

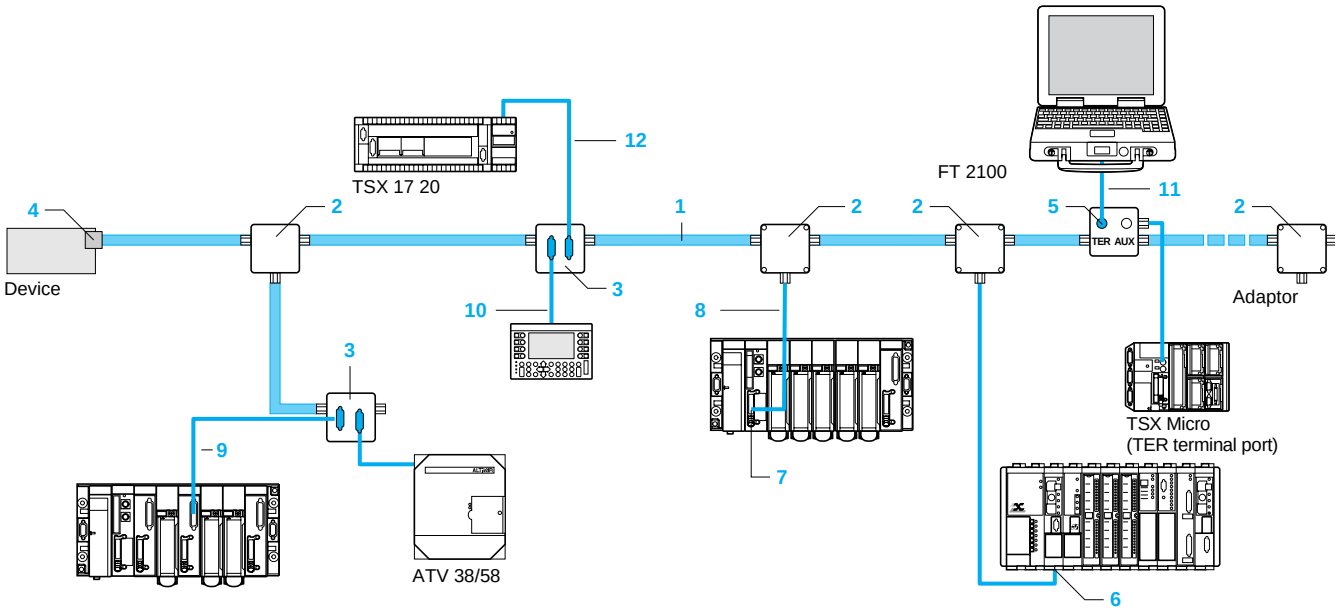
□ TSX SCP 112 PCMCIA card
20 mA current loop link. This type of card is used for a multidrop link (2 to 16 devices) and requires a ⎓ 24V external power supply.

(1) N = Number of usable characters corresponding to the messages to be exchanged.
(2) TER port for TSX 37 05/08/10 PLC.
(3) This slot can also accept the TSX FPP 20 PCMCIA card for Fipway networks, or the TSX JNP 112/114 PCMCIA card for JNet networks.

Connections: page 4/62
References: page 4/63

Modicon TSX Micro automation platform
Uni-Telway bus

Uni-Telway bus wiring system



1 **TSX CSA ●●●**: bus cable, double shielded twisted pair. The shielding must be connected to the earth of each device.
2 **TSX SCA 50:** passive T-junction box, matches the impedance when it is installed at the end of the line.
3 **TSX SCA 62:** passive 2-channel Uni-Telway subscriber socket, is used for coding the address of two connected devices, and matching the impedance when it is installed at the end of the line.
4 **TSX SCA 60/61:** passive terminal block, used for intermediate devices that have a 15-way female SUB D connector:
- TSX SCA 60 used for intermediate devices,
- TSX SCA 61 used for end devices.

5 **TSX P ACC 01:** connection box, used for connecting a TSX Micro/Premium PLC to the Uni-Telway bus via the PLC terminal port. The connecting cable (length 1 m) is integrated in the connection box. It isolates the signals (for distances >10 m) and is used to match the end of line impedance. It is also used to set the operation of the terminal port (Uni-Telway Master/Slave or character mode).
6 **TSX LES 64/74:** cable connectors for extensions to the Uni-Telway bus, used to connect TSX model 40 PLC processors that have an integral Uni-Telway port as standard. They are used for coding the address of the connected device.
7 **TSX SCP 114**: PCMCIA card for connecting TSX Micro *(1)*/Premium PLCs to the Uni-Telway bus.
8 **TSX SCP CU 4030:** Uni-Telway connecting cable between the TSX SCP 114 PCMCIA card (on TSX P57 ●0M processor or TSX SCY 21601 module) and the TSX SCA 50 junction box.
9 **TSX SCY CU 6530:** Uni-Telway connecting cable between the TSX SCY 21601 module integrated channel and the TSX SCA 62 subscriber socket.
10 **XBT-Z908:** Uni-Telway connecting cable between the CCX 17 and the TSX SCA 62 subscriber socket.
11 **TSX PCX 1031:** universal connecting cable between a PC compatible (COM port, 9-way SUB D connector) and the TER or AUX port for TSX Micro/Premium PLCs or the TSX P ACC 01 connection box (8-way mini-DIN connector).
12 **TSX CSC 015:** connecting cable between the TSX 17 micro-PLC (via a TSX 17 ACC 5 adapter or a TSX SCG 1161 module) and TSX SCA 62 subscriber socket.

TSX DG UTW F: this manual describes the operating principles and the architectures of the Uni-Telway bus. It is required for setting up and installing the Uni-Telway bus.
TSX DR NET F: this manual describes the X-Way architectures, services and address mechanisms. It includes the coding of Uni-TE requests as well as precautions for connecting earths for the networks. It also includes the principles of asynchronous serial transmission.

(1) With TSX 37 21/22 PLCs.

Characteristics: pages 4/60 and 4/61
Description: page 4/61
References: page 4/63

Modicon TSX Micro automation platform
Uni-Telway bus

TSX Micro

TSX SCY 21601 TSX SCY 21601

TSX SCP 11●

TSX P ACC 01

TSX SCA 50

TSX SCA 62

TSX SCA 72

TSX PCX 1031

Elements for connection to Uni-Telway bus

Description	Protocol	Physical layer	PLC	Addr.	Reference (1)	Weight kg
Integrated link on processor	Uni-Telway Character mode	Non isolated RS 485	TSX Micro	–	See page 1/15	
			Premium	–	Consult our catalog "Modicon Premium automation platform"	
			Atrium	–	Consult our catalog "Modicon Premium automation platform"	
Communication module	Uni-Telway Modbus/Jbus Character mode	1 isolated 2-wire RS 485 integrated channel (channel 0), 1 PCMCIA card slot (channel 1) *(2)*	Premium Atrium	–	**TSX SCY 21601**	0.360
Type III PCMCIA cards for Premium processors, Atrium coprocessors, TSX 37 21/22 PLCs, or TSX SCY 21601 modules	Uni-Telway Modbus/Jbus Character mode	RS 232 D (9 signals) 0.3…19.2 Kbit/s		7	**TSX SCP 111**	0.105
		RS 485 (RS 422 compatible) 1.2…19.2 Kbit/s		7	**TSX SCP 114**	0.105
		20 mA CL 1.2…19.2 Kbit/s		7	**TSX SCP 112**	0.105
Set of X-Way drivers for PC compatibles	Includes all the X-Way drivers see page 5/15		1 CD-Rom	–	**TSX CD DRV 20M**	–

Uni-Telway bus connection accessories

Description	Use	Addr.	Reference	Weight kg
Terminal port connection box	Isolation of Uni-Telway signals for bus length > 10 m, end of line adaptation, bus cable tap links. Supplied with cable (1 m length) equipped with a mini-DIN connector (TER or AUX ports)	5	**TSX P ACC 01**	0.690
Passive T-junction box	Tap link and extension of bus cable,	2	**TSX SCA 50**	0.520
Passive 2-channel subscriber socket	2-channel tap link (15-way female SUB-D connector) and extension of bus cable, address coding and end of line adaptation	3	**TSX SCA 62**	0.570
Active adaptation box RS 232C/RS 485	Connection of an RS 232C device active adapter unit (using Uni-Telway protocol), adaptation and isolation of signals, end of line adaptation (no address coding)	–	**TSX SCA 72**	0.520

Uni-Telway bus connecting cables *(3)*

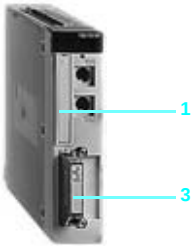
Description	Use		Addr.	Length	Reference (1)	Weight kg
	From	To				
Double shielded twisted pair RS 485 cables	Uni-Telway bus	–	1	100 m	**TSX CSA 100**	5.680
				200 m	**TSX CSA 200**	10.920
				500 m	**TSX CSA 500**	30.000
Cables for isolated RS 485 tap link	TSX SCP 114 card	TSX SCA 50 T-jun. box	8	3 m	**TSX SCP CU 4030**	0.160
		TSX SCA 62 sub. sock.	–	3 m	**TSX SCP CU 4530**	0.180
	TSX SCY 21601 module integrated channel (channel 0)	TSX SCA 50 T-jun. box	–	3 m	**TSX SCP CU 6030**	0.180
		TSX SCA 62 sub. sock.	9	3 m	**TSX SCP CU 6530**	0.200
RS 232 terminal port/peripheral device connecting cable	TSX Micro/ Premium or Atrium port or TSX P ACC 01 box (TER or AUX)	RS 232D port for 9-way SUB D type PC compatible	11	2.5 m	**TSX PCX 1031**	0.170
		USB port of PC	–	2.5 m	**TSX PCX 3030**	–

(1) Product supplied with bilingual Quick Reference Guide: English and French.
(2) Type III PCMCIA type III slot for TSX SCP 111/112/114, TSX FPP 20 or TSX JNP 112/114● card
(3) For information on other connection cables, please see page 4/64.

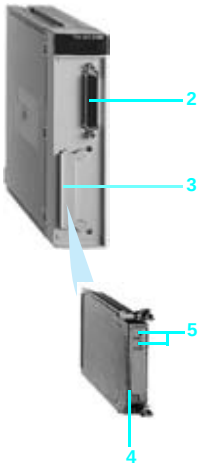
Characteristics: pages 4/60 and 4/61
Description: page 4/61
Connections: page 4/62

Modicon TSX Micro automation platform
Asynchronous serial links

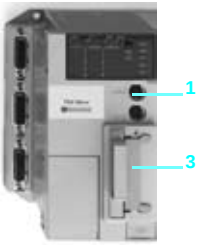
Premium



TSX SCY 21601



TSX Micro



Presentation

TSX Micro/Premium PLCs provide, via their processor, coprocessor or TSX SCY 21601 communication module, several possible ways for exchanging data in character mode with devices equipped with an asynchronous serial link interface:
- RS 485 integrated port.
- Type III PCMCIA card with RS 232D, RS 485 (RS 422 compatible) or 20 mA current loop link.

Protocols supported are character mode (ASCII), Uni-Telway and Modbus.
Other protocols are also available, or can be developed on request, on a RS 485 or RS 232D link, which enables TSX Micro/Premium PLCs to communicate on third-party architectures. These products are offered within the framework of the Schneider Alliances partnership programme. The list of modules available can be obtained from your Regional Sales Office, or from our Internet site www.schneideralliances.com.

Description

Integrated links

1 Via integrated port on the processor or coprocessor
The AUX *(1)* port (8-way mini-DIN connector) has one non-isolated RS 485 serial link channel (maximum distance 10 m).

2 Via integrated port on the TSX SCY 21601 module
This module for Premium PLCs has one isolated RS 485 serial link channel (25-way SUB-D connector). Half duplex multiprotocol, including Uni-Telway.

TSX SCP 11● multiprotocol PCMCIA cards

3 A slot on the processor, coprocessor and on the TSX SCY 21601 module takes cards which comprise:
4 A removable cover with fixing screws for access to the 20-way miniature connector.
5 Two indicator lamps:
- ERR lamp: card or link fault,
- COM lamp: data transmission or reception.

Connector cable to be ordered separately:
TSX SCP C● ●●● cable.

(1) TER port for TSX Micro TSX 37 05/08/10 PLC.

Characteristics

Type			Non isolated RS 485 terminal port	Isolated RS 485 TSX SCY 21601 integrated port *(1)*	PCMCIA cards RS 232D	PCMCIA cards RS 485 RS 422 Compatible	PCMCIA cards 20 mA current loop *(3)*
Physical layer	Data rate		1.2…19.2 Kbit/s *(2)*	1.2…19.2 Kbit/s	0.3…19.2 Kbit/s	1.2…19.2 Kbit/s	
Transmission	Size		120 characters		4096 characters max.		
	Data		7 or 8 bits				
	Stop bit		1 or 2 bits				
	Parity bit		Even, odd or none				
	Stop on silence						
Services	Reception echo						
	Repeat 1st char. echo						
	Auto LF						
	Back space						
	Beep						
	Flow mgmt	by Xon-Xoff					
		byRTS/CTS					
	RTS/CTS delay						
	Stop on reception						
	End of message						
	PSR management						

Parameters which can be accessed in configuration mode.

(1) For characteristics of the communication module integrated channel, consult our Modicon Premium automation platform catalogue.
(2) With the TSX P57 3●3/453 processor, data rate up to 115 Kbit/s during program uploading.
(3) Point-to-point or multidrop link.

References:
page 4/59

Modicon TSX Micro automation platform
Asynchronous serial links

TSX Micro

Premium

TSX SCY 21601

TSX SCP 11●

TSX P ACC 01

TSX PCX 1031

References

Asynchronous serial link elements (character mode)

Description	Protocol	Physical layer	PLC	Reference (1)	Weight kg
Integrated link on processor	Character mode Uni-Telway	RS 485 non-isolated	TSX Micro	See page 1/15	–
			Premium	Consult our catalog "Modicon Premium automation platform"	–
			Atrium	Consult our catalog "Modicon Premium automation platform"	–
Communication module	Character mode Uni-Telway Modbus/Jbus	- 1 isolated RS 485 integrated chan. (channel 0), - 1 type III PCMCIA card slot (channel 1) (2)	Premium Atrium	**TSX SCY 21601**	–
Type III PCMCIA cards for TSX 37 21/22, PLC, TSX/PCX Premium processor or TSX SCY 21601 module	Character mode Uni-Telway Modbus/Jbus	RS 232 D (9 signaux) 0,3…19,2 K bits/s		**TSX SCP 111**	–
		RS 485 (compatible RS 422) 1,2…19,2 K bits/s		**TSX SCP 114**	–
		BC 20 mA 1,2…19,2 K bits/s		**TSX SCP 112**	–

Asynchronous serial link connection accessories

Description	Use	Length	Reference	Weight kg
Terminal port connection box	Isolation of RS 485 signals, end of line adaptation, supplied with cable for connection to PLC	1 m	**TSX P ACC 01**	0.690

Connecting cables for asynchronous serial links

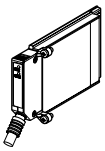
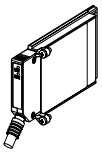
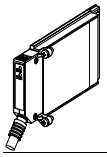
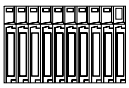
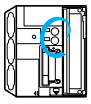
Description	Use From	To	Length	Reference	Weight kg
Cables for isolated RS 485 connection	TSX SCP 114 card	RS 485/RS 422 device (3)	3 m	**TSX SCP CX 4030**	0.160
	Integrated channel (channel 0) module TSX SCY 21601	RS 485/RS 422 device (4) via TSX SCA 50 box	3 m	**TSX SCY CU 6030**	0.180
Universal cable for terminal port/RS 232 device	TSX Micro/Premium/ Atrium port (TER or AUX) or TSX P ACC 01 box	RS 232D of a terminal device (DTE) (5)	2.5 m	**TSX PCX 1031**	0.170
		USB port of PC	2.5 m	**TSX PCX 3030**	–
Cables for RS 232D connection	TSX SCP 111 card	Communication device: modem, converter, (DCE) (4)	3 m	**TSX SCP CC 1030**	0.190
		Point-to-point terminal device (DTE) (4)	3 m	**TSX SCP CD 1030**	0.190
			10 m	**TSX SCP CD 1100**	0.620
Cable for BC 20 mA connection	TSX SCP 112 card	Current loop device (3)	3 m	**TSX SCP CX 2030**	0.160

(1) Product supplied with a bilingual Quick Reference Guide: English and French.
(2) PCMCIA type III slot can receive one TSX SCP 111/112/114, TSX FPP 20 or TSX JNP 112/114 card.
(3) End of cable fitted with flying leads.
(4) End of cable fitted with a 25-way male SUB-D connector.
(5) End of cable fitted with a 9-way male SUB-D connector. For use, to order separatly one ***TSX CTC 10*** *adaptator (9-way male SUB-D connector/25-way male SUB-D connectors).*

Presentation: page 4/58
Description: page 4/58
Characteristics: page 4/58

Modicon TSX Micro automation platform

Connecting cables for PCMCIA cards and TER/AUX ports

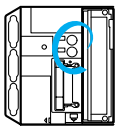
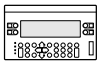
TSX Micro/Premium PLC	Device to be connected	Physical link	Protocol	Length	Reference	Weight kg
TSX SCP 111 PCMCIA card 	DTE terminal 2	RS 232D	Character mode	3 m	**TSX SCP CD 1030**	0.190
				10 m	**TSX SCP CD 1100**	0.620
	DCE terminal (Modem...) 2	RS 232D	Character mode Uni-Telway	3 m	**TSX SCP CC 1030**	0.190
TSX SCP 114 PCMCIA card 	TSX SCA 50 T-junction box 3	RS 485 (2-wire isolated)	Character mode Uni-Telway	3 m	**TSX SCP CU 4030**	0.160
		RS 422/485 (2-wire isolated)	Character mode Modbus	3 m	**TSX SCP CM 4030**	0.160
	TSX SCA 62 2-channel subscriber socket 4	RS 485 (2-wire isolated)	Uni-Telway	3 m	**TSX SCP CU 4530**	0.160
	TSX SCA 64 2-channel subscriber socket 4	RS 422/485 (2/4 wire)	Modbus	3 m	**TSX SCP CM 4530**	0.180
	DTE Terminal 3	RS 422/485 (4-wire)	Modbus	3 m	**TSX SCP CX 4030**	0.160
TSX SCP 112 PCMCIA card 	Active or passive terminal 3 	20 mA current loop	Character mode Uni-Telway Modbus	3 m	**TSX SCP CX 2030**	0.160
TER/AUX ports  1	TSX P ACC 01 junction box	RS 485	Uni-Telway	1 m	Included with TSX P ACC 01	
	TSX P ACC 01 junction box 5	RS 485	Uni-Telway	2 m	**T FTX CB1 020**	0.100
				5 m	**T FTX CB1 050**	0.190
	DTE terminal (PC, printer) 6 7	RS 232	Character mode	2,5 m	**TSX PCX 1031** *(1)*	0.170
		RS 232	Character mode	2,5 m	**TSX PCX 3030**	–

1 25-way male miniature connector.
2 25-way male SUB-D connector.
3 Flying leads.
4 15-way male SUB-D connector.
5 8-way female mini-DIN connector.
6 9-way female SUB-D connector.
7 USB type connector.

(1) Separate parts see page 4/67.

Modicon TSX Micro automation platform

Connecting cables for PCMCIA cards and TER/AUX ports

TSX Micro/Premium PLC	Device to be connected	Physical link	Protocol	Length	Reference	Weight kg
TER/AUX ports (contin.)  1	DTE terminal (slave PC)	2 RS 232 RS 485	Uni-Telway	2.5 m	**TSX PCX 1031**	0.170
		3 RS 232 RS 485	Uni-Telway	2.5 m	**TSX PCX 3030**	–
	DTE terminal (printer, slave PC without RTS)	RS 232 2	Character mode Uni-Telway	2.5 m	**TSX PCX 1031** *(1)*	0.170
		3 RS 232	Character mode Uni-Telway	2.5 m	**TSX PCX 3030**	–
	DCE terminal (Modem M/SI. USA/Europe) 4	RS 232	Character mode Uni-Telway	3 m	**TSX PCX 1130** *(2)*	0.140
	CCX 17, panel, XBT terminal 5 	RS 485	Uni-Telway	2.5 m	**XBT Z968**	0.180
				5 m	**XTB Z9681**	0.340
TSX SCY 21601 communication module integrated port 5	TSX SCA 50 T-junction box 6	RS 485 (2-wire isolated)	Uni-Telway	3 m	**TSX SCY CU 6030**	0.180
			Modbus/Jbus	3 m	**TSX SCY CM 6030**	0.180
	TSX SCA 62 2-channel subscriber socket 7	RS 485 (2-wire isolated)	Uni-Telway	3 m	**TSX SCY CU 6530**	0.200
	RS 485 terminal 6	RS 485 (2-wire isolated)	Character mode	3 m	**TSX SCY CM 6030**	0.180

Separate parts

Description	Description	Reference	Weight kg
SUB-D adapter	9-way male SUB-D connector/25-way female SUB-D connectors	**TSX CTC 07**	0.060
	9-way male SUB-D connector/25-way male SUB-D connector	**TSX CTC 10**	0.060

1 8-way female mini-DIN connector.
2 9-way female SUB-D connector.
3 USB type connector.
4 9-way male SUB-D connector.
5 25-way male SUB-D connector
6 Flying leads.
7 15-way male SUB-D connector

(1) To be ordered separatly: TSX CTC 07 and TSX CTC 10 adapters, see above separate parts.
(2) Point to point, supplied wih 1 SUB-D adapter: ***TSX CTC 09*** *9-way female/25-way male SUB-D connector.*

5

5 - PL7 software and Magelis terminals

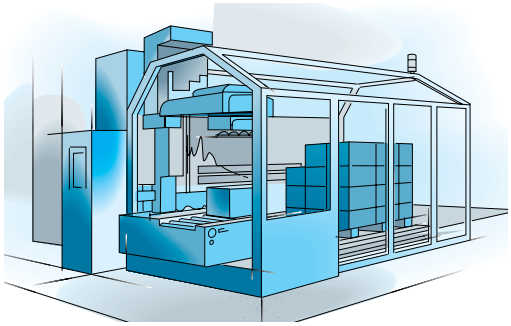
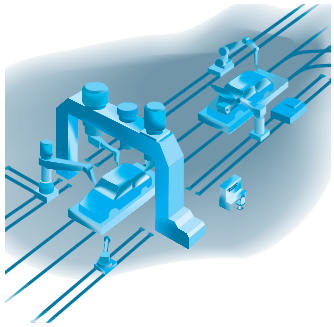
Selection guide PL7 programming software . . . . . page 5/2

- PL7 Micro/Junior/Pro programming software . . . . . *page 5/4*
- PL7 SMC application converter software . . . . . *page 5/20*
- PL7 DIF application comparison software . . . . . *page 5/22*
- Logiciel SDKC C language development software . . . . . *page 5/24*
- PL7 FUZ fuzzy logic processing software . . . . . *page 5/26*
- FTX 117 Adjust terminal . . . . . *page 5/28*

Selection guide XBT Magelis dialog terminals . . . . . page 5/30

Selection guide XBT-F/G Magelis terminals with graphic screen. . . . page 5/32

Modicon TSX Micro automation platform
Programming softwares

Applications	Application development and installation		
			
Type of PLC	TSX Micro	TSX Micro/Premium/Atrium	
Services			
Programming	Yes		
Debugging	Yes		
Adjustment	Yes		
Instruction list	Yes		
Ladder language	Yes		
Grafcet language	Yes	Yes (with macro-steps for Premium)	
Structured text language	Yes	Yes	
DFBs function blocks	No	Use (for Premium/Atrium)	Creation/use for Premium/Atrium
Fonctional view	No	No	Yes (Premium/Atrium)
Import/export od function modules	No	No	Yes (Premium/Atrium)
Diagnostic DFBs	No	No	Yes (Premium/Atrium)
Runtime screens			Creation/use
Functions	Development debugging of applications with: ■ A broswer accessing all the application components ■ Dedicated editors ■ Two types of application structure: single task or multitask ■ Master and fast tasks divided into sections ■ Possibility of selecting the desired language in each section ■ Debugging simplified by automatic creation of animation tables	For Premium: ■ Use of Grafcet macro-steps ■ Application split into function modules ■ Use of function blocks: DFBs reusable in any application in order to improve application legibility and development	■ Creation of runtime screens (synoptics, text, values) which are displayed depending on the state of the process in order to simplify operation and control of an installation ■ Diagnostic “viewer”
Name of software	**PL7 Micro**	**PL7 Junior**	**PL7 Pro**
Type of software	**TLX CD PL7M P 43M**	**TLX CD PL7J P 43M**	**TLX CD PL7P P 43M**
Pages	5/18		5/19

Application conversion	Development of functions in C language	Comparison of PL7 Premium applications	Availability of Premium applications	Development of a multi-PLC data server
		Premium/Atrium		Nano/TSX Micro/ Premium/Atrium Quantum/Momentum/ TSX Series 7/April
Conversion of SMC PLC applications for TSX Micro/Premium PLC applications: ■ Selection of sequences to translate into Ladder language. ■ Conversion of symbol database. ■ Reassignment of I/O ■ Conversion report. PL7 Junior/Pro software required.	Enhances the library of PL7 functions by developing functions in C language: ■ Creation of functions families. ■ Development of functions in C langage. ■ Debugging of functions (step by step, breakpoints, …) ■ Generation of disks for installation on over PL7 stations. ■ Use of new functions in applications.	Automatic comparison of 2 Premium applications with identification of all the differences. PL7 Pro software required.	Continuity of operation in a Premium PLC redundant architecture automate Premium. Possible to have shared I/O on a Fipio bus or redundant I/O Typical “Normal/Backup” changeover time: 1 to 2 s	Development of a multi-PLC data server accessible by “Client” applications: ■ Access to server in local or remote mode. ■ Access to variables in the form of symbols in one or more PLCs. ■ Management of Uni-TE and Modbus protocols. ■ Programming in Visual Basic or C++. ■ Simulates access to variables for debugging.
PL7 SMC	**PL7 SDKC**	**PL7 DIF**	**Warm Standby**	**OFS**
TLX LC SMC PL7 40M	**TLX L SDKC PL7 41M**	**TLX CD PL7 DIF 4EF**	**TLX CD WSBY P 40F**	**TLX CD OFS 25M**
5/21	5/25	5/23	Consult our Modicon Premium automation platform catalogue	

Other software:
- PL7 FUZ, software for fuzzy logic processing for TSX Micro/Premium platforms: TLX L PL7 FUZ 34 M, see page 5/27.
- SyCon, CANopen machine bus configuraor (TSX Micro/Premium) and INTERBUS fieldbus (Quantum) and Profibus DP (Premium/Quantum): SYS SPU LF● CD28M, see page 4/25.

Modicon TSX Micro automation platform

PL7 Micro/Junior/Pro programming software

To meet the evolving hardware and software needs of our customers, Schneider Electric introduces PL7 version 4.4 programming software for the Modicon TSX Micro and Modicon Premium platforms.

Modicon TSX Micro automation enhancements

TSX CPP 110

CANopen connectivity
Micro TSX 37 21 and 37 22 PLC communications are enriched with the addition of a CANopen machine bus, made possible through the use of a PCMCIA card equipped with a cable (length 0.5m) and a tap junction (with 9-way SUB-D connector). This **TSX CPP 110** kit allows a direct link to the bus and ensures the role of the master on the CANopen bus. The PCMCIA card is inserted into the reserved communication card slot that is available on the TSX 37 21 and TSX 37 22 CPU.

Extension memory size
In order to extend the memory of existing applications or to create more complex applications, the memory capacity of TSX 37 21/22 PLCs can be extended from 64 Kwords to 128 Kwords (program and constants). The CPU bases are capable of receiving 3 different memory cards:
- 128 Kwords application RAM memory TSX MRP 0128P.
- 128 Kwords application Flash EPROM memory TSX MRF 0128P.
- 128 Kwords application and 128 Kwords data storage RAM memory TSX MRP 2128P.

SyCon configuration software for CANopen machine bus
A version of PL7 Micro programming software (1-station) is available with SyCon configuration software for the CANopen machine bus (reference TLX CD PL7M PC44M).

5

Modicon TSX Premium automation enhancements

TSX CSY 164

TSX WMY 100

CANopen connectivity
- The Premium TSX P57 103M low-end processor has CANopen machine bus connectivity via the use of the new **TSX CPP 110** PCMCIA card (see “CANopen connectivity” for TSX Micro platform, above). This new card is compatible with all Premium processors and Atrium coprocessors (except TSX P57 153M processor with embedded Fipio bus link).

New application-specific modules:
- **TSX CSY 164** SERCOS motion control module. PL7 version 4.4 Junior/Pro software makes it possible for this module to individually declare the 16 channels as real axes, imaginary axes or remote axes. This new 16-channel module is in addition to the current **TSX CSY 84** module with 8 real axes.
- **TSX WMY 100** FactoryCast HMI Ethernet module. This new Ethernet TCP/IP module with embedded Web server offers additional HMI web services compared to current modules (TSX ETH 110WS/4103/5103). New features include acquisition of PLC data in the HMI database of the module, Email with automatic messaging on events, math and logic functions, and connection to relational databases.

PL7 Micro Junior/Pro software version 4.4 software enhancements

PL7 version 4.4 enables new TSX Micro/Premium modules to take advantage of additional functionalities:
- PL7 software registrations by the Internet, electronic mail, fax or phone (obligatory registration before 22nd day).
- Change in the Fipio catalogue for Momentum distributed I/O.
- Transfer of PL7 user rights between PCs via floppy disk or network.
- Enriched export files of the data application (FEF) for better compatibility with Unity software after migration.

PL7 Micro Junior/Pro software packages are offered according to two alternatives depending on the type of PLCs/PC cable: connection on the RS 232C port, or the USB port of a PC.

Modicon TSX Micro automation platform
PL7 Micro/Junior/Pro programming software

Presentation

PL7 Micro/Junior/Pro software packages are designed for Windows 2000 Professional and Windows XP *(1)* operating systems and therefore benefit from all the facilities relating to these:

Ergonomics of the software

More user-friendly and productive ergonomics thanks to:

- Access to contextual menus by right-clicking with the mouse for fast access to the services available for the selected object.
- Contextual help: direct access to help corresponding to the selected object.
- Tool tips: explanatory messages appear when skimming over the toolbar buttons.

Furthermore, some important functions make the software easier and safer to use:

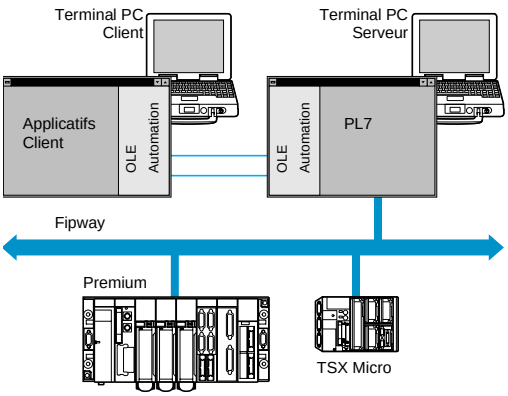
Multi-instance

The multi-instance function enables several applications to be worked on simultaneously.

This function enables:
- Several different applications present on the PC to be opened in offline mode in order to check or copy data.
- Debugging of two (or more) applications on two PLCs present on the same network in on-line mode. This is particularly useful when debugging inter-PLC communication functions.

Management of access rights

Use of the various PL7 software functions can be limited and controlled by managing the access rights.
There are 5 user profiles (differentiated by passwords) which characterize the functions available to users on the programming terminal. The profiles range from read-only access to an application (lowest profile) to full programming (profile with the most rights).



Application server

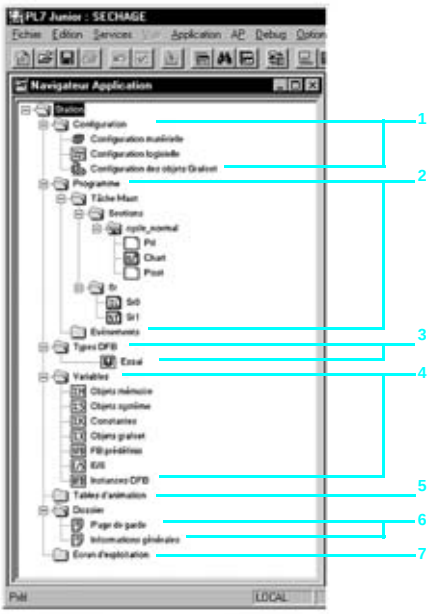
PL7 Pro software can be launched in OLE Automation server mode from a third-party client application. In this case, certain PL7 program functions can be executed following commands sent by an OLE client application. This instance of the program then no longer reacts to commands from the operator keyboard. Server mode can be launched in offline mode (COM) if both programs are on the same machine, or in remote mode (DCOM), if the programs are installed on different machines.

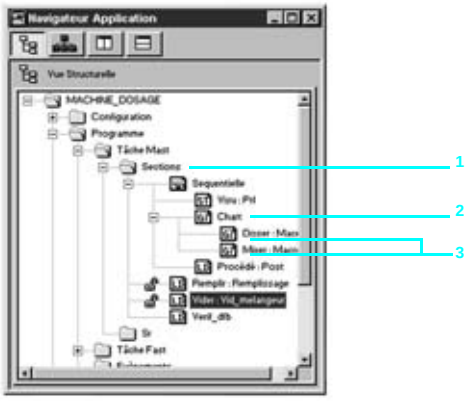
The commands available are as follows:
- Manage an execution context (open/close an application, modification of the address and driver of the connected PLC; PLC status).
- Control the PLC (connection/disconnection, send a RUN/STOP/INIT command, program uploading/downloading).
- Read data (application or symbol export only in source format, read symbol/comment associated with an address, read application identity).

(1) However, compatibility with the Windows 95 operating system is no longer provided and USB port is not compatible with Windows 95 and Windows NT 4.0.

Modicon TSX Micro automation platform

PL7 Micro/Junior/Pro programming software





Application creation and debug tools

Application browser (conventional view)

Access to all programming and debug tools is gained via the application browser. This gives a global view of the program and enables all the application components to be accessed quickly via contextual menus.

1 Configuration editor.
2 Program editor.
3 DFB user function block editor.
4 Variable editor.
5 Animation table editor.
6 Documentation editor.
7 Operating screen editor.

Concept of sections and Grafcet enhancement

In order to make programs more comprehensible, the FAST and MAST tasks are split into sections.
Each section 1 has a name, a comment and is programmed in one of the four languages available in PL7.
A section programmed in Grafcet language can contain a main chart 2 and macro-steps 3. Version ≥ V4.0 of PL7 allows comments to be added to each macro-step.
To protect intellectual property or avoid any unwarranted modification, each section can be write-protected or read/write-protected.

Function views of an application

PL7 Pro software can be used to structure an application for a Premium platform into functional modules that are broken down into sections (program code), animation tables and operating screens. Independently of the multitask structure of the PLC, the designer can define a multilevel tree structure of the automation application.
At each level, it is possible to attach program sections written in Ladder language (LD), Structured Text (ST), Instruction List (IL), Grafcet (SFC), and animation tables.

Two types of view are available at all times:

- A representation showing a tree structure of modules can provide a breakdown according to consistent functions in relation to the process to control.
- The classic representation of the application browser provides a view of the execution order of the program sections for each PLC.

The operation services associated with the functional view are available in one or the other view. In particular, a single command can be used to force whether or not a functional module is executed.
In this case, every section attached to the functional module is automatically forced.

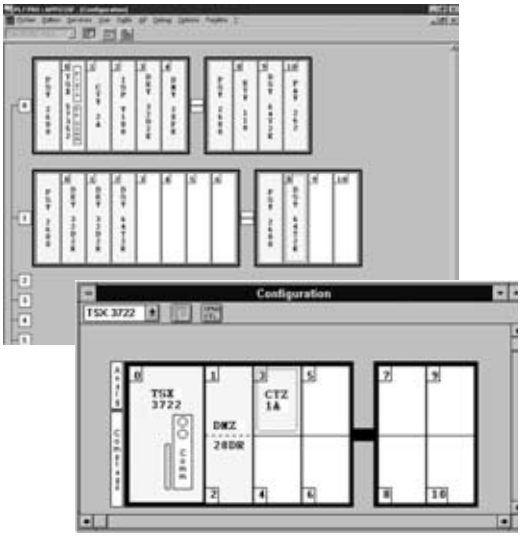
Exporting/importing functional modules

All or part of the tree structure can be exported into functional modules.
In this case, all program sections of the different module levels are exported.
During an import, an assistant can be used to reassign the data associated with the module in stages.

Presentation: page 5/5
Functions: pages 5/12 to 5/15
Characteristics: pages 5/16 to 5/18
Reference: pages 5/18 to 5/19

Modicon TSX Micro automation platform

PL7 Micro/Junior/Pro programming software



Configuration editor

Hardware configuration

The configuration editor intuitively and graphically enables the declaration and configuration of the various components of the TSX Micro/Premium PLC application:

- Processor, coprocessor.
- Tasks.
- Application-specific I/O modules.
- Memory.
- ...

By clicking on an unconfigured position, the display of a dialog box shows the available I/O modules, classed according to family.
Once the various modules are positioned, selecting them accesses parameter entry for each module.

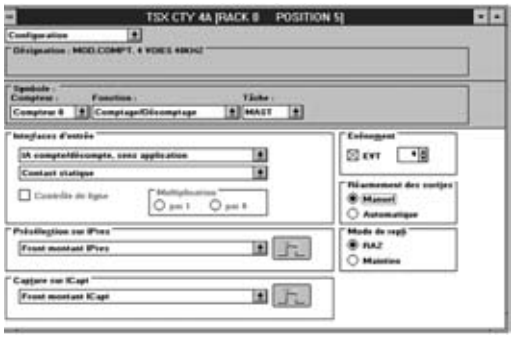
Software configuration

The configuration editor can also be used to set the software parameters of the application: choice of the number of constants, number of internal words and the number of each type of function block.
The configuration editor provides access to parameter entry for the function blocks.
The copy/paste function for these parameters is available from version ≥ V4.0 of the PL7 software onwards.

Configuration of Grafcet objects

When programming in Grafcet language, the configuration editor can define Grafcet objects (steps, macro-steps, etc.) and execution parameters (number of steps and active transitions).

Setup of application-specific functions



A number of tools are provided as standard for setting up the various applications: discrete I/O, analog I/O, counting, motion control *(1)*, man-machine interface (MMI), communication, weighing *(1)*, Warm Standby redundancy *(2)*.
The parameter screens for the application-specific functions are accessed from the I/O configuration screen by clicking on the position in which the module has been defined.
The screens enable the main operating characteristics of the chosen application to be defined, for example:

- Filter values for discrete I/O.
- Voltage or current range for analog I/O.
- Threshold values for counting.
- Path of axes for position control.
- Calibration change during weighing.
- Transmission speed for communication.

(1) PL7 Junior/Pro function available on a Premium platform.
(2) PL7 Junior/Pro function available on a Premium platform based on a TSX P57 353/453 processor (version with integrated Fipio link).

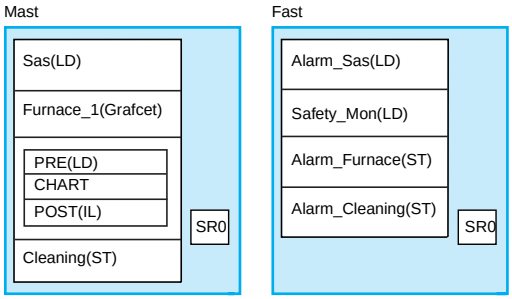
5

Modicon TSX Micro automation platform
PL7 Micro/Junior/Pro programming software

Software structure

PL7 Micro/Junior/Pro software offers two types of structure:
- Single task: this is the simplified structure offered by default, where a single master task consisting of a main program, comprising several sections and subroutines, is executed.
- Multitask: this structure, which is better suited to high-performance real-time applications, consists of a master task, a fast task and event-triggered tasks, which have the highest priority. Master and fast tasks are divided into sections.

Structured and modular programming



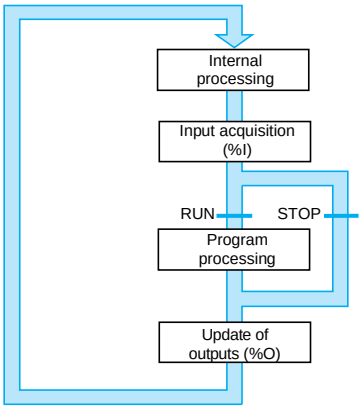
PL7 program tasks comprise several parts called sections and subroutines. Each section can be programmed in the appropriate language for the processing to be carried out.
Such division into sections enables a structured program to be created and program modules can easily be generated or added.

Subroutines can be called from any section of the task to which they belong or from other subroutines in the same task.

Simple task software structure

There are two types of cyclic execution:
- Normal cyclic execution. This is the default option.
- Periodic execution. This type of execution, as well as the period, are selected by the user during configuration.

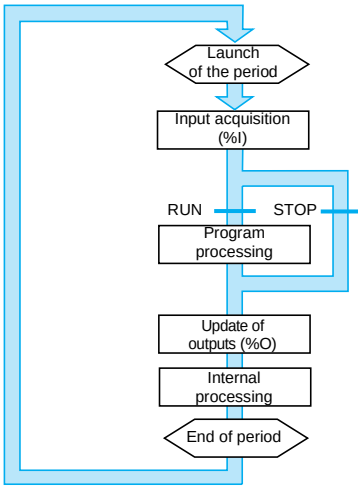
Normal execution (cyclic)



At the end of each scan, the PLC system launches the execution of a new scan. The execution time of each scan is monitored by a software watchdog whose value is defined by the user.

In the event of overrun, a fault occurs causing:
- The scan to stop immediately (STOP).
- A display on the front panel of the PLC.
- The alarm relay of the main rack power supply to be set to 0.

Periodic execution



A new scan is executed at the end of each period. The execution time of the scan must be less than the time of the period defined (1 to 255 ms). In the event of overrun, the latter is stored in a system bit (%S19), which can be set to 0 by the user (by program or by the terminal).

A software watchdog which can be configured by the user monitors the scan time. In the event of overrun, an execution fault is signaled (see normal execution).

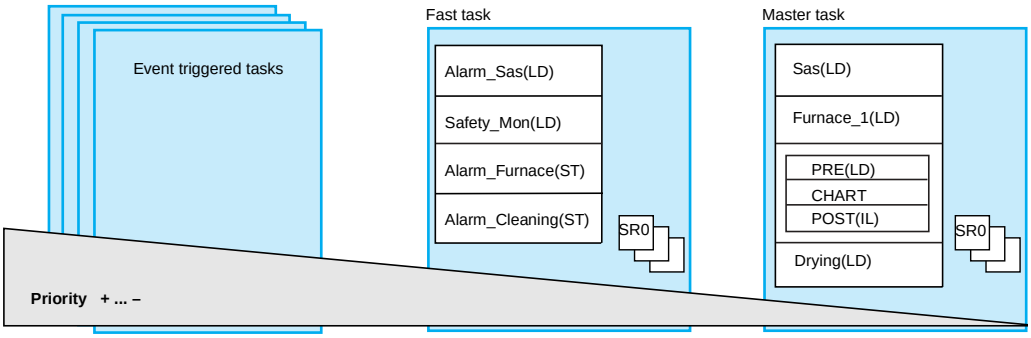
Modicon TSX Micro automation platform

PL7 Micro/Junior/Pro programming software

Multitask software structure

PL7 Micro/Junior/Pro software offers a Multitask software structure, consisting of:
- A master task (divided into sections, one of which may contain Grafcet).
- A fast task (divided into sections).
- One or more event-triggered tasks (only one section per task).

These tasks are independent and are executed in "parallel", with the PLC processor managing the execution priority. When an event occurs, or at the start of the fast task cycle:
- The current execution of lower priority tasks is stopped.
- The event-triggered task or the fast task is executed.
- The interrupted task takes over again when processing of the priority task is completed.



This structure can optimize use of the processing power, and can be used to structure the application and simplify design and debugging, as it is possible to write and debug each task independently of the others.

Master task

This compulsory task, which executes the main program, is periodic or cyclic (see single task structures). It is activated systematically. It is intended for sequential processing. Each section can be programmed in Ladder, Structured Text or Instruction List language. One section is dedicated to Grafcet language; when this language is chosen, 3 processing operations are proposed:
- Preliminary processing (PRE) is programmed in Ladder, Structured Text or Instruction List language and processes initializations on power return, operating mode modifications, input logic.
- Sequential processing (CHART) includes the graphic transcription and management of Grafcet charts. It provides access to processing of the actions and transition conditions.
- Post-processing (POST). This is programmed in Ladder, Structured Text or Instruction List language and is used to process all the instructions from the 2 preceding processing operations and the indirect safety functions specific to the outputs.

Fast task

This task, which is higher priority than the master task, is periodic in order to leave time for execution of the lower priority task. Processing operations in this task must be as short as possible so as not to adversely affect the master task. It is useful when fast periodic changes in discrete inputs need to be monitored.
Each section of this task can be programmed in Ladder, Structured Text or Instruction List language.

Event triggered tasks

Unlike the tasks described above, these tasks are not linked to a period. Their execution is triggered by an event occurring in an application-specific module (eg.: overrun of a counter threshold, change in state of a discrete input). These tasks have higher priority than all other tasks, and they are therefore suitable for processing operations requiring very short response times to the occurrence of an event.
They can be programmed in Ladder, Structured Text or Instruction List language.
Number of EVTi control events:
- TSX Micro PLCs: 8 events with TSX 37 10 and 16 events with TSX 37 21/22.
- Premium PLCs: 32 events with TSX 57 10 and 64 events with TSX 57 20/30/40 and PCX 57 20/30.

TSX Micro TSX 37 21/22 and Premium PLCs have 2 priority levels (EVT0 event has priority over other EVTi events).

Ladder language (LD)

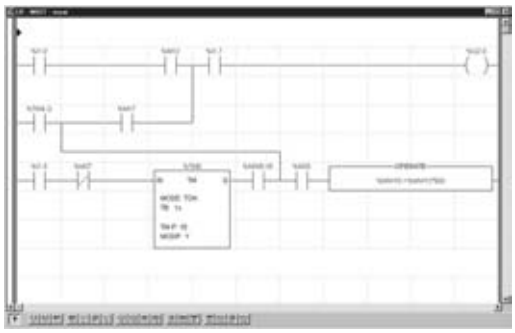
Program structure (section, SR or event-triggered task)

Programs written in Ladder language consist of a series of rungs which are executed sequentially by the PLC. Each rung may be:
- Identified by a label.
- Completed by a comment of up to 222 characters.

A rung consists of 7 lines on TSX Micro and 16 lines on Premium, with 11 columns, allowing a maximum of 10 contacts and one coil per line.

Program editor: Ladder language

The Ladder language editor offers several tools for constructing rungs in a user-friendly way:
- A palette of graphic elements for direct access to the various graphic symbols of the language via the mouse or the keyboard: contacts, Boolean logic, coils, operation blocks, predefined function blocks…



- A rung can be drawn without having to fill in each element.
- The language objects can be entered and displayed in either symbol or address format.
- The symbol and address of each object can be displayed simultaneously.
- A rung is constructed simply by selecting the symbol from the graphic palette and placing it in the correct position in the grid on-screen.
- An automatic link line function optimizes the number of user actions.

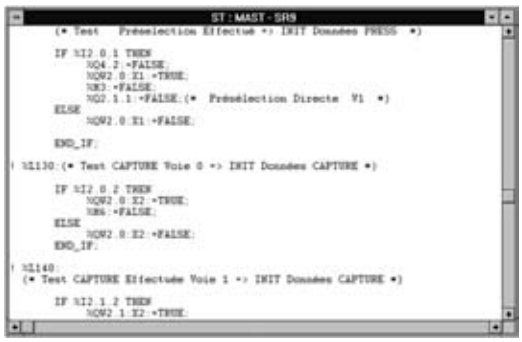
The Ladder language editor is used to call up immediately the functions which assist data entry:
- Access to function libraries.
- Access to the variables editor.
- Cut, copy, paste.

Structured Text language (ST)

Structured Text language is a sophisticated algorithmic type language which is particularly suitable for programming complex arithmetic functions, table operations, message handling, etc.

Program structure (section, SR or event-triggered task)

Structured Text language enables direct transcription of a flowchart analysis and is organized into statements. Each statement consists of a label (1000 labels max), comments (256 characters max) and instructions.
There are four methods for controlling statements:
- Conditional action IF.
- Conditional iterative action WHILE (action repeated while a condition is true).
- Conditional iterative action REPEAT (action repeated until a condition is true).
- Repetitive action FOR (action repeated a certain number of times).



Program editor: Structured Text language

The editor enables statements to be entered one after another.
The editor provides help with entering:
- Modifications, insertion, etc.
- Cut, copy, paste.

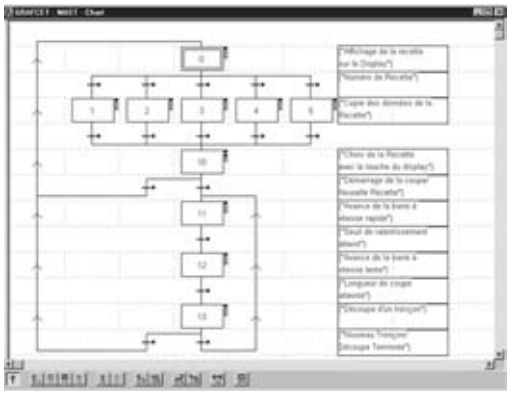
Objects can be entered and displayed in either symbol or address format.

Different colors are used for the objects, language key words and program comments to make it easier to read.

Modicon TSX Micro automation platform

PL7 Micro/Junior/Pro programming software

TSX Micro PLC	Premium PLC
■ 96 steps maximum on 8 pages for TSX 37-10 and 128 steps for TSX 37-21/22 ■ 1024 transitions maximum ■ 11 elements maximum per divergence/convergence	■ maximum of 250 steps on 8 pages ■ 64 macro-steps of 250 steps. ■ A "generic" comment can be associated with each macro-step ■ 1024 transitions maximum ■ 11 elements maximum per divergence/ convergence ■ 1024 steps maximum in the application



Grafcet language (SFC)

Grafcet language is used to describe, in a simple and graphic manner, the sequential part of control systems. It corresponds to the SFC "sequential function chart" language described in standard IEC 1131-3.

Structure of the section in the master task

Grafcet SFC language is only used in one section of the master task.
This is structured in three processing operations, see page 5/8.
Programs written in Grafcet SFC language consist of:
- Macro-steps *(1)* which are the only representation of a set of steps and a transition.
- Steps, with which the actions to be executed are associated.
- Transitions, with which the conditions are associated (transition conditions).
- Directed links, connecting the steps and transitions.

See characteristics page 5/16.
The actions (continual, pulsed on activation or deactivation) and transition conditions can be programmed in the desired language: Ladder, Structured Text or Instruction List.

Program editor: Grafcet SFC language

The editor offers 8 pages, each consisting of 11 columns and 14 lines, giving 154 cells per page.
A palette of graphic objects is used for direct access to each graphic symbol (macro-steps, steps, transitions, sequence selection, simultaneous activation/ deactivation and connectors).
Programming of the transition conditions and actions is performed simply by clicking on the required chart element.
On a Grafcet page, comments of up to 64 characters can be entered in any cell.
Functions which assist entry: cut, copy, paste, etc. are available to the user.

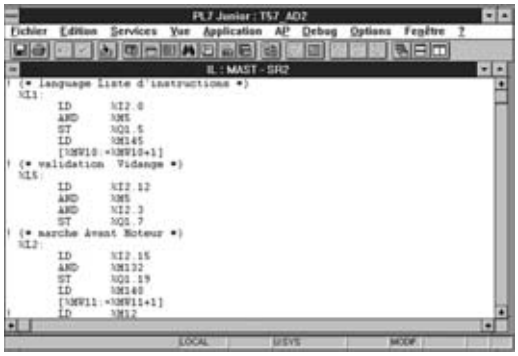
Instruction List language (IL)

Instruction List language is a language representing, in the form of text, the equivalent of a Ladder diagram. It is used for writing Boolean equations and making use of the functions available in the language.

Program structure (section, SR or event-triggered tasks)

A program in Instruction List language comprises a sequence of instructions from the following different families:
- Bit instructions, for example read input n° 3: **LD %I1.3**.
- Instructions on function blocks, for example start timer n° 0: **IN %TM0**.
- Numerical instructions on single, double and floating point integers, for example, perform an addition: **[%MW10:= %MW50 + 100]**.
- Instructions on word tables, character strings, for example, perform an assignment: **[%MW10:10:=%KW50:10]**.
- Program instructions, for example, call subroutine n° 10: **SR10**.

Each instruction is composed of an instruction code and a bit or word type operand.



Program editor: Instruction List language

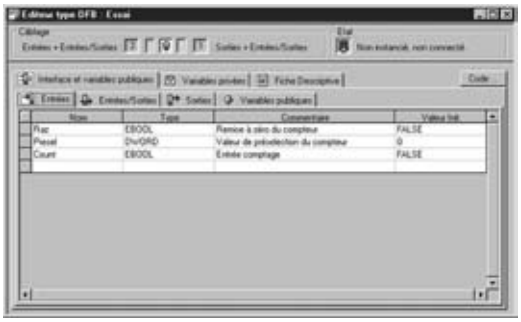
As in Ladder language, instructions are organized into sequences of instructions (equivalent to a rung). Each sequence of instructions can be identified by a label %Li, with i being from 0 to 999 and accompanied by a comment of 222 characters maximum.
Each sequence of instructions is composed of one or more test instructions. The result of these instructions is applied to one or more action instructions.
Objects can be entered and displayed in either symbol or address format.
The editor provides help with entering data.

(1) With Premium PLCs only.

5

Modicon TSX Micro automation platform

PL7 Micro/Junior/Pro programming software



Functions

User DFB function blocks

PL7 Pro software offers the user the possibility (for Premium PLCs) of creating their own function blocks which meet the particular needs of their applications. Once they have been created in the library, these function blocks can be used with PL7 Junior/Pro software.
These user function blocks enable an application to be structured. They are used as soon as a program sequence is repeated several times in the application or to freeze a standard type of programming. They can be exported to all other PL7 applications.
Using a DFB function block in one or more applications enables:
- Simplification of program entry and design.
- Improved program readability.
- Easier debugging (all variables handled by the DFB function block are identified on its interface).
- Use of DFB-specific internal variables (independent of the application).

A DFB derived function block is set up in three phases:
- Design of the DFB which has a name, parameters (I/O), variables and code in Structured Text or ladder language.
- Creation of a DFB instance in the variables editor or when calling the function in the program editor.
- Using this instance in the program in the same way as a standard function block.

Variables editor

The variables editor is used to:
- Symbolize the various application objects (bits, words, function blocks, I/O, …).
- Define the parameters of the predefined function blocks (timers, counters, registers etc.).
- Enter the values of the constants and select the display base (decimal, binary, hexadecimal, floating point, message).
- Define the DFB user function block parameters.

Each symbol (32 characters max, accented characters are permitted) can be accompanied by a comment (508 characters max).
Editing services are available in the editor:
- Find/replace an object in a part of the program or in a set of function modules (PL7 Pro).
- Find a character string in a list of symbols or comments.

Version ≥ V4.0 of PL7 offers enhanced functions due to:
- Copy/paste function for one or more symbol(s) and comments.
- Display in plain language of the overlap of different types of variable on a single memory address (for example, single and double format internal words, %MW0/%MD0).
- Highlighting of objects used by the application program.
- Opening the application variable database to third-party tools by importing/exporting text files (.txt). This new function makes it possible to create/modify application databases using a third-party software (for example TSX Microsoft Excel) that has extended edit functions.

Animation table

Tables containing the application variables to be monitored or modified can be created by entering them or automatically initialized from the selected phrase or rung.
Variables can then be:
- Modified.
- Forced to 0 or 1 for bit objects.

For each numerical variable, it is possible to select the display base (decimal, binary, hexadecimal, floating point, ASCII message).
Version ≥ V4.0 of PL7 offers new options for animation tables:
- Display of the comment associated with variables.
- Assignment of a single value to a number of variables.
- Change of display format for a number of variables.
- Display of the list of forced bits.

Modicon TSX Micro automation platform

PL7 Micro/Junior/Pro programming software

Documentation editor

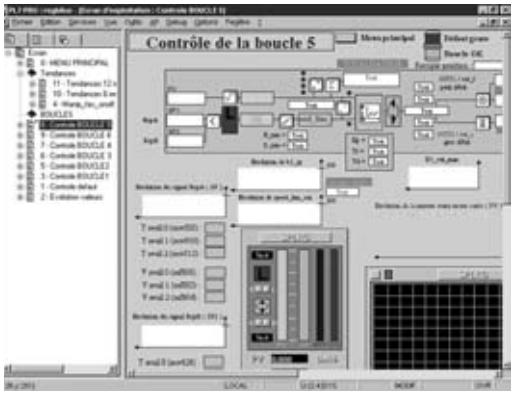
The documentation editor is built around the Documentation Browser which displays the contents of the documentation file in a tree structure.
It can be used to print all or part of the application documentation file on any graphic printer which can be accessed in Windows and uses True Type technology, in A4 or US letter print formats.

The documentation editor is used to define:

- A title page, including the name of the designer and project.
- General information pages.
- A footer.

The documentation editor automatically generates:

- The contents.
- The application documentation file: hardware and software configuration, program with its comments (including those relating to the macro-steps and subroutines).
- The list of variables sorted by address or symbol.
- The cross-references, sorted by address or symbol.



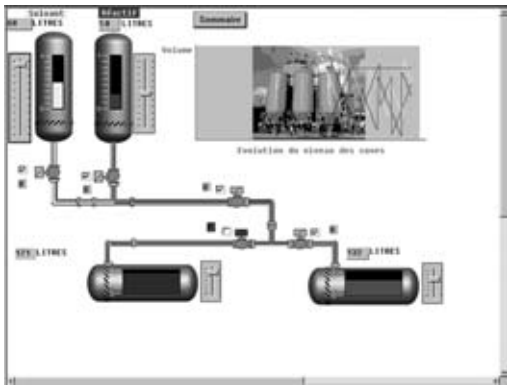
Runtime screens

The runtime screen tool is integrated in PL7 Pro software (creation and use of screens). It is intended in particular, for debugging when starting up installations and for diagnostics on faults or malfunctions.

It comprises data (explanatory texts, dynamic values, synoptics, etc.) and enables a simple and fast action (modification and dynamic monitoring of PLC variables).

The editor enables the design of these screens using the following tools:

- Screen: creation of runtime screens, which can be classed according to family.
- Message: creation of messages used.
- Objects: creation of a graphic objects library.



When the station is connected to the PLC, the user can display screens dynamically depending on the state of the process.
Screen sequencing is possible, depending on the attributed priority, via either the keyboard or PLC request.

In online mode, runtime screens enable direct access to the PL7 program from synoptics by simply clicking on the selected object.

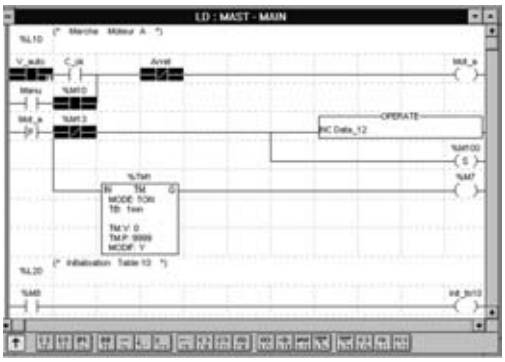
It is also possible to activate the animation table functions or cross references once one or more variables have been selected on the screen. Version ⩾ V4.0 of PL7 software also enables character string type objects to be displayed.

Synoptics can be displayed on the full screen for ease of viewing.

5

Modicon TSX Micro automation platform

PL7 Micro/Junior/Pro programming software



Debugging tools

PL7 Micro/Junior/Pro software offers a complete set of tools for debugging applications. A tool palette provides direct access to the main functions:
- Setting stop points.
- Step by step program execution.
- Independent execution of the master (MAST), fast (FAST) and event-triggered (EVTi) tasks.

Animation of program elements

Parts of the program are animated directly when the TSX Micro/Premium PLC is in RUN (rung, Structured Text statement or sequence of instructions in Instruction List language) by activating the PL7 animation function.
Animation is used to display the status of program variables, whatever the language used.
The animation can be frozen. Several windows can be displayed and animated simultaneously.

Animation tables

Tables containing the application variables to be monitored or modified can be created by entering them or automatically initialized from the selected program part. Variables can then be modified, forced to 0 or to 1 for bit objects.
These tables can be stored in the application and therefore retrieved at a later date.

Debugging the DFBs

- Animation table: all public parameters and variables are displayed and animated in real time. It is possible to modify and force the desired objects.
- As for the rest of the program, it is possible to use the following functions: breakpoint, step-by-step and program diagnostics.

Grafcet debugging

In online mode, the browser gives a hierarchical view of the chart with CHART module and macro-step nesting. Animation is characterized by the presence or absence of indicator colors.
The Grafcet debug bar:
- Displays the state of the chart.
- Modifies the state of the chart.
- Gives information on the state of the Master task.

Debugging the application-specific functions

The debug screens for the application-specific functions are accessed from the I/O configuration screen by clicking on the position in which the module has been defined, when the terminal is in online mode.
These screens are used for:
- Displaying and modifying the state of the I/O.
- Forcing the I/O.
- Displaying and modifying the current values.
- ...

Diagnostics

The debug screens provide access to the general module or channel diagnostics. These screens identify:
Internal module faults.
- External faults from the application.
- E.g.: range overrun fault for an analog module.

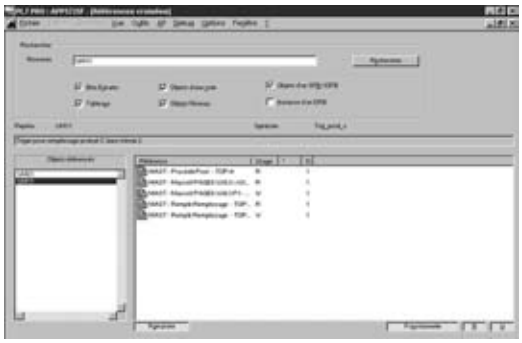
With version ⩾ V4.0 of PL7 software, the Premium platform system diagnostics are extended. It is possible to monitor system bits and words as well as to display associated time-stamped messages automatically, without the need for additional programming. This monitoring applies to the system elements (processor, memory,tasks, ...), in-rack I/O and remote I/O on the Fipio bus.

5

Presentation: page 5/5
Setup, language: pages 5/6 to 5/11
Characteristics: pages 5/16 to 5/18
Reference: pages 5/18 to 5/19

Modicon TSX Micro automation platform

PL7 Micro/Junior/Pro programming software



Variable cross-references

For every variable, this function can be used to:
- Search for program modules where this variable is used.
- Obtain the list of statements, rungs or expressions.
- Display and check activation conditions.

A log is used to keep track of this navigation.
Options relating to the variable, can be associated with the search (extract bit, table object, function block elements, network object, etc.).
This function can be initialized from the program or runtime screens.

Application converters

PL7 Micro/Junior/Pro software includes application converters which make it possible to reuse in full or in part, applications already written in:
- PL7 2, applications for TSX 17, TSX 27 or TSX 47 10/20/25 PLCs.
- PL7 3 *(1)*, applications for TSX/PMX 47...TSX/PMX 107 PLCs.
- ORPHEE *(1)*, applications for April Series 1000 PLCs.

The converters offer the following utilities:
- Translation of language objects into the new PL7 syntax with retrieval of associated symbols and comments.
- Possibility of manually reassigning objects.
- Configuration check: the tool checks whether the configuration resources required by the program to be converted are compatible with the configuration of the destination application.
- Conversion *(1)* with generation of source files (Ladder, Structured Text or Grafcet) in PL7 Junior/Pro format.
- Conversion ensures that instructions which are translated are functionally identical to the original program.
- A translation report gives a summary:
  - result of the conversion with the cause of non-translation where possible,
  - correspondence of variables in PL7 with original variables.

X-Way communication drivers

The communication drivers (Uni-Telway COM port ans USB port, PC side) are available in the PL7 software CD-Rom.
Depending on needs, another drivers can be be installed from **TLX CD DRV20M** CD-Rom (to order separately). See following table.

Type of drivers	Windows XP Windows 2000	Windows NT	Windows 98 Millenium	Windows 95	OS/2	DOS
Uni-Telway	V1.6 IE17	V1.9 IE17	V1.6 IE17	V7.8 IE18	–	V7.4 IE14
TSX FPC10	V1.3 IE05	V1.3 IE08	V1.3 IE05	V2.4 IE14	V2.4 IE13	V2.2 IE11
TSX FPC20	V1.2 IE03	V1.3 IE08	V1.2 IE04	V1.2 IE04	V1.5 IE05	–
TSX SCP 114	V1.1 IE04	V1.1 IE04	V1.1 IE04	V1.1 IE04	–	–
Ethway	V1.1 IE02	V1.1 IE03	V2.6 IE06	V2.6 IE06	V2.6 IE22	–
ISAway	V1.2 IE04	V1.5 IE06	V1.2 IE04	V1.2 IE09	–	–
PCIway	V1.0 IE06	–	–	–	–	–
XIP	V1.7 IE13	V1.7 IE13	V1.7 IE13	V1.7 IE13	–	–
Modbus	V1.1 IE06	V1.1 IE06	V1.1 IE06	V1.1 IE06	–	–
USB for mini-DIN terminal port	Inclus PL7	–	–	–	–	–
USB for USB terminal port	V1.0 IE14	–	–	–	–	–

(1) Function or functionality requiring PL7 Junior/Pro software.

Modicon TSX Micro automation platform
PL7 Micro/Junior/Pro programming software

Functions and instructions

Predefined function blocks *(1)*

- 64/255 Timers: **%TMi** (0 ≤ i ≤ 254) 10 ms to 9999 ms
- 32/255 Up/Down counters: **%Ci** (0 ≤ i ≤ 254) 0 to 9999 (word)
- 64/255 Timers PL7-2: **%Ti** (0 ≤ i ≤ 254)
- 8/255 Monostables: **%MNi** (0 ≤ i ≤ 254) 16 steps
- 4/255 LIFO or FIFO 16 bit registers: **%Ri** (0 ≤ i ≤ 254)
- 8/255 Drums: **%DRi** (0 ≤ i ≤ 254) 16 steps
- The total number of timers **%TMi** and **%Ti** is limited to 64/255

Type of PL7 instructions

- Instructions on word and double word tables.
- Logical instructions on words and double words.
- Arithmetic instructions on words and double words.
- Instructions on floating point words.
- Instructions on bit tables.
- Character string instructions.
- Binary conversion instructions.
- Time management instructions.
- Logarithmic and exponential instructions.
- Trigonometric instructions.
- Instructions on program.

Addressable objects *(2)*

Bit objects

- **%I/Qx.i**: I/O module inputs/outputs
- **%Mi**: internal bits
- 256 on TSX Micro TSX 37,
- 3692 on TSX P57 1●3M,
- 8056 on TSX P57 2●3M/T PCX 57 203M
- 16248 on TSX P57 3●3M/453M and T PCX 57 353M
- **%Si:** 128 bit system
- **%Xi:** Grafcet step bits
- 96 on TSX Micro TSX 37-10,
- 128 on TSX Micro TSX 37-21/22
- 1024 *(3)* on Premium
- %XMj: 64 macro-step bits on Premium PLC
- **%…i.j.**: function block bits
- **%…i.Xk**: bits extracted from internal words, systems, constants, from I/O, common networks

Word objects

- **%MWi**, **%MDi**, **%MFi**: single length internal words, double length, floating
- **%KWi**, **%KDi**, **%KFi**: single length constant words, double length, floating
- **%IWi.j/%QWi.j**: module I/O words
- **%SWi**: 128 system words
- **%NWi**: common words on the network
- **%MBi:L**, **%KBi:L**: character string
- **%…i.j**: function block words
- **%…i[%MWi]**: indexed objects (I/O bits, constant internal words)

Indexed objects

- **%i[%MWj]**: bits (inputs, outputs and internal)
- **%M●i[%mWj]**: internal words, (single/double length and floating)
- **%K●i[%mWj]**: constant words (single and double length and floating point)
- **%MWi[MWj]**: table of internal words

Structured objects

- **%Mi:L**: bits string (I/O, internal and Grafcet bits)
- **%●●i:L:** constant internal words (single or double length, floating and words system)
- **%●Bi:L**: character string (internal words and constants)

(1) Function requiring PL7 Junior/Pro software.
(2) If the maximum number of objects are not specified in this table, consult our Modicon Premium automation platform catalogue.
(3) 1024 step bits and macro-step step bits.

Modicon TSX Micro automation platform
PL7 Micro/Junior/Pro programming software

Selection

The selection table shown below can be used to define the most suitable programming software in terms of services that are required and the TSX Micro/Premium automation platforms used.

Utilities/functions	Programming software		
Languages	**PL7 Micro**	**PL7 Junior**	**PL7 Pro**
Instruction List	TSX Micro	TSX Micro/Premium	TSX Micro/Premium
Ladder language	TSX Micro	TSX Micro/Premium	TSX Micro/Premium
Grafcet	TSX Micro	TSX Micro/Premium	TSX Micro/Premium
Grafcet macro-steps		Premium	Premium
Structured Text	TSX Micro	TSX Micro/Premium	TSX Micro/Premium
DFB function blocks			
Creation			Premium
Operation		Premium	Premium
Display		Premium	Premium
Functional views			
Application			Premium
Function modules			
Creation			Premium
Operation			Premium
DFB function blocks for application diagnostics			
Creation			Premium
Operation			Premium
Display			Premium
Diagnostics viewer			Premium
Runtime screens			
Creation			TSX Micro/Premium
Operation			TSX Micro/Premium
Application converters			
PL7 2	TSX Micro/Premium	TSX Micro/Premium	TSX Micro/Premium
PL7 3		TSX Micro/Premium	TSX Micro/Premium
Orphee		TSX Micro/Premium	TSX Micro/Premium
Software extensions			
SMC (converter)		TSX Micro/Premium	TSX Micro/Premium
SDKC (C language dev)	TSX Micro	TSX Micro/Premium	TSX Micro/Premium
PL7 DIF (comparison of PL7 applications)			TSX Micro/Premium
PL7 FUZ (sofware for fuzzy logic processing)	TSX Micro	TSX Micro/Premium	TSX Micro/Premium
OFS (data server)	TSX Micro	TSX Micro/Premium	TSX Micro/Premium
WSBY (Warm Standby redundancy)			Premium
Sycon (fieldbus configurator)	CANopen	CANopen, Profibus DP	

References

Multilingual software packages (English, French, German, Spanish and Italian) for PC compatibles *(1)* equipped with Windows 98, Windows NT 4.0, Windows Millennium, Windows 2000 Professional or Windows XP operating systems.
For one station, these packages comprise:
- A CD-ROM supporting the PL7 multilingual software, the PL7 demonstration applications and the terminal link Uni-Telway driver.
- A cable reference TSX PCU 1031, PC compatible with TSX Micro/Premium PLC (length 2.5 m). Not supplied with software upgrade or update packages and PL7 software licenses.
- Two CD-ROMs containing multilingual technical documentation.
- A CD-ROM containing the TSX Micro/Premium platform operating systems.

For packages for 3 stations, the above quantities are multiplied by three. For software licenses, TSX PCX 1031 cables must be ordered separately, according to the required number of users.
All documentation reference (software setup manuals) reference TLX DOC PL7 43F should be ordered separately.

(1) Typical recommended configuration: Pentium processor, 266 MHz, 128 Mb of RAM memory, CD-ROM drive for installation of the PL7 program, VGA screen or above.

Modicon TSX Micro automation platform
PL7 Micro/Junior/Pro programming software

PL7 Micro software packages

PL7 Micro software enables programming in Instruction List, Ladder, Structured Text and Grafcet language. It can also be used to set up application-specific functions and perform maintenance and diagnostics of the developed applications. It includes the PL7 2 application converter.

Description	For PLC	Type of device and update	Reference *(1)*	Weight kg
PL7 Micro software packages	TSX Micro	Single (1 station)	**TLX CD PL7M ●44M**	–
		Group (3 stations)	**TLX CD3 PL7M ●44M**	–
PL7 Micro and SyCon V2.8 software package	TSX Micro	Single (1 station)	**TLX CD PL7M PC44M**	–
Mises à jour logiciels PL7 Micro				
Software updates for previous version of PL7 Micro	TSX Micro	Single (1 station)	**TLX RCD PL7M P 44M**	–
		Group (3 stations)	**TLX RCD3 PL7M P 44M**	–
Software update for previous version of PL7 Micro supplied with SyCon V2.8	TSX Micro	Single (1 station)	**TLX RCD PL7M PC44M**	–

PL7 junior software packages

PL7 Junior software enables programming in Instruction List, Ladder, Structured Text and Grafcet languages. It can also be used to set up application-specific functions and perform maintenance and diagnostics of the developed applications. It includes the PL7 2, PL7 3 and ORPHEE application converters.

Description	For PLCs	Type	Reference *(1)*	Weight kg
PL7 Junior software packages	TSX Micro, Premium, Atrium PCX	Single (1 station)	**TLX CD PL7J ●44M**	–
		Group (3 stations)	**TLX CD3 PL7J ●44M**	–
Software updates for previous version of PL7 Junior	TSX Micro, Premium, Atrium PCX	Single (1 station)	**TLX RCD PL7J P44M**	–
		Group (3 stations)	**TLX RCD3 PL7J P44M**	–
Software upgrade packages from previous version of PL7 TSX Micro	TSX Micro, Premium, Atrium PCX	Single (1 station)	**TLX UCD PL7J P44M**	–
		Group (3 stations)	**TLX UCD3 PL7J P44M**	–

(1) ● in reference, defines the type of connecting cable PC/PLC (length 2.5 m)
*□ **P**: TSX PCX 1031 cable for RS 232C port of PC,*
*□ **PU**: TSX PCX 3030 cable for USB port of PC.*

Modicon TSX Micro automation platform
PL7 Micro/Junior/Pro programming software

Ensembles logiciels PL7 Pro

Functions on PL7 Pro software are identical to those on PL7 Junior software. It also offers the user the possibility of creating his own function blocks (DFBs) and graphic runtime screens.

Description	For PLCs	Type	Reference (1)	Weight kg
PL7 Pro software package	TSX Micro, Premium, Atrium PCX	Single (1 station)	**TLX CD PL7P ●44M**	–
		Group (3 stations)	**TLX CD3 PL7P ●44M**	–
Software updates for previous version of PL7 Pro	TSX Micro, Premium, Atrium PCX	Single (1 station)	**TLX RCD PL7P P44M**	–
		Group (3 stations)	**TLX RCD3 PL7P P44M**	–
Software upgrade packages from previous versions of PL7 Junior	TSX Micro, Premium, Atrium PCX	Single (1 station)	**TLX UCD PL7P P44M**	–
		Group (3 stations)	**TLX UCD3 PL7P P44M**	–

PL7 Micro/Pro software licenses

Description	For PLCs	Type	Reference	Weight kg
PL7 TSX Micro Open Team software license	TSX Micro	Team (10 stations) *(2)*	**TLX OT PL7M P44M**	–
PL7 Pro Open Team software license	TSX Micro, Premium, Atrium PCX	Team (10 stations) *(2)*	**TLX OT PL7P P44M**	–
PL7 Pro Open Site software license	TSX Micro, Premium, Atrium PCX	Site > 10 stations *(2)*	**TLX OS PL7P P44M**	–
PL7 Pro Servi software license	TSX Micro, Premium, Atrium PCX	Client/server network architecture server device. Use of the PL7 Pro via client station (Thin client) on network and with access rights.	**TLX S PL7P P44M**	–

Separated elements

Description	Use	Reference	Weight kg
X-Way drivers package for compatible PC	Includes all X-Way drivers (see page 5/15) Includes multilingual user documentation.	**TLX CD DRV20M**	–

Description	Used from processor	to PC port	Length	Reference	Weight kg
Universal terminal port cable	Mini-DIN port TSX Micro/Premium	RS 232D (15-way SUB-D connector)	2.5 m	**TSX PCX 1031**	0.170
		USB Port	2.5 m	**TSX PCX 3030**	0.150

TSX PCX 1031

Description	Description	Reference	Weight kg
Set of manuals PL7 software (in english)	Hard copy including PL7 reference manuals, functions, communication, converters and diagnostics	**TLX DOC PL7 44E**	3.410

(1) ● in reference, defines the type of connecting cable PC/PLC (length 2.5 m)
*□ **P**: TSX PCX 1031 cable for RS 232C port of PC,*
*□ **PU**: TSX PCX 3030 cable for USB port of PC.*
(2) Team user stations from the same geographical site.

5

Modicon TSX Micro automation platform

PL7 SMC application converter software

Presentation

The application converter software for SMC PLCs is a PL7 Junior and PL7 Pro software option. It enables parts of, or in certain cases, the entire existing SMC PLC application to be reused with Micro/Premium PLCs. The converter generates instructions in PL7 language which are functionally identical to the original instructions.

If the application has been archived using VPSOFT programming software (version 3.02 minimum) for SMC PLCs, it is possible to translate the program and comments and retrieve the entire database (variable symbols and comments). If this is not the case, the program only can still be converted once it has been transferred with VPSOFT software. Program conversion is possible for SMC 200/500, SMC 23/35 and SMC 50/600 PLC applications.

The SMC converter provides the following functions:
- Selection of the application in the directory where SMC applications are stored.
- Selection of the program to be converted: sequences to be converted.
- Code and data analysis: associations are suggested for SMC variables with PL7 correspondence (bits, words, double words or reals).
- Code and variable conversion in order to generate a PL7 equivalent.
- Report which shows the user the conversion success rate, associations and causes of non-conversion when applicable.
- Target configuration for displaying or entering a configuration required for arranging variables in PL7.

It is possible to convert only the SMC database.

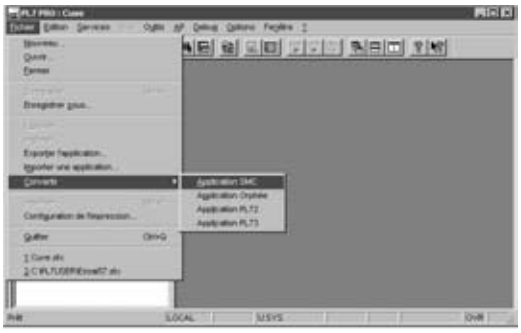
Software setup

Once installed, the SMC converter is activated from PL7 (File/Convert command). Translated program modules are converted into an importable source format in a new PL7 application or in the current application.

A consistency check is performed with the current application configuration. It is also possible to modify the destination application while the converter is being used.

Functions: page 5/21
Reference: page 5/21

Modicon TSX Micro automation platform
PL7 SMC application converter software



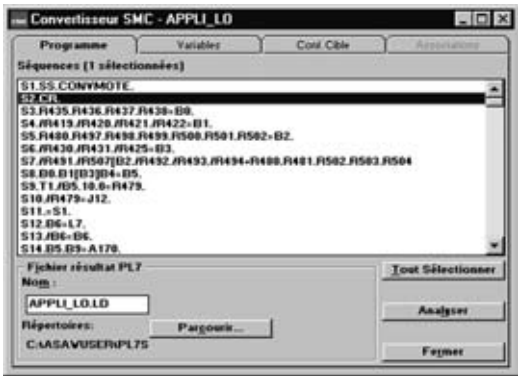
Functions

Database conversion

The converter is extremely easy to use. All or part of the symbolised database can be retrieved. Its reassignment services operate on individual data or blocks of data addresses.

I/O reassignment:

The converter in particular enables discrete I/O variables from an SMC PLC to be directly reassigned by module to TSX Micro/Premium PLC modules. It is also possible to merge objects from several SMC modules into a single Premium module (when using-modules with 64 channels for example).



Program conversion

The SMC sequential program conversion can be carried out on the entire program or on a selected part of the program. The result of the conversion is a PL7 format source file which can be imported into any task written in Ladder language.

Once an analysis phase is completed, the software offers default correspondence and requests additional information when necessary.

A conversion report provides the following information:

- Result of the conversion for each instruction with the cause of non-conversion if applicable.
- List of variable correspondence before and after conversion, including I/O reassignment.

Reference

This software extension conforms to SMC PLC application conversion requirements using PL7 Junior and PL7 Pro setup software. It comprises:

- A set of 3"1/2 disks.
- A multilingual user manual (English, French and Spanish).

Logiciel convertisseur d'applications pour automates SMC

Description	Function	Target PLC extension	Reference	Weight kg
PL7 SMC application converter software	Facilitates conversion of SMC 200/500 and SMC 25/35/50/600 applications to PL7 applications. Converts sequential information into Ladder language and data	PL7 Junior/Pro Micro/Premium	**TLX LC SMC PL7 40M**	0.560

5

Rererence, setup:
page 5/20

Modicon TSX Micro automation platform
PL7 DIF application comparison software

Presentation

PL7 DIF application comparison software for Premium platforms is an optional program which complements the PL7 Pro programming software. It is used to compare two PL7 applications generated by PL7 Pro and automatically provide an exhaustive list of all the differences between them.

The PL7 DIF program increases productivity in the main life phases of a control system based on a Premium platform:

- Application development and debugging.
- Starting up installations and processes.
- Operation and maintenance of installations and processes.

PL7 DIF software is an efficient tool for handling PL7 applications for:

- Control system design offices.
- Operation and maintenance managers.
- Installers and systems integrators.

Software setup

The PL7 DIF software can be used in one of two modes:

- Interactive mode, when the comparison is launched by an operator command (double-click on the **PL7Diff** software icon).
- “Batch” mode, when it is launched by a previously established call command.

These comparison commands locate all the differences between two applications in terms of:

- The hardware configuration.
- The application access protection.
- The software structure with the section validation conditions.
- The application program regardless of the language(s) used.
- The function modules.
- The code for the DFB user function blocks.
- All the variables.

The result of the comparison between the two applications can be:

- Displayed.
- Printed.
- Saved in .txt format in a differences list.

Comparison

The end of the comparison operation is signalled by the appearance of the application browser with its three tabs.

1

2

3

1 Identification tab for accessing the characteristics of the two applications being compared. The differences are marked by the sign #.

2 Browser tab for accessing the application multilevel tree structure.

3 List tab for accessing:
- Printing the comparison list,
- Creating the comparison file.

References:
page 5/23

Modicon TSX Micro automation platform
PL7 DIF application comparison software

Setup (continued)

Display of results

The representation of the application multilevel tree structure, which can be accessed via the browser tab after launching a comparison, is annotated by 4 symbols in which the information associated with application 1 appear in blue and those associated with application 2 appear in red:

This branch, found in this level of the tree structure, contains at least one difference

This block contains at least one difference

This section is only present in application 1

This section is only present in application 2

The programming language of this section differs between application 1 and application 2

In the example opposite, a difference on the rung causing changeover to manual mode is detected:

1 This line [7] displayed in blue belongs to application 1.
2 This line [7] displayed in red belongs to application 2.

The source code extracts of both applications can be used to locate the differences precisely.

Printing a comparison list/creating a comparison file

The list tab is the means of accessing the functions for printing a comparison list or creating a comparison file:

Access to the list form for printing a comparison list (or creating a comparison file)

Used to include the block selected in the tree structure in the comparison list (or the comparison file)

Used to exclude the block selected in the tree structure of the comparison list (or the comparison file)

Used to create the comparison list (or the comparison file) according to the selections above

Starts printing the comparison list (or saving the comparison file)

References

This software extension can be used to compare two PL7 applications generated by PL7 Pro and designed for TSX Micro/Premium platforms. It comprises one CD-Rom (three disks), containing the PL7 DIF software with its documentation (English and French). A software subscription is available for this extension (please consult your Regional Sales Office).

PL7 DIF application comparison software

Function	Target extension PLC target	Type of device	Reference	Weight kg
Using for comparing applications generated by PL7 Pro version ⩾ V4	PL7 Pro TSX Micro/ Premium	1 station	**TLX CD PL7 DIF 41**	–
		3 stations	**TLX CD3 PL7 DIF 41**	–

Presentation:
page 5/22

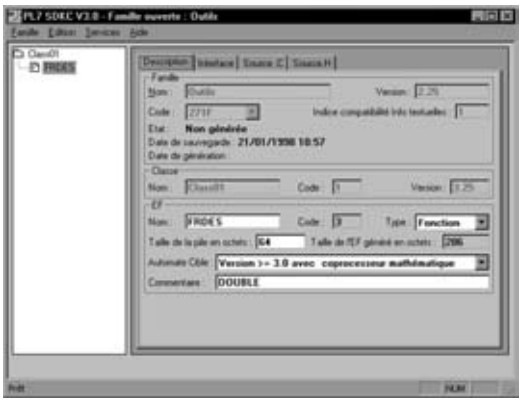
Modicon TSX Micro automation platform
SDKC software

Presentation

C language function development software, also called SDKC, is a PL7 Micro, PL7 Junior and PL7 Pro software option. It enables new functions to be developed (internal code written in C language) and extends and completes the standard set of functions offered by PL7 software.
SDKC software also integrates a creation and management service for families of functions, so they can be integrated in the PL7 library.
Finally, it can be used to generate the function which ensures the protection of PL7 applications by reading a signature in the PCMCIA card inserted in the PLC.

Setup

C language development software is a genuine tool for managing the entire function which has been created:
- A user-friendly creation interface, integrated in PL7, with automatic file organisation.
- Powerful debug and test tools.
- Management of compatibility and software version for the functions created.
- Generation of disks for the subsequent installation of functions on other development stations.



Management of function families

The software enables different function families to be defined. These functions, also known as EF, are classed according to family, allowing the user to create a sequential library of functions written in C language.
These functions, which will eventually form a part of the PL7 library, can be:
- Used in all languages.
- Displayed by the PL7 library tool.
- Classed according to family/function.

The user has the following data at his disposal:
- Date of creation and generation of the function.
- The version number of the function family.

Editing functions

The various SDKC software editor tabs enable the user to create the function by:
- Declaring the interface (name, type and comment) for each input, output or I/O parameter.
- Writing the source code file in C language.
- Declaring the constants as separate files.

A function written in C language can access numerous internal PLC services such as real-time clock, PLC variables, system words, mathematical functions.
In particular, it is possible to carry out numerical processing in floating point format, if the target PLC allows.

Reference:
page 5/25

Modicon TSX Micro automation platform
SDKC software

Setup (continued)

Debugging the functions

The function created must be generated under the “debug” format to be tested. Once it has been inserted in an application and loaded to a PLC, the execution of a function can be checked using numerous debug tools.

A specific function debug menu in C language accesses the following services:

- Breakpoint insertion.
- Step by step execution.
- Display of code with breakpoints shown.
- Display of data manipulations.

Functions library enhancement

After developing, generating, then debugging the function, the last step consists of generating a function family installation disk.

This enables the function library on the user's programming terminal to be enhanced. Managing the versions allows the level of any functions installed on a station to be known at any time.

These functions can be used in all PL7 languages.

5

Reference

This software extension enables standard functions offered by PL7 Micro, PL7 Junior and PL7 Pro version > V4 software to be extended.

It comprises:
- A set of 3"1/2 disks.
- A bilingual user manual (English and French).

This software is supplied with a Microsoft Visual C++ software package registration card.

PL7 SDKC procedure creation software

Description	Function	Target PLC extension	Reference	Weight kg
PL7 SDKC software extension	Procedure written in C language with access to floating point functions Debug in PLC	PL7 Micro/ Junior/Pro TSX Micro/ Premium	**TLX L SDKC PL7 41M**	0.930

Presentation:
page 5/24

Modicon TSX Micro automation platform

PL7 FUZ software for fuzzy logic processing

Presentation

PL7 FUZ software is a PL7 TSX Micro/Junior/Pro software option enabling fuzzy logic processing in order to optimise the control of processes from Micro and Premium PLCs. This is a software function which can be integrated in any PL7 program. It includes setup and debug tools.

This function is particularly suitable for controlling:
- Systems which are difficult to model or non-linear systems, with wide variation of inputs or an insufficient sensor resolution.
- Systems which are difficult to control and require experience and human intuition.

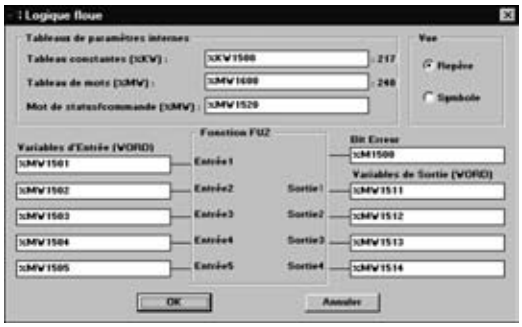
It enables:
- Boolean logic limits to be exceeded (true or false state).
- The representation of physical measurements by gradual concepts.
- Benefit to be gained from the expertise of operators when controlling a proces.s

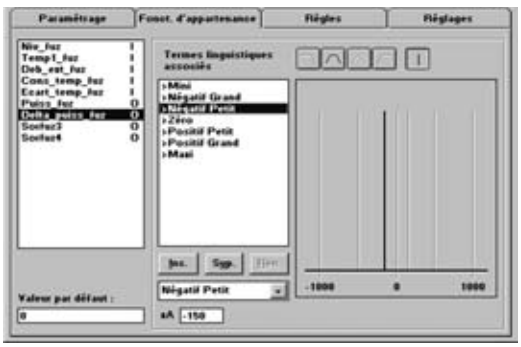
The fuzzy logic function is characterised by:
- 5 physical measurements used as inputs (temperature, pressure, speed…).
- 20 graphic related functions which allow the physical measurement inputs to be represented by predefined associated linguistic terms. A temperature will be represented for example by the terms: low, average, high according to the limits for the various terminals.
- 25 linguistic rules which determine the state to be applied to the outputs (3 conditions and 2 conclusions per rule).
- 4 numerical variables as outputs, results applying to the function input values
- The possibility of debugging its control offline.

Once inserted in a program, the fuzzy function can either operate in continuous mode (function executed on each scan) or on request (a single iteration on each execution). The operating mode enables the function to be used in automatic mode (calculation of the outputs depending on the state of the inputs) or in manual mode (applications with predefined output values).

Software setup

The fuzzy logic function software is set up in 2 steps:
- Integration of the fuzzy function in the application program, in the same way as any other standard function.
- Setting the fuzzy function parameters using the setup screen.





Integration in the program

The fuzzy logic function is inserted in the program in all the available languages. The software checks the various function parameters:
- The 5 input variables.
- The 4 output variables (plus an error bit).
- The internal variables necessary for the function to operate correctly.

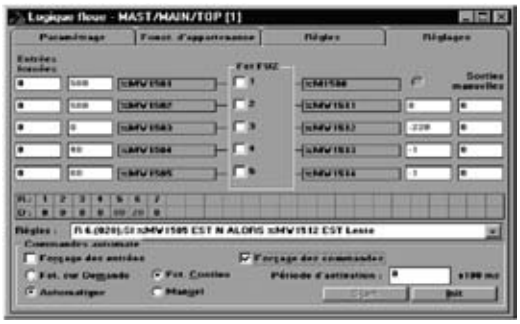
The function setup screen is used to access parameters (I/O), membership functions, linguistic rules, as well as debug functions.

Membership functions

The membership functions are described intuitively using a suitable layout.
A membership function is characterised by:
- The selection of one of the parameters (I/O).
- The choice of associated linguistic terms from a library of terms predefined or created by the user.
- The type of function to apply for the inputs (trapeze, triangle, etc) as well as its characteristic values and the functions to apply for the outputs (singleton).

Reference:
page 5/27

Modicon TSX Micro automation platform
PL7 FUZ software for fuzzy logic processing



Setup software (continued)

Linguistic rules

Linguistic rules (25 maximum) enable experts' know-how to be transcribed using conditions/conclusions such as: If…Then…
- The definition of a rule is made easier by selecting the input parameters (3 per rule).
- By assigning one of the possible linguistic terms to each input.
- By defining the outputs affected by this rule (2 per rule) as well as the associated linguistic terms.

Simulation and debug

The fuzzy function is easily debugged using the setup and debug screen, especially simplified by the possibility of simulating the operation offline.

Offline simulation

Once the parameter entry screens have been completed, it is possible to perform the fuzzy function operation offline. The debug screen offers the possibility of:
- Forcing values for the various input variables.
- Starting the simulation using the “Start” key.

The results achieved are:
The values which will be applied to the outputs in normal operation.
The percentages obtained under the various rules.

Debug in online mode

In online mode the debug screen enables:
- Display of the state of the I/O.
- Access to the involvement percentages obtained under the various rules.

It can also:
- Force the inputs for testing precise operating points.
- Change to manual mode to apply predetermined values on the outputs.
- Change the operating mode: on request, or continuously by defining a period of activation.

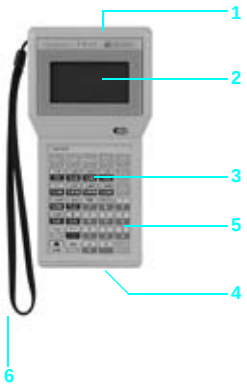
Reference

This software extension enables standard functions offered by PL7 Micro, PL7 Junior and PL7 Pro software to be extended into the domain of fuzzy logic.
It comprises:
- A set of 3"1/2 disks.
- A multilingual user manual (English, French and German).

Software for fuzzy logic processing

Description	Function	Target PLC extension	Reference	Weight kg
PL7 FUZ software extension	Development and debugging of fuzzy logic applications. Defines the membership functions and fuzzy rules for the applications.	PL7 Micro/Junior/Pro TSX Micro/Premium	**TLX L PL7 FUZ 34M**	0.560

Modicon TSX Micro automation platform
FTX 117 Adjust terminal




```
TSX 0720-10
RUN ERR  I/O
APP : Exec f
Mod0=OK
```

Example of TSX editor

```
%IW0.0     0
%IW0.0     0
%IW0.1   200
%IW0.0     0
```

Example of DAT editor

```
Transfer list

Format Card

ADJ (max 62) :
```

Example of DT-i editor

```
%Q00       1f
End of list
```

Example of Frc editor

Presentation

The FTX 117 Adjust pocket terminal is used for adjusting Nano/Micro/Premium PLCs. It is used to:
- Read, modify and force valid parameters.
- Save and retrieve PLC object lists.
- Up/down load programs and PLC data (one program and up to 10 data files per protected RAM memory PCMCIA card).

The PLC provides the power supply to the FTX 117 Adjust terminal.

Description

The front panel of the FTX 117 Adjust terminal comprises:

1 A connector for connecting a T FTX CB1 020 cable to the PLC.

2 A back-lit screen with 4 lines of 16 alphanumeric characters.

3 A keypad with 35 keys.

4 A slot for the type 1 PCMCIA memory card.

5 Magnets on the rear of the terminal which are used to keep it in a vertical position on a metal support.

6 A carrying strap.

Functions

All functions can be easily accessed at any moment using 7 editors with the following menus:
- **TSX:** has menus for:
  - displaying the type of PLC,
  - modifying/displaying the PLC operating mode: RUN/STOP/ERR,
  - naming the application and the presence of forced bits,
  - module diagnostics,
  - setting the internal clock of the PLC.
- **DAT:** data editor used to:
  - access all variables in real-time display,
  - modify or force valid variables,
  - access to the modification and display of Grafcet steps,
  - convert word objects into Hexadecimal, ASCII, decimal or binary code.
- **DT-i:** object list editor used to:
  - display or modify a list of 16 variables,
  - store and retrieve an object list (63 lists maximum),
  - This function requires a PCMCIA card.
- **Frc:** editor to find forced bits is used to:
  - find and display forced bits in the PLC.
- **FTX:** terminal editor is used to:
  - show the terminal versio,
  - select the language (English, French, German, Italian Spanish),
  - adjust a beep sound and lighting.
- **Adr:** connection editor used to access PLCs connected to the UNI-Telway bus (master or slave).
- **Trf:** transfer editor requiring a PCMCIA RAM memory card. Used for transfers from PLCs to the PCMCIA card and vice versa, a program and one or more %MWi data files (up to 10 data files) via the FTX 117 terminal.

References: page 5/29
Encombrements: page 5/29

Modicon TSX Micro automation platform
FTX 117 Adjust terminal

T FTX 117 ADJ 02

T FTX RSM●●16

Functions (continued)

Objects which can be accessed by the terminal

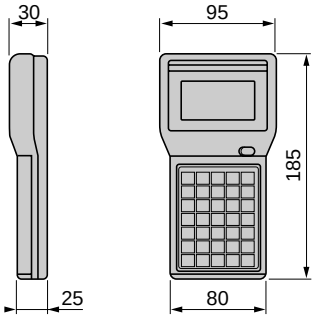
Language element	Type	Symbol	Action *(1)*
Inputs	Input bit	%Ix.i	R, W, F
	Input word (single, double)	%IWi, %IDi *(2)*	R, W
Outputs	Output bit	%Qx.i	R, W, F
	Output word (single, double)	%QWi, %QDi *(2)*	R, W
Internal variables	Internal bit	%Mi	R, W, F *(3)*
	System bit/word (single, double)	%Si, %SWi, %SDi	R, W *(4)*
	Internal word (single, double, floating point)	%MWi, %MDi *(2)*, %MFi *(2)*	R, W
	Constant word (single, double, floating point)	%KWi, %KDi *(2)*, %KFi *(2)*	R
	Network common word	%NW{i}k *(2)*	R, W
Grafcet objects	Step state	%Xi	R, W *(2)*
	Step activity time	%Xi, T *(2)*	Indirect access
Functions blocks	Timer, monostable, register, up/dowm counter, drum controller	%TMi.z, %Mi.z, %Ri.z, %Ci.z, %DRi.z	R, W (dep. on object)

References

Description	Use	Description	Reference	Weight kg
Portable mini terminal *(5)*	Adjustment of Nano/ TSX Micro/Premium	LCD screen, 4 lines of 16 characters, 35-key dust and damp proof keypad. Power supply via PLC terminal port	**T FTX 117 ADJ 02**	0.380
Protected RAM memory type 1 PCMCIA cards	Back up lists of PLC objects	32 K words (28 K useful words)	**T FTX RSM 3216**	0.060
		128 K words (123 K useful words)	**T FTX RSM 12816**	0.060
Battery	For RAM type PCMCIA memory card	–	**TSX BAT M01**	0.010

Dimensions

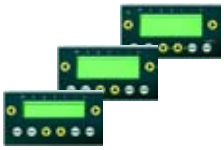
T FTX 117 ADJ 02



(1) R : read, W : write, F : force.
(2) On TSX Micro/Premium only.
(3) No forcing on Nano.
(4) Only certain system bits and words can be written.
(5) Includes the cable for connecting to Nano/TSX Micro/Premium T FTX CB1 020 *(2 m length) and multilingual installation guide.*

Presentation: page 5/28
Description: page 5/28

Modicon TSX Micro automation platform
Magelis display units and terminals

Applications		**Display of text messages**		**Display of text messages and/or semi-graphics**
Type of unit		**Compact display units**	**Display units**	
				
Display	Type	Back-lit green LCD, height 5.5 mm or Back-lit green, orange or red LCD, height 4.34…17.36 mm	Fluorescent green matrix (5 x 7 pixels), height 5 mm or Back-lit LCD (5 x 7 pixels), height 9 mm	Back-lit monochrome matrix LCD (240 x 64 pixels), height 5.3 or 10.6 mm
	Capacity	2 lines of 20 characters or 1 to 4 lines of 5 to 20 characters	2 lines of 20 characters	4 to 8 lines of 20 to 40 characters
Data entry		Via keypad with 8 keys (4 with changeable legends)	Display only **or** via keypad with 4 function keys + 1 service key **or** 5 service keys	
Memory capacity	Application	512 Kb Flash	128 Kb/256 Kb Flash	384 Kb Flash EPROM
	Extension via type II PCMCIA	–		
Functions	Maximum number of pages	128/200 application pages 256 alarm pages	100/200 application pages 128/256 alarm pages 256 print-out form pages *(1)*	600 application pages 256 alarm pages 256 print-out form pages *(1)*
	Variables per page	40…50		50
	Representation of variables	Alphanumeric		Alphanumeric, bargraph, gauge
	Recipes	–		
	Curves	–		
	Alarm logs	–	Depending on model	
	Real-time clock	Access to the PLC real-time clock		
	Alarm relay	–	No	
Communication	Asynchronous serial link	RS 232 C/RS 485	RS 232 C/RS 485/RS 422	
	Downloadable protocols	Uni-Telway, Modbus	Uni-Telway, Modbus, AEG and for PLC brands: Allen Bradley, GE Fanuc, Omron, Siemens	
	Bus and networks	–	AS-i using 22.5 pitch module	
	Printer link	–	RS 232 C asynchronous serial link *(1)*	
Development software		XBT L1001 and XBT L1003 (under Windows 98, 2000 and XP)		
Operating systems		Magelis		
Type of terminal		**XBT N**	**XBT H**	**XBT HM**
Pages		Consult our “Operator dialogue terminals” catalogue		

(1) Depending on model

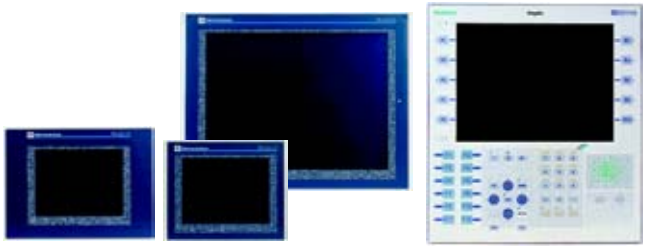
Display of text messages Control and parametering of data		Display of text messages and/or semi-graphics Control and parametering of data
Terminals		
Fluorescent green matrix (5 x 7 pixels), height 5 mm or Back-lit LCD (5 x 7 pixels), height 9 mm	Fluorescent green matrix (5 x 7 pixels), height 5 mm or Back-lit LCD (5 x 7 pixels), height 5 mm	Back-lit monochrome matrix LCD (240 x 64 pixels), height 5.3 or 10.6 mm
2 lines of 20 characters	2 or 4 lines of 40 characters	4 to 8 lines of 20 to 40 characters
Via keypad with 8 function keys + 9 service keys **or** keypad with 12 function keys + 10 service keys + 12 numeric keys	Via keypad with 24 function keys + 10 service keys + 12 alphanumeric keys	Via keypad with 12 function keys 10 service keys 12 numeric keys 4 soft function keys
256 Kb Flash EPROM	384 Kb Flash EPROM	512 Kb Flash EPROM
–		
400 application pages 256 alarm pages 256 print-out form pages *(1)*	800 application pages 256 alarm pages 256 print-out form pages *(1)*	800 application pages 256 alarm pages 256 print-out form pages *(1)*
50		
Alphanumeric		Alphanumeric, bargraph, gauge
–		
–		
Depending on model		
Access to the PLC real-time clock	Built-in	Access to the PLC real-time clock
No	Yes	No
RS 232 C/RS 485/RS 422		
Uni-Telway, Modbus, AEG and for PLC brands: Allen Bradley, GE Fanuc, Omron, Siemens		
AS-i using 22.5 pitch module	–	AS-i using 22.5 pitch module
RS 232 C asynchronous serial link *(1)*		
XBT L1001 and XBT L1003 (under Windows 98, 2000 and XP)		
Magelis		
XBT P	**XBT E**	**XBT PM**
Consult our “Operator dialogue terminals” catalogue		

Modicon TSX Micro automation platform
Magelis graphic terminals and stations

Applications		**Display of text messages and graphic objects** **Control and parametering of data**
Type of unit		**Graphic terminals**

Display	Type	Back-lit monochrome LCD (320 x 240 pixels) or Colour LCD STN with touch-sensitive screen (320 x 240 pixels) with optimum viewing angle *(1)*
	Capacity	5.7"
Data entry		Via touch-sensitive screen 4 tactile feedback keys (XBT-FC)
		Via keypad with 10 static function keys 8 soft function keys 12 service keys 12 alphanumeric keys
Memory capacity	Application	8 Mb Flash EPROM (via PCMCIA type II card)
	Extension	By PCMCIA type II card, 8 or 16 Mb
Functions	Maximum number of pages	50 to 720 application, alarm, help and print-out form pages depending on the memory card used (512 alarms maximum)
	Variables per page	64
	Representation of variables	Alphanumeric, bitmap, bargraph, gauge, potentiometer, selector
	Recipes	125 records maximum with 5000 values maximum
	Curves	16
	Alarm logs	Yes
	Real-time clock	Access to the PLC real-time clock
	Alarm relay	Yes
Communication	Asynchronous serial link	RS 232 C/RS 485/RS 422
	Downloadable protocols	Uni-Telway, Modbus, AEG and for PLC brands: Allen Bradley, GE Fanuc, Omron, Siemens
	Bus and networks	Modbus Plus, Fipio/Fipway with add-on PCMCIA type III card, Ethernet 10/100 TCP/IP *(1) (2)*
	Printer link	RS 232 C asynchronous serial link (depending on model)
Development software		XBT L1003 (under Windows 98, 2000 and XP)
Operating systems		Magelis
Type of terminal		**XBT F01/F03/FC**
Pages		Consult our “Operator dialogue terminals” catalogue

(1) Depending on model.
(2) TCP/IP with Modbus protocol for XBT F. TCP/IP with X-Way protocol for TXBT F.

			Dialogue applications with combined processing
		New Technology touch-sensitive graphic terminals	**Graphic stations**
			
Back-lit monochrome LCD (640 x 480 pixels) or Back-lit colour LCD TFT (640 x 480 pixels) with optimum viewing angle *(1)*		Back-lit monochrome (blue or black and white mode) or colour LCD STN or LCD TFT (320 x 240 pixels) or Back-lit colour LCD TFT (640 x 480 pixels or 800 x 600 pixels) or Back-lit colour LCD STN (640 x 480 pixels)	Back-lit colour LCD TFT (640 x 480 pixels)
9.5" (monochrome) 10.4" (colour)		5.7" (monochrome or colour) 7.4", 10.4" and 12.1" (colour)	10.4" (colour)
Via touch-sensitive screen 8, 12 or 16 tactile feedback keys (XBT-FC) *(1)*	Via keypad with 12 static function keys 10 soft function keys 12 service keys 12 alphanumeric keys	Via touch-sensitive screen *(1)*	Via keypad with 12 static function keys 10 soft function keys 14 service keys 15 alphanumeric keys Pointing device External keypad connection
		4…8 Mb 1 *(1)*	1.6 Gb (hard disk)
		By "Compact Flash" card, 16 or 32 Mb	By PCMCIA type II card, 8 or 16 Mb
30 to 480 application, alarm, help and print-out form pages depending on the memory card used (512 alarms maximum)		Limited by the internal Flash memory capacity or "Compact Flash" card memory capacity	Limited by hard disk capacity (1024 alarms maximum)
		Unrestricted	128
		Alphanumeric, bitmap, bargraph, gauge, button, light, clock, flashing light, keypad	Alphanumeric, bitmap, bargraph, gauge, potentiometer, selector
		–	
		Yes, with log	32
		Built-in	
		–	Yes
		RS 232 C/RS 485	RS 232 C/RS 485/RS 422
		Uni-Telway *(3)*, Modbus, Modbus TCP/IP	Uni-Telway *(3)*, Modbus
		Ethernet *(1)*, IEEE 802.3 10 BaseT, RJ 45	Modbus Plus, Fipio/Fipway with add-on PCMCIA type III card, Ethernet 10/100 TCP/IP *(1) (2)*
		For future use	Parallel link
		VJD SPUL FUCDV10M (under Windows 2000 and XP)	XBT L1003 (under Windows 98, 2000 and XP)
		Magelis (CPU 100 MHz RISC)	Windows 95 *(4)*
XBT F02/F03/FC		**XBT G**	**TXBT F**
Consult our “Operator dialogue terminals” catalogue			

(3) Uni-Telway version V2 for Nano/Micro/Premium PLCs.
(4) Depending on model, the TXBT F station incorporates an Atrium PCX 57 coprocessor.

6 - Services

6 - Services

- Documentation . . . . . page 6/2
- Power consumption of TSX Micro PLC modules. . . . . page 6/4
- Standards, certifications and environment conditions . . . . . page 6/6
- Automation product certifications and community regulations . . . . . page 6/8
- Schneider Electric worldwide. . . . . page 6/10
- Product references index. . . . . page 6/16

Modicon TSX Micro automation platform
Documentation

PLC products generally include:

■ A multilingual installation guide in B7 format (128 x 92 mm) for TSX PLC bases and their modules.

■ An installation and start-up manual for PL7 software, in A5 format (216 x 181 mm).

A multilingual contextual on-line help is included with PL7 software. The paper version of the hardware and software installation manuals should be ordered separately.

Documentation on CD-Rom (in english)

Description	Composition	Reference (1)	Weight kg
TSX technical documentation	Includes all documentation for PLCs, software, networks, buses and terminals	**TSX CD D MTE 13E**	0.120

Documentation (paper edition) (in english)

PLCs

Description	Included with product	Reference (1)	Weight kg
Micro PLC hardware installation: bases, discrete I/O modules, application-specific modules, Telefast 2, process and AS-Interface bus supplies	To be ordered separately	**TSX DM 37 50E**	0.660
Premium PLC hardware installation: bases, discrete I/O modules, application-specific modules, Telefast 2, process and AS-Interface bus supplies	To be ordered separately	**TSX DM 57 43E**	0.740
Nano PLC programming and installation	T FTX 117 071E (FTX 117 terminal)	**TLX DM 07 117E**	0.265
	TLX L PL7 07●30E (PL7-07 logiciel)	**TLX DM 07 DSE**	0.320

PL7 software

Description	Included with product	Reference (1)	Weight kg
Set of manuals PL7 software (reference, application-specific functions, converters, operating screens, diagnostics)	To be ordered separately	**TLX DOC PL7 44E**	3.410

Terminals

Description	Included with product	Reference (1)	Weight kg
Designing CCX 17 applications under Windows	TMX LP M17 XWF 6EF	**TMX DM M17 W V6E**	0.340

(1) For documentation in french, german, spanish, etc., please consult your Regional Sales Office.

Modicon TSX Micro automation platform
Documentation

Documentation in bound A5 format (in english)

Buses and networks

Description	Included with product	Reference (1)	Weight kg
X-Way communication reference manual	To be ordered separately	**TSX DR NET E**	0.320
Buses and network wiring guide	To be ordered separately	**TSX DG KBL E**	0.160
Fipway network installation and setup	To be ordered separately	**TSX DG FPW E**	0.140
Fipio bus reference manual	To be ordered separately	**TSX DR FIP E**	0.230
Fipio/Fipway fibre optic transceiver setup	To be ordered separately	**TSX DM OZD 01E**	0.110
Modbus Plus network installation guide	To be ordered separately	**890 USE 100 00**	0,140
Uni-Telway bus installation and setup	To be ordered separately	**TSX DG UTW E**	0.060
Modbus bus user manual	To be ordered separately	**TSX DG MDB E**	0.040

(1) For documentation in french, german, spanish, etc., please consult your Regional Sales Office.

Modicon TSX Micro automation platform

Power consumption of TSX Micro PLC modules

The power supplies incorporated into TSX Micro PLC bases have sufficient nominal power to enable them to activate 60% of discrete inputs and/or outputs simultaneously at state 1. At peak power, these power supplies can activate 100% of discrete inputs and/or outputs simultaneously at state 1 without tripping.

Note:

■ Base supplied in a.c., ⎓ 24 V process power supply must be used for the mini extension rack when this supports analogue I/O modules and relay output modules.

■ Base supplied in d.c., providing ⎓ 24 V voltage for the mini extension rack, even if this supports analogue I/O modules and relay output modules.

For configurations near the limit, it is however necessary to establish the power consumption using the table below.

	Reference	Format 1/2 : half S : standard	Number	Nominal currents consumed in mA *(1)* Voltage ⎓ 5 V Module	Total	Voltage ⎓ 24 VR Module	Total	Voltage ⎓ 24 V *(2)* Module	Total
Discrete inputs									
	TSX DEZ 12D2K	1/2		20				76/104	
	TSX DEZ 32D2	S		60				170/254	
	TSX DEZ 12D2	1/2		20					
	positive logic inputs							87/123	
	negative logic inputs							83/107	
	TSX DEZ 08A4	1/2		20					
	TSX DEZ 08A5	1/2		20					
Discrete outputs									
	TSX DSZ 08T2K	1/2		46/56				35/38	
	TSX DSZ 08T2	1/2		46/56				35/38	
	TSX DSZ 32T2	S		106/146				72/94	
	TSX DSZ 04T22	1/2		30				32/36	
	TSX DSZ 08T5	1/2		25		55/85			
	TSX DSZ 32T5	S		50		115/175		125/175	
Discrete I/O									
	TSX DMZ 16DTK	1/2		46/56				55/76	
	TSX DMZ 28DTK	S		56/68				104/132	
	TSX DMZ 28DT	S		56/68				104/132	
	TSX DMZ 28DR	S		45		85/125			
	positive logic inputs							106/160	
	negative logic inputs							95/131	
	TSX DMZ 28AR	S		40		85/125			
	TSX DMZ 64DTK	S		110/152				147/197	
Preventa safety module									
	TSX DPZ 10D2A	1/2		20					
Analogue I/O									
	TSX AEZ 801	1/2		30		60			
	TSX AEZ 802	1/2		30		60			
	TSX AEZ 414	1/2		40		85			
	TSX ASZ 401	1/2		30		90			
	TSX ASZ 200	1/2		30		150			
	TSX AMZ 600	1/2		30		180			
Counting/positioning									
	TSX CTZ 1A	1/2		100				15	
	TSX CTZ 1B	1/2		100				15	
	TSX CTZ 2A	1/2		100				15	
	TSX CTZ 2AA	1/2		120				15	
Total (to report page 6/5)		Total current (mA)							

(1) The first value corresponds to the module consumption with 60% of inputs and/or outputs at state 1 simultaneously. The second value is for 100% of inputs and/or outputs at state 1.

(2) ⎓ 24 V sensor voltage, provided by the ∿ 100…240 V power supply on basic configurations, is limited to supplying approx. 100 inputs. In excess of this, use a process power supply (see page 2/61).

	Reference	Format 1/2 : half S : standard	Number	Nominal currents consumed in mA *(1)* Voltage ⎓ 5 V Module	Total	Voltage ⎓ 24 VR Module	Total	Voltage ⎓ 24 V *(2)* Module	Total
Report									
Communication									
	TSX CPP 110	–		60					
	TSX ETZ 410/510	*(4)*							
	TSX STZ 10	1/2		130					
	TSX SAZ 10 *(3)*	1/2		100					
	TSX SCP 111	–		140					
	TSX SCP 112	–		120					
	TSX SCP 114	–		150					
	TSX FPP 10/20	–		330					
	TSX MBP 100	–		220					
	TSX P ACC 01	–		150					
Terminals									
	FTX ADJ 117 02	–		310					
	XBT H811050	–		150					
Consumption by voltage		Total current (mA)							
					≤		≤		≤
∿ **power supplies**	Nominal current	–			2800		500		400
	Peak current				3200		600		600
⎓ **power supplies**	Nominal current	–			2800		–		–
	Peak current				3200		–		–

(1) The first value corresponds to the module consumption with 60% of inputs and/or outputs at state 1 simultaneously. The second value is for 100% of inputs and/or outputs at state 1.
(2) ⎓ 24 V sensor voltage, provided by the ∿ 100…240 V power supply on basic configurations, is limited to supplying approx. 100 inputs. In excess of this, use a process power supply (see page 2/61).
(3) (Consumption on ⎓ 30 V of the power supply for the AS-i bus : 50 mA typical (100 mA max).
(4) External module to be supplied with ⎓ 24 V: 100 mA typical (200 mA max).

Modicon TSX Micro automation platform

Standards, certifications and environment conditions

Standards and certifications

Modicon TSX Micro PLCs have been developed to conform to the principal national and international standards concerning electronic equipment for industrial automation systems.

- Requirements specific to programmable controllers: functional characteristics, immunity, resistance, safety, etc.: IEC 61131-2, CSA 22.2 N° 142, UL 508.
- Merchant navy requirements of the main international bodies: ABS, BV, DNV, GL, LR, RINA, RMRS, etc.
- Compliance with European Directives:
  - Low Voltage: 73/23/EEC amendment 93/68/EEC,
  - Electromagnetic Compatibility: 89/336/EEC amendments 92/31/EEC and 93/68/EEC.
- Electrical qualities and self-extinguishing capacity of insulating materials: UL 746C, UL 94.
- Hazardous areas classification: CSA 22.2 No. 213 Class I, Division 2 II , groups A, B, C and D .

Characteristics

Service conditions and recommendations relating to environment

Temperature	Operation	**° C**	0...+ 60 (to IEC 61131-2, + 5...+ 55) 0...+ 70 with TSX FAN fan modules	
	Storage	**° C**	-25...+ 70 (according to IEC 61131-2)	
Relative humidity	Operation	**%**	10…95 without condensation	
	Storage	**%**	5…95 without condensation (according to IEC 61131-2)	
Altitude		**m**	0…2000	
Supply voltage			**TSX 37 10/21/22 1●●**	**TSX 37 05/08/10/21/22 0●●**
	Nominal voltage	**V**	⎓ 24	∿ 100...240
	Limit voltages		⎓ 19..30	∿ 90...264
	Nominal frequencies	**Hz**	–	50/60
	Limit frequencies	**Hz**	–	47/63

Protective treatment of Modicon TSX Micro PLCs

TSX Micro PLCs meet the requirements of "TC" treatment *(Treatment for all Climates)*.
For installations in industrial production workshops or environments corresponding to "TH" treatment *(Treatment for Hot and humid environments)*, TSX Micro PLCs must be embedded in envelopes with a minimum IP 54 protection, in compliance with IEC 60664 and NF C 20 040.

TSX Micro PLCs themselves offer **protection to IP 20 level** *(1)*. They can therefore be installed without an envelope in reserved-access areas which do not exceed **pollution level 2** (control room with no dust-producing machine or activity). The pollution level 2 does not take account of more severe environmental conditions: air pollution by dust, smoke, corrosive or radioactive particles, vapours or salts, attack by fungi, insects, ...

Environment tests

Name of test	Standards	Levels
Immunity to LF interference (CE) *(2)*		
Voltage and frequency variation	IEC/EN 61131-2	0.85 Un/0.95 Fn for 30 minutes; 1.15 Un/1.05 Fn for 30 minutes; 0.8 Un/0.9 Fn for 5 seconds; 1.2 Un/1.1 Fn for 5 seconds
Direct voltage variation	IEC/EN 61131-2	0.85 Un...1.2 Un for 30 minutes with 5% ripple (peak values)
Harmonic 3	IEC/EN 61131-2	10 % Un; 0°/5 min...180°/5 min
Short momentary interrupt	IEC/EN 61131-2	10 ms with ∿ supply; 1 ms with ⎓ supply
Voltage shut-down/start-up	IEC/EN 61131-2	Un-0-Un; Un for 60 s; 3 cycles separated by 10 s Un-0-Un; Un for 5 s; 3 cycles separated by 1 to 5 s Un-0.9-Udl; Un for 60 s; 3 cycles separated by 1 to 5 s

Where:
Un: nominal voltage
Fn: nominal frequency
Udl: detection level when powered

(CE): *tests required by European directives CE and based on IEC / EN 61131-2 standards.*
(5) In the case where a position is not occupied by a module, a **TSX RAZ 01** *protection cover must be installed.*
(6) Devices must be installed and wired in compliance with the instructions provided in the **TSX DG KBL E** *manual "Electromagnetic compatibility of networks and field buses".*

Modicon TSX Micro automation platform

Standards, certifications and environment conditions

Name of test	Standards	Levels
Immunity to HF interference. (CE) *(1)*		
Damped oscillatory wave	IEC 61000-4-12	~ / ⎓ supply: 1kV in serial mode Discrete I/O ≥ 24V: 1 kV in serial mode
Electrical fast transient bursts	IEC 61000-4-4	~ / ⎓ supply: 2 kV in wire/common mode Discrete I/O > 48V: 2 kV in common mode; other ports: 1 kV in common mode
Surge	IEC 61000-4-5	~ / ⎓supply: 2 kV in wire mode/1 kV in serial mode; Discrete I/O ~: 2 kV in wire mode/1 kV in serial mode; Discrete I/O ⎓: 2 kV in wire mode/0.5 kV in serial mode; shielded cable: 1 kV in common mode
Electrostatic discharges	IEC 61000-4-2	6 kV contact, 8 kV air
Radiated electromagnetic field	IEC 61000-4-3	10 V/m; 80 MHz...2 GHz Sinusoidal modulation amplitude 80 %/1 kHz
Conducted interference induced by radiated field	IEC 61000-4-6	10 V/0,15 MHz...80 MHz Sinusoidal modulation amplitude 80%/1 kHz
Electromagnetic emissions (CE) *(1) (2)*		
Interference voltage	IEC 61000-6-4	Class A 150 kHz...500 kHz quasi-peak 79 dB (µV); average 66 dB (µV) 500 kHz...30 MHz quasi-peak 73 dB (µV); average 60 dB (µV)
Interference field	IEC 61000-6-4	Class A, 10 m measurement 30 MHz...230 MHz quasi-peak 40 dB (µV); 230 MHz...1 GHz quasi-peak 47 dB (µV)
Immunity to climatic variations		
Dry heat	IEC 60068-2-2 Bd	60 ° C for 16 hours (D.O); 40 ° C for 16 hours (D.C)
Cold	IEC 60068-2-1 Ad	0 ° C for 16 hours
Continuous humid heat	IEC 60068-2-3 Ca	60 ° C with 93 % relative humidity/96 hours (D.O); 40 ° C with 93...95 % relative humidity/96 hours (D.C);
Cyclical humid heat	IEC 60068-2-3 Db	[55 ° C (D.O)/40 ° C (D.O)] - 25 ° C with 93...95 % relative humidity; 2 cycles: 12 hours/12 hours
Cyclical temperature variations	IEC 60068-2-14 Nb	0 ° C...60 ° C/5 cycles: 6 hours/6 hours (D.O) 0 ° C...40 ° C/5 cycles: 6 hours/6 hours (D.C)
Temperature Rise	IEC 61131-2/UL 508 CSA 22-2 No.142	Ambient temperature: 60 ° C
Withstand to climatic variations		
Dry heat (power off)	IEC 60068-2-2 Bb	70 ° C for 96 hours
Cold (power off)	IEC 60068-2-1 Ab	-25 ° C for 96 hours
Humid heat (power off)	IEC 60068-2-30 dB	60 ° C-25 ° C with 93...95 % relative humidity; 2 cycles: 12 hours/12 hours
Heat shocks when not operational	IEC 60068-2-14 Na	- 25 ° C...70 ° C; 2 cycles: 3 hours/3 hours
Immunity to mechanical constraints		
Sinusoidal vibrations	IEC 60068-2-6 Fc	3 Hz...100 Hz/1 mm amplitude/0.7 g; endurance: fr/90 min/axis (application coefficient < 10)
	IEC 60068-2-6 Fc	10...150 Hz/150 µm amplitude/2 g; endurance: 10 cycles of 1 octave/min
Shocks	IEC 60068-2-27 Ea	15 g-11 ms; 3 shocks/direction/axis
Withstand to mechanical constraints		
Flat freefall	IEC 60068-2-32 Ed	10 cm/2 falls
Controlled position freefall	IEC 60068-2-31 Ec	30 ° or 10 cm/2 falls
Random freefall, equipment in packaging	IEC 60068-2-32 method 1	1 m/5 falls
Equipment and personnel safety *(1)*		
Dielectric strength and insulation resistance (CE)	UL 508/CSA 22-2 No.14 IEC 60950	⎓ 24 V supply: no isolation; ~ 100/220V supply: 2,000 V rms Discrete I/O ≥ 48 V: 500 V rms; Discrete I/O > 48 V: 2,000 V rms; > 10 MΩ
Continuity of earth(CE)	UL 508 CSA 22-2 No.142	< 0,1 Ω/30 A/2 min
Leakage current (CE)	CSA 22-2 No.142/IEC 60950	< 3.5 mA fixed device
Protection offered by enclosures (CE)	CSA 22-2 No.142 IEC 60950	IP 20
Withstand to impacts	CSA 22-2 No.142/IEC 60950	500 g sphere: fall from 1.3 m

D.O: Device Open (device to be embedded in an envelope;
D.C: Device Closed (device can be installed without envelope), see *(1)* page 6/6

(CE): *tests required by European directives CE and based on IEC / EN 61131-2 standards.*

(1) Devices must be installed and wired in compliance with the instructions provided in the **TSX DG KBL E** *manual "Electromagnetic compatibility of networks and field buses".*
(2) These tests are performed without a cabinet, with devices ***fixed on a metal grid*** *and wired as per the recommendations in the industrial* **TSX DG KBL E** *manual "Electromagnetic compatibility of networks and field buses".*

In some countries, certification of certain electrical components is enforced by law. A standard conformity certificate is then issued by the official organization. Each certified product must carry approval symbols when enforced.
Use on board merchant navy vessels generally requires prior approval (= certification) of an electrical device by certain marine classification authorities.

Key	Certification body	Country
CSA	Canadian Standards Association	Canada
C-Tick	Australian Communication Authority	Australia
GOST	Institut de recherche Scientifique Gost Standardt	C.I.S., Russia
UL	Underwriters Laboratories	USA

Key	Classification authority	Country
ABS	American Bureau of Shipping	USA
BV	Bureau Veritas	France
DNV	Det Norske Veritas	Norway
GL	Germanischer Lloyd	Germany
LR	Lloyd's Register	United-Kingdom
RINA	Registro Italiano Navale	Italiy
RMRS	Register of Shipping	C.I.S.

The table below shows the situation as of the 01.05.2002 for certifications obtained or pending from organizations for base PLCs. An overview of certificates for Telemecanique products is available on our Internet web site :
www.telemecanique.com

Product certifications

	Certifications					
Certified / *Pending certification*	**UL**	**CSA**	C-Tick **ACA**	**SIMTARS**	**GOST**	**Hazardous locations** Class 1, div 2 *(1)*
	USA	Canada	Australia	Australia	CEI, Russia	US
Advantys STB	■	□	□			■
CCX 17	■					
Lexium MHD/BPH	■	■				
Magelis iPC	■					■
Magelis XBT-F/FC	■	■	■			
Magelis XBT-G/H/P/E/HM/PM	■	■				
Momentum	■	■	■			
Nano	■	■	■		■	
Premium	■	■	■	■	■	■
Quantum	■	■	■		■	■
TBX	■	■	■			
Telefast 2	■	■				
TSX Micro	■	■	■	■	■	■
TSX/PMX 47 à 107	■	■			■	■
Twido	*(1)*					
Twin Line	■					

(1) ***Hazardous locations****: CSA 22.2 no. 213, certified products are suitable for use in Class I, division 2, groups A, B, C and D or non-hazardous locations only.*
(2) cULus north-american certification (Canada and US).

Specific certifications		
BG	Germany	TSX DPZ 10D2A safety module (TSX Micro) TSX PAY 262/282 safety modules (Premium)
AS-Interface	Europe	TSX SAZ 10 master module (TSX Micro) TSX SAY 100/1000 master modules (Premium) TBX SAP 10 Fipio bus/AS-Interface bus gateway

Modicon TSX Micro automation platform

Automation products certifications
Community regulations

Marine classification

Marine classification des authorities

Certified
Pending certification

	ABS	BV	DNV	GL	LR	RINA	RMRS
	USA	France	Norway	Germany	Unit.-Kingdom	Italiy	C.I.S.
Advantys STB							
CCX 17							
Lexium MHD/BPH							
Magelis iPC							
Magelis XBT-F/FC							
Magelis XBT-H/P/E/HM/PM							
Momentum							
Nano							
Premium							
Quantum							
TBX							
Telefast 2							
TSX Micro							
TSX/PMX 47 à 107							
Twido							
Twin Line							

Community regulations

European directives

The opening of European markets implies a harmonization of regulations in the various European Union member states.
European Directives are documents used to remove obstacles to the free movement of goods and their application is compulsory in all states of the European Union.
Member states are obliged to transcribe each Directive into their national legislation and, at the same time, to withdraw any conflicting regulations.
The Directives, particularly those of a technical nature with which we are concerned, only set objectives, called “general requirements”.
The manufacturer must take all necessary measures to ensure that his products conform to the requirements of each Directive relating to his equipment.
As a general rule, the manufacturer affirms that his product conforms to the necessary requirements of the Directive(s) by applying the CE label to his product.
CE marking is applied to Telemecanique products where relevant.

The significance of CE marking

■ CE marking on a product means that the manufacturer certifies that his product conforms to the relevant European Directives ; it is necessary in order that a product which is subject to a Directive(s) can be marketed and freely moved within the European Union.
■ CE marking is intended solely for the national authorities responsible for market regulation.

For electrical equipment, only conformity of the product to standards indicates that it is suitable for use, and only a guarantee by a recognised manufacturer can ensure a high level of quality.
One or more Directives, as appropriate, may apply to our products, in particular :
■ The Low Voltage Directive 72/23/EEC amended by Directive 93/68/EEC : CE marking under the terms of this Directive is compulsory as of 1 January 1997.
■ The Electromagnetic Compatibility Directive 89/336/EEC, amended by Directives 92/31/EEC and 93/68/EEC : CE marking on the products covered by this Directive has been compulsory since 1 January 1996.

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Antartica	Contacts are assured by	**Schneider Electric Brazil**		
Antigua & Barbuda	Contacts are assured by	**Schneider Electric Dominican Rep.**		
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