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

Applications		For low to medium complexy control systems		
				
Slot	Base	2 (1 equipped with discrete I/O module)	3 (2 equipped with discrete I/O module)	2 (1 equipped with discrete
	Extension	–	–	2
No. of discrete I/O, connection	Per HE 10 connector	92	120	–
	Per terminal block	60	88	124
Preventa safety module		Emergency stop and limit switch monitoring		
Remote I/O	Number			96 remote I/O (4 Nano PLCs) or
	Type			Input ⎓ 24 V, input ∿ 115 V,
Telefast 2	Connection sub-base	8, 12 or 16 channels, with or without DEL, with common or 2 terminals per channel		
	Adaptor sub-base	8 ou 16 channels ⎓ 5 V TTL, ⎓ 24 V, ⎓ 48 V, ∿ 115 ou 230 V, 2 terminals per channel		
Real-time clock				
Analogue I/O				
	Integrated			
	No. of modules	2 half-format modules		
	Type of module	8 inputs 12 bits (± 10 V, 0-10 V), 8 inputs 12 bits (0-20 mA, 4-20 mA), 4 differential inputs multirange 16 bits (high level, thermocouples, temperature probes), 4 output 11 bits + sign (± 10 V), 2 outputs 11 bits + sign (± 10 V, 0-20 mA, 4-20 mA), 4 inputs/2 outputs 12 bits (± 10 V, 0-10 V, 0-20 mA, 4-20 mA)		
	Remote			3 Nano analogue extensions
Process control		Control loops, 3 integrated functions : PID, PWM (pulse width modulation) et SERVO (discrete valve		
Counting/positioning	Integrated	2 x 500 Hz channels using discrete inputs		
	No. of modules	2 half-format modules		
	Type of module	1 or 2 x 40 kHz channels, 2 x 500 kHz channels for incremental encoders (Totem pôle or RS 422), 1 channel 1 MHz for SSI absolute encoder,		
Communication	Integrated	1 x RS 485 terminal port, Uni-Telway master/slave, Modbus slave or character string protocol		1 x RS 485 terminal port, Modbus master/slave or
	With PCMCIA card			
	Ethernet TCP/IP			Ethernet TCP/IP external module
Software structure		Single task (cyclic or periodic), multi-task (cyclic or periodic master task, fast task)		
		Event-triggered (1 to 8 events)		
Memory structure		11 Kword internal protected RAM memory		14 Kword internal protected RAM
Supply voltage		∿ 100/240 V (integrated ⎓ 24 V sensor power supply)		∿ 100/240 V (integrated ⎓ 24 V
Standard I/O	Type	16 inputs ⎓ 24 V, 12 relay ouputs	2 x 16 inputs ⎓ 24 V, 12 relay ouputs	16 inputs ∿ 115 V or ⎓ 24 V depend. on model 12 relay ouputs/⎓ 24 V depending on model
	Connection	Via screw terminal block		
Type of PLC		**TSX 37 05 028DR1**	**TSX 37 08 056DR1**	**TSX 37 10 ●28●●1**
Pages		43050/13		

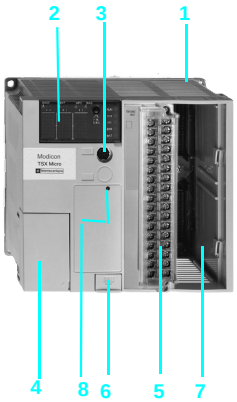
	For control systems which require a signifiant amount of processing (program and data) and:or communication	For control systems which require low-cost analogue I/O and fast counting functions
		
I/O module)	3 (non-equipped with discrete I/O module)	
	2	
184	248	
–	160	
248 I/O on AS-i bus (total with “in-rack” discrete I/O)		
input ⎓ 24 V, relay outputs		
	Integrated (seconds, minutes, hour, day, month, year)	
		8 inputs 8 bits (0-10 V, 0-20 mA, 4-20 mA) 1 ouput 8 bits (0-10 V)
	4 half-format modules	
each providing 3 inputs and 1 ouput (inputs 12 bits: 0-10 V, ± 10 V, 0-20 mA, 4-20 mA ; output 11 bits: 0-10 V, ± 10 V, 0-20 mA, 4-20 mA)		
control) with MMI on CCX 17 operator panel (control and adjustment of 9 loops maximum).		
		2 x 500 Hz channels using discrete inputs and 2 integrated 10 kHz channels
	4 half-format modules.	
Uni-Telway master/slave, character string protocol	1 fixed station auxiliary port and 1 terminal port (RS 485, protocole Uni-Telway master/slave, Modbus master/slave or character string protocol)	
	1 PCMCIA card: RS 232/422/485 or current loop serial link, with Fipway/Modbus Plus network, Fipio bus (Agent function)	
or Modem (PPP) RS 232 serial link		
	Event-triggered (1 to 16 events with 2 priority levels)	
memory	20 Kword internal protected RAM memory Extension via PCMCIA card up 64 Kwords + 128 Kwords (file storage)	
sensor power supply) or ⎓ 24 V depending of model		
16 or 32 inputs ⎓ 24 V depending on model 12 or 32 outputs ⎓ 24 V depending on model		
Via HE 10 connector		
TSX 37 10 1●●DTK1	**TSX 37 21 001/101**	**TSX 37 22 001/101**

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 or Modbus slave protocol).

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).

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		■		■	■	

■ Insertion possible

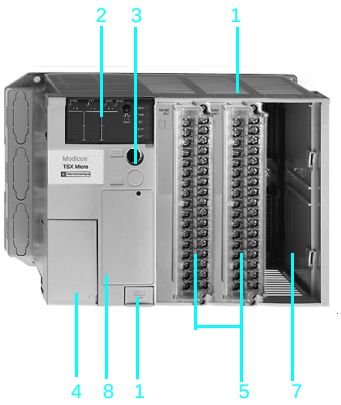
Functions: pages 43050/6 and 43050/7
Characteristics : pages 43050/11 and 43050/12
references: pages 43050/13 and 43050/14
Dimensions, mounting: page 43050/15

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 or Modbus slave protocol).

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).

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		■		■	■	

■ Insertion possible

Functions: pages 43050/6 and 43050/7
characteristics: pages 43050/11 and 43050/12
references: pages 43050/13 and 43050/14
Dimensions, mounting: page 43050/15

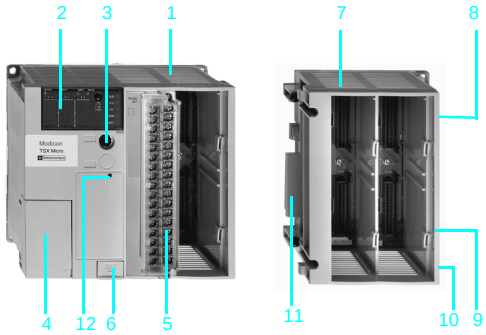
Micro Automation Platform
TSX 37-10 PLCs

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 or Modbus Master/Slave protocol).
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		Connector	Term.blk	
	⎓ 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-i 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-i bus modules are installed in position 4 which means that their use is mutually exclusive.

Functions: pages 43050/6 and 43050/7
characteristics: pages 43050/11 and 43050/12
references: pages 43050/13 and 43050/14
Dimensions, mounting: page 43050/15

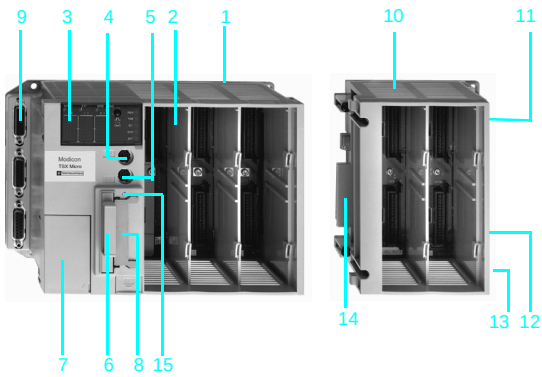
Micro Automation Platform
TSX 37-21/22 PLCs

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 64 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 or Modbus Master/Slave protocol).
5 Man-machine interface port labeled AUX.
6 Slot for a memory extension card.
7 Cover for accessing the power supply terminals.
8 Slot for a communication module.
9 On TSX 37-22, connectors 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)*					Format		Connection	
		1	3	4	5	9	Stand.	Half	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-i 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)	Uni-Telway	■								
	Serial link	■								
	Modbus	■								
	Modbus Plus	■								
	Fipway	■								
	Fipio Agent	■								
Communication	Ethernet TCP/IP or external Modem	■					*External module*			

■ Insertion possible

(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-i 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.

Functions: pages 43050/6 and 43050/7
characteristics: pages 43050/11 and 43050/12
references: pages 43050/13 and 43050/14
Dimensions, mounting: page 43050/15

Micro Automation Platform
TSX 37-05/08/10/21/22 PLCs

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 43051/2 to 43051/13.

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 43308/2 to 43307/5.

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 40056/2 40056/3.

- The AS-i sensor/actuator bus. Micro PLCs are connected to the AS-i bus via an AS-i 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 43610/2 to 43613/3.

Analogue I/O and process control

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 40055/2 and 40055/3, 43053/2 to 43053/7.

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 43531/2 and 43531/3, 43100/2 to 43100/17.

(1) I/O TSX AMZ 600 analog modules require a MIcro PLC with a ⩾ 5.0 operating system installed with ⩾ 4.2 PL7 Micro/Junior/ Pro version software.

Micro Automation Platform
TSX 37-05/08/10/21/22 PLCs

Counting/positioning

Counter modules 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 *(1)*. These half format modules are inserted in the available slots in the base rack.

For further details, see pages 43054/2 and 43054/7, 43050/2 to 43050/5.

Communication

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 slave or character string. Also TSX 37-10/21/22 PLCs integrate Modbus Master protocol *(1)*.
- 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, FIPIO, Uni-Telway, or Modbus/Jbus, Modbus Plus and Fipway network).
- Ethernet TCP/IP 10/100 MHz external modules. The module connects to the terminal port of TSX 37-10/21/22 PLCs and has Uni-TE and Modbus messaging. It allows connection to an external modem using PPP protocol.

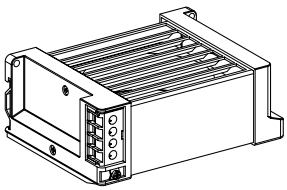
For further details, see pages 43609/2 to 43599/5.

Fan modules

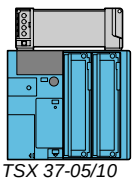
TSX FAN ●●P fan modules installed above Micro PLCs ensure a forced air convection, which creates a uniform ambient temperature within the enclosure and eliminates any hot spots which might exist.

Fan modules are required when the ambient temperature is between 60 °C and 70 °C. Forced ventilation is used to eliminate hot spots *(2)*.
Three types of fan module are available: ⎓ 24 V, ∿ 110 V and ∿ 220 V.

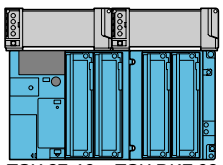
One fan module is required for a TSX 37-05/08/10/21/22 configuration, two fan modules are required for a TSX 37-10/21/22 configuration with the TSX RKZ 02 mini rack.



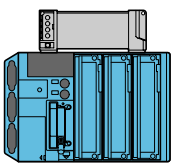
TSX FAN ●●P



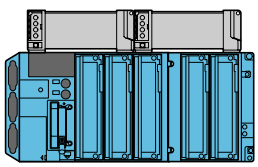
TSX 37-05/10



TSX 37-10 + TSX RKZ 02



TSX 37-08/21/22



TSX 37-21/22 + TSX RKZ 02

(1) The TSX CTZ 1B module or the Modbus slave protocol require a MIcro PLC with a ⩾ 5.0 operating system installed with ⩾ 4.2 PL7 Micro/Junior/ Pro version software.
(2) For an ambient temperature of between 25 °C and 60 °C, the use of fan modules increases the MBTF.

Micro Automation Platform
TSX 37-05/08/10/21/22 PLCs

Memory structure

The memory structure of 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 Kword or 64 Kword PCMCIA memory card, either RAM or Flash EPROM. The same memory card incorporates the possibility of containing 128 K words designed to back up recipe or log files.

PCMCIA memory extension cards for TSX 37-21/22 PLCs

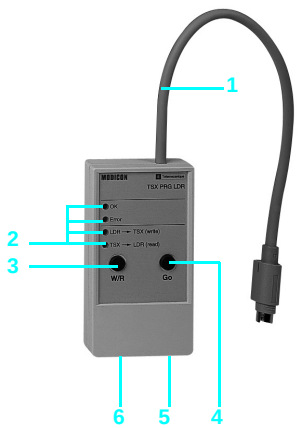
These cards can be used to extend the PLC internal memory for storing the application program and constants.
Two types of memory card are available:
- **Battery-backed RAM type memory card**
  Used in particular during application program creation and debugging, this card enables all application transfer 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 files:
- **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 log files 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 PGR LDR module is designed to simplify duplicating or updating applications on Nano and Micro PLCs without the need for a programming terminal. An application (15 K words maximum in internal RAM) can be transferred from a PLC in the TSX PGR LDR module (and saved within it), then transferred from the TSX PGR LDR module in a PLC.

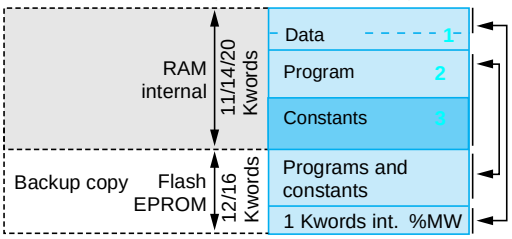


The front panel of the TSX PGR LDR module comprises:
1 A cord for connecting to the PLC terminal port.
2 Four operation indicator LEDs.
3 A W/R button which selects the program transfer direction (PLC ➞ module or module ➞ PLC).
4 A GO button to start the transfer.
5 A Write Only switch which prevents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

Functions: pages 43050/6 and 43050/7
characteristics: pages 43050/11 and 43050/12
references: pages 43050/13 and 43050/14
Dimensions, mounting: page 43050/15

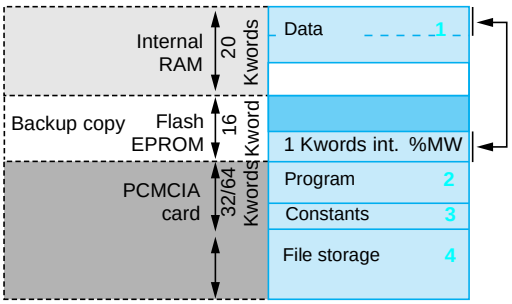
Micro Automation Platform
TSX 37-05/08/10/21/22 PLCs

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



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

TSX 37-21/22 (with a PCMCIA card)



1 Application data (17.7 Kwords maximum).
2 Descriptor and executable codes for task.
3 Constant words, initial values and configuration.
4 According to the PCMCIA card model.

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 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 2 Kwords of application data and 7 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 storage zone for 128 Kword files (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 17.5 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 Micro PLCs.

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 K words 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 43050/6 and 43050/7
characteristics: pages 43050/11 and 43050/12
references: pages 43050/13 and 43050/14
Dimensions, mounting: page 43050/15

Micro Automation Platform
TSX 37-05/08/10/21/22 PLCs

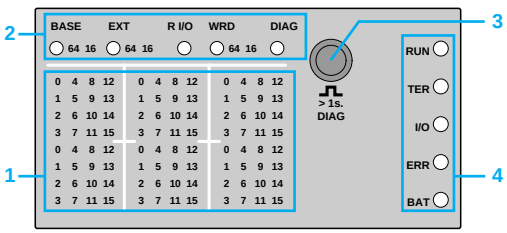
Centralized display

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-i bus and AS-i bus diagnostics (see page 42718/2).
- 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 43050/6 and 43050/7
characteristics: pages 43050/11 and 43050/12
references: pages 43050/13 and 43050/14
Dimensions, mounting: page 43050/15

Micro Automation Platform
TSX 37-05/08/10/21/22 PLCs

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, RINA, 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 43311/3.

Environmental characteristics (characteristics common to all 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**	2500 - 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 43050/6 and 43050/7
references: pages 43050/13 and 43050/14
Dimensions, mounting: page 43050/15

Micro Automation Platform
TSX 37-05/08/10/21/22 PLCs

Processor characteristics

Type of PLC			TSX 37-05	TSX 37-08	TSX 37-10	TSX 37-21	TSX 37-22
Functions							
I/O							
	Max. no. (without remote)		60/92 *(1)*	120/184 *(1)*	124/184 *(1)*	160/248 *(1)*	
	Max. no. (Nano remote I/O)		–	–	200/264 *(1)*	236/328 *(1)*	
	Max. no. (remote I/O on AS-i bus)		–	–	340/404 *(1)*	376/468 *(1)*	
	Max. no. of modules 28/32 channels		2	3	4	5	
	Max. no. of 64 channel modules		1	1	2	3	
Safety	Max. no. of Preventa modules		2	2	6	8	
Analog	Max. no. of modules		2 (max. 16 I or 8 O)			4 (max. 32 I or 16 O)	
	No. of integrated channels		–			–	9 (8 I and 1 O)
Counting/positionin *(2)*g							
	Max. no. of modules		2	2	2 *(3)*	4 *(3)*	
	No. of integrated channels		–			–	2
	No. of channels on discrete inputs		2				
	Max. no. of modules		2	2	2 *(3)*	4 *(3)*	
Communication							
	Integrated channels (terminal port)		1 RS 485 channel (Uni-Telway master/slave Modbus slave or character mode)		1 RS 485 channel (Uni-Telway master/slave Modbus master/slave or character mode)		
	No. of PCMCIA card		–			1	
Real-time clock			–		1		
Memory							
	Internal RAM which can be backed up	**Kwords**	11	11	14	20	
	PCMCIA memory card	**Kwords**	–			32/64 + 128 (file storage)	
	Max. memory size	**Kwords**	11		14	64	
Application structure							
	Master task		1				
	Fast task		1				
	Event processing		8			16 (where 1 has priority)	
Execution time (standard instructions)							
	Boolean instruction	**µs**	0.25	0.25	0.25	0.13 (0.19 with PCMCIA card)	
	numerical instruction	**µs**	4.81	4.81	4.81	4.50	
Execution time for 1 k instructions							
	100 % Boolean	**ms**	0.33	0.33	0.33	0.17 (0.25 with PCMCIA card)	
	65 % Boolean and 35 % numerical	**ms**	4.08	4.08	4.08	3.71 (3.76 with PCMCIA card)	

PLC types			TSX 37-05	TSX 37-05	TSX 37-10	TSX 37-21/22		
Memory capacity								
PCMCIA card			–	–	–	–	32 Kwords	64 Kwords
Data (% MWi)		**Kwords**	1 (4)	1 (4)	1 (4)	1 (4)	17.5	17.5
Constants (% KWi)		**Kwords**	128 (4)	128 (4)	128 (4)	128 (3)	128 (3)	128 (3)
File storage		**Kwords**	–	–	–	–	128	128
Program Ladder (LD)								
	100 % Boolean	**kinst.**	2	2	4	6.6	13.5	28.1
	65 % Boolean and 35 % numerical	**kinst.**	1.1	1.1	2.1	3.9	8.8	18.6
List (IL)	100 % Boolean	**kinst.**	2.5	2.5	5.1	8.5	17.2	35.9
	65 % Boolean and 35 % numerical	**kinst.**	1.2	1.2	2.4	4.4	10	21
Structured Text (ST)	100 % Boolean	**kinst.**	1.6	1.6	3.4	5.6	11.5	23.9
	65 % Boolean and 35 % numerical	**kinst.**	1.2	1.2	2.4	4.4	10	21
System overhead		**ms**	1.9	1.9	1.9	1.6	2.3	2.3

(1) 1st value for connection via terminal block, 2nd value via HE 10 type connector.
(2) Maximum number of counting/positioning channels, see page 43054/2.
(3) TSX CTZ ●● counting/positioning modules, only in the Micro base.
(4) Default size, can be extended, but will have an adverse effect on the size of the application program.

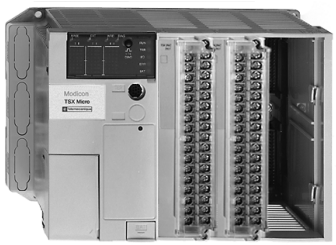
Functions:
pages 43050/6 and 43050/7

references:
pages 43050/13 and 43050/14

Dimensions, mounting:
page 43050/15

Micro Automation Platform
TSX 37-05/08/10/21/22 PLCs


TSX 37 05/10 ●28●●1


TSX 37 08 056 DR1


TSX 37 10 164DTK1


TSX 37 22 ●01


TSX RKZ 02

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

Power supply	Integrated memories RAM	Integrated memories Flash EPROM	Integrated memory Discrete I/O modules Type	Integrated memory Discrete I/O modules Connection	Reference (1)	Mass kg
∿ **100…240 V**	11 Kwords + data memory	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

Basic TSX 37-10 PLC configurations (1 slot available)

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

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

Supply	Integrated memories RAM	Integrated memories Flash EPROM	Integrated functions	Reference (1)	Mass kg
⎓ **24 V**	20 Kwords + data memory	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 + data memory	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 22 101**	1.750

Mini extension rack

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

Documentation

Micro base and module installation manual	See page 43901/2	-

(1) Product supplied with multilingual installation guide: English, French, German, Italian and Spanish.

Description: pages 43050/2 and 43050/5
Functions: pages 43050/6 and 43050/7
characteristics: pages 43050/11 and 43050/12
Dimensions, mounting: page 43050/15

Micro Automation Platform
TSX 37-05/08/10/21/22 PLCs

TSX MRP ●●●P

Memory extension cards (PCMCIA type 1)

Extension for application memory

Description	Use	Memory size Application	Memory size File storage	Reference	Mass kg
RAM memory	PLCs TSX 37-21/22	32 Kwords	–	**TSX MRP 032P**	0.030
		64 Kwords	–	**TSX MRP 064P**	0.030
Flash EPROM Memory	PLCs TSX 37-21/22	32 Kwords	–	**TSX MFP 032P**	0.025
		64 Kwords	–	**TSX MFP 064P**	0.025
Backup card(1)	PLCs TSX 37-21/22	32 Kwords	–	**TSX MFP BAK 032P**	0.025

Extension for application memory and file storage in RAM memory

These cartridges are used for distributed applications, as well as for storing information which can be consulted remotely via Modem. They can also be used to store manufacturing recipes.

RAM memory	TSX 37-21/22	32 Kwords	128 Kwords	**TSX MRP 232P**	0.060
		64 Kwords	128 Kwords	**TSX MRP 264P**	0.060
Flash memory EPROM	TSX 37-21/22 TSX/PMX/PCX Premium	32 Kwords	128 Kwords	**TSX MFP 232P**	0.060
		64 Kwords	128 Kwords	**TSX MFP 264P**	0.060

TSX FAN ●●P

Fan modules

Description	Power supply	Reference	Mass kg
Fan modules (2)	⎓ 24 V	**TSX FAN D2P**	0.500
	∿ 100…120 V	**TSX FAN A4P**	0.500
	∿ 200…240 V	**TSX FAN A5P**	0.500

Separate parts

Description	Use		Unit Weight	Mass kg
Program loader with terminal port conn. cable (length: 0.3 m)	Simplifies duplication, updating or backup of 15 Kwords applications (program) and constants in internal RAM		**TSX PRG LDR**	0.150
Connection accessories	Discrete I/O		See page 43051/10	–
	Discrete I/O with Telefast 2		See pages 14025/2 and 14025/3	–
	Integrated analog I/O		See page 43051/10	–
	Integrated counter channels		See page 43053/5	–
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 (3)	TSX 37-05/08/10/21/22 PLCs	Sold in individual batches of 10	**TSX RKA 01**	0.150
Gripper	Memory extension cards (PCMCIA type 1)		**TSX P CAP**	0.030

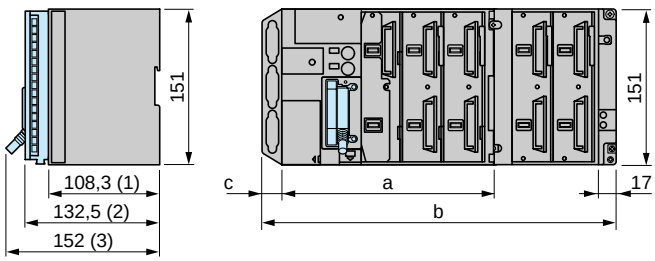
TSX PRG LDR

(1) Card previously loaded to enable the 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.

Description: pages 43050/2 and 43050/5
Functions: pages 43050/6 and 43050/7
characteristics: pages 43050/11 and 43050/12
Dimensions, mounting: page 43050/15

Dimensions, mounting

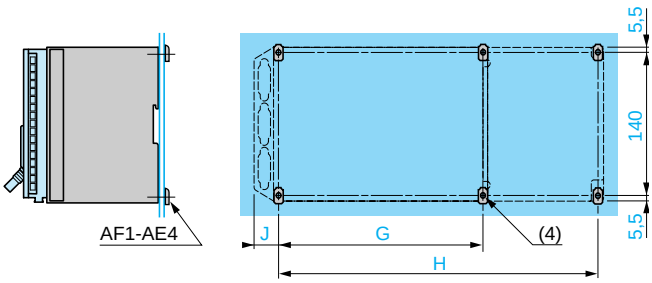
Side view / Front view



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

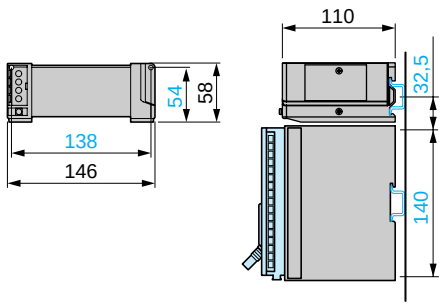
(1) Empty PLC
(2) With screw terminal block
(3) With HE 10 type or SUB-D connectors
(4) Fixing holes for M4 screws

Mounting

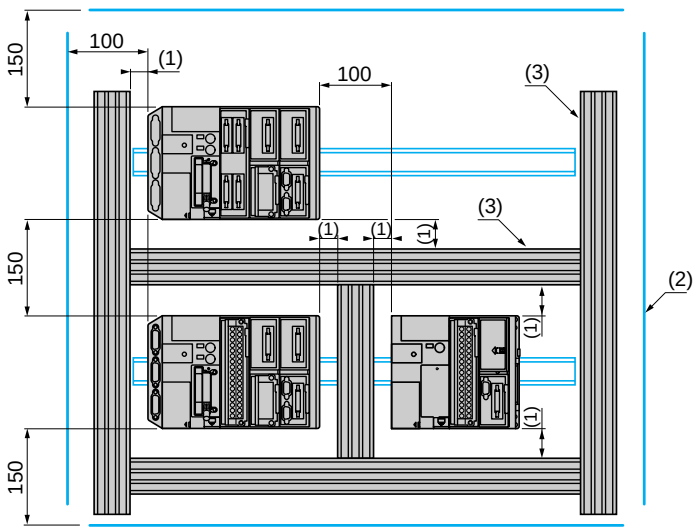


	G	H	J
TSX 37 05 028DR1	159.2	–	5
TSX 37 08 056DR1	198.9	–	24
TSX 37 10 028/128/164●●1	159.2	271.7	5
TSX 37 21/22 ●01	198.9	311.4	24

Mounting for TSX FAN ●●P modules



Installation regulations

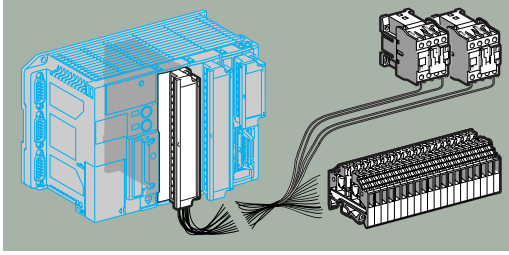


(1) ≥ 50 mm
(2) Switch gear or enclosure
(3) Cable ducting or wiring clip

Description: pages 43050/2 and 43050/5
Functions: pages 43050/6 and 43050/7
characteristics: pages 43050/11 and 43050/12
references: pages 43050/13 and 43050/14

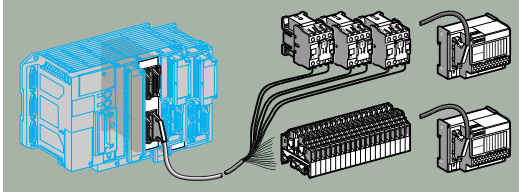
Micro automation platform

Discrete I/O modules

Applications	**I/O connection on screw terminal block** : via bare wires, via wires fitted with cable ends, or wires fitted with open or		
			
			
Type	32 inputs	32 outputs	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 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 conformity		Yes	–
Protection		Protected	Non-protected
Logic		Positive	–
Type of discrete I/O module	TSX DEZ 32D2	TSX DSZ 32T2	TSX DSZ 32R5
Pages	43051/9		

closed tags (minimum cross-section 0.28 mm², 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 connection 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/0.5 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 chann. with 1 N/O, 1 or 2 C/O or solid state relays ⎓ 5…48V, ⎓ 24 V, ∿ 24…240 V 1 or 2 terminals per channel	
			Yes (see page 15000/2)	Yes (see page 15020/2)
Sensor voltage monitoring	Sensor voltage monitoring	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		
Configurable fallback of outputs		Preactuator voltage monitoring Configurable fallback of outputs		
–		Yes		
Non-protected		Protected		
–		Positive		
TSX DMZ 28DR	TSX DMZ 28AR	TSX DMZ 28DT	TSX DMZ 28DTK	TSX DMZ 64DTK

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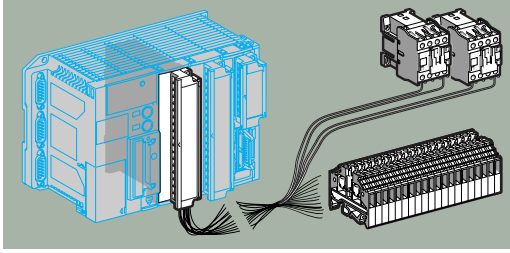
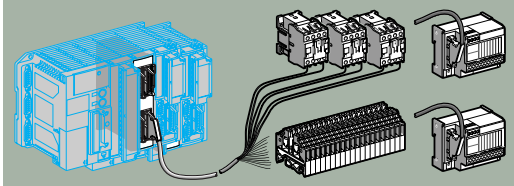
Micro automation platform

Discrete I/O modules

Applications	**I/O connection on screw terminal block** : via bare wires, via wires fitted with cable ends, or wires fitted with open or maximum 1.5 mm^2) 			
				
Type	12 inputs	8 inputs		8 outputs
Nature	Inputs ⎓ 24 V	Inputs ∿ 100…120 V	Inputs ∿ 200…240 V	Outputs ⎓/∿ relay 3 A (th)
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 systems : **Tego Dial** **Tego Power**				
Isolated inputs	Sensor voltage monitoring	Sensor voltage monitoring	Sensor voltage monitoring	
Control				
IEC 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				Configurable fallback of outputs
Control				
IEC 1131 conformity				–
Protection				Non-protected
Logic				–
Type of discrete I/O module	TSX DEZ 12D2	TSX DEZ 08A4	TSX DEZ 08A5	TSX DSZ 08R5
Pages	43051/9			

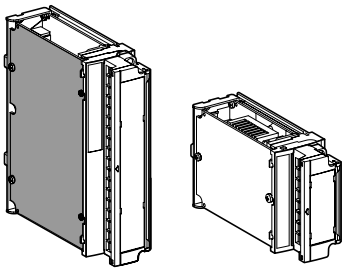
closed tags (minimum cross-section 0.28 mm2,

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 connection cables (cross-section 0.324 mm2).



4 outputs Outputs ⎓ 24 V/2 A	8 outputs Ouputs ⎓ 24 V/0.5 A		12 inputs Inputs ⎓ 24 V	8 I/O Inputs ⎓ 24 V Outputs ⎓ 24 V/0.5 A
	Connection via 20-way HE 10 connector			
	8, 12 or 16 channels, with or without LED, with common or 2 terminals per channel Inputs : 16 channels ⎓ 5 V TTL, ⎓ 24 V, ⎓ 48, ∿ 48 V ∿ 115 V or 230 V, 2 terminal per channel. Outputs: 8 or 16 chan. with 1 N/O, 1 or C/O or solid state relays, ⎓ 5... 48 V, ⎓ 24 v, ∿ 24...240V 1 or 2 terminals per channel			
				Yes (see page 15000/2) Yes (see page 15020/2)
			Sensor voltage monitoring Type 2 Positive ⎓ 2-wire, ⎓/∿ 2-wire, ⎓ 3-wire PNP	Sensor voltage monitoring Type 1 Positive ⎓ 2-wire ⎓ 3-wire PNP
Preactuator voltage monitoring Configurable fallback of outputs Yes Protected Positive				Preactuator voltage monitoring. Configurable fallback of outputs Yes Protected Positive
TSX DSZ 04T22	TSX DSZ 08T2	TSX DSZ 08T2K	TSX DEZ 12D2K	TSX DMZ 16DTK
43051/9				

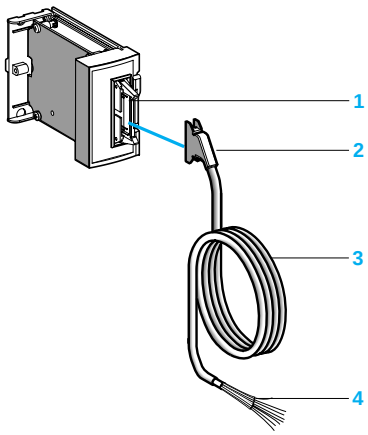
Micro automation platform
Discrete I/O modules



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 metres
TSX CDP 501 : length 5 metres
TSX CDP 1001 : length 10 metres

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

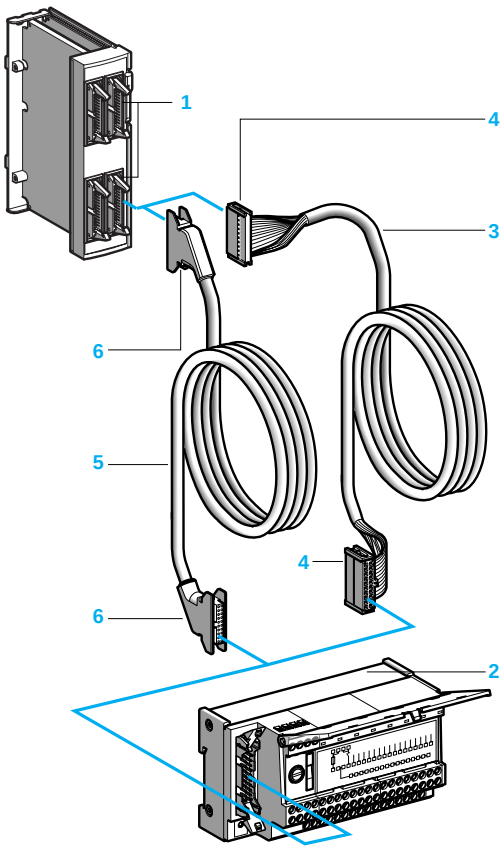
Used to connect the I/O of modules with HE 10 type connectors 1 to Telefast 2 connection and adaption rapid wiring interfaces 2. The cable 3 comprises 2 HE 10 type connectors 4 and a sheathed rolled ribbon cable with 0.08 mm^2 cross-section wires.
Bearing in mind the small cross-section of the wire, 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 metre
TSX CDP 202 : length 2 metres
TSX CDP 302 : length 3 metres

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).

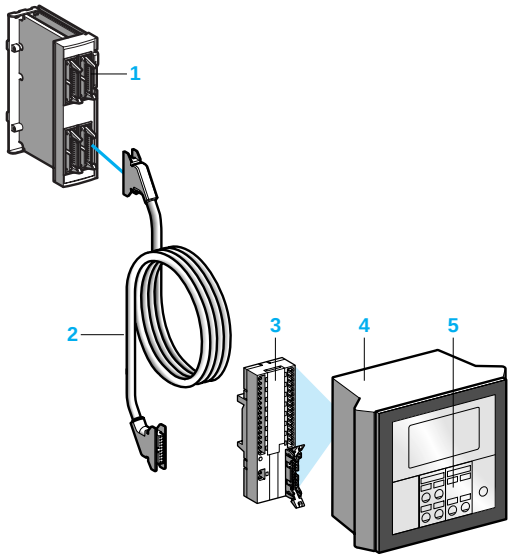
TSX CDP 053 : length 0.5 metres
TSX CDP 103 : length 1 metre
TSX CDP 203 : length 2 metres
TSX CDP 303 : length 3 metres
TSX CDP 503 : length 5 metres



Specifications :
pages 43051/5 to 43051/8

References :
pages 43051/9 and 43051/10

Connections :
pages 43051/11 to 43051/13

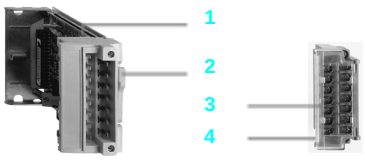


Connection to Tego Dial and Tego Power systems

The TSX DMZ 16 DTK 1 module is specially designed (1) for association with Tego Dial and Tego Power (2) systems.
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

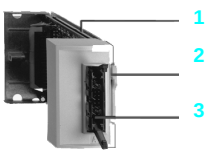


Half-format or standard format I/O module

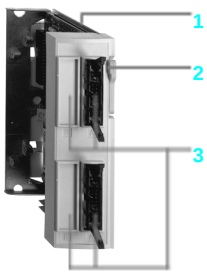
Half-format or standard format I/O modules with connection via screw terminal block comprise:

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

Discrete I/O modules connected via connector



Half-format I/O module

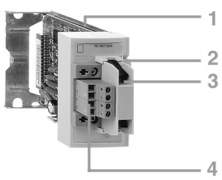


Standard format I/O module

I/O modules with connection via connector comprise:

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

Discrete I/O module connected via connector and cage terminal



The TSX DMZ 16DTK module comprises :

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

(1) TSX DMZ 28 DTK and TSX DMZ 64 DTK I/O modules can also be used in association with Tego Dial and Tego Power systems.
(2) See pages 15000/2 to 15012/3.

Specifications : pages 43051/5 to 43051/8
References : pages 43051/9 and 43051/10
Connections : pages 43051/11 to 43051/13

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. A 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 input	⎓ **24 V**	⎓ **24 V**	⎓ **24 V**	∿ **100…120 V**	∿ **200…240 V**
	Type 1 Positive logic	**Type 2 Positive logic**	**Negative logic**	**Type 2**	**Type 1**
Type of proximity sensor					
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.

Specifications : pages 43051/5 to 43051/8
References : pages 43051/9 and 43051/10
Connections : pages 43051/11 to 43051/13

Micro automation platform
Discrete I/O modules

Specifications of ⎓ 24 V input modules (1)

Module type			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 (pos. log.)	⎓ 24 (neg. log.)	⎓ 24 (positive logic)	
	current	**mA**	9	6	7	
	Sensor supply (ripple included)	**V**	19...30 (possible up to 34 V, limited to 1 hour per 24 hours)			
Input limit values						
At state 1	Voltage	**V**	≥ 11	≤ 8	≥ 11	≥ 11
	Current	**mA**	> 2.5	> 2.5	> 6	> 2.5
At state 0	Voltage	**V**	< 5	> Usup - 5	< 5	< 5
	Current	**mA**	< 1.5	< 1.5	< 2	< 1.5
Input impedance at state 1		**KΩ**	2.4	4	3.4	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 43311/2			
Dissipated power		**W**	**TSX DEZ 12D2** : 2.7 **TSX DMZ 28DR** : 4.5		**TSX DEZ 12D2K** : 2.7 **TSX DEZ 32D2** : 6	3
Isolation	Betw. channels and ground	**V rms**	1500 - 50/60 Hz for 1 min			
	Betw. channels and int. log.	**V rms**	1500 - 50/60 Hz for 1 min			

Module type			TSX DMZ 28DTK/DMZ 28DT		TSX DMZ 64DTK	TSX ACZ 03 (2)
Number of inputs			16		32	8
Connection			HE 10 connector/screw term. 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)	**V**	19…30 (possible up to 34 V, limited to 1 hour per 24 hours)			
Input limit values						
At state 1	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 (fixed)
State 1 to 0		**ms**	0.1…7.5			0.2/0.3 (fixed)
IEC 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 43311/2			
Dissipated power		**W**	5		5	–
Isolation	Betw. channels and ground	**V rms**	1500 - 50/60 Hz for 1 min			–
	Betw. channels and int. log.	**V rms**	1500 - 50/60 Hz for 1 min			–

(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 43053/2).

References :
pages 43051/9 and 43051/10

Connections :
pages 43051/11 to 43051/13

Specifications of a.c. input modules *(1)*

Module type				TSX DEZ 08A4	TSX DEZ 08A5	TSX DMZ 28AR
Number of inputs				8	8	16
Connection				Screw terminal block	Screw terminal block	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	47…63	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 43311/2		
Dissipated power			**W**	1.7	1.4	5.6
Isolation	Betw. channels and ground		**V rms**	2000 - 50/60 Hz for 1 min		
	Betw. channels and int. log.		**V rms**	2000 - 50/60 Hz for 1 min		

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

References :
pages 43051/9 and 43051/10

Connections :
pages 43051/11 to 43051/13

Specifications of solid state output modules *(1)*

Module type			TSX DSZ 08T2K/TSX DMZ 28DTK	TSX DSZ 08T2/TSX DMZ 28DT	TSX DSZ 32T2
Number of outputs			8/12	8/12	32
Connection			HE 10 connector	Screw terminal block	Screw terminal block
Nominal output values	Voltage	**V**	⎓ 24	⎓ 24	⎓ 24
	Current	**A**	0.5	0.5	0.5
	Tungsten filament lamp	**W**	10		
Limit output values	Voltage	**V**	19…30 (possible up to 34 V, limited to 1 hour per 24 hours)		
	Current (for U = 30 or 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)		
Min. 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/LI^2		
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		By current limiter and thermal breaker 0.75 ≤ Id ≤ 2		
Paralleling of outputs			2 outputs max.		
Consumption			See page 43311/2		
Nominal dissipated power					
	Via module	**W**	3/5	3/5	3.2
	Via channel at 1	**W**	0.15		
Isolation	Betw. outputs and ground	**V rms**	1500 - 50/60 Hz for 1 min		
(Test	Betw. outputs and internal log.	**V rms**	1500 - 50/60 Hz for 1 min		
voltage)	Insulation resistance	**MΩ**	> 10 at ⎓ 500 V		

Module type			TSX DSZ 04T22	TSX DMZ 16DTK	TSX DMZ 64DTK
Number of outputs			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 to 1 hour per 24 hours)		
	Current (for U = 30 or 34 V)	**A**	2.5	0.625	0.125
Logic			Positive, current source		
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
Min. 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^2	< 0.5/LI^2
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 electronic breaker 2,6 ≤ Id ≤ 5	By current limiter and thermal breaker 0,75 ≤ Id ≤ 2	By current limiter and electronic breaker 0,125 ≤ Id ≤ 0,185
Paralleling of outputs			2 outputs max.	2 outputs max.	3 outputs max.
Consumption			See page 43311/2		
Nominal dissipated power					
	Per module	W	3.8	3	5
	Per channel at 1	**W**	1.15 (U = 24 V)	0.15	< 0.7 (U = 24 V)
Isolation	Betw. outputs and ground	**V rms**	1500 - 50/60 Hz for 1 min		
(Test	Betw. outputs and internal log.	**V rms**	1500 - 50/60 Hz for 1 min		
voltage)	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 43051/9 and 43051/10

Connections :
pages 43051/11 to 43051/13

Micro automation platform
Discrete I/O modules

Specifications of relay outputs (connection via screw terminal block) *(1)*

Module type				**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				Normally open							
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 duty	Voltage	**V**	**24**	**48**	**110**	**220**	**24**	**48**	**100...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 duty	Voltage	**V**	**24**	**48**	**110**	**220**	**24**	**48**	**100...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 duty	Voltage	**V**	**24**				**24**			
		Power	**W**	24 (1 x 10^6 operations) 40 (0.3 x 10^6 operations)				12 (0.6 x 10^6 operations) 24 (0.3 x 10^6 operations) 48 (0.15 x 10^6 operations)			
	Inductive DC-13 duty (L/R = 60 ms)	Voltage	**V**	**24**				**24**			
		Power	**W**	10 (2 x 10^6 operations) 24 (1 x 10^6 operations)				6 (0.12 x 10^6 operations) 12 (0.06 x 10^6 operations) 24 (0.3 x 10^6 operations)			
Response time	Activation		**ms**	< 10							
	Deactivation		**ms**	< 10							
Built-in protection	Against short-circuits and overloads			None, obligatory mounting of a fast blow fuse per channel or group of channels							
	Against inductive overvoltages in ∼			None, obligatory parallel mounting of an 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 43311/2							
Dissipated power per module			**W**	1.5/4.5/5.6				3.5			
Isolation (Test voltage)	Betw. outputs and ground		**V rms**	2000 - 50/60 Hz for 1 min							
	Betw. outputs and internal log.		**V rms**	2000 - 50/60 Hz for 1 min							
	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 43051/9 and 43051/10

Connections :
pages 43051/11 to 43051/13

Micro automation platform
Discrete I/O modules

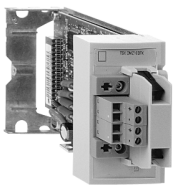
Discrete I/O modules

TSX DEZ 12D2

TSX DSZ 08T2K

Nature of current	Input voltage	Modularity (no. of channels)	Format	Connection	Reference	Weigh kg
⎓	24 V (positive log. IEC type 2)	12	Half	Via HE 10 type connector (1)	**TSX DEZ 12D2K**	0.160
		32	Stand.	Via screw terminal block (supplied)	**TSX DEZ 32D2**	0.290
	24 V (positive log. IEC type 1 or negative log.)	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

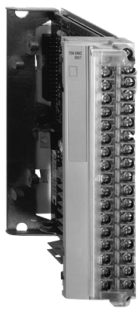
Discrete output modules



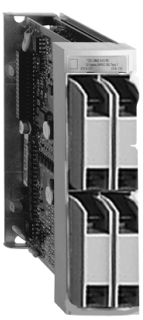
TSX DMZ 16DTK

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	Stand.	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	Stand.	Via screw terminal block (supplied)	**TSX DSZ 32R5**	0.580

Discrete I/O modules



TSX DMZ 28DT



TSX DMZ 64DTK

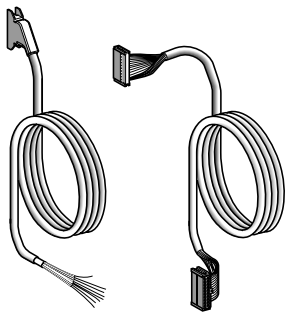
Number of I/O	No., type of inputs	No., type of outputs	Format	Connection	Reference	Weight kg
16 *(2)*	8, ⎓ 24 V (positive log. IEC type 1)	8, solid state ⎓ 24 V/0.5 A protected	Half	Via HE 10 type connector *(1)* and encl. terminal block	**TSX DMZ 16DTK**	0.160
28	16, ⎓ 24 V (positive log. IEC type 1)	12, solid state ⎓ 24 V/0.5 A protected	Stand.	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 log. IEC type 1 or negative log.)	12, relay 50 VA not protected	Stand.	Via screw terminal block (supplied)	**TSX DMZ 28DR**	0.500
	16, ∿ 100…120 V IEC type 2	12, relay 50 VA not protected	Stand.	Via screw terminal block (supplied)	**TSX DMZ 28AR**	0.500
64	32, ⎓ 24 V (positive log. IEC type 1)	32, solid state ⎓ 24 V/0.1 A protected	Stand.	Via HE 10 type connector *(1)*	**TSX DMZ 64DTK**	0.410

(1) Module supplied with HE 10 type connector cover.
(2) Module compatible with Tego industrial control installation system (please consult your Regional Sales Office).

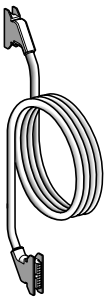
Specifications :
pages 43051/5 to 43051/8

Connections :
pages 43051/11 to 43051/13

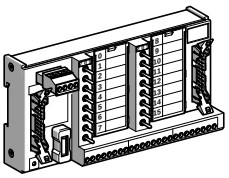
Connecting cables for I/O modules fitted with HE 10 type connectors



TSX CDP ●01 *TSX CDP ●02*



TSX CDP ●●3



ABE-7TES160

Description	Constitution Use	Cross-section	Length	Reference	Weight kg
20-wire pre-formed 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
Connecting 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, 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

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

TSX BLZ H01

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

TSX BLZ L01

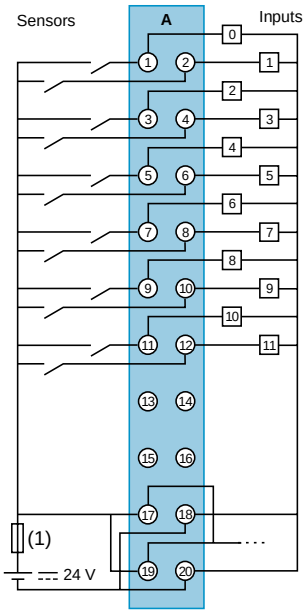
Description	Use	Reference	Weight kg
Screw terminal blocks (supplied with I/O modules with screw terminal block connection)	For half-format modules	**TSX BLZ H01**	0.055
	For standard format modules	**TSX BLZ L01**	0.115

Specifications : pages 43051/5 to 43051/8

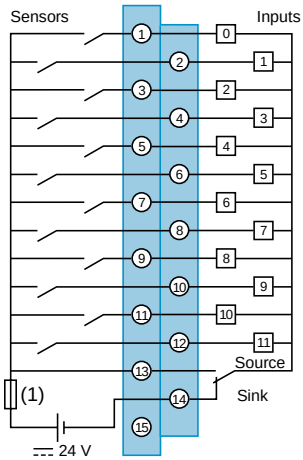
Connections : pages 43051/11 to 43051/13

Micro automation platform
Discrete I/O modules

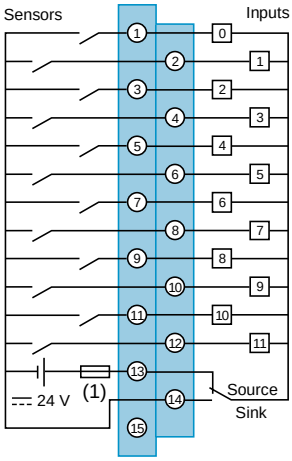
TSX DEZ 12D2K



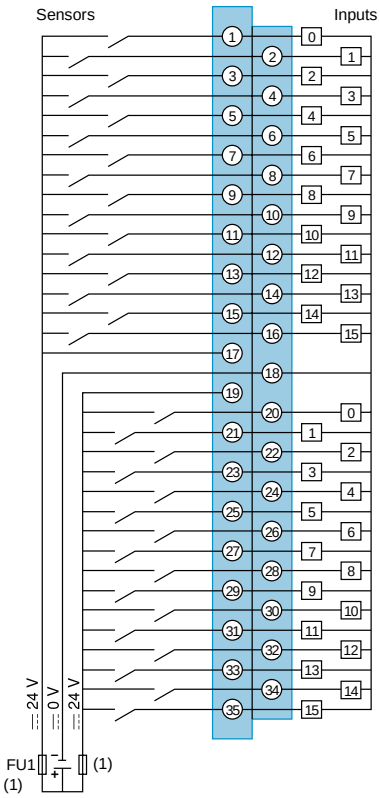
TSX DEZ 12D2
Positive logic



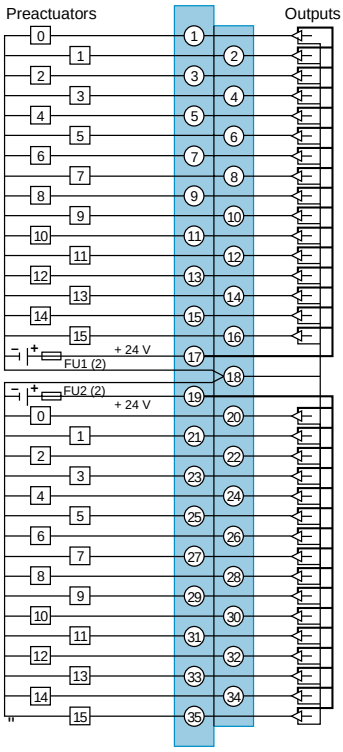
TSX DEZ 12D2
Negative logic



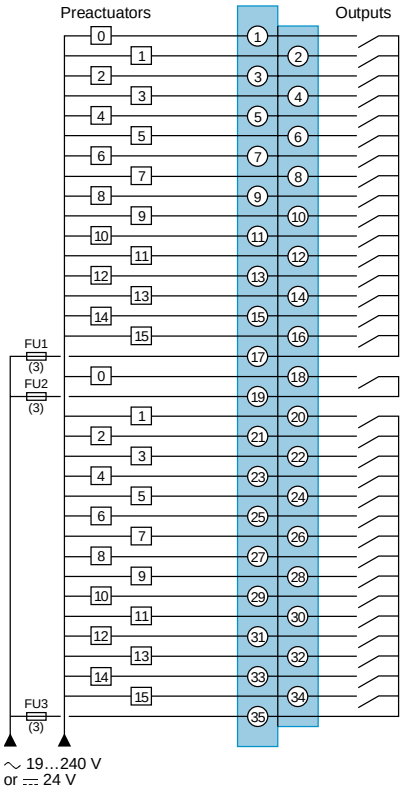
TSX DEZ 32D2



TSX DSZ 32T2



TSX DSZ 32R5



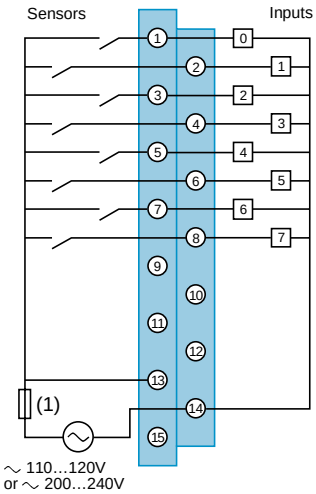
(1) 0.5 A fast blow fuse
(2) 10 A fast blow fuse
(3) Fast blow fuses, rated according to the load

Specifications :
pages 43051/5 to 43051/8

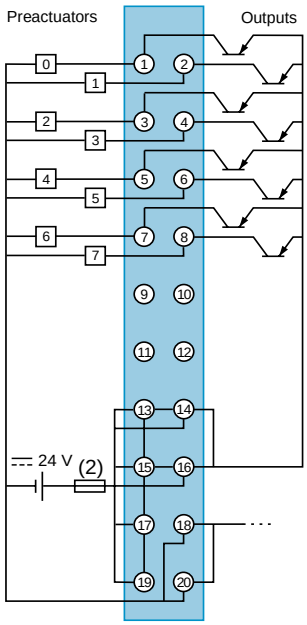
References :
pages 43051/9 and 43051/10

Micro automation platform
Discrete I/O modules

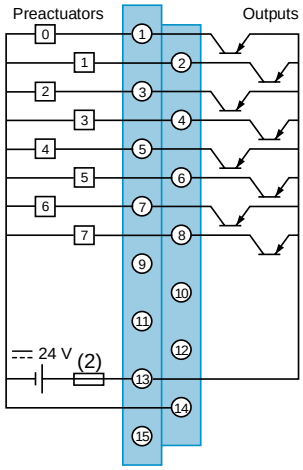
TSX DEZ 08A4/08A5



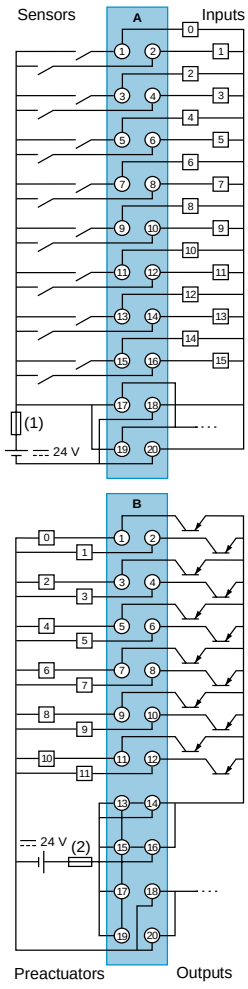
TSX DSZ 08T2K



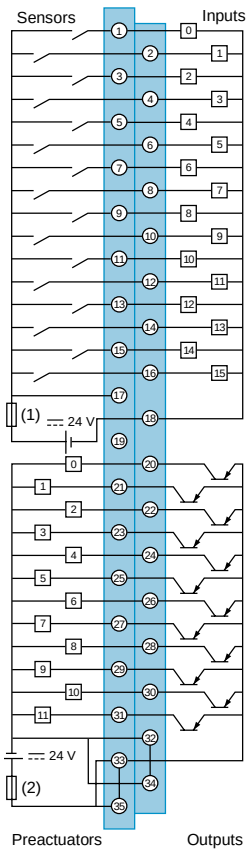
TSX DSZ 08T2



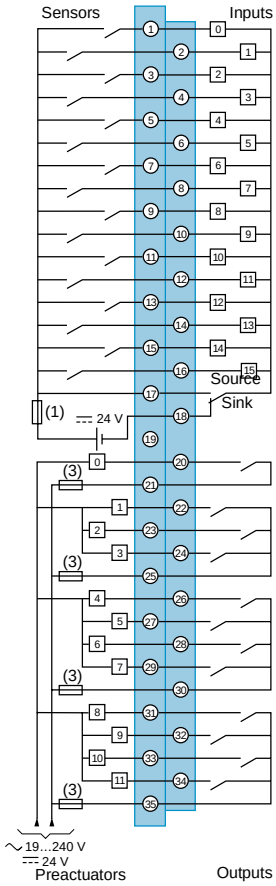
TSX DMZ 28DTK



TSX DMZ 28DT



TSX DMZ 28DR
Positive logic (Sink)



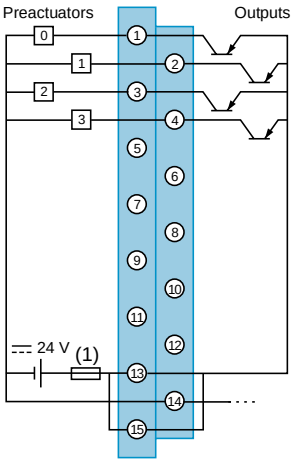
Negative logic (Source) :
+ 24 V = terminal 17
- 24 V = terminal 18 = common

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

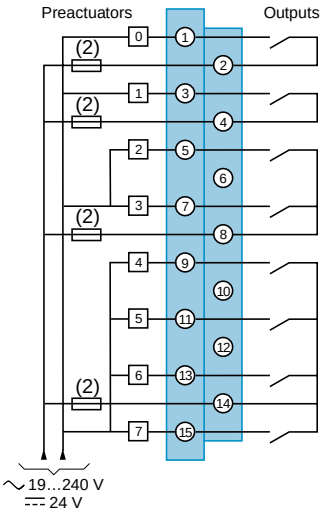
Specifications :
pages 43051/5 to 43051/8

References :
pages 43051/9 and 43051/10

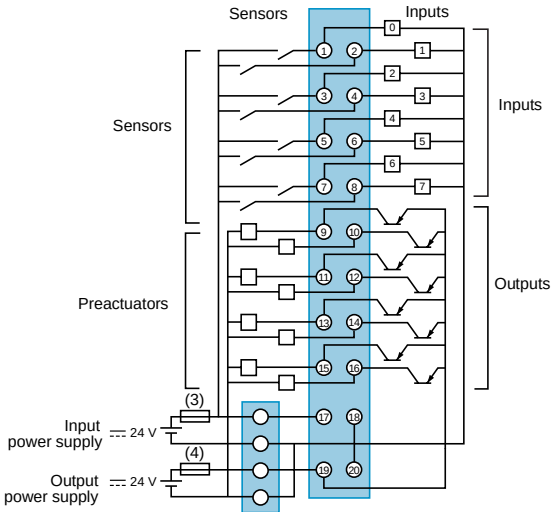
TSX DSZ 04T22



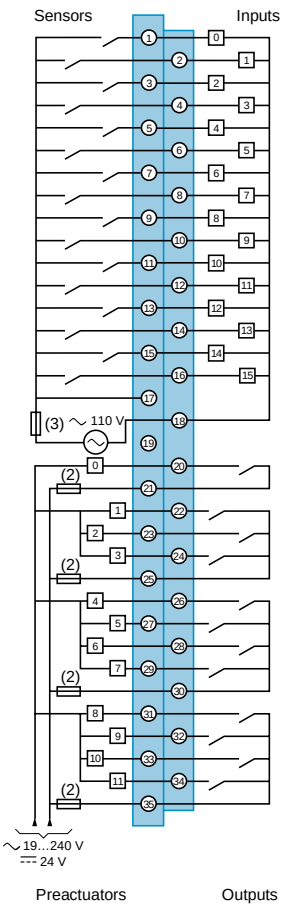
TSX DSZ 08R5



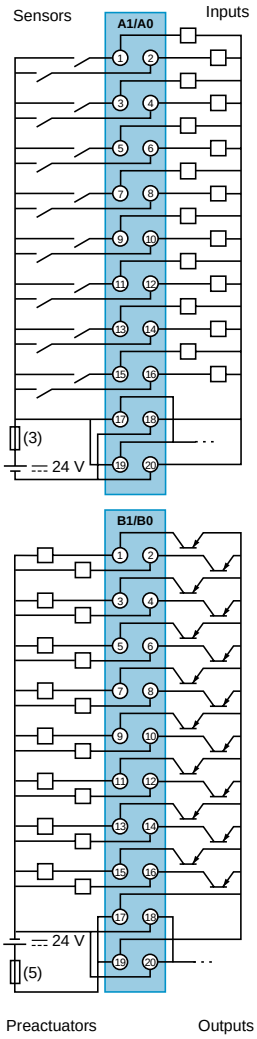
TSX DMZ 16DTK



TSX DMZ 28AR



TSX DMZ 64DTK



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

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) 10 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

Specifications :
pages 43051/5 to 43051/8

References :
pages 43051/9 and 43051/10

Connection interfaces

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	⎓ 24V				
Output voltage	⎓ 24V				
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 ⎓ 24V or 0 V)	Signal	Signal, Common (configurable ⎓ 24V or 0 V)	
Connectors	20-way HE 10 connector				
Terminal block removable / type of terminals	No / Screw		No / Screw or spring		
Additional or optional* function	Low cost version fitted with cable	Miniature sub-bases	Compact size *	Type 2 input * *(1)*	Isolator
Type of device	ABE-7H20E●●● 7H32E●●●	ABE-7H16C●●	ABE-7H●●R1● 7H●●R50	ABE-7H●●R2●	ABE-7H●●S21
Pages	14025/2		14025/3		

(1) For Micro and Prenium PLCs.

Discrete input and output

817432

817433

–		Removable electromechanical or solid state	
–		No	Yes
⎓ 24V			
⎓ 24V		⎓ 24V (solid state) ⎓ 5... 24V, ∿ 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	Contact 1 N/O and common, 4 output channels 2 input connection points	
20-way HE 10 connector			
No			
Screw			
Miniature sub-base Synergy with Tego Power and Micro PLC		Miniature sub-base - Volt-free or common per 4 channels Synergy with Tego Power and Micro PLC	
ABE-7H16CM11	ABE-7H16CM21	ABE-7P16M111	ABE-7R16M111
14025/2		14025/6	14025/5

Connection interfaces

Telefast® 2 pre-wired system
Discrete input and output sub-bases

Applications	Discrete output					
	 817440					
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... 24V, ∿ 230 V (E.M.)		⎓ 5 V... 150 V ∿ 230 V
Outupt curent 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 type of terminals	Yes Screw or spring	Yes	Yes	No Screw		No 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
Type of device	ABE-7R08S216●	ABE-7R●●S1●●	ABE-7R●●S2●●	ABE-7R16T111	ABE-7P16T111	ABE-7P16T2●●● 7P08T3●●●
Pages	14025/4			14025/5	14025/6	

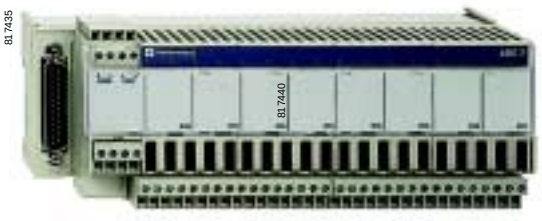
				Discrete input			
				 817439			
Electromechanical, removable		Solid state, fixed	–	–		Solid state, fixed	Solid state, removable
Yes		Yes	–	–		Yes	No
						From ⎓ 24 V to ∿ 230 V	From 5 V TTL to ∿ 230 V
⎓ 5 V... 150 V ∿ 230 V		⎓ 24 V					
5A (th)	8 A (th)	from 0.5 to 2 A	125 mA	0.5 A	125 mA	12 mA	
16							
	2 to 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●
14025/5		14025/4	14025/3			14025/4	14025/5

Connection interfaces

Telefast® 2 pre-wired system
Analogue sub-bases

Applications	Analogue signals and special functions			

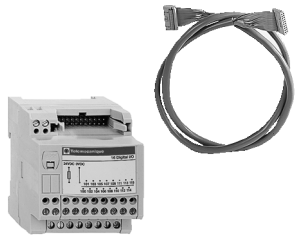
Compatibility	Micro	Premium	Standard	
Type of signal	Counter inputs and analogue I/O	Counter inputs Axis control Position control	Analogue inputs Current Voltage Pt 100	Analogue outputs Current Voltage
Functions	Passive connection, point-to-point with shield continuity			
Modularity	1 counter channel 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			
No, 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	
Type of device	ABE-7CPA01		ABE-7CPA02	ABE-CPA21
Pages	14026/2			



	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 Counting	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
				0.5 A
		–	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

Connection interfaces

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



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 (m)	Type of connection	Reference	Weight (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

816462

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.

Presentation, compatibility: page 14029/2
Dimensions, schemes: page 14040/3

Connection interfaces

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

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

ABE-7H16R31

ABE-7H16●43

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

Presentation, compatibility: page 14029/2
Dimensions, schemes: page 14040/3

Connection interfaces

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

Presentation, compatibility: page 14029/2
Dimensions, schemes: page 14040/3

Connection interfaces

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

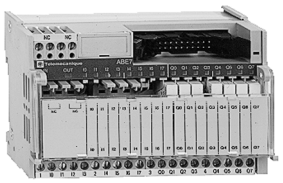
816469

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 (2)	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 (3)

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** (4)	0.600
	10	ABR-7S21	1 N/O	Volt-free	**ABE-7R16T210**	0.735
				Common on both poles (5)	**ABE-7R16T212**	0.730
		ABR-7S23	1 C/O	Contact common (5)	**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 (6)	**ABE-7R16T332**	1.200
		ABR-7S37	2 C/O	Volt-free	**ABE-7R16T370**	1.300

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

Presentation, compatibility: page 14029/2
Dimensions, schemes: page 14040/3

Connection interfaces

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


816473

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.

Presentation, compatibility: page 14029/2
Dimensions, schemes: page 14040/3

Connection interfaces

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
			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-7SA3M**	0.016

Plug-in electromechanical relays

816476

ABR-7S2●

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

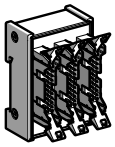
Description	Reference	Weight kg
Extractor for 5 mm miniature relays	**ABE-7ACC12**	0.010

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

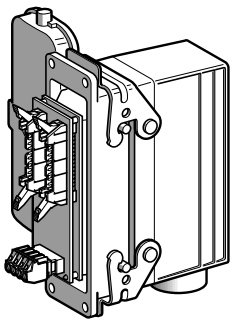
Presentation, compatibility: page 14029/2
Dimensions, schemes: page 14040/3

Micro automation platform

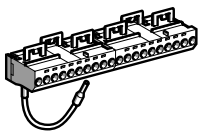
Telefast® 2 pre-wired system
Accessories for connection sub-bases



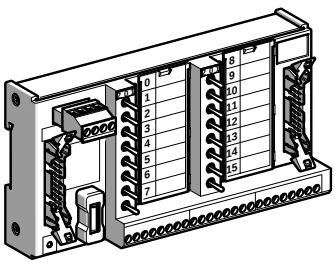
ABE-7ACC02



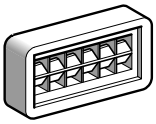
ABE-7ACC80 + ABE-7ACC81



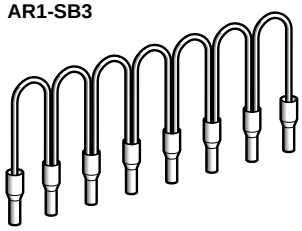
ABE-7BV20



ABE-7TES160



AR1-SB3



ABF+C08R●●●

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

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 (1 x 20-way HE 10 connector, PLC end)	16	19-way	1	**ABE-7ACC82**	0.150
	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

“Flexible commoning links” accessories

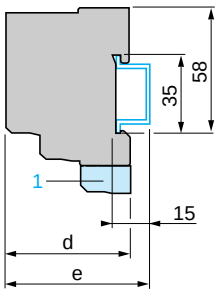
Description	For common	Colour	Distance between cable ends **cm**	Reference	Weight kg
Flexible commoning links Modularity 8 x 1 mm²	Coil	White	12	**ABF-C08R12W**	0.020
			2	**ABF-C08R02W**	0.010
	~	Red	12	**ABF-C08R12R**	0.020
			2	**ABF-C08R02R**	0.010
	⎓	Blue	12	**ABF-C08R12B**	0.020
			2	**ABF-C08R02B**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

Dimensions : page 14040/3

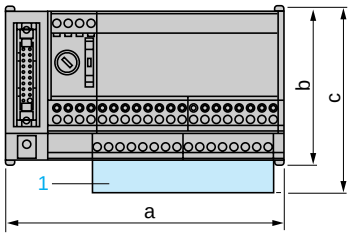
Micro automation platform

Telefast® 2 pre-wired system

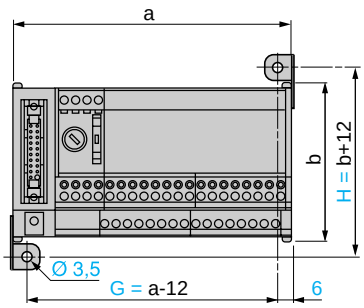
Common side view



ABE-7H/P/R/S sub-bases



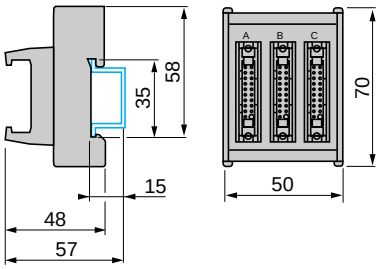
Fixing with ABE-7ACC01 kit



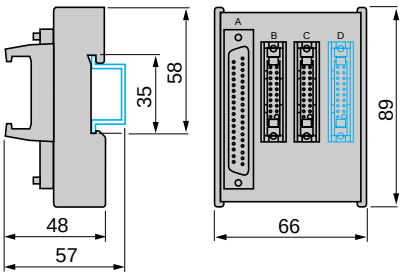
1 Additional shunt terminal block ABE-7BV20

ABE-7	a	b	c	d	e
H08R1●/H08R21	84	70	82	58	67
H08S111	84	70	82	58	67
H12R1●/H12R2●	125	70	82	58	67
H12R50	84	70	82	58	67
H16●43	206	70	82	58	67
H16R1●/H16R2●/H16R3●	125	70	82	58	67
H16R50	84	70	82	58	67
P16F31●	272	89	101	74	83
P16T3●●	272	89	101	74	83
P16T2●●	211	89	101	64	73
R08S111	84	77	89	58	67
R08S210/R08S2B0	125	77	89	58	67
R16S11●	125	70	82	58	67
R16S21●	206	70	82	58	67
R16T2●●	211	89	101	64	73
R16T3●●	272	89	101	74	83
S08S2B1	206	77	89	58	67
S16E2●●	206	77	89	58	67
S16S1B2	125	77	89	58	67
S16S2B0	206	77	89	58	67
CPA01	143	70	82	58	67
CPA02/CPA03	125	70	82	58	67
CPA11/CPA12	143	70	82	58	67
CPA21	84	70	82	58	67
CPA31	206	77	89	58	67

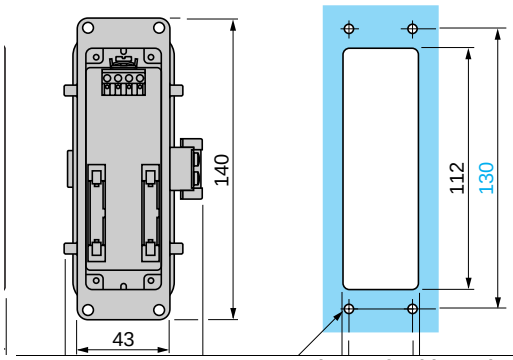
ABE-7ACC02 splitter sub-base



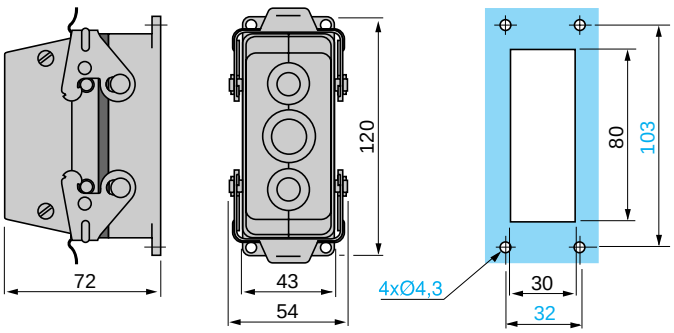
ABE-7ACC10/11 redundant I/O sub-base



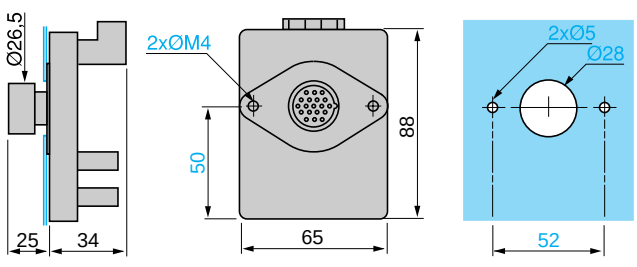
ABE-7ACC80 enclosure feedthrough



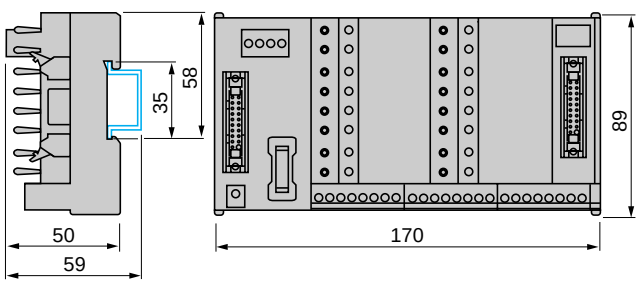
ABE-7ACC84 cable gland block



ABE-7ACC82, ABE-7ACC83 enclosure feedthrough



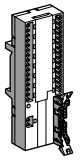
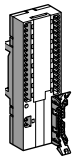
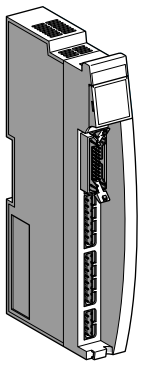
Embase de simulation ABE-7TES160



References : and 14040/2
pages 14025/2 to 14025/5

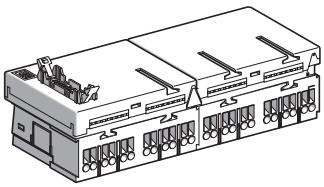
Micro automation platform
Tego Dial/Tego Power installation system

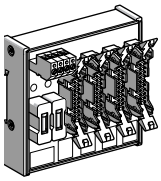
Tego Dial for Human-Machine interfaces and Tego Power for motor power-starter components

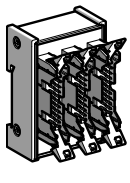
Automation platforms			Tego Dial components		Tego Power components
					
Type	**Modularity of connection to the PLC**	**Compatible I/O modules**	**Tego Dialbase 8 I/8 O**	**Tego Dialbase 16 I**	**Communication module or control splitter box with 8 I/8 O**
			APE-1B24M	**APE-1B24E**	**APP-1CH, APP-2R4H1/H3**
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 TSX DSY 32T2K/64T2K			1
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, 140 DD0 353 00/10			1

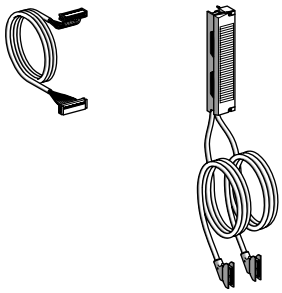
(1) For the connection of a second Dialbase APE-1B24M, use 2 x TSX DP ●●3 connecting cables

Connecting components









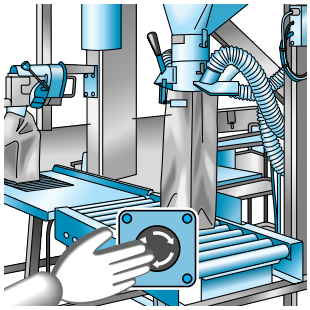
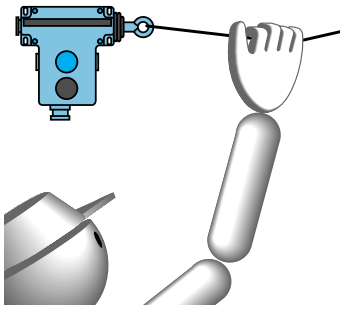
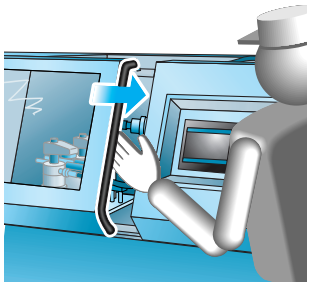
Control splitter box 16 I/8 O	Splitter box 16 I + 16 O to 2 x (8 I+8 O)	Splitter box 16 to 2 x 8	Telefast connecting cables	
APP-2RH2/H4	APE-1R1628	ABE-7ACC02	TSX CDP ●●3	ABF-M32H●●0
			1	
	1		2	
	1			
			1	
	1 *(2)*		3	
1		1 *(3)*	3	
	1		2	
			2	
	1 *(2)*		3	
1		1 *(3)*	3	
	1		1	2
				1
	1 *(2)*		1	2
1		1 *(3)*	1	2

(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.

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

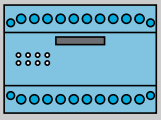
The user is required to ensure that his range of machines conforms to the use of work equipment by workers at work directive. Directive 89/655/EEC lays down the minimum objectives for protection in the working environment and in particular concerns the use of products. The directive specifies the general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

Safety and automated systems

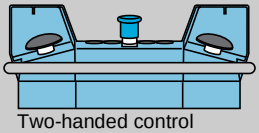
All dangerous areas must be identified and have restricted access, controlled in a secure manner, ie. any breakdown or careless operation must leave the automated system in a safe position.
It should be noted that the use of safety products does not necessarily mean that the machine conforms to the machinery 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.

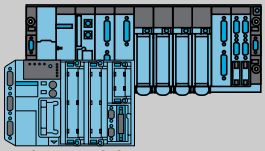
Groupe Schneider, safety specialists

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

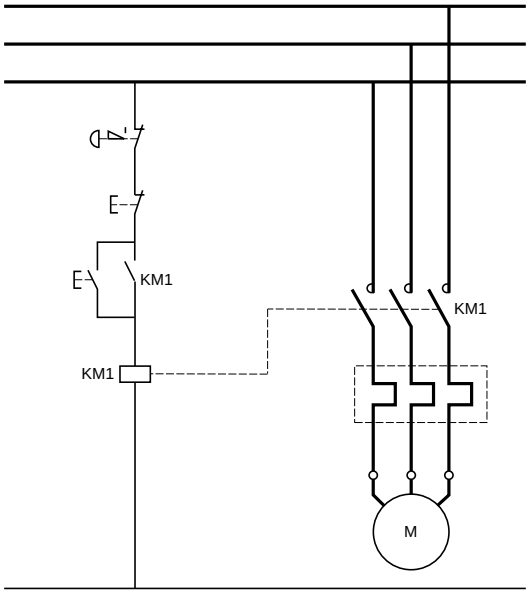

Two-handed control


Safety module integrated in PLC

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

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.

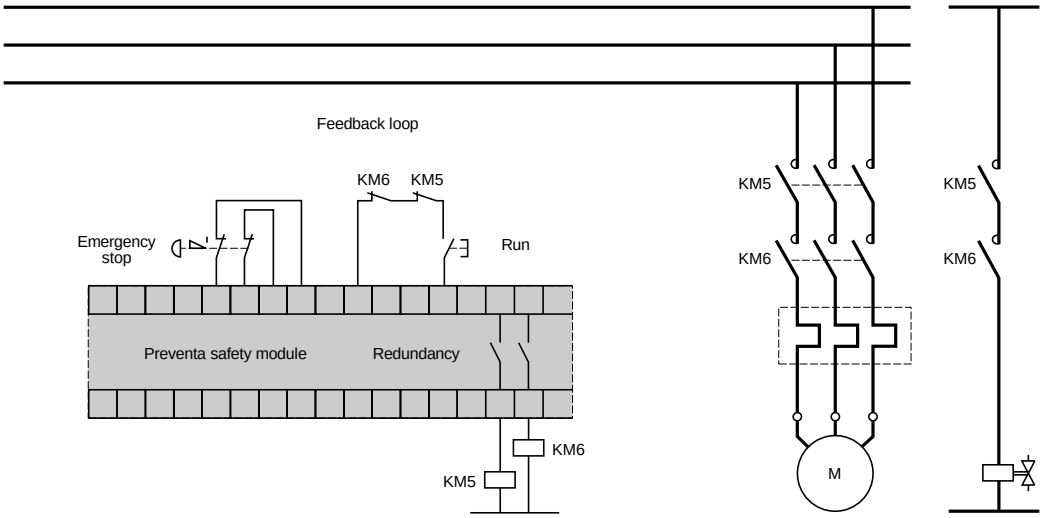
In this type of scheme, the risks of simple faults are :
- emergency stop button being shorted
- KM1 contactor sticking

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



KM5 and KM6 contactors with mechanically linked contacts

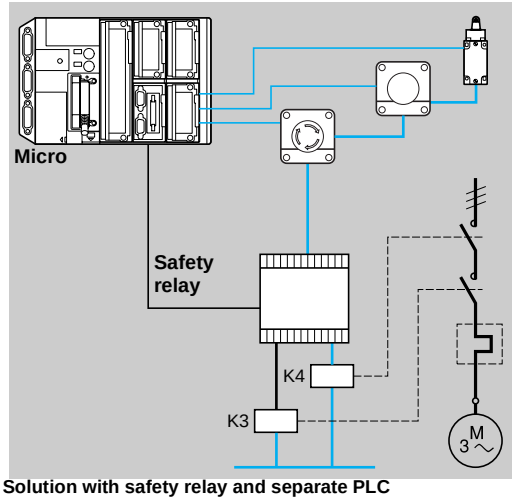
Independent safety circuits

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

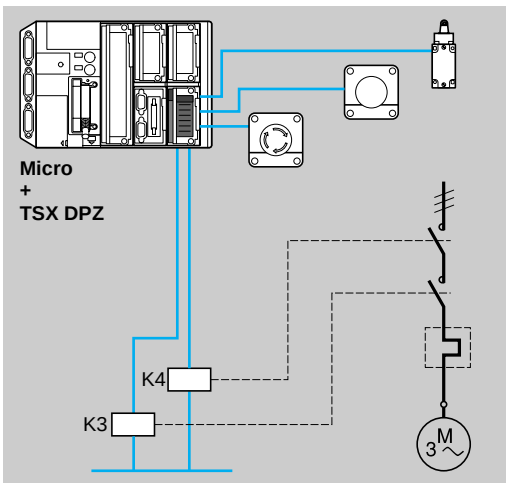
- A control circuit fault (inputs)
- A power circuit fault (outputs)
- A fault on an internal safety module component

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.

Micro automation platform
TSX DPZ safety module



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 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.

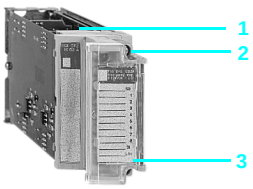
The TSX DPZ 10D2A safety module is used to interrupt one or more emergency or safety stop control circuits in complete safety, in accordance with EN 60204-1.

The proven safety of hard-wired technology and the capacity of the 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

Module 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.



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.

Specifications : page 43307/4
References : page 43307/4
Connections : page 43307/5

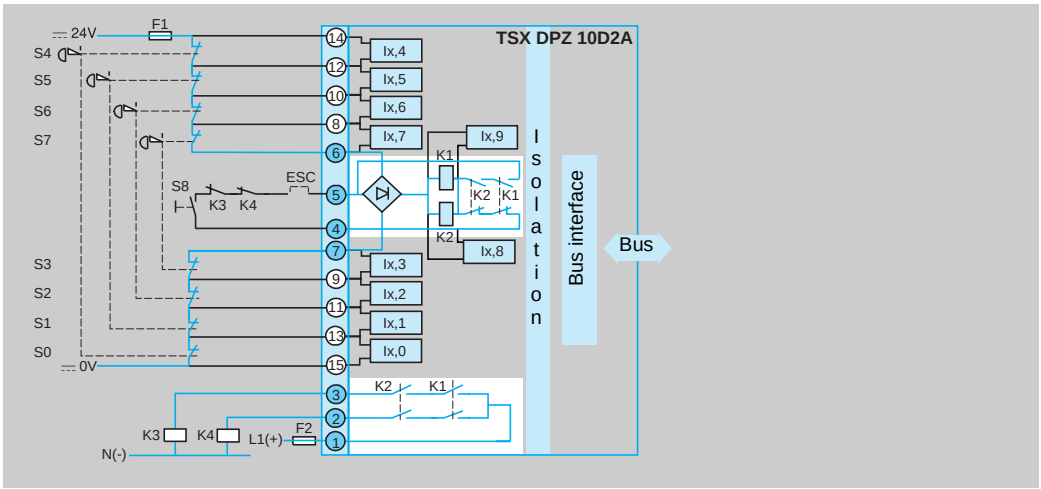
Micro automation platform
TSX DPZ safety module

Safety module TSX DPZ 10D2A provides the following functions :
- Monitoring of 1 to 4 dual (or single), 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 Micro PLC processor :**the PLC does not affect the safety module**
- 10 LEDs on the 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.

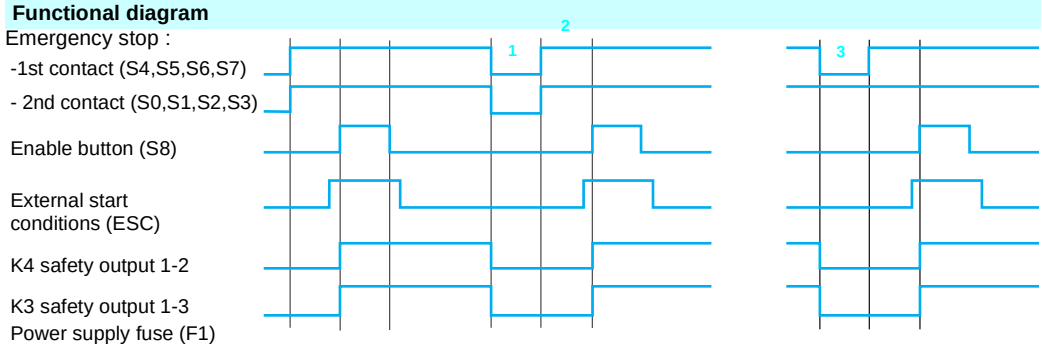
Schematic diagram

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 page43307/4).



6-7	Control of the safety system
1-2 and 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.

Specifications : page 43307/4
References : page 43307/4
Connections : page 43307/5

Micro automation platform
TSX DPZ safety module

Standards and certifications

Standards	Whole machine	Electrical equipment of industrial machines		EN 60204-1 or 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 pr 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 to IEC 947-5-1	**A**	1 (gI)
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 min
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 (Ith)			**A**	1.25			
Minimum current			**mA**	10			
a.c. load	Inductive	Voltage	**V**	∿ 24	∿ 48	∿ 110	∿ 220
	AC-15 duty	Power	**VA**	30	60	140	165
d.c. load	Inductive	Voltage	**V**	⎓ 24			
	DC-13 duty (L/R = 100 ms)	Power	**VA**	30			
Response time			**ms**	< 100			
Type of contacts				AgNi gold flashed			
External output protection via F2 fuse	Conforming to IEC 947-5-1		**A**	4 (gI)			
Isolation between output and earth	Insulation voltage		**V**	300			
	conforming to DIN VDE 0110 part 2						
	Test voltage		**V rms**	2000-50/60 Hz for 1 min			

Environment

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

References

Inputs Number	Voltage	Safety outputs	Connection format	Reference *(1)*	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 (Ithe)	Via screw terminal block (supplied) Half-format	**TSX DPZ 10D2A**	0.280

TSX DPZ 10D2A

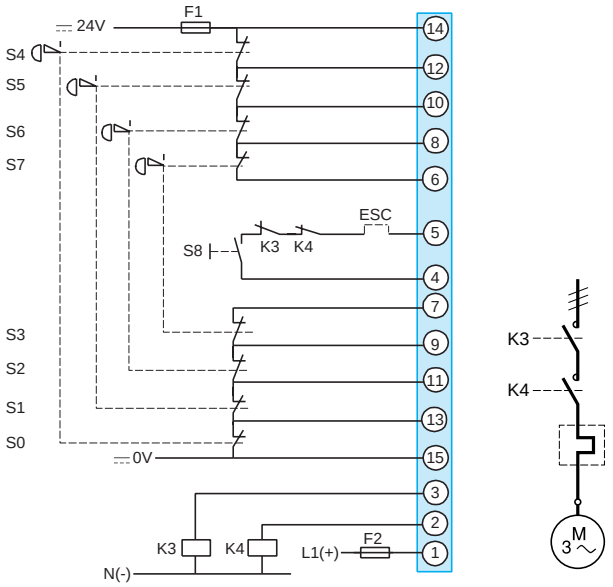
(1) Product supplied with a multilingual installation guide in English, French and German.

Connections : page 43307/5

Micro automation platform
TSX DPZ safety module

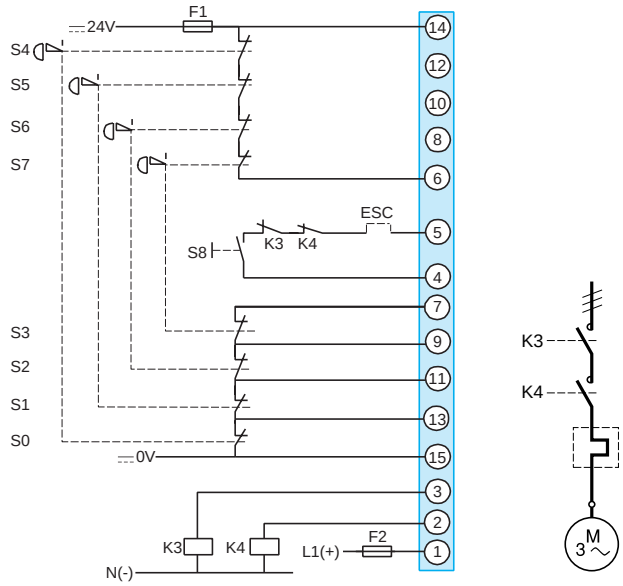
Category 3 wiring diagrams (redundant inputs and outputs) : recommended applications

Connection of 4 sensors with dual contacts



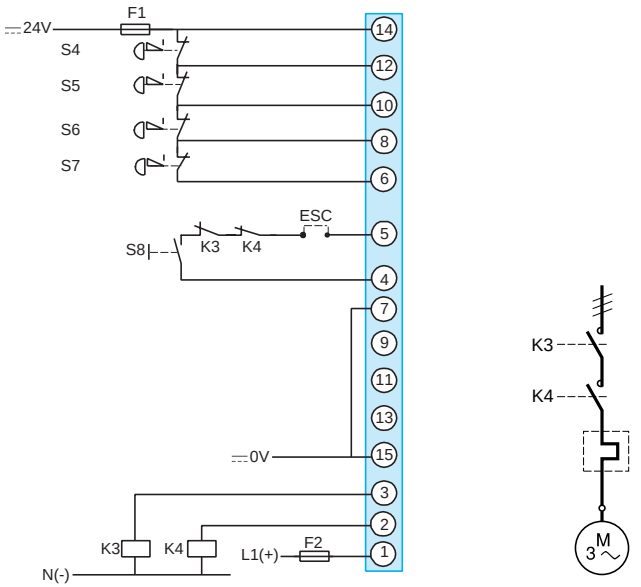
The states of all the contacts in the input circuit are read by the PLC. The consistency test carried out by the PLC program on the input contacts enables it to signal and locate precisely the faulty contact(s).
When using less than 4 dual contacts, the input terminals not in use must be linked. For 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



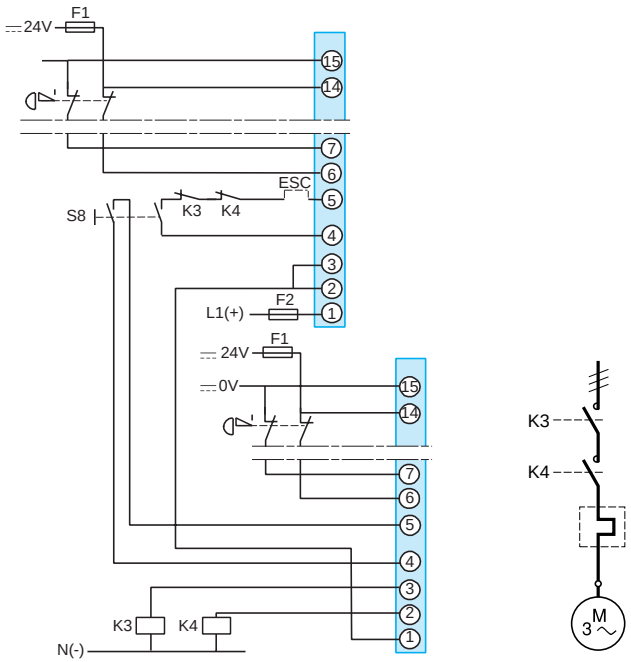
Suitable for use with existing wiring; with one contact on the safety module and one contact for diagnostics, this wiring enables global reading of the state of contacts S4 to S7 and individual reading of contacts S0 to S3.
The consistency test carried out by the PLC program on the inputs enables it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

Wiring diagram with single contacts



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



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 Micro PLC.

Specifications :
page 43307/4

References :
page 43307/4

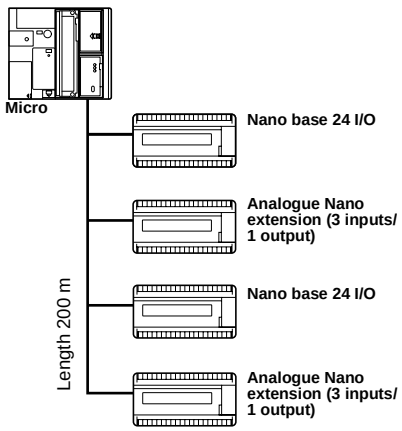
Micro automation platform
TSX STZ extension module for Nano PLCs

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 Micro PLC) can be used as :

- I/O of the Micro PLC. In this case the number of I/O managed by the 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-i bus master module.



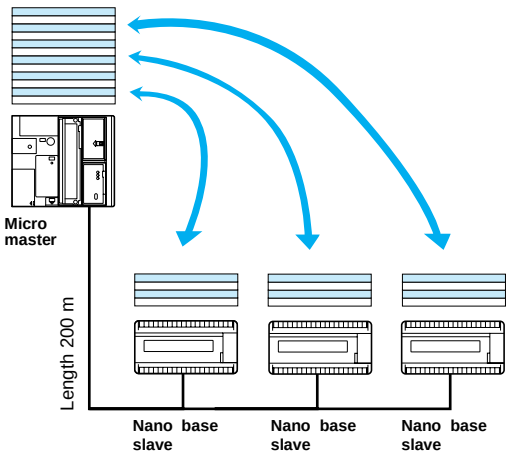
Remote discrete I/O configuration

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 Micro PLC.

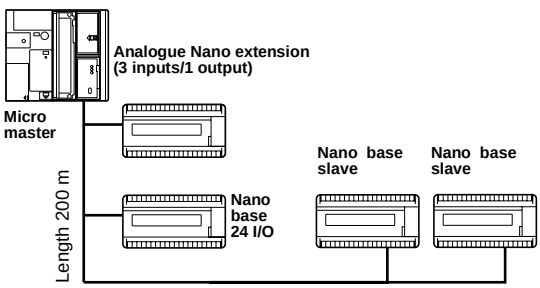
Configuration:
One to four Nano PLC bases with 10, 16 or 24 I/O, i.e. a maximum of 96 discrete I/O.



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 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

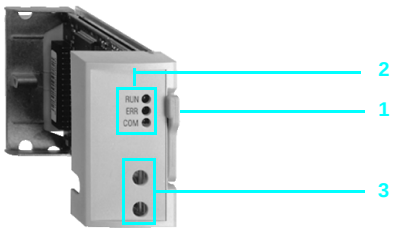
It is possible to combine both types of configuration on one link, in which case the maximum number of Nano PLCs is limited to 4.

(1) Cannot be used with Nano extensions.

References :
page 43056/3

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 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 Negative logic	⎓ 24 V transistors Positive logic	Relay ⎓ 24 V ~ 24/240 V	Input	Output	
10 discrete I/O bases (6 inputs, 4 outputs) *(1)*	■		■				■	■		**TSX 07 30 1028**
	■		■		■			■	■	**TSX 07 30 1008**
		■	■				■	■		**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 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 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.

References

I/O extension module for Nano PLCs

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-i bus module.

TSX STZ 10

Description	Use	Format	Connection	Reference *(1)*	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

(1) Multilingual quick reference guide included as standard (English, French, German, Italian and Spanish).

Presentation : page 43056/2

Micro automation platform

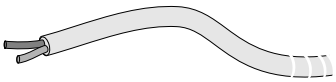
AS-i bus

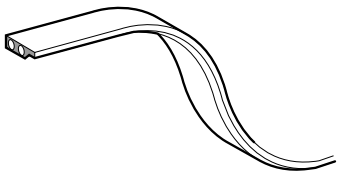
Presentation

AS-i is a bus for sensors and actuators (**Actuator Sensor interface**). It is a deterministic bus with very short response times.

AS-i is an open industrial standard supported by the AS-i association. This association includes European leaders in the sensor, actuator, PLC and connector technology markets. AS-i thus has the advantage of not being a proprietary network.

AS-i benefits

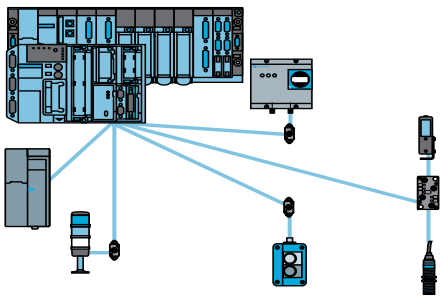




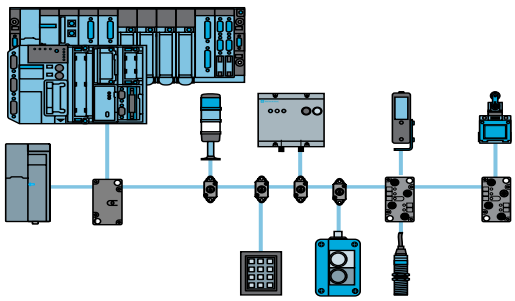
Wiring : data is transmitted via a standard cable comprising a pair of non twisted, non-shielded wires with a cross section of 1.5 to 2.5 mm^2. This cable provides a power supply to the sensors and actuators. It is installed directly onto the machine, without the need for any special components (splitter terminal blocks, etc). All topologies are possible. The maximum length of the segment without repeaters is 100 m ; with repeaters it is 200m.
Physical installation : as the medium (cable) is standard, it can be installed in all industrial applications. Dust and damp proofing and a locating device are added when a special AS-i cable is used.
Hardware installation : software tools, integrated into PL7 products, allow a choice of bus components to be made and to set the parameters for these components within the control system configuration. This is transparent to the user.
Maintenance : all services available on the interface and the programming of “In rack” I/O can be found in PL7 tools with diagnostic screens, channel topology syntax, associated mnemonics, forcing of variables, debug zone, etc.
Impact on the machine : lowers cost and volume of wiring, reduces size of floor-standing enclosures, eliminates “control” wiring ducts, increases and simplifies the capacity for developing and adapting the machine. Greater availability and adaptability of subassemblies.

AS-i topology

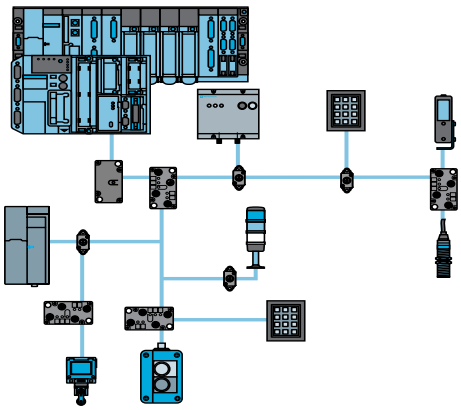
The topology of the AS-i bus is unrestricted.



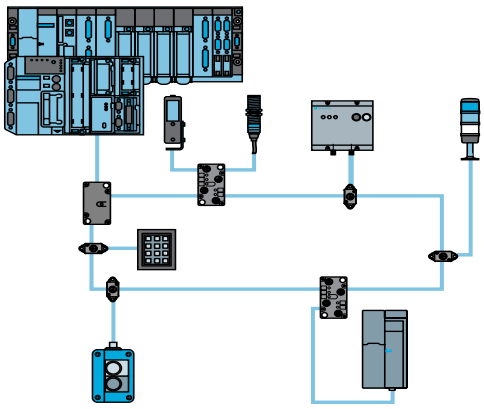
Point-to-point



Line



Tree



Ring

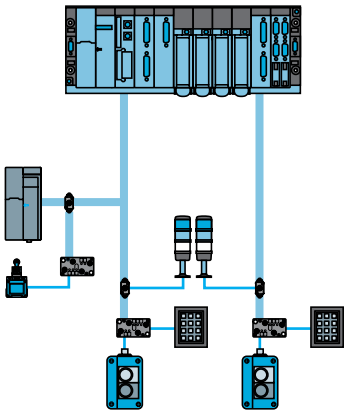
Micro automation platform
AS-i bus

A master/slave bus

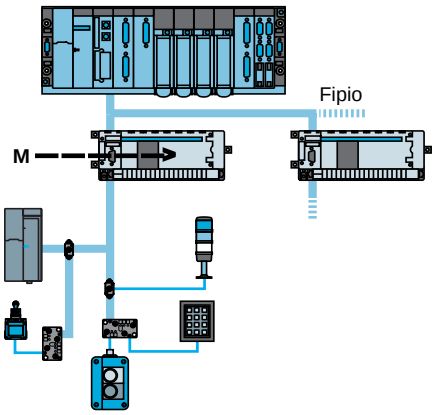
AS-i is a master/slave bus : the slaves are managed by a single master.
The master interrogates each slave on the bus in succession and waits for a reply. The maximum time for the interrogation cycle is 5 ms for 31 discrete slaves.
Dialogue is always initiated by the master.

The AS-i master

The AS-i master on a Premium PLC can be a module (from 1 to 8 modules) or a gateway on the Fipio fieldbus (from 1 to 16 gateways). On the Micro PLC the number of modules is limited to 1.



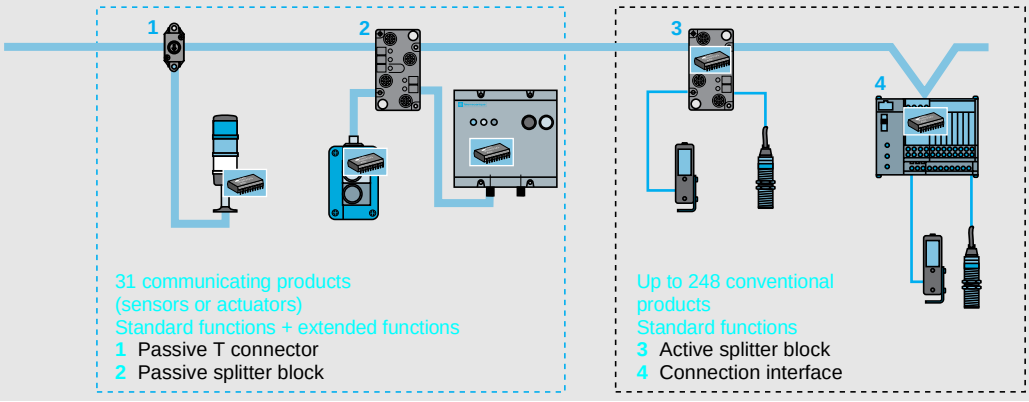
Each PLC with an AS-i module enables user-transparent communication.



Each gateway converts the AS-i bus into a Fipio bus device address on a higher level.
Please refer to our specialist catalogue.

Slaves

AS-i accepts up to 31 slaves each with 4 input bits and 4 output bits for cyclical exchange of data with the master and 4 parameter-setting bits for extended functions (configuration, diagnostics, etc).
Each slave has its own address and a profile (definition of the exchange of variables). The communicating sensors or actuators (incorporating a specific AS-i component) are connected directly to the AS-i bus using passive splitter blocks or T connectors.
Conventional discrete sensors or actuators are connected to the bus using active splitter blocks or connection interfaces. The maximum number of conventional sensors or actuators which can be connected is therefore 248. A combination of communicating and conventional sensors/actuators is possible.



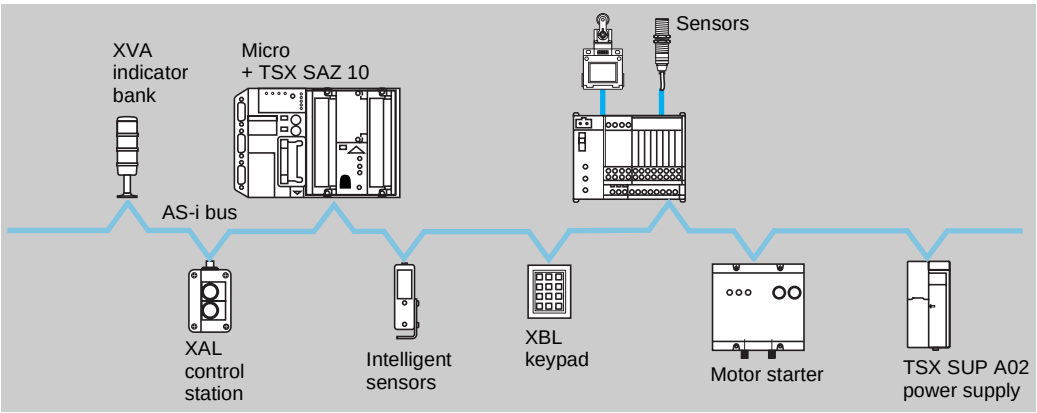
AS-i power supply

Each device connected on the AS-i bus is powered by a specific power supply via the AS-i cable. The size of the power supply must be suitable for the total power consumption of the devices on the bus. This power supply can be located at any point on the bus.

Micro automation platform
TSX SAZ master module for AS-i bus

Presentation

The TSX SAZ 10 AS-i bus module enables the Micro PLC to act as the AS-i bus master. In this way up to 31 sensor/actuator type devices may be managed on the one AS-i 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-i bus comprises a master station (Micro PLC) and slave stations. The TSX SAZ 10 module supports the AS-i M2 profile, interrogates the device connected on the AS-i bus in turn and stores the data (state of sensors/actuators, operational status of devices) in the PLC memory. Communication management on the AS-i bus is completely transparent with regard to the PLC application program.
An AS-i power supply must be used for powering the various components on the AS-i bus. Ideally this PSU should be situated nearest to the stations with the largest current demands.
For further details, please consult our specialist catalogue.

Description

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

The front panel comprises :

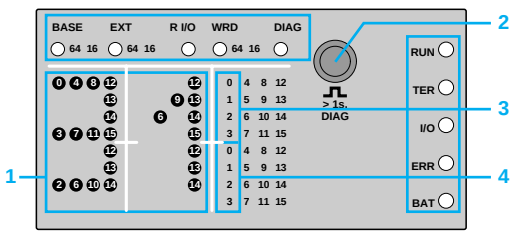
1 An opening with locating device for routing AS-i bus ribbon or round cable (to be connected to a terminal block inside the module).

2 Four indicator lamps :
- RUN : the module is active
- ERR : module fault or bus connection fault
- COM : AS-i bus communication is active
- AS-i : bus configuration error

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

(

Diagnostics



The 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-i 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

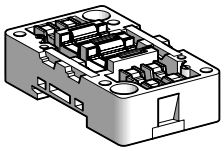
(1) When the TSX SAZ 10 module is in position 4, the upper position 3 can only receive a TSX A●Z ●●●● analogue or TSX CTZ ●●● counter half-format module.

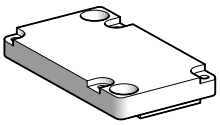
References :
page 42718/3

Micro automation platform
TSX SAZ master module for AS-i bus

References

TSX SAZ 10


XZ-SDE11●3


XZ-SDP


XZ-CB1●●0●

AS-i bus module

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

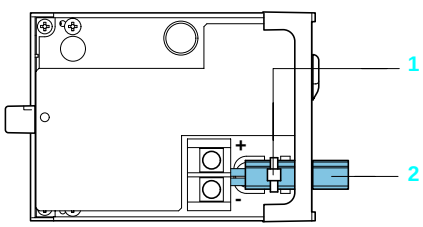
Connection accessories

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-i bus (yellow)	**XZ-SDE1113**	0.070
		2 ribbon cables : - 1 for AS-i bus (yellow) - 1 for separate supply (black)	**XZ-SDE1133**	0.070
Cover for connection module	–	–	**XZ-SDP**	0.030

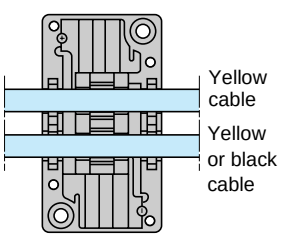
Description	Supply	Length	Reference	Weight kg
Ribbon cables for AS-i bus	For AS-i bus (yellow)	20 m	**XZ-CB10201**	1.400
		50 m	**XZ-CB10501**	3.500
		100 m	**XZ-CB11001**	7.000
Other AS-i accessories		–	Please consult our specialist catalogue	

Connections

TSX SAZ 10 module



XZ-SDE11●3



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

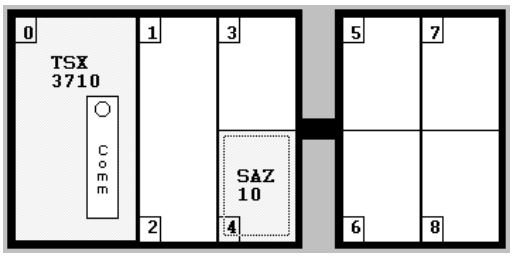
Micro automation platform
Master modules for AS-i bus

Software setup

The AS-i bus is configured using PL7 Micro/Junior/Pro software. The utilities available 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-i slave declared on the bus is assigned a topological address on the bus by the user. This is transparent to the user.
- Each sensor/actuator on the AS-i bus is treated as an in-rack I/O by the Micro/Premium PLC.

AS-i bus configuration

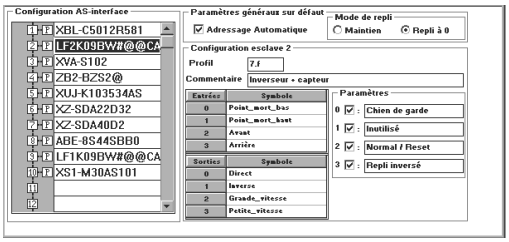
All devices on the AS-i bus are configured implicitly using the following sequence of screens :



Declaration of the AS-i bus master module

- The TSX SAZ 10 module is always inserted and declared in position no. 4 on TSX 37-10 or TSX 37-21/22 PLCs.

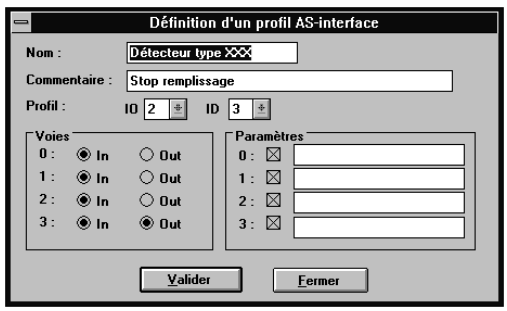
- The TSX SAY 100 module is inserted into any position on TSX P57/T PCX 57 PLCs (except the position reserved for processors and power supply).



Configuration of the AS-i slave devices

Using the configuration screen, it is possible to configure all the slave devices (1 to 31), ie. all 248 I/O. Configuration for each device consists of defining, according to case :

- Groupe Schneider AS-i devices. The user selects the AS-i device reference from the various product families. This selection determines the AS-i profile and the parameters associated with the device.



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

The configuration screen is also used to :

- Associate a symbol with each AS-i input or output (up to 32 characters)
- Define the fallback position of the actuators for all devices (set to state 0 or maintained) should the Micro/Premium PLC stop.

Programming

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

Micro automation platform
Master modules for AS-i bus

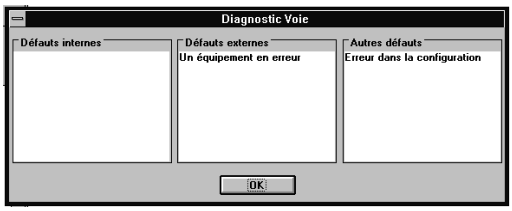
Diagnostics

Diagnostics performed using the centralised display unit on the Micro PLC or using the centralised display unit on the TSX SAY 100 module of the Premium PLC can be completed using an FT2100 terminal or PC compatible with PL7 Micro/Junior/Pro software.

The terminal connected to the Micro/Premium PLC is used for operational diagnostics of the TSX SAZ 10 and TSX SAY 100 master modules, the AS-i bus and the slave devices on the AS-i bus.

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

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



In the event of an AS-i 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.

Specifications

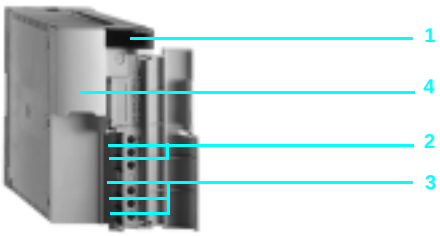
Type of module	**TSX SAZ 10**			**TSX SAY 100**		
Product certifications	AS-i no. 12001, NF C 63-850			AS-i no. 18801, NF C 63-850		
AS-i profile	M2					
Ambient air temperature	Operation : 0…+ 60 °C. Storage : - 25…+ 70 °C.					
Degree of protection	IP 20					
Vibration resistance	Conforming to IEC 68-2-6. Fc tests.					
Shock resistance	Conforming to IEC 68-2-27. EA tests.					
Number of connectable slaves	31 AS-i slaves					
Number of I/O	124 inputs and 124 outputs					
Transfer times (1)	Depending on the PLC master task execution time :					
Execution time	10 ms	30 ms	60 ms	10 ms	30 ms	60 ms
Average transfer time	22 ms	50 ms	80 ms	27 ms	33 ms	45 ms
Maximum transfer time	35 ms	75 ms	135 ms	37 ms	55 ms	80 ms
Bus connection	By terminal block inside module (polarity locating device)			By 3-way SUB-D connector		
Module power supply	Power supply integrated on Micro PLC (~ 100…240 V, ⎓ 24 V)			Power supply integrated on Premium PLC (~ 100…240 V, ⎓ 24 V)		
Display/Diagnostics	Via centralised display unit on Micro PLC or on TSX SAY 100 module and the diagnostics function of PL7 Micro, PL7 Junior and PL7 Pro software.					

(1) Defined as the time between the appearance of an input, its processing by the PLC processor and the activation of an output on the same slave device.

Micro automation platform
AS-i bus power supply module and unit

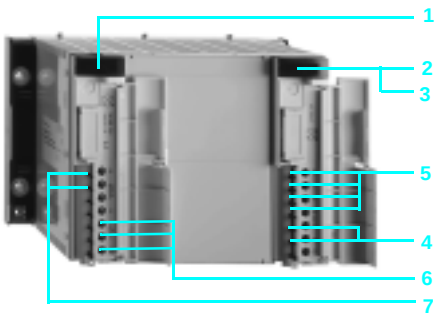
Description

The TSX SUP A02 power supply module and the TSX SUP A05 power supply unit integrate the special filters necessary for the AS-i bus power supply. These elements provide polarisation of the AS-i bus and power the associated sensors (within the limits of available power). These supplies conform to PLC standards (IEC 1131-1 and IEC 1131-2) in terms of radiation, filtering and interference withstand.
The TSX SUP A05 unit also has a ⎓ 24 V output used to supply other elements which may or may not be connected to the AS-i bus (PLCs, sensors, actuators, etc).



TSX SUP A02 power supply module
It comprises:

1 An AS-i indicator lamp (green) indicating that the 30 V supply is present on the AS-i bus.
2 Two screw terminals (AS-i + and AS-i -) to connect the AS-i bus, and one ⏚ terminal to connect the shielding when using a shielded bus cable.
3 Three screw terminals for connection to the network.
4 A primary voltage selector (∿ 110…120 V and ∿ 200…240 V).



TSX SUP A05 power supply unit
It comprises:

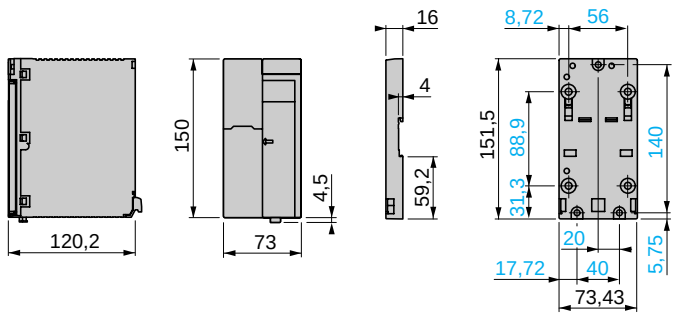
1 An ON indicator lamp (orange), mains supply present.
2 An AS-i indicator lamp (green), 30 V supply present on the AS-i bus.
3 A 24 V indicator lamp (green), 24 V supply present for the auxiliary power supply.
4 Two screw terminals (AS-i + and AS-i -) for connection to the AS-i bus, and one ⏚ terminal to connect the shielding when using a shielded bus cable.
5 Four screw terminals for the ⎓ 24 V output.
6 Three screw terminals for connection to the network.
7 Two terminals to select the primary voltage (∿ 110…120 V and ∿ 200…240 V).

These two power supplies conform to the fixing dimensions of Micro PLCs (TSX SUP A02/SUP A05) and Premium PLCs (TSX SUP A05) which enables them to be mounted independently on rails next to Micro/Premium PLCs or, in the case of the TSX RKY ●● rack of the Premium PLC.

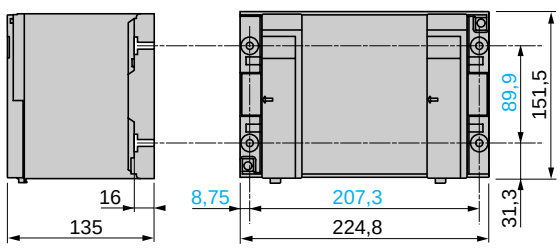
Dimensions

TSX SUP A02
Power supply module

Mounting bracket (provided)



TSX SUP A05
Power supply unit



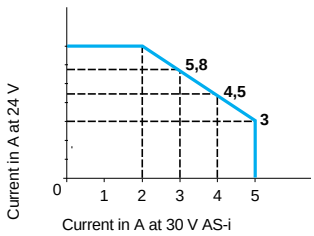
Specifications : page 43612/3
References : page 43612/3

Micro automation platform
AS-i bus power supply module and unit

Specifications

Type of power supply module		TSX SUP A02		TSX SUP A05	
Primary nominal voltage	**V**	∿ 100…120	∿ 200…240	∿ 100…120	∿ 200…240
Primary voltage range	**V**	∿ 85…132	∿ 170…264	∿ 85…132	∿ 170…264
Mains frequency limit	**Hz**	47…63	47…63	47…63	47…63
Maximum time of immunity from micro power cuts	**ms**	10	10	10	10
Secondary nominal voltages	**V**	30 (AS-i bus)		30 (AS-i bus)	24 (process)
Voltage limits	**V**	29.5…31.6		29.5…31.6	24 ± 3 %
Output current	**A**	2.4 at 60 °C (2.8 A peak)		See output currents graph at 60 °C	
Secondary useful power	**W**	72 at 60 °C		See output currents graph at 60 °C	

TSX SUP A05 output currents *(1)*



rms insulation between primary and secondary		**V rms**	3500	
Withstand to electrical fields		**V/m**	10	
Safety extra low voltage (SELV)			Yes	
Emission withstand class			FCC class A	
Conformity to standards	PLC		IEC 1131-1, IEC 1131-2	
	Vibrations		IEC 68-2-6-Fc (2 gn), marine standard IEC 945	IEC 68-2-6-Fc (1 gn), marine standard IEC 945
	Shocks		IEC 68-2-27 (15 gn, 11 ms)	
Temperatures	Operation	**°C**	- 10… + 60	
	Storage	**°C**	- 25… + 70	

(1) The TSX SUP A05 power supply unit is a power supply with constant maximum output. Power not consumed on one output is available to another output. Output current must correspond to the graph shown above.

References

TSX SUP A02

TSX SUP A05

Description	Current at secondary voltages ⎓ 30 V (AS-i bus)	⎓ 24 V	Reference	Weight kg
∿ 100…120 V and ∿ 200…240 V, 50/60 Hz module	2.4 A	–	**TSX SUP A02**	1.050
∿ 100…120 V and ∿ 200…240 V, 50/60 Hz unit	5 A *(1)*	7 A *(1)*	**TSX SUP A05**	2.250

(1) Power supply unit with constant maximum output, see graph above.

Dimensions :
page 43612/2

Micro Automation Platform
Integrated analog channels and analog I/O modules

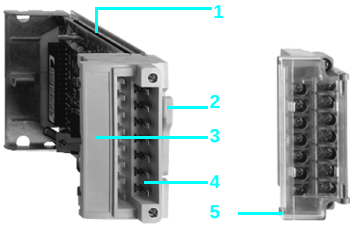
Presentation

Micro PLCs provide three ways of performing analog processing:
- With input half format TSX AEZ ●●● modules, and TSX ASZ ●●● analog outputs modules and TSX AMZ 600 analog I/O installed in the available slots (base or mini extension rack).
- Or by using the analog I/O integrated into TSX 37-22 PLC bases.
- Or by using Nano remote analog I/O extension modules (see pages 43056/3 and 40055/3).
- The maximum number of analog modules in a 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 analog input or output modules are always connected via screw terminal blocks.

Description

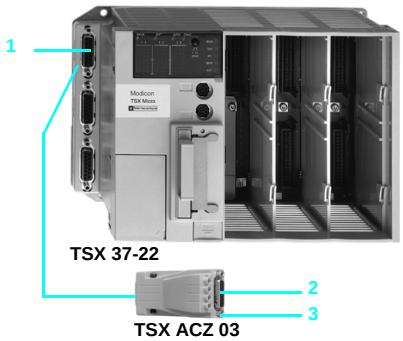
TSX AEZ/ASZ/AMZ analog I/O modules



TSX AEZ/ASZ/AMZ analog 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 analog sensors and actuators.

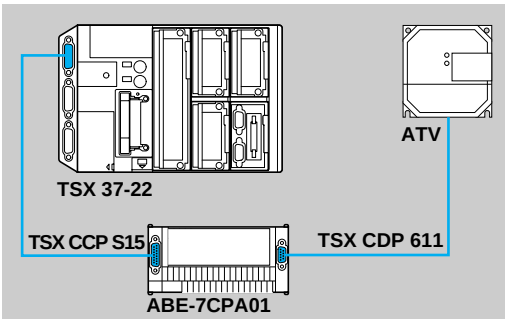
Integrated analog I/O



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 analog sensors/preactuators or the discrete sensors.
3 Potentiometers for adjusting the first 4 input channels.

Connection principle for integrated analog 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 à 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 analog inputs (or 8 ⎓ 24 V discrete inputs with TSX ACZ 03 adaptor module).
- 1 analog output
- 1 ⎓ 10 V reference output for using 4 external potentiometers for the last 4 channels (4.7 kΩ, precision ± 20 % maximum), if required.

A female 9-contact SUB-D type connector enables direct connection of the speed reference for an Altivar 16 type variable speed controller.

Micro Automation Platform
Integrated analog channels and analog I/O modules

Analog I/O modules do not require an external power supply: energy is provided via the 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 analog input modules

These modules (TSX AEZ 801 and TSX AEZ 802) are analog 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 analog input modules are as follows:
- Scanning of input channels used by solid state multiplexing (normal or fast) and acquisition of values.
- Analog/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 analog input modules

The TSX AEZ 414 module is an analog 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 43053/5 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.
- Analog/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 analog output modules

The TSX ASZ 401 module provides 4 common point analog 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 analog output modules are as follows:
- The acceptance of digital values corresponding to analog 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).
- Analog/digital conversion (11 bits + sign) of output values.

Micro Automation Platform
Integrated analog channels and analog I/O modules

TSX AMZ 600 analog 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.
- Analog/digital conversion (11 bits + sign or 12 bits) of input signals.

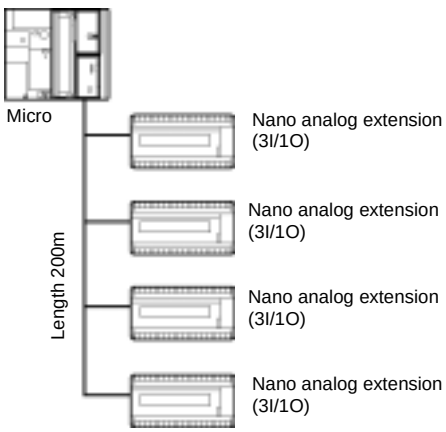
The processing performed by the PLC processor, in addition to the above functions is:
- Monitoring of input overshoots.
- Filtering measurements.
- Converting input measurements to user format for display in directly readable units.

The 2 output channels guarantee the following functions:
- The acceptance of digital values corresponding to analog 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).
- Analog/digital conversion (11 bits + sign) of output values.

Integrated analog 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 analog processing but where the performance criteria and characteristics of an analog input module cannot be justified.

The various functions of integrated analog channels are as follows:
- Scanning of input channels by solid state multiplexing (normal or fast) and acquisition of values.
- Analog/digital conversion (8 bits) and filtering of input measurements.
- Updating the digital output value by the processor.
- Analog/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 analog 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 analog I/O modules (3 input channels/1output channel per module).

For further details, see pages 40055/2 et 40055/3 and pages 43056/2 and 43056/3.

(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.

Micro Automation Platform
Integrated analog channels and analog I/O modules

Specifications of I/O modules

Type of input modules			TSX AEZ 801	TSX AEZ 802	TSX AEZ 414
Number of channels			8	8	4
Input ranges			**± 10 V 0…10 V**	**0 - 20 mA 4...20 mA**	**Thermocouples, temperature probes, high level (see range below)**
Analog/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 43311/2		

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

Analog output module specifications

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/analog 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 43311/2			

(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.

Analog input specifications (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)*	
Analog/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	
							Voltage	**Current**
Maximum error	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 43311/2					

Analog output specifications (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**
Analog/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 43311/2				

Specifications 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 43050/7.*

(2) Output for a maximum of 4 adjustment potentiometers (internal or external).

Micro Automation Platform

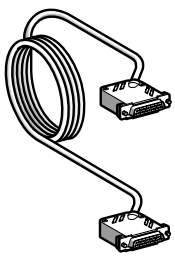
Integrated analog channels and analog I/O modules

TSX AEZ 802

TSX ASZ 401

TSX ASZ 200/AMZ 600

ABE-7CPA01



TSX CCP S15

TSX BLZ H01

Analog input modules

Type of input	Number of channels	Range of of input signal	Resolution	Reference (1)	Weight kg
High level analog 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 analog 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

Analog output modules

Type of outputs	Number of channels	Range of outputs signals	Resolution	Reference (1)	Weight kg
Analog 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

Analog 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 (1)	Weight kg
Adaptation module	Analog 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 analog and counter I/O channels	15-pin SUB-D type connector	**TSX CAP S15**	0.050
Telefast 2 connection base	Integrated analog 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 mm²)	Integrated analog 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 (1)	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 414)	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 and bilingual installation guide: English and French.

Micro automation platform
Process control of semi-continuous processes

Presentation

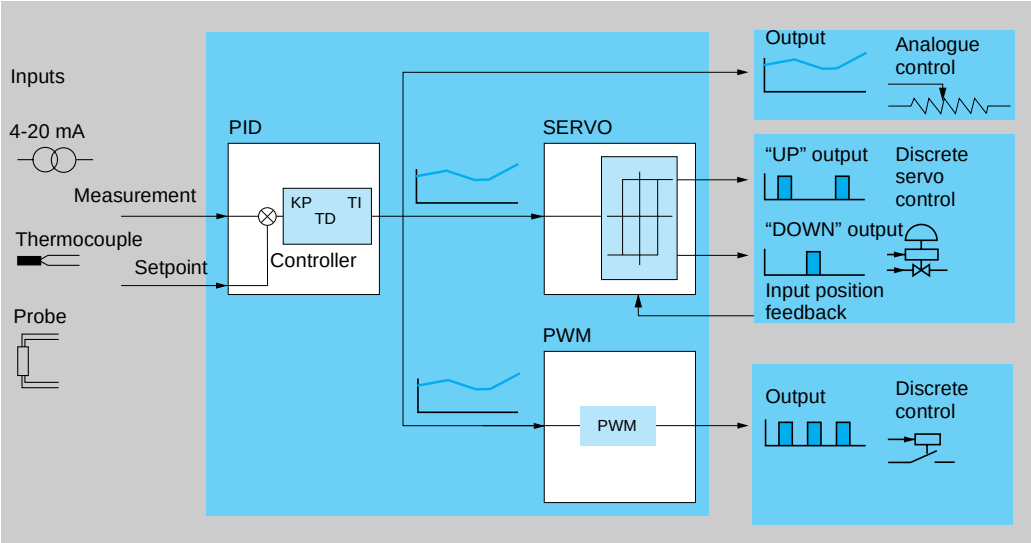
Micro and Premium PLCs have, as standard, process control functions which can be accessed by the user via the PL7 Micro, PL7 Junior or PL7 Pro programming software.

These functions are particularly suitable for:
- Sequential processes requiring auxiliary process control functions, such as wrapping machines, surface treatment machines, presses, etc.
- Simple processes such as metal smelting furnaces, ceramic kilns, small refrigeration units, etc.
- Servo controls or mechanical controls where the sampling period is crucial, such as torque control, speed control, etc.

The variety of analogue input ranges (± 10 V, 4-20 mA, Pt 100, thermocouple, etc) and counter input ranges (incremental encoder, pulse generator, etc) enables them to interface directly with most industrial sensors which take measurements during processes.
The control executed by the process control functions can interface directly with analogue or discrete outputs as required.

Process control function

Control loops are created in a simple and user-friendly manner using 3 functions contained in PL7 Micro/Junior/Pro software :
- The PID function
- The PWM function
- The SERVO function



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 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.

Specfications :
page 43531/3

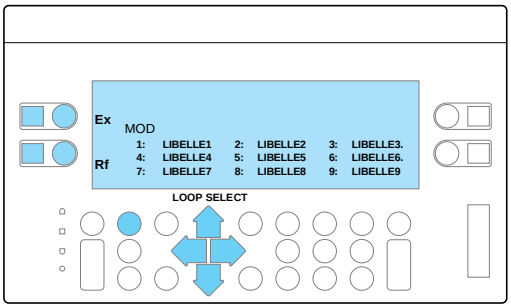
Micro automation platform
Process control of semi-continuous processes

Control and man-machine interface functions

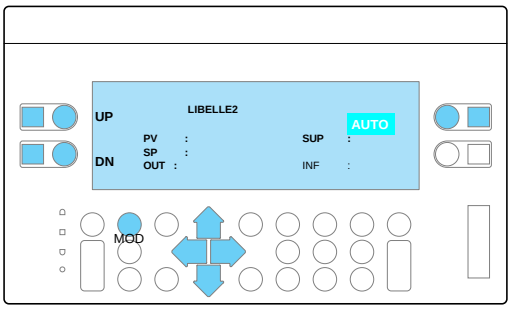
The CCX 17 industrial operator panel displays and controls all the PID controller parameters which can be modified **without having to program the Micro or Premium PLC application program.**

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

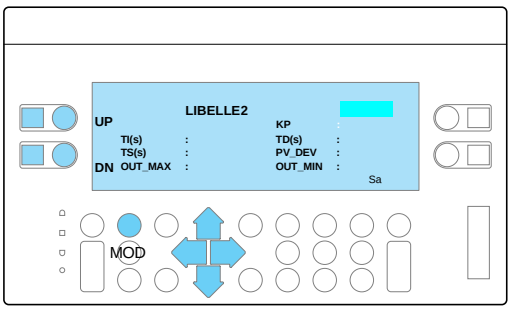
This man-machine interface function is easily installed for any man-machine interface application on the CCX 17 operator panel. The three preconfigured screens enable the required operations to be performed on any PID controller.



PID loop selection screen



PID loop control screen



PID loop adjustment screen

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 Micro or Premium PLC (unconditional call-up).
- A single call-up of the PID_MMI function manages all the PID loops in the Micro or Premium PLC -application.

Specifications

PID function	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**	
		No man-machine interface	Internal RAM	Cartridge		Internal RAM	Cartridge
		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 pulsed outputs							
PWM function	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 function	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

Micro automation platform
Integrated counter channels and counter/positoning modules

Applications	Counter channels integrated in Micro PLCs	
		
Number of channels *(1)*	2 independent channels	2 independent 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 Pôle 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	**Counter channels on discrete inputs**	**Counter channels integrated in TSX 37-22**
Pages	43050/8	

(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

Counter modules for incremental encoder			Positionning module for SSI absolute encoder
			
1 channel	2 independent channel		1 channel
40 kHz	40 kHz	500 kHz	200 kHz or 1 MHz
ask with cycle time = 5 ms)			
Per channel : ⎓ 5/24 V inputs for 1 Totem pôle 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 to 25 bits or ⎓ 5/10/30 V parallel output absolute encoder 8 to 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 to 33 554 431 points)	In modulo mode, 8 to 25 bits (0 à 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 - Capture : 2 capture registers on rising or failling edge of the physiqual inputs
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			
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**
43054/5			43313/5

43054/2).

Micro automation platform
Integrated counter channels and counter modules

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. 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 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 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

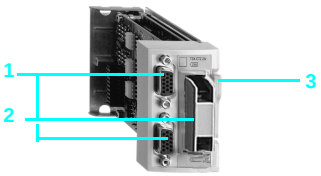
Counter channels (10 kHz) integrated in TSX 37-22 PLCs

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)

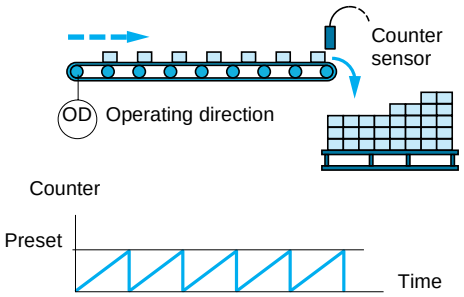
3 Locking system for fixing the module in its slot

Specifications : page 43054/4
References : page 43054/5

Micro automation platform
Integrated counter channels and counter modules

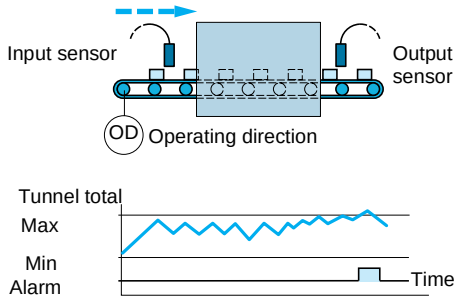
Applications

Example of upcounting or downcounting



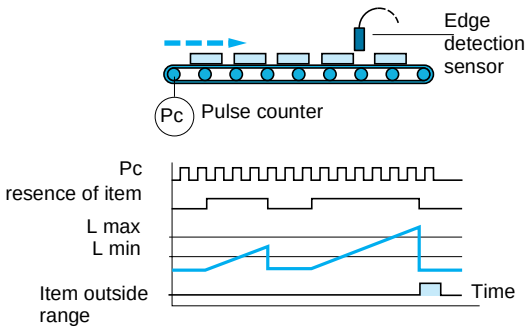
This example shows the grouping of objects supplied by a conveyor belt for packaging.
This simple counting application uses a sensor (proximity sensor, photoelectric sensor) linked to a preset counter. When the preset value is reached the packaging command is activated and the control system initiates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

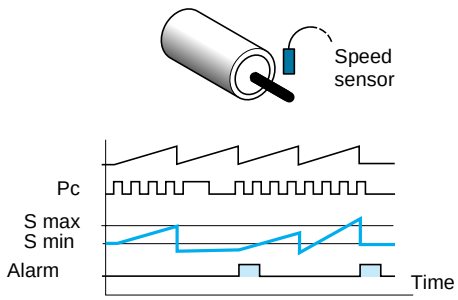
This up/down counting application uses two sensors (proximity sensors or photoelectric sensors) linked to a threshold up/down counter. Each input sensor pulse increments the counter, each output sensor pulse decrements it. Crossing the authorised maximum threshold sets off an alarm.



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.

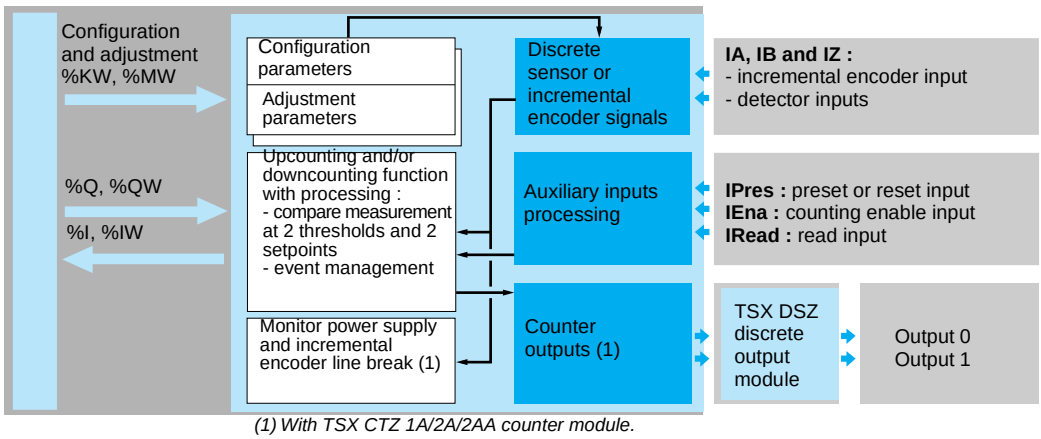
Specifications :
page 43054/4

References :
page 43054/5

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	IEna	IRead	CO
TSX DSZ discrete module	per chan.		(1)		(1) (2)	(2)		
Integrated counting	chan.11				(2)	(2)		
	chan.12				(2)	(2)		
TSX CTZ modules	per chan.				(2)	(2)	(2)	

Physical input available

(1) Input IB can be defined by software configuration in input IPres.
(2) Software input possible.
Counting functions are configured and installed using PL7 Micro or PL7 Junior software (see page 43100/9).

Electrical specifications

Type of counter module/channel			TSX CTZ 1A	TSX CTZ 2A	TSX CTZ 2AA	TSX 37-22	TSX DEZ/DMZ	
Number of channels			1	2	2	2	2	
							⎓ 24 V	∿ 100…120 V
Frequency on counter inputs		**kHz**	40	40	500	10	0.5/0.45 (1)	0.02
Frequency limitation		**Hz**	100, with ⎓ 24 V sensors with mechanical output (limit switches, etc)					
Event processing response time		**ms**	Taking account of an input and positioning of a discrete module output : 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 43311/2					

Input specifications (2)

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	⎓ 24	⎓ 24
	Current	**mA**	18	18	3	8,7	7	10
Limit values	Voltage	**V**	5.5	19…30 (3)	2…5.5	19…30	19…30 (3)	19…30
	At state 1 Voltage	**V**	≥ 2.4	≥ 11	≥ 2.1	≥ 11	≥ 11	≥ 11
	Current	**mA**	> 3.7 (U = 2.4 V) (4)	> 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	< 2	< 1.4
Logic			Positive		Positive		Positive	
Input impedance	for nominal U	**kΩ**	0.270	1.4	0.270	2.7	3.4	2.4
	for U = 2.4 V	**kΩ**	> 0.440 (U = 2.4 V) (5)	–	> 0.270	–	–	–
	RS 422 compatibility							
Response time (immunity when mechanical contacts used)		**ms**	3		4		< 0.250 (6)	0.2…1
Type of input			–	Resistive	–	Current sink	Current sink	Resistive
IEC 1131 conformity			–	Type 2	–	Type 1	Type 2	
Proximity sensor compatibility			–	2-wire/3-wire	–	2-wire/3-wire	2-wire/3-wire	

(1) 0.45 kHz for an incremental encoder with phase-shifted signals.
(2) For characteristics of TSX DEZ/DMZ ●●●● discrete input modules, see page 43051/4.
(3) Up to 34 V for 1 hr in 24 hours.
(4) For TSX CTZ 2AA module : > 6.8 mA (U = 3 V).
(5) For TSX CTZ 2AA module : > 0.350 ký (U = 3V).
(6) For TSX CTZ 2AA module : < 25 µs (state 0 to 1), < 50 µs (state 1 to 0).

Connections :
pages 43054/6 and 43054/7

Micro automation platform
Integrated counter channels and counter modules


TSX CTZ 1A


TSX CTZ 2A/2AA

Counter modules

Counter modules

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

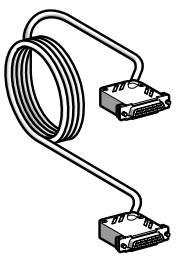

ABE-7H16R20

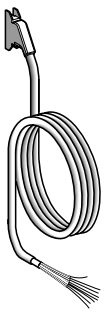

TSX TAP S15 ●●

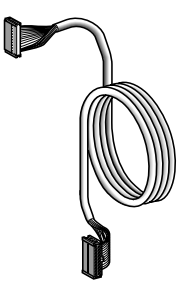
Connection cables

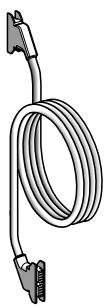
Description	From	To	Length	Reference	Weight kg
Cable (cross-section 0.205 mm²)	Integrated counter (15-way SUB-D connector)	ABE-7CPA01 sub-base (15-way SUB-D connector)	0.5 m	**TSX CCP S15 050**	0.110
			1 m	**TSX CCP S15 100**	0.160
			2.5 m	**TSX CCP S15**	0.300
	TSX CTZ ●A module counter sensors or encoder (high-density 15-way SUB-D connector)	ABE-7CPA01or 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 max)	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 max)	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 max)	Auxiliary inputs, ⎓ 24 V power supply and ⎓ 5 V/10…30 V encoder power supply (moulded 20-way HE 10 connector)	ABE-7H08R10/16R20 Telefast 2 sub-base (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 CDP503**	0.670

(1) Product supplied with bilingual installation guide : English and French.


TSX CCP S15


TSX CDP ●01


TSX CDP ●02


TSX CDP ●03

Specifications : page 43054/4

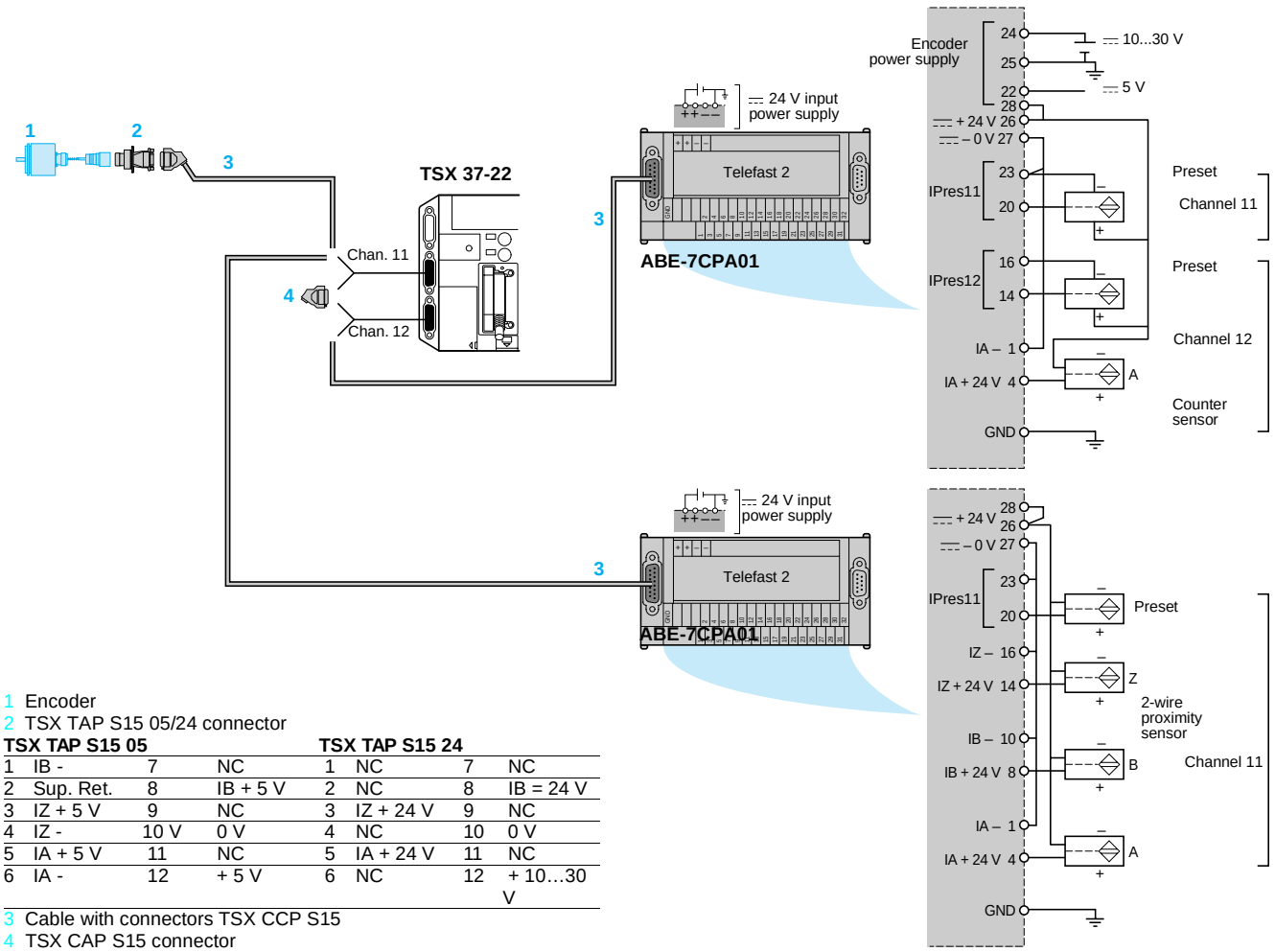
Connections : pages 43054/6 and 43054/7

Micro automation platform
Integrated counter channels and counter modules

Connections

Connection to integrated counter channels

Connection examples for counter and auxiliary inputs



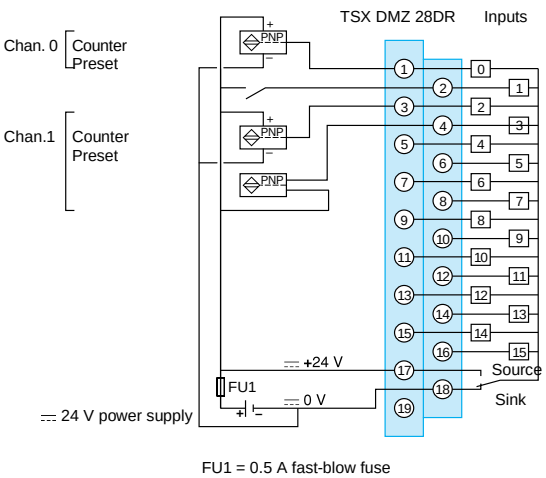
1 Encoder
2 TSX TAP S15 05/24 connector

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 V	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

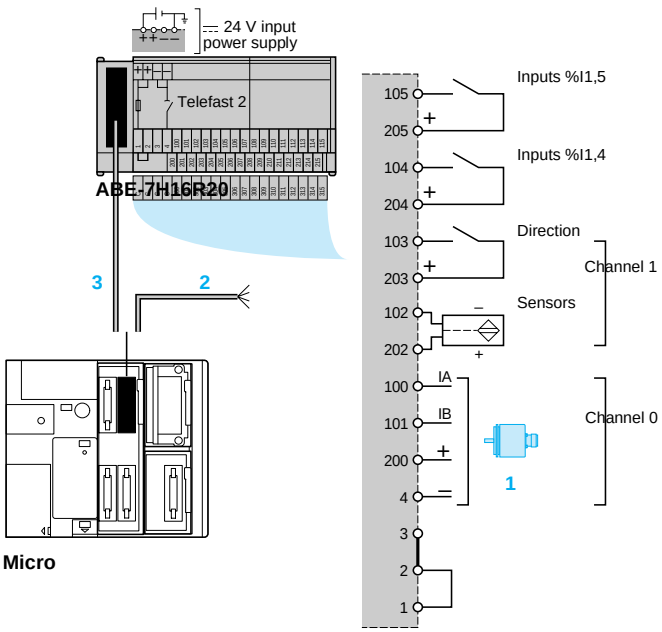
Connection to TSX DEZ/DMZ discrete input module

Example of connecting inputs to TSX DMZ 28DR



FU1 = 0.5 A fast-blow fuse

Example of connecting inputs to TSX DMZ 64DTK

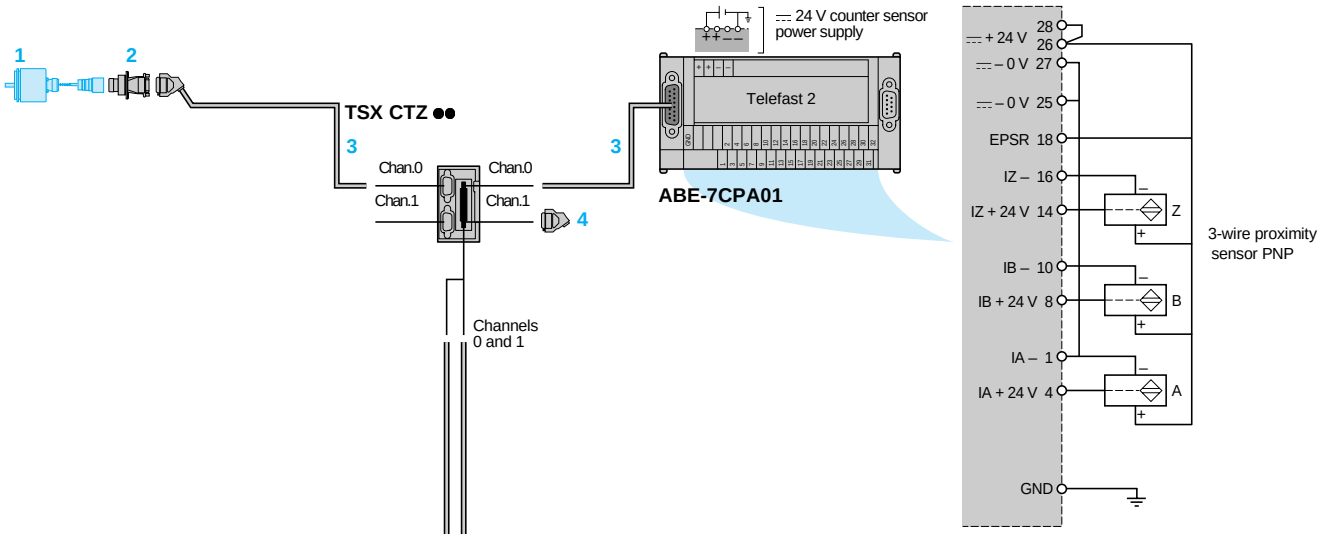


1 Encoder
2 Cable with connectors TSX CDP●●1
3 Cable with connectors TSX CDP●●2 or TSX CDP ●●3

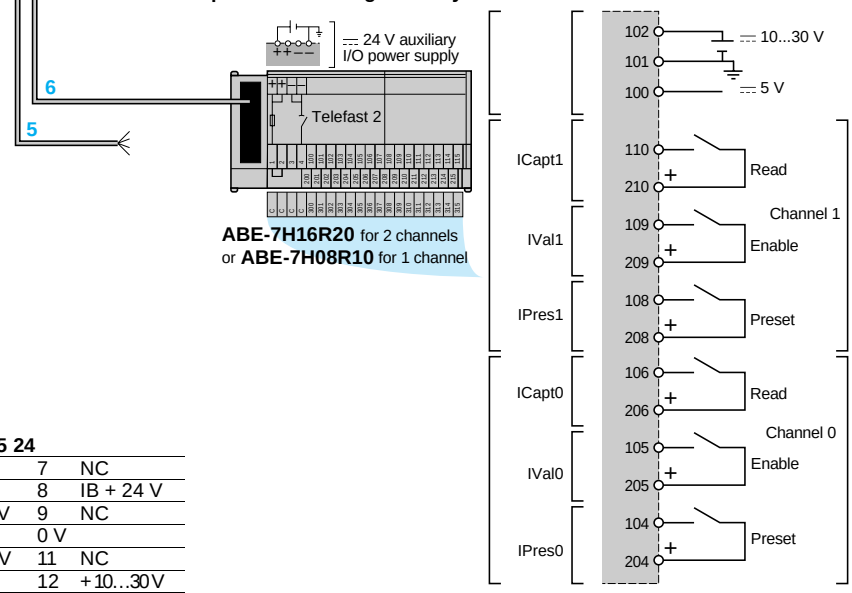
Specifications : page 43054/4
References : page 43054/5

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

Example of connecting counter inputs



Example of connecting auxiliary I/O



1 Encoder
2 TSX TAP S15 05/24 connector

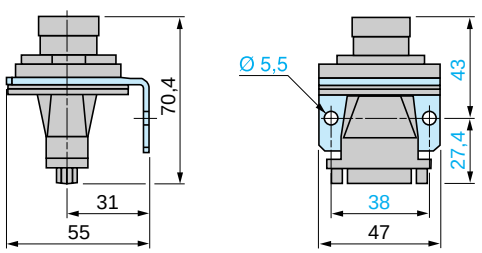
TSX TAP S15 05			
1	IB -	7	NC
2	Sup. Ret.	8	IB + 5 V
3	IZ + 5V	9	NC
4	IZ -10	0 V	4
5	IA + 5 V	11	NC
6	IA -	12	+ 5 V

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

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 or TSX CDP ●●3

Dimensions

TSX TAP S15 ●●



Mounting through enclosure (dust and damp proof)
- cut-out Ø 37
- panel with 5 mm maximum

Specifications : page 43054/4
References : page 43054/5

Micro automation platform
TSX CTZ 1B absolute encoder positioning module

Presentation

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

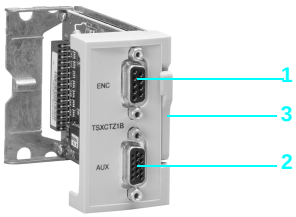
This type of module allows for the following and actual positioning of a moving object, including after a loss of power. This characteristic, linked to the absolute encoder is used to simplify the installation of positioning applications. It also simplifies the input interfaces by suppressing homing,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

Depending on the model, the 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 Micro PLC (see page 43054/2).

Description



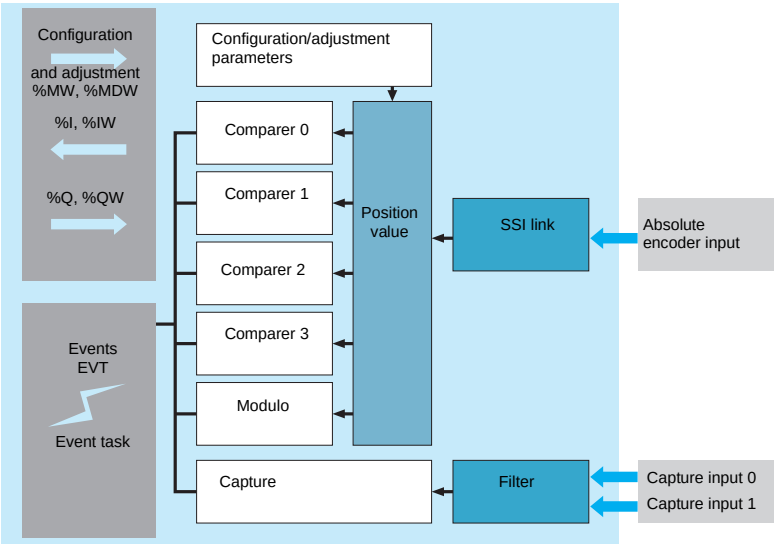
The front panel of the TSX CTZ 1B half-size positioning module (1 channel) includes:

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.

3 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 Micro PLC receiving the module should be equipped with the operating system version ⩾ 5.0.

Specifications: page 43313/3
References: page 43313/4
Connections: 43313/5

Micro automation platform
TSX CTZ 1B absolute encoder positioning module

Electrical specifications

Module type			TSX CTZ 1B	
Channel number			1	
Positioning input				
	Voltage	⎓ **V**	5, 10...30	
	SSI absolute encoder			
	Number of bits		8 to 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 specifications

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 status 1 Voltage	**V**	> 11
	Current	**mA**	> 3 (U = 11 V)
	At status 0 Voltage	**V**	< 5
	Current	**mA**	< 1.5
Input impedance		**k ohms**	3
Acceptance time			
	0 to 1 status	**µs**	< 50
	1 to 0 status	**µs**	< 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 status 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 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

Description: page 43313/2 References page 43313/4 Connections: page 43313/5

Micro automation platform
TSX CTZ 1B absolute encoder positioning module

Positioning module for absolute encoder

TSX CTZ 1B

Input type	Specifications	Channel number	Reference *(1)*	Weight kg
Parallel or serial absolute SSI encoder *(2)* ⎓ **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. *(3)*	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 to 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. *(3)*	Reference	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

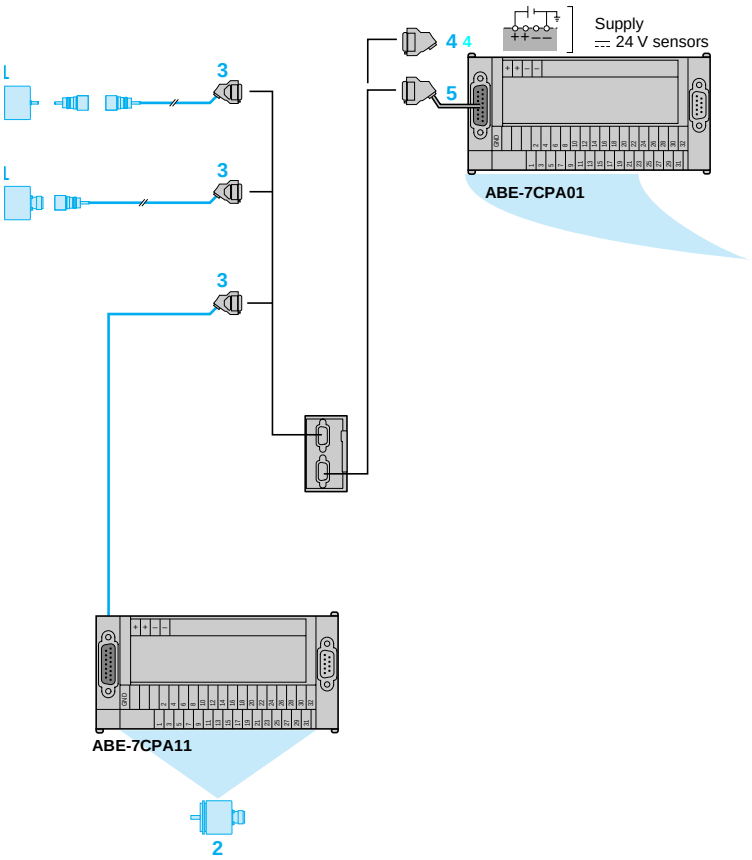
(1) Product supplied with multi-lingual service instructions: French and English.
(2) Absolute encoder with parallel outputs and ABE-7CPA11 adaptation base. This base is used to multiplex up to 44 absolute encoders on the encoder input of the TSX CTZ 1B module.
(3) Addresses, see page 43313/5.

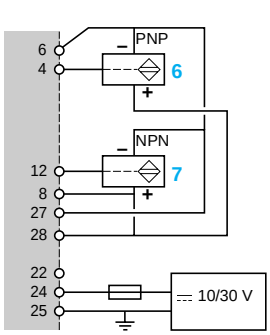
Description: page 43313/2 Specifications: page 43313/3 Connections: page 43313/5

Micro automation platform
TSX CTZ 1B absolute encoder positioning module

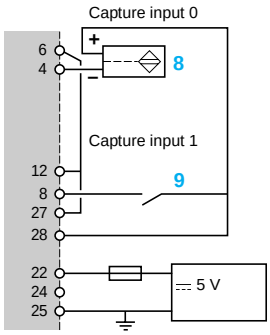
Connections to the TSX CTZ 1B module

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

Description:
page 43313/2

Specifications:
page 43313/3

References:
page 43313/4

Micro automation platform
Process power supply units and modules

Description

TBX SUP 10 and TSX SUP 1●●1 power supply units and modules are designed to provide ⎓ 24 V power to control system peripherals (sensors, preactuators, encoders, MMI terminals, regulators, indicator lamps, pushbuttons, pneumatic cylinders, mini PLC extension rack, etc). These supplies are connected to a ∿ 100...240 V, 50/60 - 400Hz a.c. supply or ⎓ 125 V d.c. supply, see characteristics below.
The power supply provided ranges from 24 W (24 V/1 A) to 240 W (24 V/10 A). The TSX SUP 1●●1 power supply outputs are safety extra low voltage (SELV) and can be wired in parallel with a device for optimising the power. TSX SUP 1011/1021 models can operate in redundant mode thus ensuring greater availability of safety control systems. These power supplies conform to PLC standards IEC 1131-2 for immunity and resistance to interference and EN 50081-2 for radiated interference.

TSX SUP 1011/1021/1051 process power supply modules
These comprise :
1 A support plate for fixing the module
2 A display block comprising a 24 V (green) indicator lamp which is on if the internal and output voltages are correct, and an LSH power optimization mode (orange) indicator lamp for TSX SUP 1011/1021 power supply modules only
3 A cover for protecting the terminal block
4 A screw terminal block for connection :
- to the mains supply
- of the ⎓ 24 V output

5 A space for the insertion of the cable clamp
6 A 110/220 V voltage selector (TSX SUP 1021/1051 modules only)
7 A NOR/LSH switch located at the rear of the module for controlling the power optimization device (TSX SUP 1011/1021 power supply modules only)

TSX SUP 1101 process power supply unit
The front panel comprises :
1 A display block comprising an ON (orange) indicator lamp which is on if the module is powered up
2 A display block comprising a 24 V (green) indicator lamp which is on if the ⎓ 24 V output voltage is present and correct
3 A cover for protecting the terminal block
4 A screw terminal block for connection to the a.c. supply
5 A screw terminal block for connection to the ⎓ 24 V output voltage
6 A space for the insertion of the cable clamp
7 Four holes for fixing the module

Specifications

Type of power supply module		TBX SUP 10	TSX SUP 1011	TSX SUP 1021	TSX SUP 1051	TSX SUP 1101
Nominal input voltage	**V**	∿ 100…240 or ⎓ 125		∿ 100…120/200...240		
Input voltage limit	**V**	∿ 90…264 or ⎓ 88…156	∿ 85…264 or ⎓ 105…150	∿ 85…132/170...264		
Accepted micro-break period *(1)*	**ms**	≤ 10 for ∿, ≤ 1 for ⎓		≤ 10		
Mains supply frequency	**Hz**	47…63	47…63/360...440			
Nominal input current	**A**	0.4		0.8	2	3.5
Maxi. inrush current *(2)* at 240 V	**A**	30	75	38	75	
Maximum I^2t value *(2)* at 240 V	**A^2S**	2	2.6	2	3.9	8.5
Power factor		0.6				
Efficiency at full load	**%**	> 75			> 80	
Useful power *(3)*	**W**	24	26 (30)	53 (60)	120	240
Nominal output current at 60 °C	**A**	1	1.1	2.2	5	10
Output voltage (0 to 60 °C)	**V**	24 ± 5 %	24 ± 3 %			
Protection against short-circuits		Continuous/ automatic resetting	Fallback to 0 and automatic reset on disappearance of fault		Current limit	
Protection against overvoltages	**V**	Peak limiting U > 36			Peak limiting U > 32	
Prim./second. dielectric withstand		1500 V rms 50/60 Hz-1 min	3500 V rms 50/60 Hz-1 min (user safety SELV conforming to EN 60950 and IEC 1131-2)			
Electromagnetic interference		Class A in accordance with EN 55022 and conforming to FCC 15-A				
Degree of protection		IP 205	IP 205, terminal block IP 215			
Cooling		By natural convection				
Parallel connection		No	Yes with power optimization (2 maximum)			
Series connection		No	Yes (2 maximum)			

(1) Nominal voltage for a repetition period of 1 Hz.
(2) 25 °C on initial power up. These values must be taken into account when starting in order to size the protective devices.
(3) For an ambient temperature of 60 °C. Useful power given in ( ) for a fan-cooled enclosure or a temperature range of 0 to 40 °C.

References : page 43560/3
Dimensions : page 43560/3

Micro automation platform
Process power supply units and modules

TBX SUP 10

TSX SUP 1011 *TSX SUP 1021/1051*

TSX SUP 1101

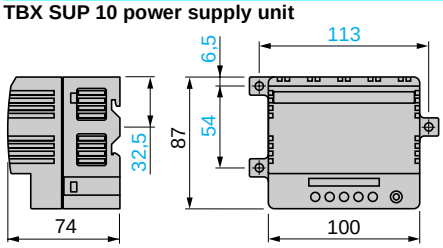
References

Description	Output Voltage V	Rating A	Parallel connection	Reference	Weight kg
Unit ∿ 100…240 V, 50/60 Hz and ⎓ 125 V	⎓ 24	1	No	**TBX SUP 10**	0.290
Module ∿ 100…240 V, 50/60 - 400 Hz and ⎓ 125 V	⎓ 24 SELV	1.1	Yes	**TSX SUP 1011** *(1) (2)*	0.720
Modules ∿ 100…120 V and ∿ 200…240 V, 50/60 - 400 Hz	⎓ 24 SELV	2.2	Yes	**TSX SUP 1021** *(1) (2)*	1.090
		5	Yes	**TSX SUP 1051** *(1) (2)*	1.120
Unit ∿ 100…120 V and ∿ 200…240 V, 50/60 - 400 Hz	⎓ 24 SELV	10	Yes	**TSX SUP 1101** *(1)*	2.100

(1) Product supplied as standard with a bilingual quick reference guide : English and French.
(2) Mounted in TSX RKY 6/8/12/6E/8E/12E racks (any slot except the slot for TSX PSY●●0M power supply modules), on AM1-DE200/DP200 rails or on AM1-PA mounting plate.

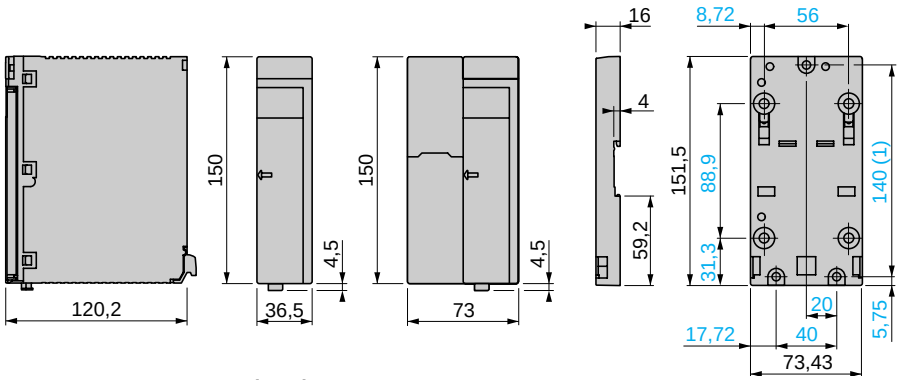
Dimensions, mounting

TBX SUP 10 power supply unit



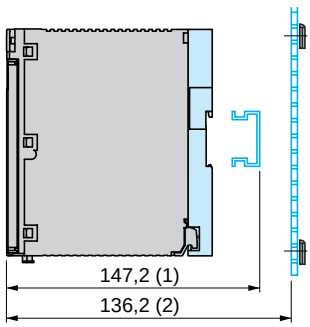
Power supply modules

TSX SUP 1011 **TSX SUP 1021/1051** **Mounting support** (supplied)



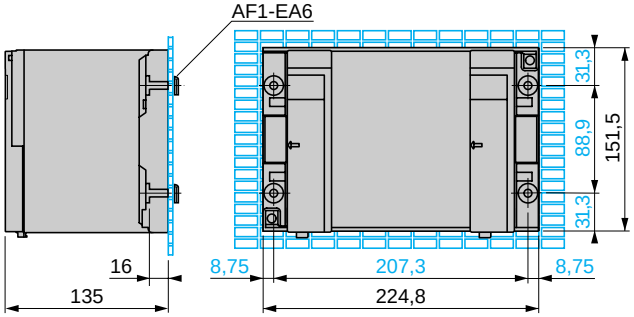
(1) Distance between centres compatible with Micro PLC

Mounted on AM1-DE200 or AM1-DP200 rail or on AM1-PA mounting plate



(1) 139.7 mm with AM1-DP200 rail
(2) Mounted on AM1-PA mounting plate

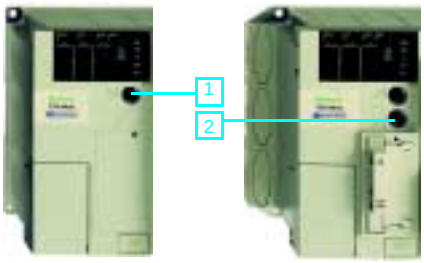
TSX SUP 1101 power supply unit
(mounted on AM1-PA mounting plate)



Characteristics:
page 43560/2

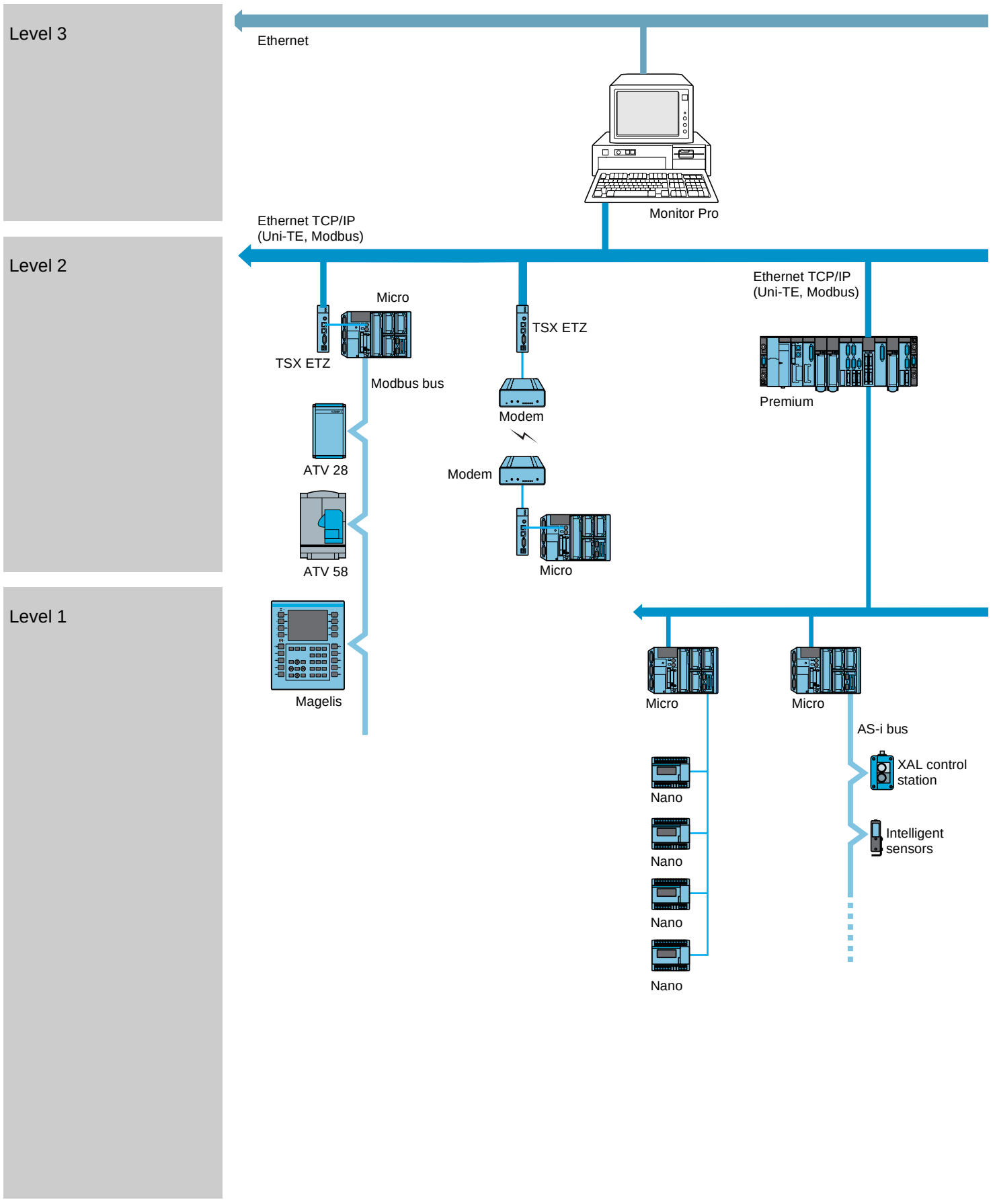
Micro automation platform
Bus and network modules

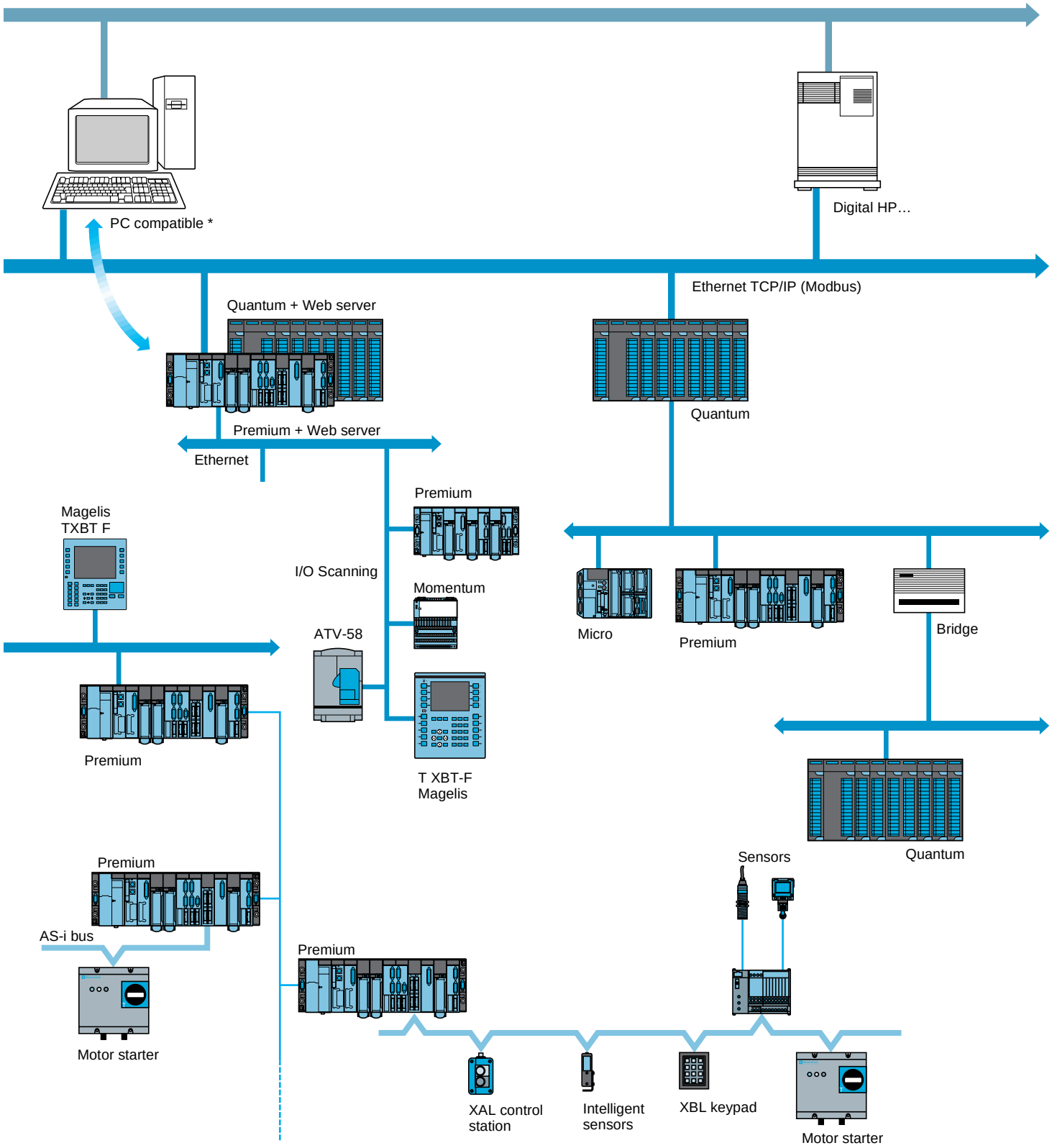
Applications		Local area network conforming to TCP/IP standard	Local area network conforming to Modbus Plus standard	Local area network/open industrial fiedbus conforming to Fip standard	
					
Types of bus and network		**Ethernet TCP/IP or RS 232 Modem (PPP)**	**Modbus Plus**	**Fipway**	**Fipio (Agent)**
Structure	Physical Interface	10/100baseT (RJ45)	Modbus Plus standard	Fip standard	
	Access method	CSMA-CD	Rotating token	Bus managed by bus arbitrator	
	Rate	10/100 Mbps	1 Mbps	1 Mbps	
Medium		Double twisted shielded pair	Twisted pair Fiber optic	Twisted pair Fiber optic	
Configuration	Maximum number of devices	64	32 per segment over 64 segments	32 per segments over 64 segments	over 128 segments
	Maximum length	100 m max. between hub and terminal device	450 m per segment 1800 m with 3 répeaters	1000 m per electrical segment 500 m max.	From1000 to 15,000 (depending on the médium use)
	No. of links/station	1 maximum	1 maximum	1 maximum	
Services		- TCP/IP ou PPP: Messagerie Uni-TE or Modbus - Server service BOOTP/DHCP - SNMP Agent service - Communication tranparency 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	- Uni-TE - Application-to-application - COM/shared table - Telegram	- Periodic data exchange - Transparent exchange of remote I/O
Type of processor		TSX 37-10/21/22 PLC bases	TSX 37-21/22 PLC bases		
Nature of module		Independent module	Type III PCMCIA card		
Type of module		**TSX ETZ 410/510**	**TSX MBP 100**	**TSX FPP 20**	**TSX FPP 10**
Pages		43312/11	43599/3	43593/3	

Multicomponent industrial buses				Open industrial fieldbus conforming to AS-i standard
				
Character mode, Uni-Telway, Modbus		**Character mode, Uni-Telway, Modbus**		**AS-i**
RS 485 non-isolated RS 485 isolated via TSX P ACC 01 (compulsory for Modbus)		RS 232 D	RS 485 isolated 20 mA CL	AS-i standard
Master/Slave *(1)*		Master/Slave		Master/Slave
1.2...19.2 Kbps		0.6...19.2 Kbps	1.2...19.2 Kbps	167 Kbps
Double shielded twisted pair				2-wire AS-i cable
5 with Uni-Telway 28 with Modbus		Point-to-point	28 / 16	31 sensor/actuator devices
10 m for non-isolated RS 485 1300 m without tap links for isolated RS 485		15 m	1000 m / 1300 m	100 m 200 m with repeater
1 maximum		1 maximum		1 maximum
Uni-Telway: - Uni-TE 128-bytes msg handling server (Client/Server) - 128-bytes application-to-application - All devices on an X-Way architecture transparent via the master Master/Slave Modbus *(1)* RTU: - Read/write bits and words - Diagnostic		Uni-Telway: - Uni-TE 240-bytes msg handling server (Client/Server) - 240-bytes application-to-application - All devices on an X-Way architecture transparent via the Modbus master Modbus: - Master/Slave RTU ou ASCII - 13 Modbus functions		Transparency of exchanges with sensor/actuator devices
TSX 37-05/08/10 PLC bases	TSX 37-21/22 PLC bases	TSX 37-21/22 PLC bases		TSX 37-10/21/22 PLC bases
Uni-Telway, Modbus Master/Slave *(1)* integrated link		Type III PCMCIA card		Module to be inserted in slot 4
Integrated link **TER** *(2)* terminal port	Integrated link **AUX** *(3)* terminal port	**TSX SCP 111**	**TSX SCP 114** / **TSX SCP 112**	**TSX SAZ 10**
43050/13		43594/6, 43595/3 and 43596/3		42718/3

(1) Modbus Slave only with TSX 37-05/08. (2) TER port common with programming and adjustment terminal. (3) TER available for programming and adjustment terminal.

Micro automation platform

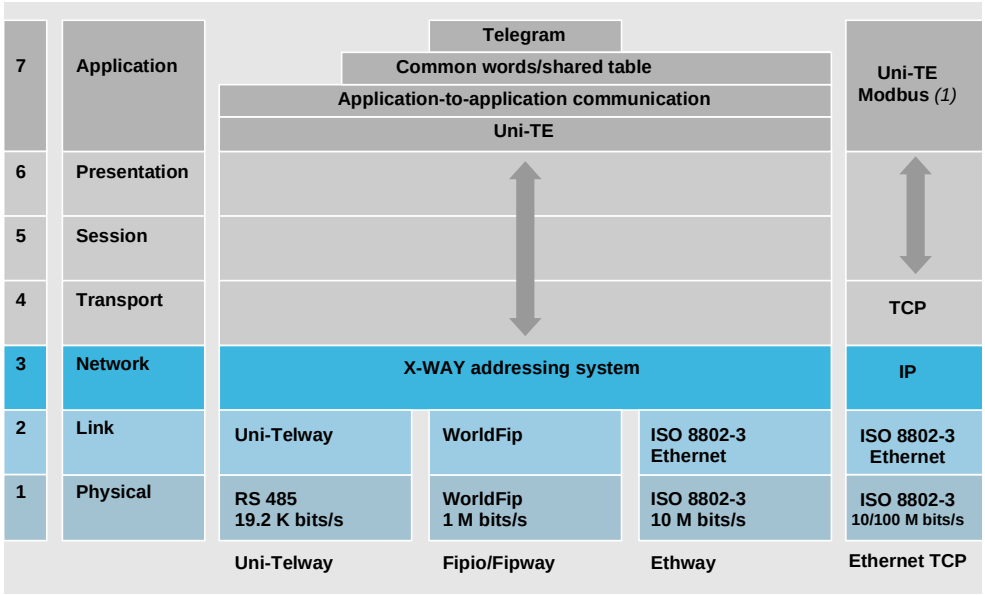




* “Thin Client” compatible PC: PC having only Windows and an Internet browser, see page 43601/6.

Micro Automation Platform
X-WAY communication

The International Standard Organization (ISO) has created a reference model for communication structures, divided into seven essential functions. Entitled OSI (Open Systems Intercommunication), it enables open systems to be connected together thus ensuring that products will operate together. The communication architecture of Micro/Premium PLC platforms, shared with that of TSX 17 or TSX/PMX model 40 PLCs, conforms to the OSI model.



Physical layer

Ensures the physical transmission of data signals between 2 systems via a medium.

- Uni-Telway is an isolated bus conforming to the RS 485 standard, with a standard data rate of 19.2 K bps.
- Fipway conforms to the WorldFip standard, and is a 1 M M bps baseband bus.
- Fipio conforms to the WorldFip standard, and is a 1 M bps baseband bus.
- Ethernet TCP/IP and Ethway (not available on Micro), conforms to standard 8802-3 and is a 10/100 M bps baseband bus.

Data link layer

Ensures organized data transfer between two adjacent systems with error detection and correction.

- Uni-Telway: a fixed master manages access to the multidrop bus.
- Fipway conforms to the WorldFip standard with access via bus arbitrator.
- Fipio conforms to the WorldFip standard with access via bus arbitrator.
- Ethernet TCP/IP and Ethway (not available on Micro) conform with CSMA/CD bus (Carrier Sense Multiple Access with Detection Collision) ISO 8802-2/8802-3 standards.

Network layer

Provides for the routing of data and the selection of a path between 2 devices.
The addressing mechanism enables the transfer of data between products and ensures automatic and totally transparent routing of messages.

Layer transport

Provides reliable data exchanges on the connected device's connections.

Layer application

Concerns application programs, data exchange and cooperation conventions.

- **Uni-TE industrial message handling system**: this standard system for all Schneider Group equipment enables read and write access to variables, program transfers, management of equipment operating modes, link and device diagnostics and transmission of unsolicited data.
- **COM distributed database**: set of words shared by several devices and updated cyclically. This service is used to exchange data between TSX 17, Micro, Premium and TSX/PMX model 40 PLCs.
- **Shared table service** *(2)*: set of words shared between several Micro and Premium PLCs and updated cyclically.
- **Exchange of periodic data**: data updated cyclically between the bus manager PLC (TSX/PMX model 40, April 5000/7000 or Premium) and the Agent device. This service is available on the Fipio bus (see page 43593/2).
- **Application-to-application communication**: suitable for data table exchanges.
- **Telegram** (not available on Micro): priority application-to-application communication for short and priority exchanges.
- **Other services**: on Ethernet TCP/IP, services other than X-Way are available (I/O Scanning, Web server launched). See page 43312/6.

(1) The Modbus application service is outside X-Way communication.
(2) The shared table service is only available on the Fipway network. The COM distributed database service and the Shared Table service are mutually exclusive.

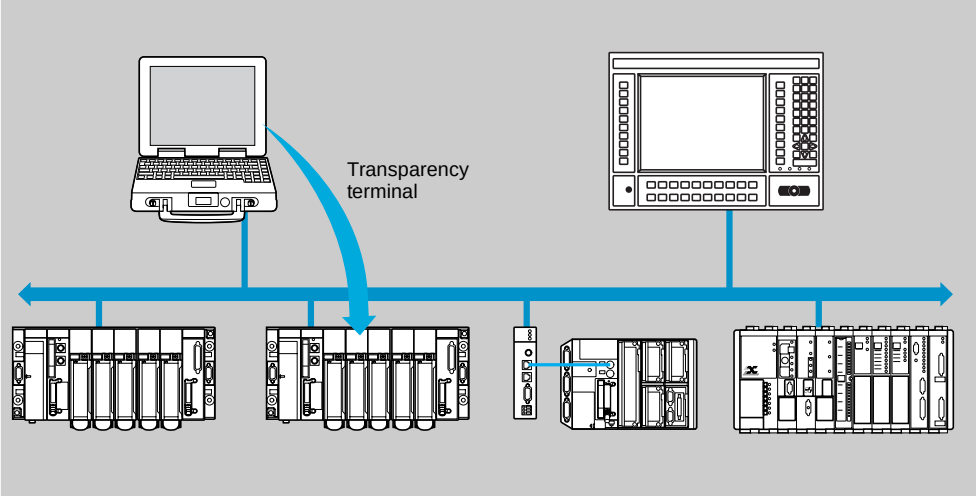
Micro Automation Platform
X-WAY communication

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 transmits an order (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 device can access the system functions of a PLC (Server), even if there is no application program, to: read/write language objects (bits, words, etc) upload/download programs, stop or start, etc.

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.
Uni-TE requests are transmitted using:
- Communication function library for Micro/Premium PLCs.
- TXT text function blocks or OFB function blocks for TSX/PMX model 40 and TSX 17-20 PLCs.

The Uni-TE request is transmitted at the end of the master task, and the response is received by the Client PLC at the start of the master task.

The Uni-TE utility is particularly suitable for supervision, diagnostic and control functions.

Uni-TE service	Ethernet TCP/IP, Ethway *(1)*	Fipway	Fipio	Uni-Telway
Request size	256 bytes or 1 Kb	128 bytes	128 bytes	240 octets *(2)*

Note:
The Uni-TE service can be used between stations connected on different Ethernet TCP/IP, Fipway, Fipio or Uni-Telway segments of the same multi-network architecture (please consult our specialist catalogue no. 42614).

Terminal transparency

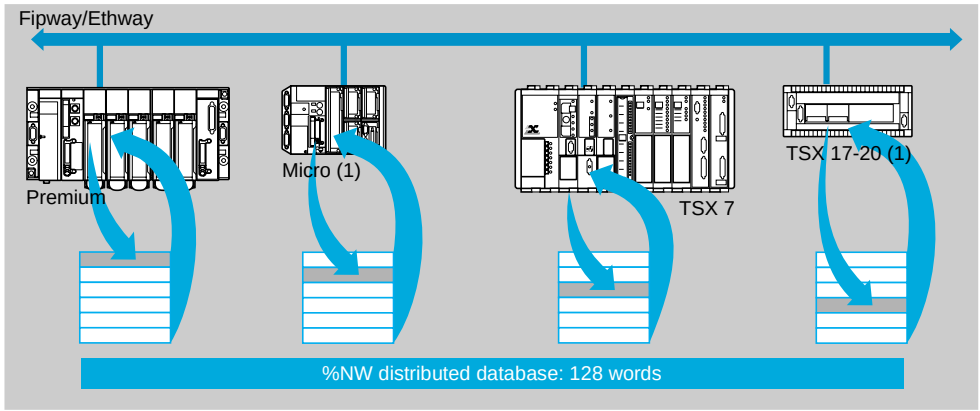
The programming terminals or TC2000 industrial PCs are Uni-TE clients. A terminal connected to any network station, or connected directly to the Fipway/Ethernet TCP/IP network, can communicate with any other station on the network (all the exchanges are transparent to the user) as though the terminal were physically connected to the PLC with which it establishes communication.

Terminal transparency can be used between stations connected on different Ethernet TCP/IP, Fipway, Fipio segments of the same multi-network architecture.

(1) Ethway is not available on Micro and TSX 17-20 PLCs. 256 bytes for synchronous requests and 1 K byte for requests processed as a background task.
(2) Size limited to 128 bytes on Micro/Premium terminal port, TSX/PMX 40 models. Size limited to 32 bytes on TSX 17-20 and TSX 47-20/25.

COM service: Distributed database

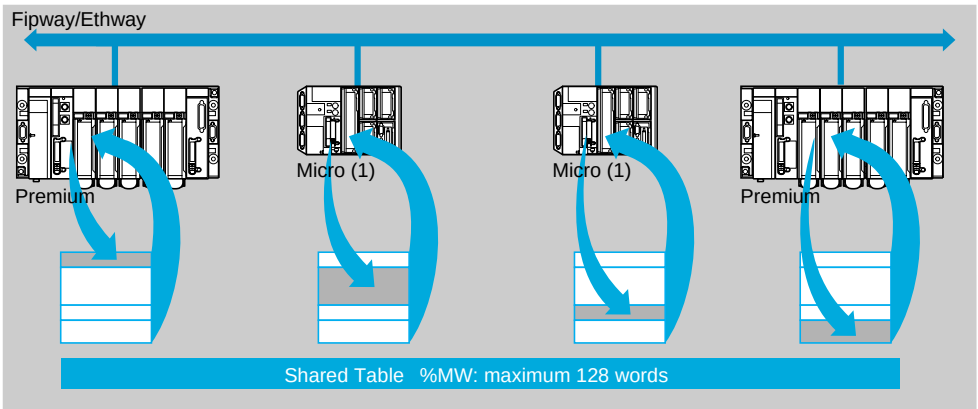
The COM service, available on the Fipway/Ethway *(1)*, network, consists of a set of dedicated words known as common words (%NW on Micro/Premium PLCs and COM i, j, k on TSX 17-20 and TSX/PMX model 40 PLCs). Depending on its software configuration, each network station may or may not access the database (in read only or read/write mode).
All PLC stations exchanging common words (maximum 32 stations) are allocated, in a dedicated 128- word database, a write field which is set at 4 words per Micro/Premium station*(2)*.



The COM words in a PLC are updated automatically during each scan of the general sequence (master task) with no intervention by the application program: at the start of the scan for reading and at the end of the scan for writing. The user program consists simply of assigning or reading these common words (%NW). As the COM service has a field of dedicated and preconfigured words, there is absolutely no risk of conflict of data between or within PLCs.

Shared Table service

This service exchanges a table of internal words %MW divided into as many zones as there are 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 other PLCs on the network.
Each network station is allocated an exchange table comprising %MW internal words.
The maximum characteristics of the exchange table are:
128 %MW internal words for 32 PLCs sharing the Shared Table service on the network.
Broadcast zone assigned to each PLC: variable from 1 to 32 %MW internal words (the size of the broadcast zone assigned to PLC **n** should be the same length in all the PLCs on the network sharing this service).



The exchange table in each PLC is updated automatically and independently of the program scan cycle. The user program consists of simply assigning or reading words %MW in the broadcast zone. The user must take care, when configuring and assigning broadcast zones, not to create memory conflicts between or within PLCs.

Available service	Ethernet TCP/IP	Ethway	Fipway	Fipio	Uni-Telway
COM	–	yes *(1)*	yes	–	–
Shared table	–	–	yes *(3)*	–	–

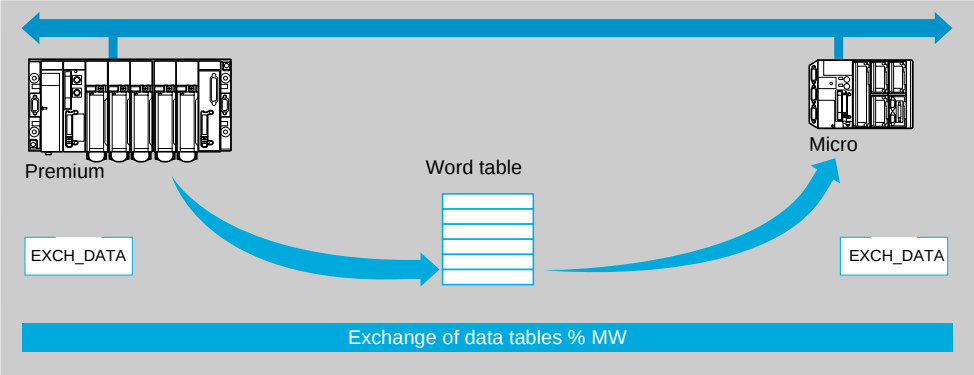
These services are mutually exclusive and are recommended for the periodic broadcasting of status variables without loading the application program. For transmission of events, application-to-application communication with confirmation is more suitable.
Note: The COM service or Shared Table service remains local to a Fipway network. Each network has its own distributed database. The Shared Table service is only available on Micro and Premium PLCs.

(1) This service is not available on the Micro and TSX 17-20.
(2) 0 or 4 common words for TSX model 40 stations with address 0 to 31 or for TSX 17-20 stations with address 0 to 15.
(3) This service is not available on the Micro and TSX 17-20.

Application-to-application communication

This consists of sending word tables between 2 devices using the user application program.
For the following types of PLC:

- Micro/Premium, transmission and/or reception is via the DATA_EXCH text type data exchange function.
- TSX 17 and TSX/PMX model 40, transmission and/or reception is via a TXT text block or an OFB Uni-TE function block.



The application-to-application communication 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.

Service	Ethernet TCP/IP	Ethway *(1)*,	Fipway	Fipio	Uni-Telway
Size of application/ application messages	256 bytes	256 bytes	128 bytes	128 bytes	240 bytes *(2)*

Note:
The application to application messaging service can be used between stations connected on different Ethway, Ethernet TCP/IP, Fipway, Fipio or Uni-Telway networks on the same multi-network architecture.

Telegram

The telegram service available with Fipway is a special case of application-to-application messages. It enables short messages to be transmitted and received on a priority basis. The maximum size of messages transmitted via telegram is 16 characters.
A telegram from a Micro/Premium PLC is transmitted immediately by the SEND_TLG transmission function (without waiting for the end of the scan). A telegram is received by Micro/Premium PLCs using the RECEIVE_TLG reception function in:

- The event-triggered task (processed as soon as the message is received in the network card).
- The fast task or master task (when scanning the RECEIVE_TLG function).

A PLC can only process one telegram at a time.

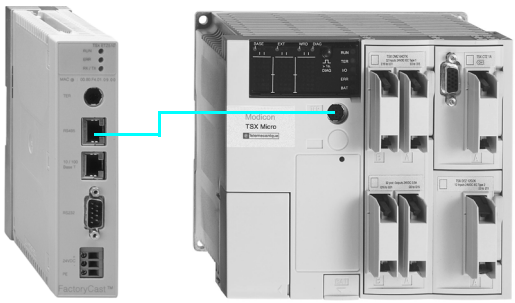
The telegram service is suitable for short and priority messages.

Service	Ethernet TCP/IP	Ethway *(1)*,	Fipway	Fipio	Uni-Telway
Telegram	–	–	16 bytes *(3)*	–	–

Note:
The telegram service remains local to a network. It can be inhibited.

(1) Ethway is not available on Micro PLC.
(2) Size limited to 128 bytes on Micro/Premium PLC terminal port, TSX/PMX model 40 PLCs and to 32 bytes on TSX 17-20 and TSX 47-20/25.
(3) Telegram service not available on the Micro and TSX 17-20.

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



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 bits/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.

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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.

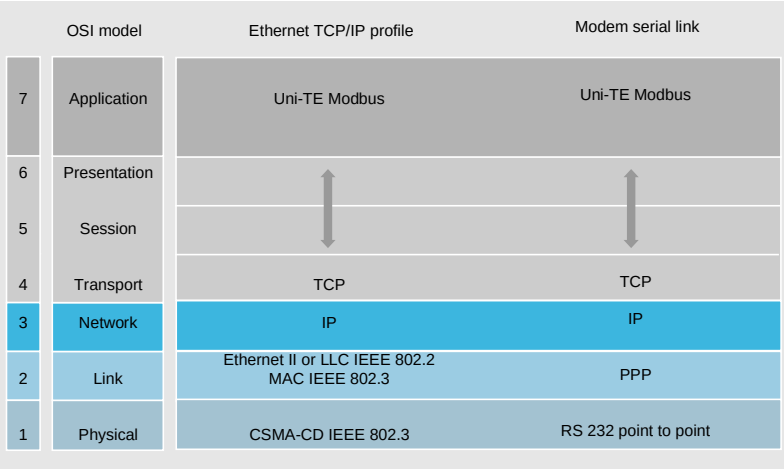
The Ethernet TSX ETZ 410/510 modules are configured using:

- The Ethernet network with the assistance of a standard browser.
- RS 232 serial link with the assistance of the PC port in hyper terminal mode (PPP protocol).

The Ethernet TSX ETZ 410/510 modules ensure that the 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 Micro/Junior/Pro software using the duplicated port on the front panel of the Ethernet module.

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



Today, the distributed automation applications can use a unique communication network which meet the needs of real-time workshop performance as well as 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:

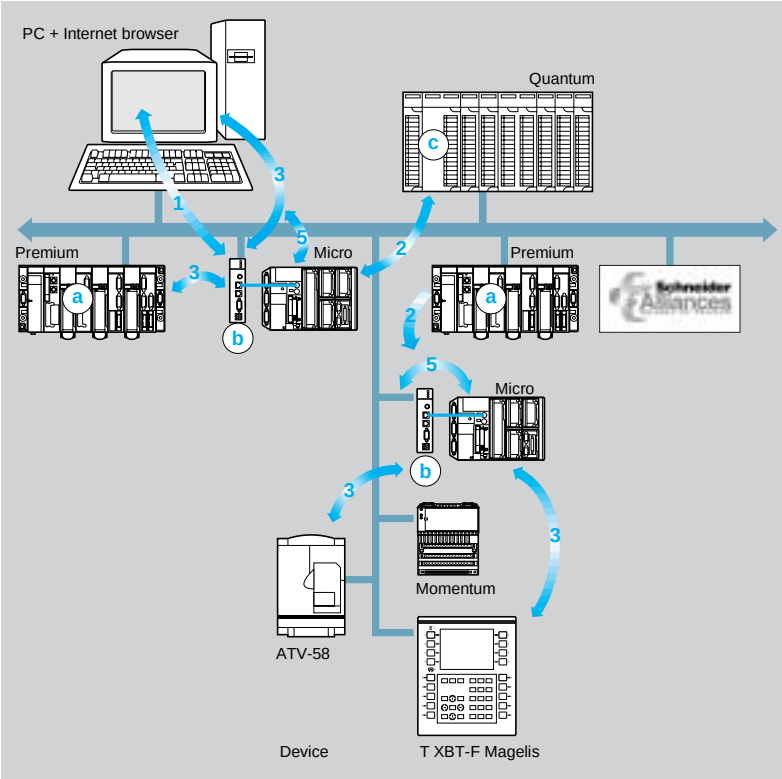
- Co-ordination between programmable PLCs.
- Local or centralized supervision.
- Communication with production information management.
- Communication with remote inputs/outputs.

The various services offered are as follows:

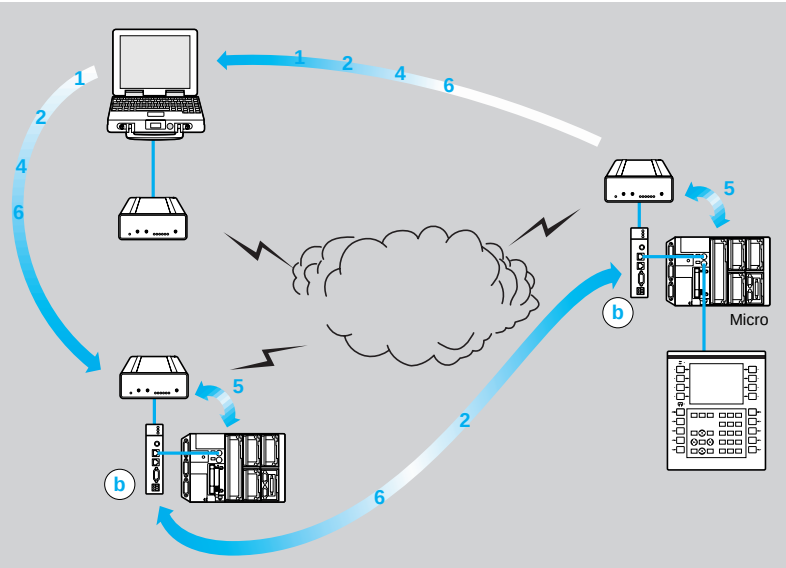
- The TCP/IP protocol standard permits communication with:
  - the Quantum platforms in the Modbus messaging, with the 140 NOE 771 ●0 module,
  - the M1E CPUs associated with the Momentum inputs/outputs I/O base in Modbus messaging,
  - the Premium platforms with TSX ETY 110 module (outside of Ethway 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 Factory private MIB. These are compatible with the main network administration software available on the market.

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 43312/5.

a Premium Ethernet TSX ETY 410●/510● module.
b Micro Ethernet TSX ETZ 410/510 module.
c Quantum Ethernet 140 NOE 711 ●0 module.

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 43300/3).

4 Un-TE messaging in TCP/IP in Client/Server mode:
- Conversion of Modbus requests to Uni-TE requests going to the 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 factory 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.*

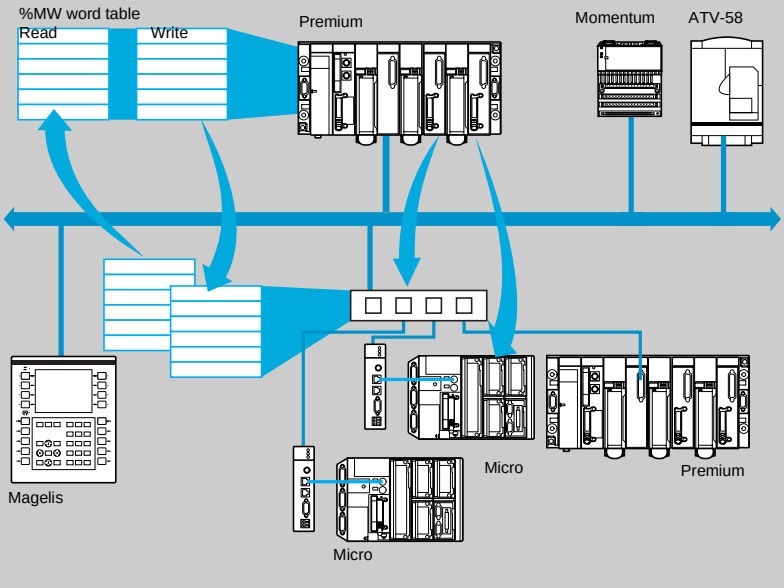
*(2) **Simple Network Management Protocol**: Network management protocol which is used to monitor a remote network by requesting the status of the stations and modifying their configuration, performing security checks and observing various information linked to data transmission. It can also be used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

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

Scanned inputs/outputs service

The Ethernet ETZ 410/510 modules for the 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 ●0).

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.

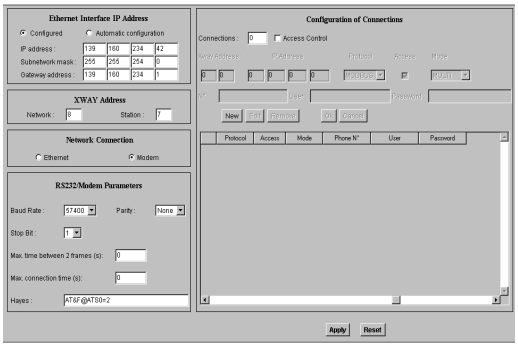
Integrated Web server

The Ethernet TSX ETZ 410/510 modules have an integrated Web server. On a 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 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 Premium 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.



Configuration function

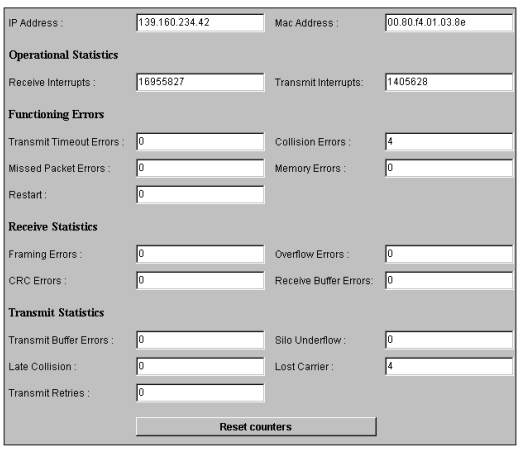
The configuration function for the module is a predefined function. It allows:

- 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, Micro PLC diagnostics

The predefined "Rack Viewer" function (display of PLC rack) is used to diagnose the 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:

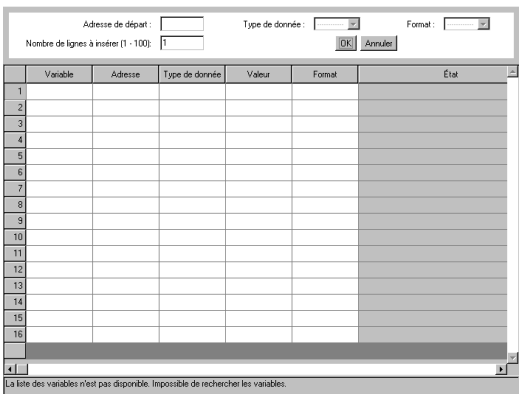
- The status of the LEDs on the front panel of the PLC.
- The version type of the PLC.
- The hardware configuration of the PLC with the status of the system words and bits.
- The detailed diagnostics of each I/O module or application share this configuration.



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

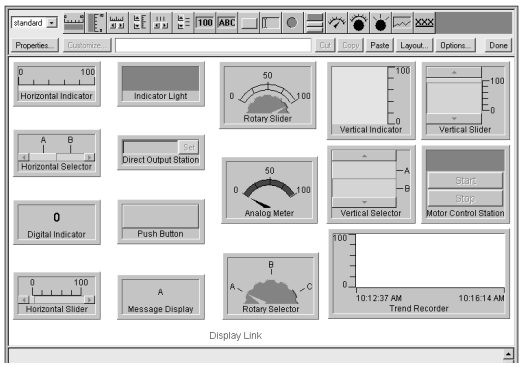
The access to the variables function is a predefined and secure function (accessible by password) allowing the creation of an events table to access the list of PLC variables in read or write.

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.

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

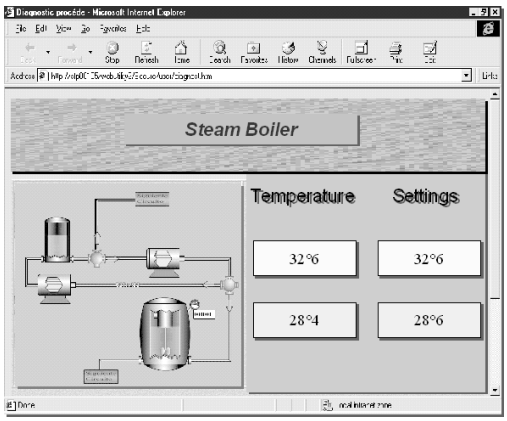


Graphic object editor function

(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.



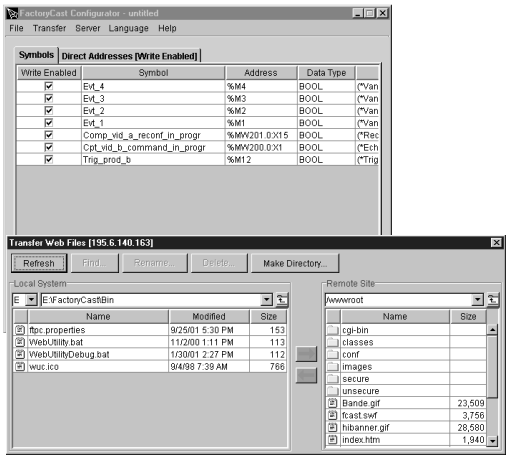
Display of predefined Web pages

(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

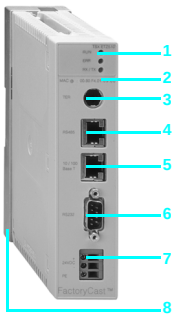
(only available on the TSX ETZ 510 module)

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 Micro, Premium and Quantum automation platforms and is Windows 95/98/NT compatible.

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 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.

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 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 factory).
3 A mini DIN connector for terminal port (TER address).
4 An RJ 45 connector for Uni-Telway auxiliary port RS 485 serial link (RS 485 address).
5 An RJ 45 normalized connector for connecting to the Ethernet network (10/100baseT 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 10/100baseT (RJ 45) interface, see page 48190/7 for accessories and connection cables.

■ By Modem via RS 232 serial link, see page 43606/2 for accessories and connection cables.

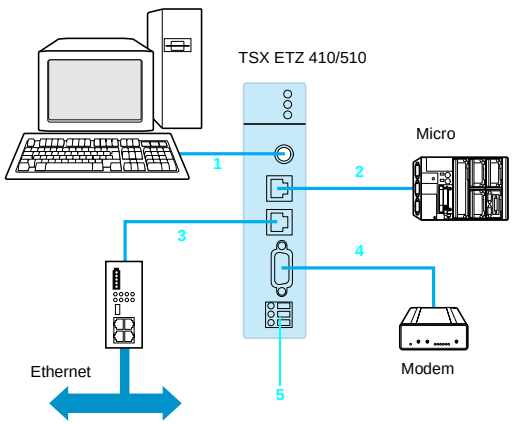
The TSX ETZ 410/510 modules are connected to the Micro PLCs *(1)* TSX 37 10/21/22 via:

■ 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 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 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. 10/100Base T) to Ethernet via hub (see page 48190/7). 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 power supply process page 43560/3).

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

Specifications 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 bits/s with automatic recognition	RS 232 link to 56 K bits/s max
	Medium		-10baseT, double shielded twisted pair of type STP, impedance 100 Ω ± 15 Ω -100baseT, 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 RJ 45 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 43300/3) -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 Micro PLC requirements (see page 43050/11), 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.

Ethernet TCP/IP network modules

SX 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 M bits/s or Modem 56 K bits/s 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

TSX P ACC 01

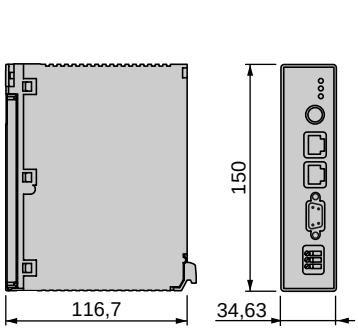
TSX SCA 50

Designation	From	To	Use	Length	References *(3)*	Weight kg
Ethernet twisted shielded cables *(3)*	TSX ETZ 410/510 module (RJ 45 connector add. ETH)	Ethernet Hub (RJ 45 connector) See page 48190/7	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 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

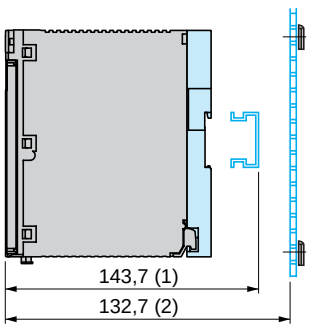
(1) Requires a TSX 37-10/20/21 PLC with a version ≥ 2.0 operating system, supplied with a TSX ETZ CDN 003 link cable (0.35 m in length). These modules should be supplied with ⎓ 24 V. (see supply process page 43560/2.)
(2) Supplied with CD-Rom including the FactoryCast V2.2.1 software, the Ethernet Transparent Factory 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 RJ 45 connector (category 5) to the end of the free wire.

Dimensions, assembly

TSX ETZ 410/510 modules



Assembly on profiled AM1-DE200
or AM1-DP200 or on AM1-PA mounting plate



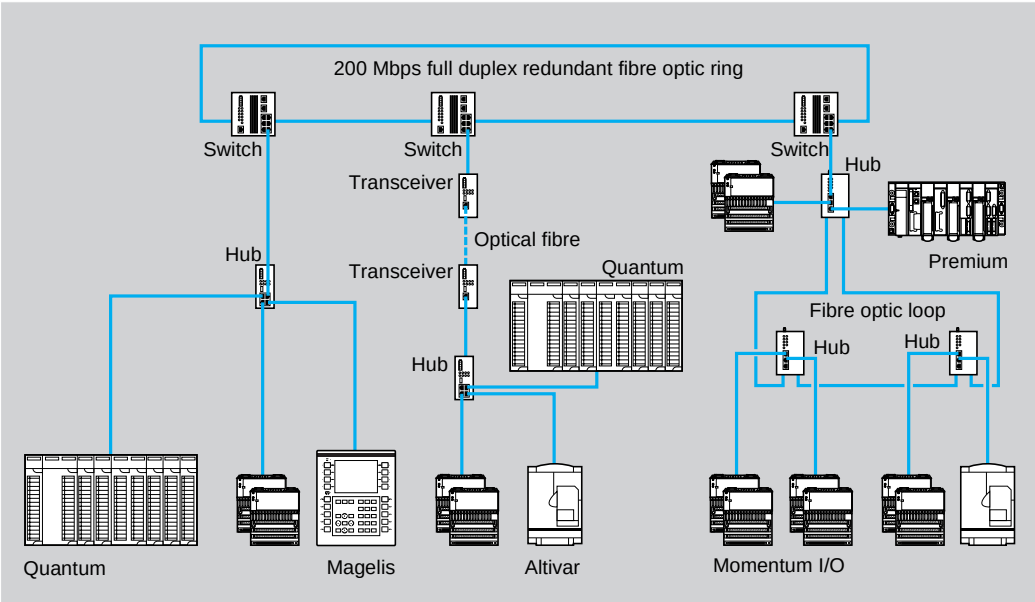
(1) 136.2 mm with profiled AM1-DP200
(2) Assembly on AM1-PA mounting plate

Micro automation platform
Ethernet TCP/IP network, connection by 10baseT/100baseTX interface

Presentation

As part of its Transparent Factory 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 product in the Ethernet cabling system is designed with compliance to Ethernet standards, and with third-party compatibility in mind.

- **Transparent Factory Hubs** connect segments to supply shared communication among PLCs. TF Hubs are low-cost solutions which enable communications with devices, such as Momentum I/O, to Ethernet networks.
- **Transparent Factory 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.
- **Transparent Factory Transceivers** provide connections to fiber optic networks in order to secure transmissions in areas of high electromagnetic interference. The use of multiple transceivers enables long distances between islands.
- **Transparent Factory Bridges** enable Modbus to Ethernet and Modbus Plus to Ethernet communications, with multiple ports allowing flexibility among network components.
- **Transparent Factory Cables** connect each device (such as PLC, I/O, PC, etc.) to the attached hub, switch, transceiver, patch panel, or to cascade hubs and switches. TF cables are available in fiber optic and twisted pair options, with a wide variety of connectors and cable lengths.



All the TF components of the Ethernet wiring system are designed to operate in severe environments. TF switches and TF hubs include mechanisms designed to ensure high levels of resilience. With their open-ended redundant functions, from a single ring structure to a double ring structure, it is easy to create a fault-tolerant Ethernet network which meets the specific demands of your industrial environment.

References :
page 48190/7

Characteristics :
pages 48190/3 to 48190/6

Micro automation platform
Ethernet TCP/IP network,
connection by 10baseT/100baseTX interface

Characteristics of TF hubs

Mechanical characteristics

Models		**499 NEH 004 10**	**499 NEH 041 00**	**499 NOH 005 10**
Operating temperature	**° C**	0 to 60		
Relative humidity		10…90% (without condensation)		
Dimensions L x H x D	**mm**	40 x 125 x 80		80 x 140 x 80
Degree of protection		IP 30		
Approvals and conformity		UL, CE, CUL 1950, FCC part B, CSA 22-2.142, CSA 22-2.213M class 1 Div. 2 (certification pending)		

Electrical characteristics

Models		**499 NEH 004 10**	**499 NEH 041 00**	**499 NOH 005 10**
Types		Ethernet 10 Mbps	Ethernet 100 Mbps	Ethernet 10 Mbps
Interfaces		4 10baseT ports with RJ45 shielded connectors	4 100baseTX ports with RJ45 shielded connectors	- 3 10baseT ports with RJ45 shielded connectors - 2 10baseFL ports with BFOC connectors
Medium		Twisted pair cables		Twisted pair cables or redundant fibre optic ring
Connectors		1 x 5-way		
Operating voltage	∿ **V**	18…32, safety low voltage	9.6…57.6, safety low voltage	18…32, safety low voltage
Redundancy		Power supply		Power supply and fibre optic ring
Consumption at ∿ 24 V	**mA**	80 typical 130 max.	200 typical 270 max.	160 typical 350 max.
Line length	**m**	100 max. with twisted pairs		Fibre optic, 3100 max.(max 10,000) Twisted pairs, 100 max.(max 330)
Number of TF hubs in cascade		4 max.		11 max.
in a ring		–		11 max.
Alarm relay		Power supply fault, Ethernet network fault or communication port fault (volt-free contact 1 A max. at ∿ 24 V)		
Indicator lights		Power supply, data exchange, collision and line status via communication port		

References :
page 48190/7

Characteristics of TF switches

Mechanical characteristics

Models		**499 NES 071 00**	**499 NOS 071 00**
Operating temperature	**° C**	0 to 50	
Relative humidity		10…90% (without condensation)	
Dimensions L x H x D	**mm**	105 x 130 x 105	
Degree of protection		IP 20	
Approvals and conformity		UL, CE, CUL 1950, FCC part B, CSA 22-2.142, CSA 22-2.213M class 1 Div. 2 (certification pending)	

Electrical characteristics

Models		**499 NES 071 00**	**499 NOS 071 00**
Types		Ethernet 10 Mbps and Ethernet 100 Mbps	
Interfaces		- 5 10baseT/100baseTX ports with shielded RJ45 connectors - 2 100baseTX ports with RJ45 connectors	- 5 10baseT/100baseTX ports with shielded RJ45 connectors - 2 100baseFX ports with SC connectors
Medium		Twisted pair cables	Twisted pair cables or redundant fibre optic ring
Connectors		1 x 5-way	
Operating voltage	∿ **V**	18...32, safety low voltage	
Redundancy		- Power supply - Ring structure and/or twisted pair - Switching time < 0.3 s - Redundancy manager	
Consumption at ∿ 24 V	**mA**	800 max.	
Line length	**m**	100 max. with twisted pairs	Fibre optic, 3100 max. Twisted pairs, 100 max.
Number of TF switches in cascade		50 max.	
in a ring		4 max. at 10 Mbps 50 max. at 100 Mbps	
Alarm relay		Power supply fault, Ethernet networt fault or communication port fault (volt-free contact 1 A max. at ∿ 24 V)	
Indicator lights		Power supply, data exchange, collision and line status via communication port	

References :
page 48190/7

Characteristics of TF transceivers

Mechanical characteristics

Models		**499 NTR 000 10**	**499 NTR 001 00**
Operating temperature	**° C**	0 to 60	
Relative humidity		10…90% (without condensation)	
Dimensions L x H x D	**mm**	40 x 140 x 80	
Degree of protection		IP 30	
Approvals and conformity		UL, CE, CUL 1950, FCC part B, CSA 22-2.142, CSA 22-2.213M class 1 Div. 2 (certification pending)	

Electrical characteristics

Models		**499 NTR 000 10**	**499 NTR 001 00**
Types		Ethernet 10 Mbps	Ethernet 100 Mbps
Interfaces		- 1 10baseT port with RJ45 shielded connector - 1 10baseFL port with BFOC connector	- 1 100baseTX port with RJ45 shielded connectors - 1 100baseFX port with SC connectors
Medium		Twisted pair cables or fibre optic cable	
Connectors		1 x 5-way	
Operating voltage	∿ **V**	18…32, safety low voltage	9.6…57.6, safety low voltage
Redundancy		Power supply	
Consumption at ∿ 24 V	**mA**	80 typical 100 max.	160 typical 190 max.
Line length	**m**	Twisted pair 100 max. Fibre optic 62.5/125 µm, 3100 max.	
Max. link attenuation	**dB**	11 with fibre optic cable 50/125 µm 14 with fibre optic cable 62.5/125 µm	
Indicator lights		Power supply, data exchange, collision and line status via communication port	

References :
page 48190/7

Micro automation platform

Ethernet TCP/IP network,
connection by 10baseT/100baseTX interface

Characteristics of TF bridges

Types of bridge		174 CEV 200 30	174 CEV 300 10
Network interconnection		Modbus Plus/Ethernet	Modbus/Ethernet
Operating voltage	V	∿ 110…120 automatic detection	Nominal ⎓ 12…24 Limit ⎓ 9…30
Ethernet ports		- 1 Ethernet 10baseT (RJ45 type), 10base2 (BNC type), 10base5 (AUI type) - 1 Modbus Plus double/single pair cable	1 RJ45 port for 10baseT cable
Mounting		Vertical panel or horizontal plane	On DIN rail
Dimensions L x H x D	mm	122 x 229 x 248	35 x 95 x 60

Characteristics of electrical cables

Types of cable		499 NTW 000 ●●	499 NTC 000 ●●
Type		Shielded twisted pair cables	Crossed shielded twisted pair cables
Length	m	2, 5, 12, 40 or 80	5, 15, 40 or 80
Preformed connectors		Type RJ45 (at each end)	
Approvals and conformity		UL, CSA 22-1 and NFPA 70 approval indicated by the letter U at the end of the reference (for example : 490 NTW 000 40U) ; Category 5 of the EIA/TIA-568 international wiring standard, class D of IEC 11801/EN50173 ; Fireproof (LSZH), product flame-retarded according to NFC32 070 #1 (C2) and IEC 322/1	

Characteristics of fibre optic cables

Types of cable		490 NOC 000 05	490 NOT 000 05	490 NOR 000 05
Type		Standard glass fibre optic		
Length	m	5		
Preformed connectors		MT/RJ-SC duplex	MT/RJ-ST	MT/RJ-MT/RJ
Susceptibility to radiation		No radiation along the cable length		

References :
page 48190/7

Micro automation platform
Ethernet TCP/IP network, connection by 10baseT/100baseTX interface


499 NEH 004 10


499 NOH 005 10


499 NEH 041 00


499 NES 071 00


174 CEV 300 10

References

Description	Type of Ethernet network	Available ports	Reference	Weight kg
TF hubs	10 Mbps	4 10baseT ports	**499 NEH 004 10**	0.520
		3 10baseT ports 2 10baseFL ports	**499 NOH 005 10**	0.900
	100 Mbps	4 100baseTX ports	**499 NEH 041 00**	0.520
TF switches	10/100 Mbps	5 10baseT/100baseTX ports 2 100baseTX ports	**499 NES 071 00**	1.450
		5 100baseTX ports 2 100baseFX ports	**499 NOS 071 00**	1.450
TF transceivers	10 Mbps	1 10baseT port 1 10baseFL port	**499 NTR 000 10**	0.520
	100 Mbps	1 100baseTX port 1 100baseFX port	**499 NTR 001 00**	0.520

Description	Type of interconnection	Ethernet ports available	Reference	Weight kg
TF bridges	Modbus Plus/Ethernet (Modbus single/ double pair)	1 10baseT (RJ 45 type) or 10base2 (BNC type) or 10base5 (AUI type) port	**174 CEV 200 30**	4.260
	Modbus/Ethernet	1 10baseT port (RJ 45 type)	**174 CEV 300 10**	0.500

Connection cables

Description	Preformed at each end	Length	Reference	Weight kg
Shielded twisted pair cables	RJ45 type connector	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)*	–
Crossed shielded twisted pair cables	RJ45 connector	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)*	–
Fibre optic cables	MT/RJ-SC duplex connector	5 m	**490 NOC 000 05**	–
	MT/RJ-ST connector	5 m	**490 NOT 000 05**	–
	MT/RJ-MT/RJ connector	5 m	**490 NOR 000 05**	–

Connection accessories

Description	Use	Ethernet ports available	Reference	Weight kg
Mini transceiver	For connecting a 10base5 interface device (1) to a 10baseT Ethernet network segment (twisted pair)	1 10base5 port (AUI type) 1 10baseT port (RJ45 type)	**TSX ETH NTR1**	–

Ethernet TCP/IP modules for automation platform

Type of platform	Description	Integrated Web server		Reference	Weight kg
		Diagnostic	Web user page		
Micro	External module 10/100 Mbp/s	yes	–	**TSX ETZ 410**	0.280
		yes	8 Mb	**TSX ETZ 510**	0.280
Momentum	M1E processor, 1 Modbus	yes	–	**171 CCC 980 ●0**	0,042
	M1E processor, 1 I/O bus	yes	–	**171 CCC 960 ●0**	0,042
	Comm. adaptator 10 Mbps	–	–	**170 ENT 110 00**	0,070
Premium	10 Mbps modules	–	–	**TSX ETY 110**	0,370
		yes	1,4 Mb	**TSX ETY 110 WS**	0,370
	10/100 Mbps modules	yes	–	**TSX ETY 410**	0,340
		yes	8 Mb	**TSX ETY 410**	0,340
Quantum	10/100 Mbps module	–	–	**140 NOE 771 00**	0.345
	100 Mbps module	yes	8 Mb	**140 NOE 771 10**	0.345

(1) Add the letter **U** *to the end of the reference for CSA 22.1, NFPA 70 and UL approved cables (flame-retardant).*
(2) For example, a TSX Series 7 PLC equipped with a TSX ETH 107 Ethernet module.

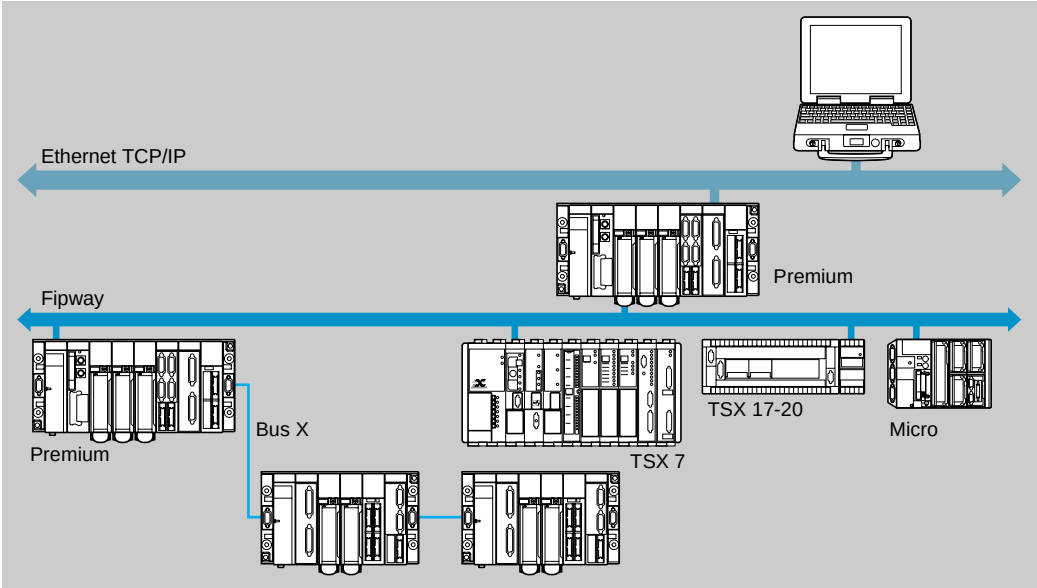
Characteristics :
pages 48190/3 to 48190/6

Premium automation platform
Fipway network

Presentation

The Fipway network is an open local area network for communication between the various Micro, Premium and TSX Series 7 PLCs using the X-Way services. Communication conforms to the FIP standard with access via a bus arbitrator.

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 43301/3 to 43301/5) 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 system and connection accessories, see pages 43597/2 to 43597/5
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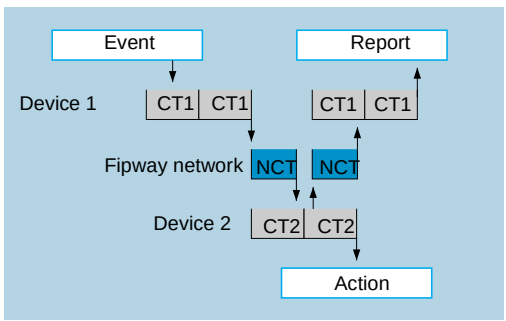
Performance

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.

References :
page 43592/3

Connectable devices

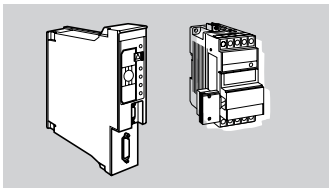
Micro/Premium PLCs

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

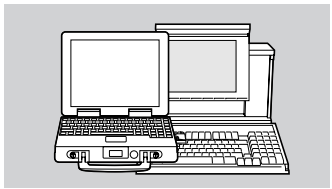
Connector to be ordered separately :
4 TSX FP CG 010/030, 1 or 3 m cable for connection to the TSX FP ACC 3/ACC 4 T-junction box (on 9-way SUB-D connector).

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 micro-PLCs.

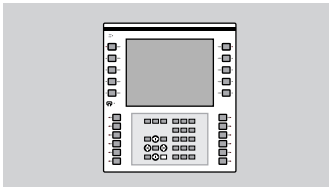
FT2100, PC compatibles



Equipped with :
- TSX FPP 20 for FT 2100 (PCMCIA card)
- 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 TLX CD DRV M.

Magelis dialogue terminals



Connection via the TSX FPP 20 PCMCIA card.

References

Description	Number per Premium PLC	Use	Composition	Reference *(1)*	Weight kg
Fipway card	1 with 57-10 1 with 57-20 3 with 57-30 4 with 57-40	Type III slot on - 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 43592/3	For Premium PLC - 1 isolated 2-wire RS 485 integrated channel (Half-duplex) - 1 slot for type III PCMCIA card	–	**TSX SCY 21601**	0.360
Set of X-Way drivers for PC compatible	Incluces all X-Way drivers : - Uni-Telway/Fipway/Fipio/Ethway under Windows 3.1/95/98/NT/2000 - XIP/ISAway under DOS and Windows 3.1/95/98/NT/2000 - Uni-Telway for TSX SCP 114 card under Windows 95/98/NT/2000 - Terminal port under OS/2		1 CD-ROM	**TLX CD DRV M**	–

TSX FPP 20

TSX SCY 21601

Connection cables and accessories *(2)*

Description	Use From	To	Lengh	Reference	Weight kg
Cables for PCMCIA	TSX FPP 20 card (miniature connector)	TSX FP ACC 4 T-junction (9-way SUB-D connector)	1 m	**TSX FP CG 010**	0.210
			3 m	**TSX FP CG 030**	0,410

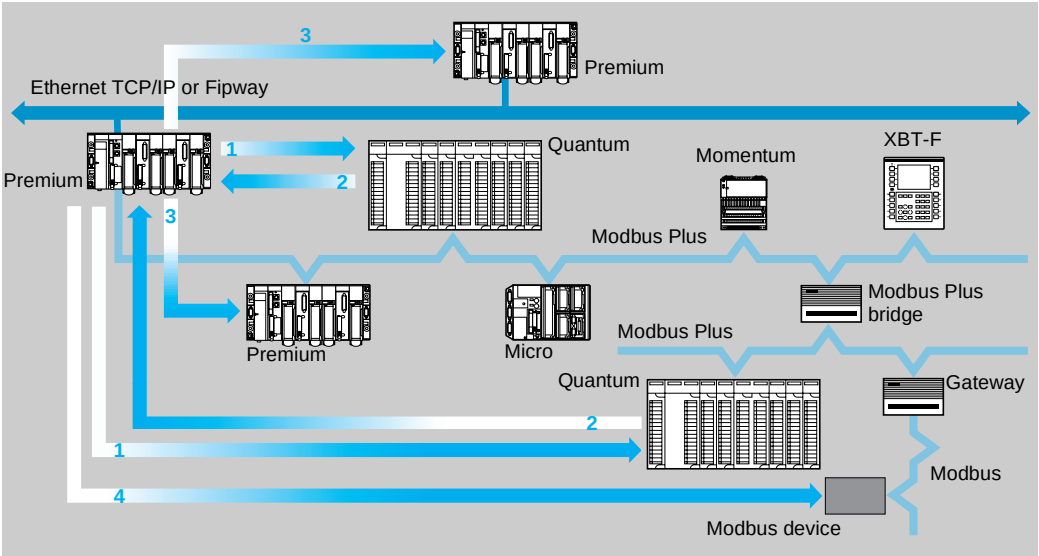
TSX FP CG 010/030

(1) Product supplied with bilingual Quick Reference Guide : English and French.
(2) For other Fipway network accessories and connection cables, see pages 43597/6 and 43597/7.

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 Mbps), 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 Micro) client communicates with the Quantum server on the Modbus Plus network.

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

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

Characteristics : page 43599/3
Connections : page 43599/4
References : page 43599/5

Micro automation platform
Modbus Plus network

Description

Premium/Micro PLCs are connected to the Modbus Plus network using a TSX MBP 100 type III PCMCIA card. This card is installed in the slot reserved for processors or coprocessors :

1 A host slot on processors or coprocessors

2 A protective cover with fixing screw (access to miniature 20-way connector)

3 A removable cover

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

Connectors to be ordered separately :
TSX MBP CE 0●● tap-off cables

Characteristics

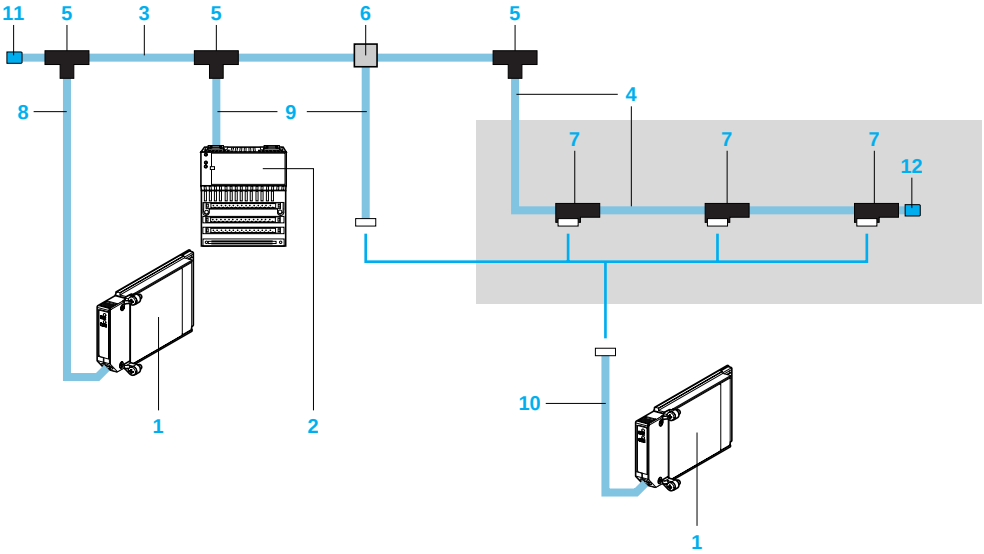
Structure	Type	Industrial bus
	Physical interface	RS 485
	Method of access	Token bus
Transmission	Mode	Synchronous HDLC
	Data rate	1 Mbps
	Medium	Twisted pair, fibre optic
Configuration	Number of devices	64 maximum on 1800 m twisted pair, 32 per segment
	Number of addresses	64 devices maximum per segment
	Length of bus	450 m maximum per segment, 1800 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 (amount of requests : 100 registers per transaction)
	Peer Cop	Cyclical exchange service (on Premium only) : 500 words per station (broadcast or point-to-point)

Connections :
page 43599/4

References :
page 43599/5

Micro automation platform
Modbus Plus network

Wiring system



1 **TSX MBP 100** : Modbus Plus PCMCIA card, for type III processor slot on 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 1500 m.

4 **170 MCI 020/021 ●●** : drop cable equipped at each end with an RJ 45 connector (interface baseT). 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).

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 RJ 45 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 RJ 45 connector). It has a 9-way SUB-D 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 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 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 adaptor) for IP 20 local site tap 990 NAD 230 00, to be placed at each end of the segment. **990 NAD 230 11** : set of 2 line terminators (impedance adaptor) 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 adaptor) for tee 170 XTS 020 00, to be placed at each end of the segment.

Characteristics : page 43599/3
References : page 43599/5

Micro automation platform
Modbus Plus network

References

TSX MBP 100

170 PNT 110 20

TSX MBP CE 030/060

Description	Number per PLC	Use	Ref. no.	Compo-sition	Reference (1)	Weight kg
Modbus Plus PCMCIA card	1 with Micro TSX 37-21/22 1 with Premium TSX/PCX	Type III slot on - TSX 37-21/22 PLC - TSX 57-10/20/30/40 processor - T PCX 57-20/30 coprocessor	1	1 type III PCMCIA card	**TSX MBP 100**	0.110

Description	Connection	Ref. no.	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 *(2)*

Description	Use	Ref. no.	Reference	Weight kg
Modbus Plus local site taps	IP 20 tap for tap link connection (tee)	5	**990 NAD 230 00**	0.230
	IP 65 tap for tap link connection (tee), supports 1 RJ 45 connector on front panel	6	**990 NAD 230 10**	0.650
	IP 20 tee with 2 RJ 45 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 (sold in lots of 2)	2 impedance adaptors for local site tap (IP 20) 990 NAD 230 00	11	**AS MBKT 185**	–
	2 impedance adaptors for local site tap (IP 65) 990 NAD 230 10	11	**990 NAD 230 11**	–
	2 impedance adaptors for tee (IP 20) 170 XTS 020 00	12	**170 XTS 021 00**	–
Fixing kit for IP 65 local site tap	For fixing on DIN rail for tap 990 NAD 230 10	–	**990 NAD 230 12**	–
Wiring tool	For fitting trunk cables and drop cables in local site tap	–	**043 509 383**	–

Connecting cables *(2)*

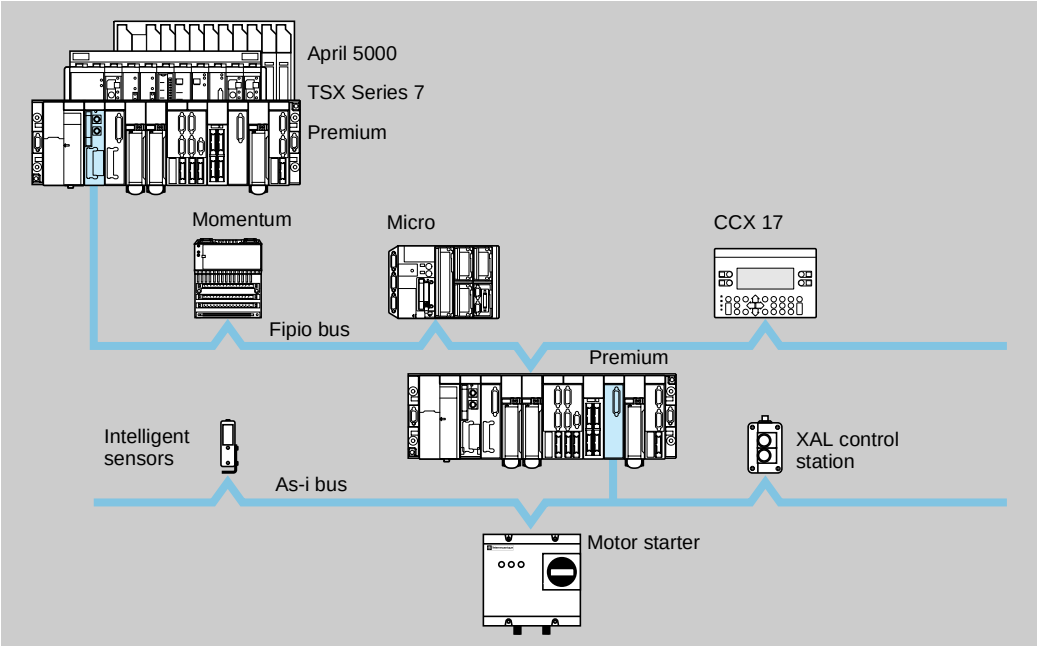
Description	Use From	To	Ref.	Length	Reference	Weight kg
Modbus Plus trunk cables	Local site tap	Local site tap 990 NAD 230 00/10	3	30 m	**490 NAA 271 01**	–
				150 m	**490 NAA 271 02**	–
				300 m	**490 NAA 271 03**	–
				450 m	**490 NAA 271 04**	–
				1500 m	**490 NAA 271 06**	–
Drop cables	IP 20 tee 170 XTS 020 00	IP 20 tee 170 XTS 020 00	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**	–
	TSX MBP 100 PCMCIA card (miniature connector)	Drop cable with male 9-way 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 sub-bases	Junction box 990 NAD 230 00/10	9	2.4 m	**990 NAD 211 10**	0.530
				6 m	**990 NAD 211 30**	0.530

(1) Product supplied with bilingual Quick Reference Guide : English and French.
(2) For other Modbus Plus network connecting cables and accessories, please consult your Regional Sales Office.

Characteristics : page 43599/3
Connections : page 43599/4

Micro automation platform
Fipio bus Agent function

Presentation

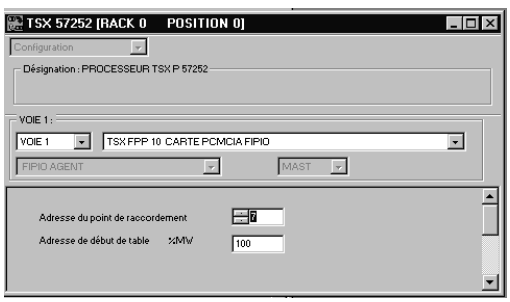


Micro (TSX 37-21/22) or Premium PLCs, fitted with a TSX FPP 10 PCMCIA card on their integrated communication channel, are agents on the Fipio bus. The bus manager is a TSX P 57 153/253/353/453, T PCX 57 203/353, TSX Series 7 model 40 or April 5000 PLC.
The Fipio bus enables I/O to be remotely located close to the devices to be controlled (Momentum, Altivar, etc). The Agent function enables offline processing, by locating a Micro PLC close to the machine.
In addition to the standard Fipio services (see pages 43301/3 to 43301/5), 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 43597/2 to 43597/7.

Application services

The application services supported by 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

Software setup



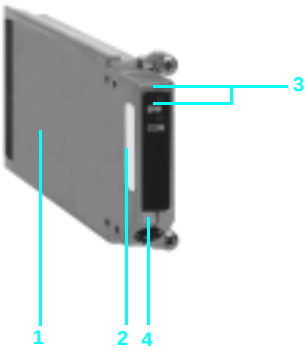
Each Micro/Premium PLC Fipio Agent uses 64 %MW consecutive internal words to exchange periodic data. The first 32 words are reserved for sending data to the manager, and the remaining 32 are reserved for receiving data from the manager.

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

References :
page 43593/3

Micro automation platform
Fipio bus Agent function

Description



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)

References

Fipio bus connection component

Description	Composition	Reference	Weight kg
Fipio Agent function card *(1)*	1 type III PCMCIA card Version V1.8	**TSX FPP 10**	0.110

TSX FPP 10

Fipio bus connection accessories *(2)*

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

TSX FP ACC 3

TSX FP ACC 4

Fipio bus connection cables *(2)*

Description	Use From	Use 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 m	**TSX FP CG 030**	0.410

TSX FP CG 010/030

(1) The TSX FPP 10 card is only supported by Micro TSX 37-21/22/Premium processors. Product supplied with bilingual Quick Reference Guide: English and French.

(2) For other Fipio bus accessories and connection cables, see pages 43597/6 and 43597/7.

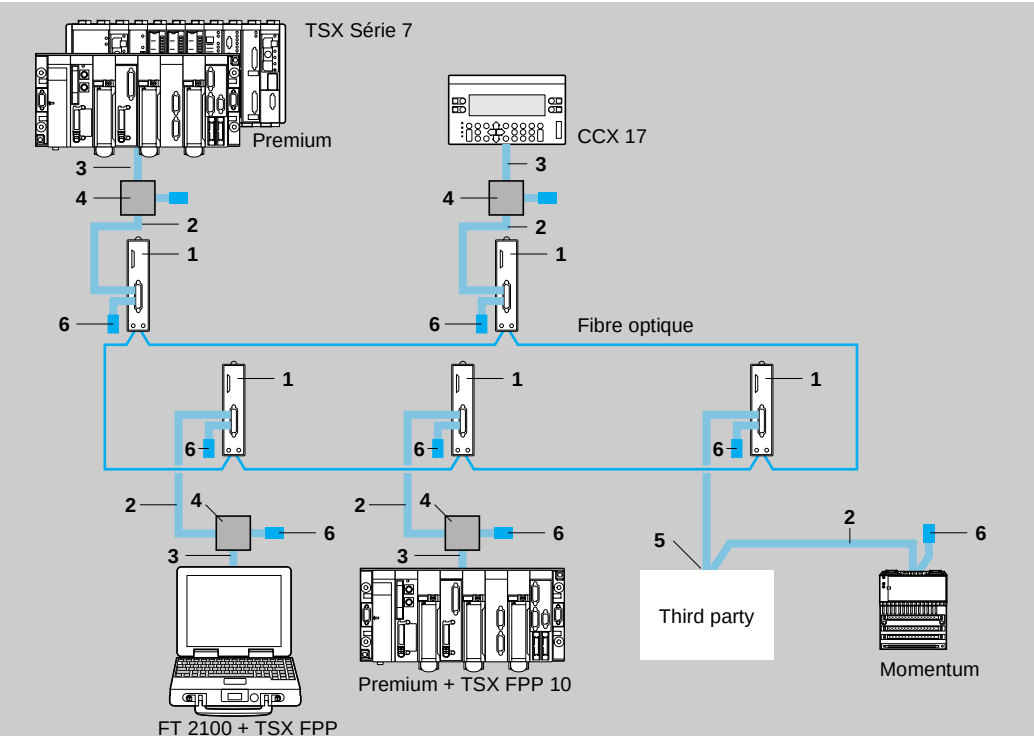
Micro automation platform
Fipio and Fipway on fibre optic cables

Presentation

When a high level of withstand to electromagnetic interference is required, two solutions are available for using fibre optic cables on Fipio bus and Fipway network :
- Using TSX FP ACC 8M fibre optic/electrical repeaters
- Using OZD FIP G3 fibre optic transceivers

Depending on requirements, it is preferable to use :
- The OZD FIP G3 fibre optic transceiver if all devices on the network must be protected from electromagnetic interference (1 fibre optic transceiver for 16 stations maximum).
- The TSX FP ACC 8 repeater (fibre optic link on one side, electrical on the other) where an installation zone without devices is subject to high levels of interference or to extend the network (for example between 2 buildings). See pages 43597/4 to 43597/7.
- The OZD FIG G3 fibre optic transceiver to guarantee availability of the installation by using the redundant ring type topology. Operation remains normal even in the event of disconnection at a point on the fibre optic medium.

Wiring system



1 **OZD FIF G3** : Hirschmann fibre optic transceiver.

2 **TSX FP CA●00** : shielded twisted pair trunk cable 150 Ω (diameter 8 mm) for standard environment and inside buildings.

3 **TSX FP CG 0●0** : tap-off connecting cable for TSX FPP 10/20 PCMCIA module card for Micro/Premium PLCs, FT 2100 terminal and PC compatible.

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 12** : 9-way female SUB-D connector for Fipway/Fipio connection (TSX FP ACC 2 for TSX 17-20 for example) 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 43590/3
References : page 43590/3

Performance

Fipio bus operating mode and performance on fibre 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 relationship existing 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 fibre 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 enable transmission of 230 messages maximum of 128 bytes per second.

Characteristics (with OZD FIP G3 fibre optic transceivers)

Type of bus/network		Fipio bus	Fipway network
Structure	Type	Open industrial support conforming to Fip standard	
	Topology *(1)*	In redundant ring or in a line with simple redundant link	
	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 Mbps	
	Medium *(2) (1)*	Fibre optic 50/125 - 17 dBm or 62.5/125 - 15 dBm	
	Inter-repeater distance	2500 m for 50/125 and 2800 m for 62.5/125	
Configuration	No. of connection points *(1)*	20 fibre optic transceivers (**OZD FIP G3** type) maximum	
	No. of devices	2 Fipio devices can be connected to the same fibre optic transceiver	16 stations can be connected to the same fibre optic transceiver but the maximum number of stations is 32
	No. of segments *(1)*	The loop (or fibre optic line) is similar to a non cascadable segment	
	Length *(1)*	Maximum circumference of the ring (or length of the line) : 20 km	
	Tap links *(1)*	From **OZD FIP G3** fibre optic transceiver, the maximum length of the electrical tap link is 100 m	
Services		Same as page 43597/2 apart from the Telegram service which is not available with OZD FIP G3 fibre optic transceiver.	

(1) Characteristics specific to use of fibre optics.
(2) Devices connected on electrical tap links are compatible with the WorldFip physical layer.

References

Description	No. of transceivers per bus or network	Connectable devices Fipio bus	Fipway network	Reference	Weight kg
Fipio/Fipway fibre optic transceiver *(1)*	20 maximum	- Micro/Premium - TBX distr. I/O with TBX LEP 30 - Momentum distr. I/O - CCX 17 panels (version 2.4) - FT 2100/FTX 517, PC compatible	Micro Premium (with TSX FPP 20 PCMCIA card)	**OZD FIP G3**	0.500


OZD FIP G3

Micro/Premium PLC connection components *(2)*

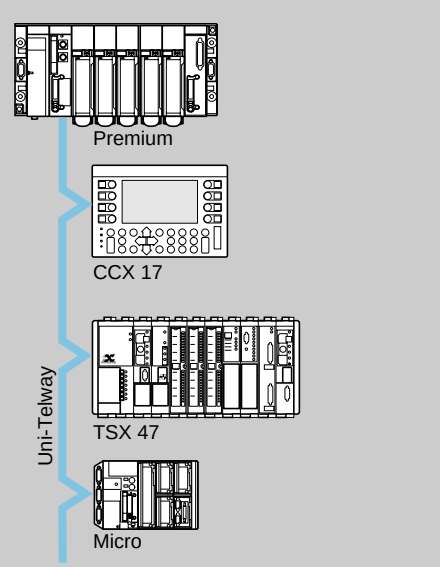
Description	Use	Composition	Reference	Weight kg
Fipway card	TSX 37-21/22 PLC, TSX/PMX 57 processor, PCX 57 coprocessor	1 type III PCMCIA card	**TSX FPP 200**	0.110
Fipio agent function card	TSX 37-21/22 PLC, TSX/PMX 57 processor, PCX 57 coprocessor	1 type III PCMCIA card	**TSX FPP 10**	0.110


TSX FPP 20/10

(1) For TSX FP ACC 8M fibre optic electrical repeater, see page 43597/6.
(2) For accessories and connecting cables, see pages 43597/5 to 43597/7.

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 pilot 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

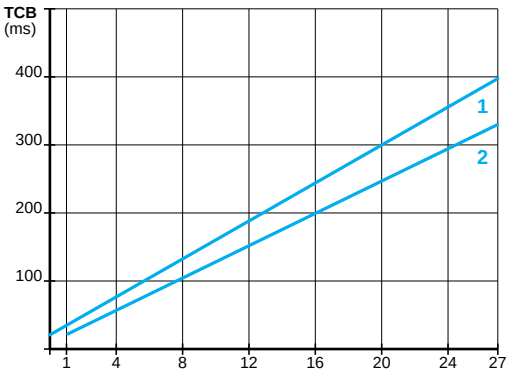
Structure	Type	Heterogeneous industrial bus				
	Physical interface	Programming port RS 485 non isolated (TER/AUX)	Integrated link to **TSX SCY 21601** module RS 485 isolated	PCMCIA card RS 485 isolated/RS 422	PCMCIA card 20 mA CL	PCMCIA card RS 232 D non isolated
	Link	Multidrop				Point-to-point
	Method of access	Master/Slave principle				
Transmission	Mode	Asynchronous transmission in baseband				
	Data rate	1.2…19.2 Kbps				0.3…19.2 Kbps
	Medium	Shielded double twisted pair				
Configuration	Number of devices	5 devices max.	28 devices maximum		16 devices max.	2 devices
		8 datalink addresses max.	96 datalink addresses maximum (1 device can occupy several datalink addresses)			
	Length of bus	10 m max., 1000 m with **TSX P ACC 01**	1000 m max. excluding tap links			15 m (unlimited via modem)
	Tap links	–	15 m	20 m	15 m	–
Services	Uni-TE	Point-to-point requests with confirmation (question/response), of up to 240 bytes *(1)* initiated by any connected device				
		Unsolicited point-to-point data, without confirmation, of up to 240 bytes *(1)* initiated by any connected device				
		Broadcast messages of up to 240 bytes *(1)* 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 bus and connected devices accessed from the master PLC using PL7 or SYSDIAG software on an FT 2100/ FTX 517 terminal or PC compatible.				

(1) Limited to 128 bytes with Micro/Premium PLC programming port. For other limitations, please consult our specialist catalogue.

References :
pages 43594/6 and 43594/7

Micro automation platform
Uni-Telway bus

Performances



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 to the same device.

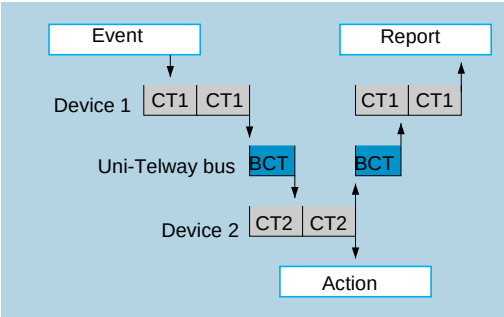
1 = 9.6 Kbps
2 = 19.2 Kbps

The above curve gives the Uni-Telway cycle time as a function of the number of slaves operating at 9.6 Kbps or
19.2 Kbps, 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	9,6 Kbps	19,2 Kbps
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)

(1) N = Number of usable characters corresponding to the messages to be exchanged.



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.

BCT = Uni-Telway bus cycle time

CT1 = Device 1 bus cycle time

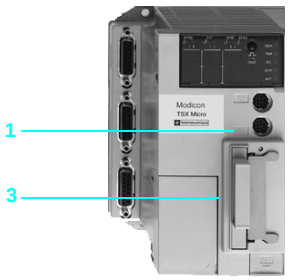
CT2 = Device 2 bus cycle time

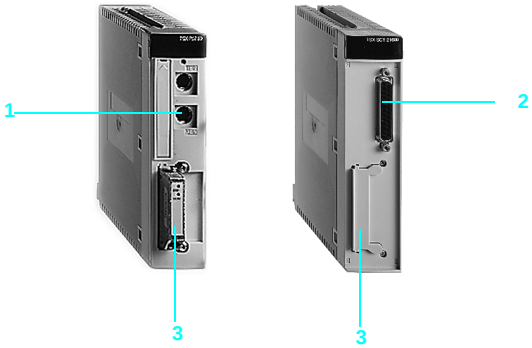
Characteristics:
page 43594/2

References:
pages 43594/6 and 43594/7

Micro automation platform
Uni-Telway bus

Connectable devices
Micro/Premium PLCs





Micro/Premium PLCs provide various ways of connecting to the Uni-Telway bus.

1 **Via the integrated port on the processor or coprocessor**
The AUX *(1)* port (8-way mini-DIN) has one non-isolated RS 485 serial link channel (maximum distance 10 m).

2 **Via the integrated port on the TSX SCY 21601 module**
This module has one isolated RS 485 serial link channel. Half-duplex multiprotocol, including Uni-Telway.

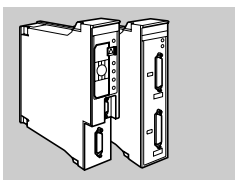
3 **Via multiprotocol PCMCIA card**
A slot on the processor of TSX 37-21/22/Premium PLCs or on the coprocessor and on the TSX SCY 21601 module accepts the following multiprotocol cards :

- 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 232 D 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 ⎓ 24 V external power supply

(1) TER port for TSX 37-05/08/10 PLC

Other devices (please consult our specialist catalogue)

TSX model 40 PLCs



Connection via processor Uni-Telway integrated port or via TSX SCM 21●6 communication module.

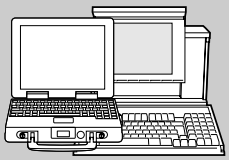
Nano PLCs

Connection via the terminal port.

TSX 17-20 micro-PLCs

Connection via the TSX SCG 1161 module of TSX 17-20 micro-PLCs fitted with the TSX P17 20 FC2/FD2 PL7-2 micro-software cartridge.

PC compatible terminals



Connection via the terminal integrated ports. These give access to all devices in the X-Way architecture.
X-Way drivers, see page 43594/6.

Other connectable devices

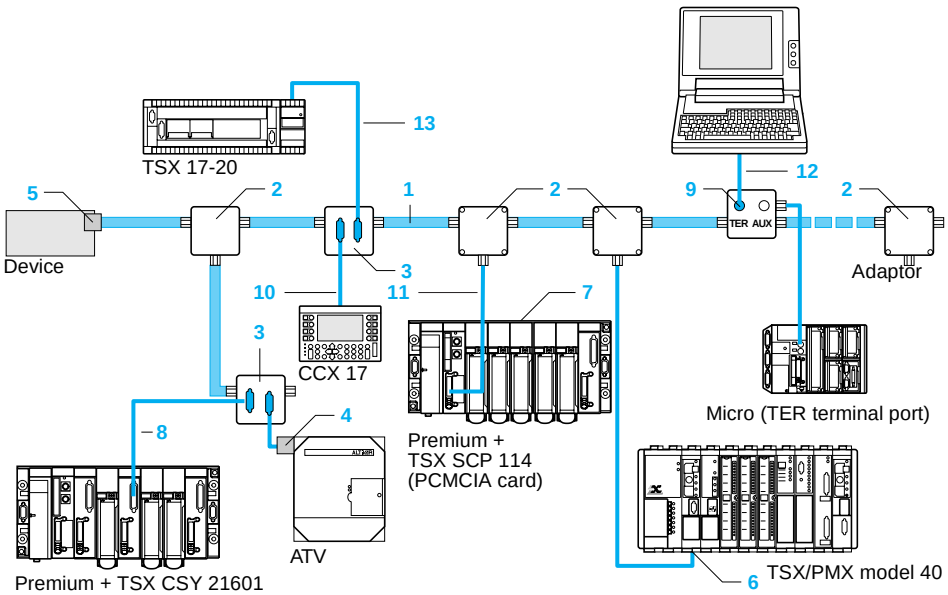
Designation	Device references	See page or catalogue
Operator panel	CCX 17-20, CCX 17-30	Page 43583/6
MMI terminals	XBT-H/P/E/HM/PM, XBT-F/FC, T XBT-F	Page 0372Q/2
Identification system	XGS-C5	Specialist catalogue
Variable speed drives	ATV-16, ATV-66, ATV-58 for asynchronous motors	Specialist catalogue
	RTV-74, RTV-84 for d.c. motors	Specialist catalogue
MASAP servodrive	MSP-62	Specialist catalogue
Industrial terminals	FT 2100 terminal	Page 43586/4
Data processing equipment	Bull : DPX2/100 computers under SPIX	–
	Digital : PDP11 computers under RSX, Micro VAX under VMS	–
	Hewlett-Packard : HP9000 computer running under HP-UX	–

Characteristics:
page 43594/2

References:
pages 43594/6 and 43594/7

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** : passive terminal block, used for intermediate devices which have the appropriate connections (ATV-45, Masap drives). It is used for coding the address of the connected device.
5 **TSX SCA 61** : passive terminal block, used for end devices which have the appropriate connections (ATV-45, Masap drives). It is used for coding the address of the connected device.
6 **TSX LES 64/74** : cable connectors for extensions to the Uni-Telway bus, used to connect PLC processors which have an integral Uni-Telway port as standard (model 40 PLCs). They are used for coding the address of the connected device.
7 **TSX SCP 114** : PCMCIA card for connecting Micro *(1)*/Premium PLCs to the Uni-Telway bus.
8 **TSX SCY CU 6530** : Uni-Telway connecting cable between the TSX SCY 21601 module and the TSX SCA 62 subscriber socket.
9 **TSX P ACC 01** : connection box, used for connecting a 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).
10 **XBT-Z908** : Uni-Telway connecting cable between the CCX 17 operator panel and the TSX SCA 62 subscriber socket (see page 43583/7).
11 **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.
12 **TSX PCU 1030/1031** : Uni-Telway connecting cable between the FT 2100/PC compatible and the TER or AUX ports of Micro/Premium PLCs or the TSX P ACC 01 connection box.
13 **TSX CSC 015** : connecting cable between the TSX 17 micro-PLC (via a TSX 17 ACC 5 adaptor or a TSX SCG 1161 module) and TSX SCA 62 subscriber socket.

TSX DG UTW E :
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 E :
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:
page 43594/2

References:
pages 43594/6 and 43594/7

Micro automation platform
Uni-Telway bus


TSX SCY 21601


TSX SCP 11●


TSX P ACC 01


TSX SCA 50


TSX SCA 62

TSX SCA 72

Elements for connection to Uni-Telway bus

Description	Protocol	Physical layer	PLC	Reference (1)	Weight kg
Integrated link on processor	Uni-Telway Character mode Modbus/Jbus Slave *(2)*	RS 485 non isolated	Micro	See page 43050/13	–
			TSX/PCX Premium	Please consult our specialist catalogue	
Communication module	Modbus/Jbus Uni-Telway Character mode	- 1 isolated RS 485 integrated 2-wire channel (ch. 0), - 1 type III PCMCIA card slot (channel 1)	TSX/PCX Premium	**TSX SCY 21601**	0,360
Type III PCMCIA cards for PMX/PCX Premium processor, TSX 37-21/22 PLC or TSX SCY 21601 module	Modbus/Jbus Uni-Telway Character mode	RS 232 D (9 signals) 0.3…19.2 Kbps		**TSX SCP 111**	0,105
		RS 485 (RS 422 compatible) 1.2…19.2 Kbps		**TSX SCP 114**	0,105
		20 mA CL 1.2…19.2 Kbps		**TSX SCP 112**	0,105
Set of X-Way drivers for PC compatible	Includes all the X-Way drivers : - Uni-Telway/Fipway/Fipio/Ethway for Windows 3.1/95/98/NT/2000 - XIP/ISAway for DOS and Windows 3.1/95/98/NT/2000 - Uni-Telway for TSX SCP 114 card in Windows 95/98/NT/2000 - Terminal port for OS/2		1 CD-ROM	**TSX CD DRV 12M**	–

Uni-Telway bus connection accessories

Description	Use	Reference	Weight kg
Terminal port connection box (TER) Premium 1 m connecting cable	Isolation of Uni-Telway signals for bus length > 10 m, end of line adaptation, bus cable tap links	**TSX P ACC 01**	0,690
Passive T-junction box	Tap link and extension of bus cable, end of line adaptation	**TSX SCA 50**	0,520
2-channel passive subscriber socket	2-channel tap link (15-way female SUB-D connector) and extension of bus cable, address coding and end of line adaptation	**TSX SCA 62**	0,570
RS 232 C/RS 485 active adaptor unit	Connection of an RS 232 C device (using Uni-Telway protocol), adaptation and isolation of signals, end of line adaptation (no address coding)	**TSX SCA 72**	0,520
Other connection	Uni-Telway bus	Please consult our specialist ctalogue	–

(1) Product supplied with bilingual Quick Reference Guide : English and French.
(2) With Micro PLC.

Micro automation platform
Uni-Telway bus

Uni-Telway bus connecting cables

Description	Use From	Use To	Length	Reference	Weight kg
Double shielded twisted pair RS 485 cables	Uni-Telway 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 485 tap link	TSX SCP 114 card	TSX SCA 50 T-jun. box	3 m	**TSX SCP CU 4030**	0.160
		TSX SCA 62 sub. sock.	3 m	**TSX SCP CU 4530**	0.180
	TSX SCY 21601 integrated channel (channel 0)	TSX SCA 50 T-jun. box	3 m	**TSX SCY CU 6030**	0.180
		TSX SCA 62 sub. sock.	3 m	**TSX SCY CU 6530**	0.200
Cables for non isolated RS 485 tap link	Micro/Premium port, PCX 57 (TER or AUX)	TSX P ACC 01 (AUX) box	2 m	**T FTX CB1 020**	0.180
			5 m	**T FTX CB1 050**	0.420
	Micro/Premium PCX 57 port or TSX P ACC 01 connection box (TER or AUX)	9-way SUB-D RS 232 D port for PC compatible	3 m *(1)*	**TSX PCU 1031**	0.140
Other RS 232 D and 20 mA CL connecting cables	–	–	–	See page 43596/3	–

(1) TSX PCU 1031 cable for use with terminal equipped with PL7 software V 4.0, reference TLX ●●● PL7 ● P 40M. For PL7 software V < 4.0, use cable TSX PCU 1030.

Characteristics:
page 43594/2

Micro automation platform
Asynchronous serial links

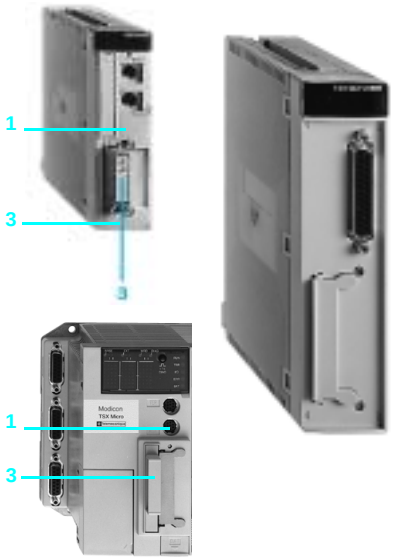
Presentation

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 232 D, 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 232 D link, which enables Micro/Premium PLCs to communicate on third-party architectures. These products are offered within the framework of the Schneider Alliances partnership programme (see page 43614/2). 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 Micro TSX 37-05/08/10 PLC.

Characteristics *(1)*

Physical layer	Type	Non-isolated RS 485 terminal port	Isolated RS 485 TSX SCY 21601 integrated port	PCMCIA cards RS 232 D	RS 485 RS 422 compatible	20 mA current loop (3)
	Data rate	1.2…19.2 Kbps *(2)*	1.2…19.2 Kbps	0.3…19.2 Kbps	1.2…19.2 Kbps	
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					
	Flow mgmt by RTS/CTS					
	RTS/CTS delay					
	Stop on reception					
	End of message					
	PSR management					
	DCD carrier					
			Parameters which can be accessed in configuration mode.			

(1) For characteristics of the communication module integrated channel, see page 43591/2.
(2) With the TSX P57 3●3/453 processor, data rate up to 115 Kbps during program uploading.
(3) Point-to-point or multidrop link.

References :
page 43596/3

Micro automation platform
Asynchronous serial links


TSX SCY 21601


TSX SCP 11●


TSX P ACC 01

Asynchronous serial link elements (character mode)

Description	Protocol	Physical layer	PLC	Reference (1)	Weight kg
Integrated link on processor	Character mode Uni-Telway Modbus (RTU)	RS 485 non-isolated	Micro	See page 43050/13	–
			TSX/PCX Premium	Please consult our specialist catalogue	
Communication module	Character mode Uni-Telway Modbus	- 1 isolated RS 485 integrated chan. (channel 0), - 1 type III PCMCIA card slot (channel 1)	TSX/PCX Premium	**TSX SCY 21601**	0.360
Type III PCMCIA cards for TSX 37-21/22 PLC, TSX/PCX Premium processor, or TSX SCY 21601 module	Character mode Uni-Telway Modbus	RS 232 D (9 signals) 0.3…19.2 Kbps		**TSX SCP 111**	0.105
		RS 485 (RS 422 compatible) 1.2…19.2 Kbps		**TSX SCP 114**	0.105
		20 mA CL 1.2…19.2 Kbps		**TSX SCP 112**	0.105

Asynchronous serial link connection accessories

Description	Use	Reference	Weight kg
Terminal port connection box	Isolation of RS 485 signals, end of line adaptation, supplied with cable for connection to PLC (length 1 m)	**TSX P ACC 01**	0.690

Connecting cables for asynchronous serial links

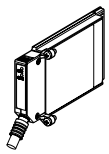
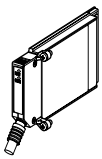
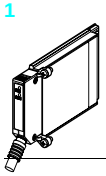
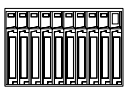
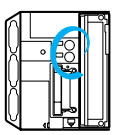
Description	Use From	To	Length	Reference	Weight kg
Cables for isolated RS 485 connection	TSX SCP 114 card	RS 485/RS 422 device *(2)*	3 m	**TSX SCP CX 4030**	0.160
	Integrated channel (channel 0) module TSX SCY 21601	RS 485/RS 422 device *(3)* via TSX SCA 50 box	3 m	**TSX SCY CU 6030**	0.180
Cable for non-isolated RS 485 connection	Micro/Premium port (TER or AUX) or TSX P ACC01 box	RS 232 D port of a terminal device (DTE) *(3)*	3 m	**TSX PCD 1030**	0.170
Cables for RS 232 D connection	TSX SCP 111 card	Communication device : Modem, converter, etc. (DCE) *(3)*	3 m	**TSX SCP CC 1030**	0.190
		Point-to-point terminal device (DTE) *(3)*	3 m	**TSX SCP CD 1030**	0.190
			10 m	**TSX SCP CD 1100**	0.620
Cable for 20 mA CL connection	TSX SCP 112 card	Current loop device *(2)*	3 m	**TSX SCP CX 2030**	0.160
Other connecting cables	–	–	–	Please consult our specialist catalogue	–

(1) Product supplied with a bilingual Quick Reference Guide : English and French.
(2) End of cable fitted with flying leads.
(3) End of cable fitted with a 25-way male SUB-D connector.

Characteristics :
page 43596/2

Micro automation platform

Connecting cables for PCMCIA cards and TER/AUX ports

Micro/Premium PLCs	Device to be connected	Physical link	Protocol	Length	Reference	Weight kg
TSX SCP 111 PCMCIA card 1 	DTE terminal 2 	RS 232 D	Character mode	3 m	**TSX SCP CD 1030**	0.190
				10 m	**TSX SCP CD 1100**	0.620
	DCE terminal (Modem, etc) 2 	RS 232 D	Character mode Uni-Telway	3 m	**TSX SCP CC 1030**	0.190
TSX SCP 114 PCMCIA card 1 	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)	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
	DTE terminal 3 	RS 422/485 (4-wire)	Modbus	3 m	**TSX SCP CX 4030**	0.160
TSX SCP 112 PCMCIA card 1 	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 5 	TSX P ACC 01 junction box 	RS 485	Uni-Telway	1 m	Included with TSX P ACC 01	–
	TSX P ACC 01 junction box for FTX 117 5 	RS 485	Uni-Telway	2 m	**T FTX CB 1020**	0.100
				5 m	**T FTX CB 1050**	0.190
	DTE terminal 6 	RS 232	Character mode	3 m	**T SX PCD 1030** *(1)*	0.170

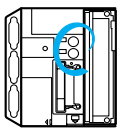
End of connecting cable fitted with:

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.

(1) Point-to-point, supplied with 2 SUB-D adapters : ***TSX CTC 07*** *9-way male/25-way female and* ***TSX CTC 08*** *9-way male/25-way male.*

Micro automation platform

Connecting cables for PCMCIA cards and TER/AUX ports

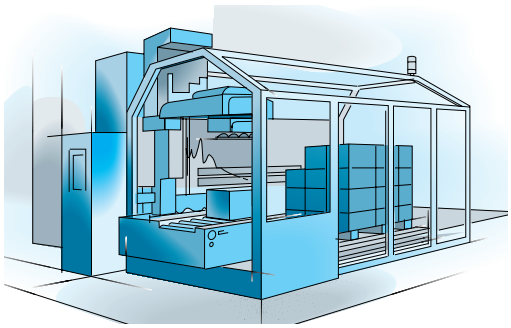
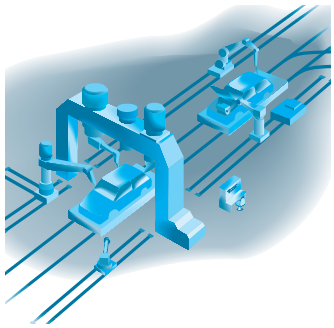
Micro/Premium PLCs	Device to be connected	Physical link	Protocol	Length	Reference	Weight kg
TER/AUX ports (continued) 1 	DTE terminal (Slave PC) 2 	RS 232	Uni-Telway	2.5 m minimum	**TSX PCU 1031** *(1) (2)*	0.140
	DTE terminal (printer, Slave PC without RTS) 2 	RS 232	Character mode Uni-Telway	3 m	**TSX PCX 1030** *(3)*	0.170
	DCE terminal (Modem M/Sl. USA/Europe) 3 	RS 232	Character mode Uni-Telway	3 m	**TSX PCX 1130** *(4)*	0.140
	FT 2100 terminal 2	RS 485	Uni-Telway	2.5 m minimum	**TSX PCU 1031** *(2)*	0.170
	CCX 17 panel XBT terminal 4 	RS 485	Uni-Telway	2.5 m	**XBT-Z968**	0.180
TSX SCY 21601 communication module integrated port 4 	TSX SCA 50 T-junction box 5 	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 6 	RS 485 (2-wire isolated)	Uni-Telway	3 m	**TSX SCY CU 6530**	0.200
	RS 485 terminal 5 	RS 485 (2-wire isolated)	Character mode	3 m	**TSX SCY CM 6030**	0.180

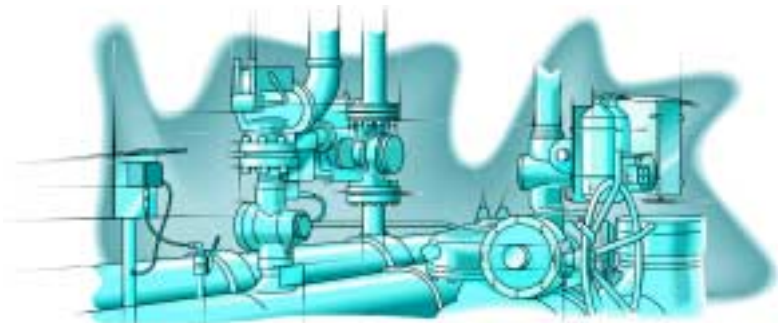
End of connecting cable fitted with :

1 8-way female mini-DIN connector.
2 9-way female SUB-D connector.
3 9-way male SUB-D connector.
4 25-way male SUB-D connector
5 Flying leads.
6 15-way male SUB-D connector

*(1) Point-to-point, supplied with 1 SUB-D adapter : **TSX CTC 07** 9-way male/25-way female.*
(2) TSX PCU 1031 cable to be used with terminal equipped with PL7 V 4.0 software reference TLX ●●● PL7 ● P 40M. For PL7 V < 4.0 software, use TSX PCU 1030 cable.
*(3) Point-to-point, supplied with 2 SUB-D adapters : **TSX CTC 07** 9-way male/25-way female and **TSX CTC 08** 9-way male/25-way male.*
*(4) Point-to-point, supplied with 1 SUB-D adapter : **TSX CTC 09** 9-way female/25-way male.*

Micro automation platform
Programming software

Applications	Application development and installation		
			
Type of PLC	Micro	Micro/Premium	
Services			
Programming	Yes		
Debugging	Yes		
Adjustment	Yes		
Instruction list	Yes		
Ladder language	Yesi		
Grafcet language	Yes	Yes (with macro-steps for Premium)	
Structured text language	Yes	Yes	
DFBs function blocks		Use (for Premium)	Creation/use for Premium
Fonctional view	No	No	Yes (Premium)
Import/export od function modules	No	No	Yes (Premium)
Diagnostic DFBs	No	No	Yes (Premium)
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	■ Création 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 42M	TLX CD PL7J P 42M	TLX CD PL7P P 42M
Pages	43100/17		

Application conversion	Development of functionsin C language	Comparison of PL7 Premium applications	Availability of Premium applications	Development of a multi-PLC data server
				
		Premium		Nano/Micro/Premium Quantum/Momentum/ TSX Series 7/April
Conversion of SMC PLC applications for Micro/Premium PLC applivations: ■ 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, etc) ■ Generation of disks forr 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 varaibles 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 40M**	**TLX DC PL7 DIF 40EF**	**TLX CD WSBY P 40F**	**TLX CD OFS 25M**
43107/3	43103/3	43107/3	43566/6	43105/3

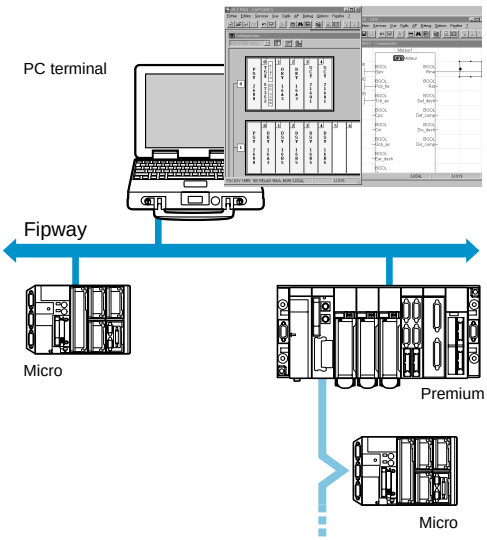
Micro Automation Platform
PL7 Micro/Junior/Pro programming software

PL7 Micro/Junior/Pro software is designed for Windows 95, Windows 98, Windows NT 4.0 and Windows 2000 Professional operating systems, and therefore benefits from all the features associated with these operating systems:

User friendly software

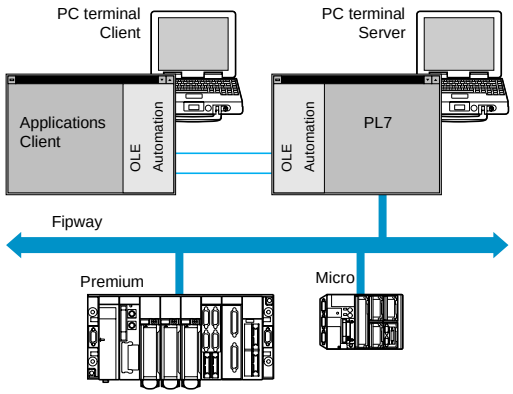
More user-friendly and productive due to:
- Shortcut menus on the right mouse button for quick access to the services available for the object selected.
- Contextual help: direct access to the help facility corresponding to the selected object.
- Tool tips: explanatory messages appear when skimming over 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.



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).

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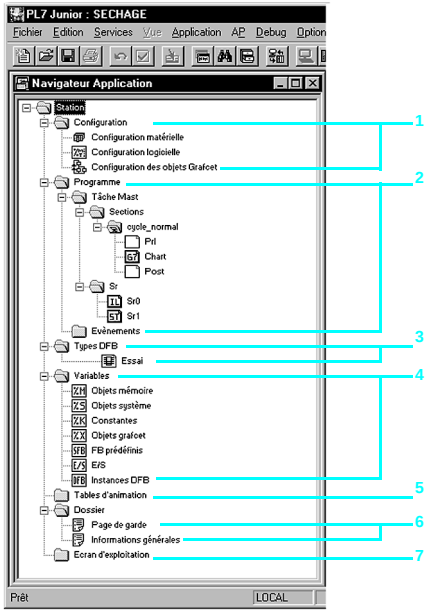
Application creation and debug tools

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 shortcut menus.

1 Configuration editor.

2 Program editor.

3 DFB user function blocks editor.

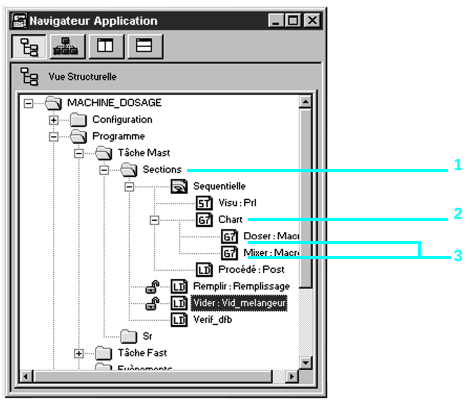
4 Variables editor.

5 Animation tables editor.

6 Documentation editor.

7 Runtime screens editor.

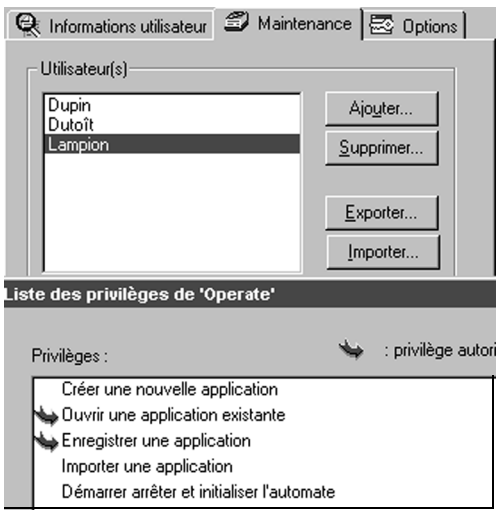
Concept of sections and Grafcet enhancement



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.

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).

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Micro Automation Platform
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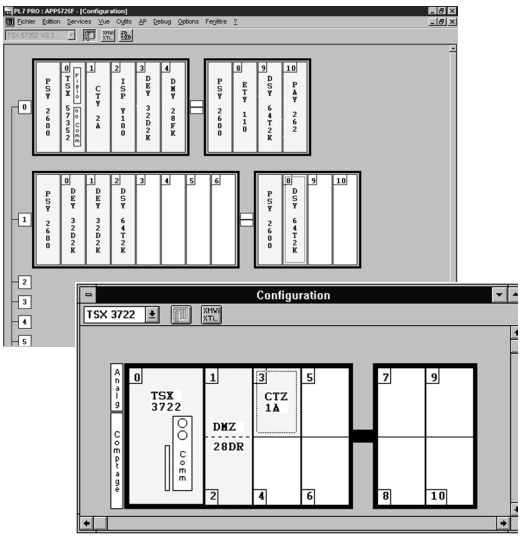


Configuration editor

Hardware configuration

The configuration editor intuitively and graphically enables the declaration and configuration of the various components of the 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

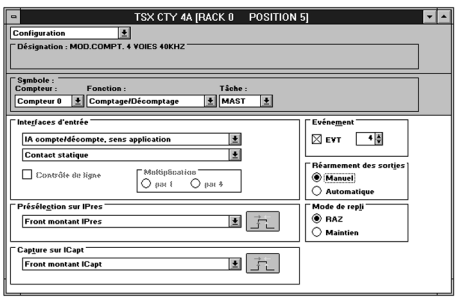
The configuration editor can also be used to set the software parameters of the application: choice of the number of constants, number of internal words and the number of each type of function block.

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



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.

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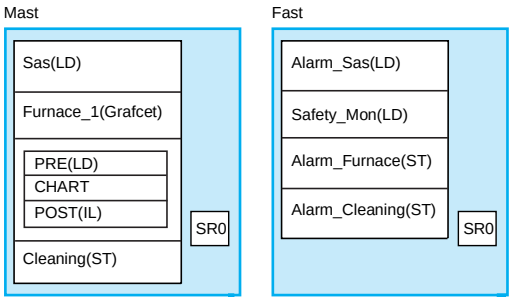
Micro Automation Platform
PL7 Micro/Junior/Pro programming software

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.



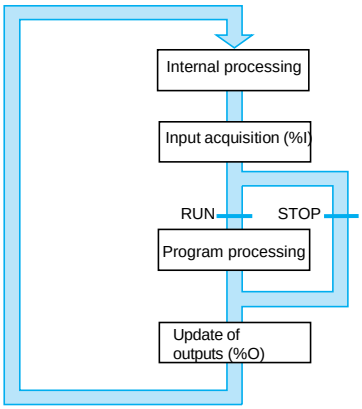
Structured and modular programming

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

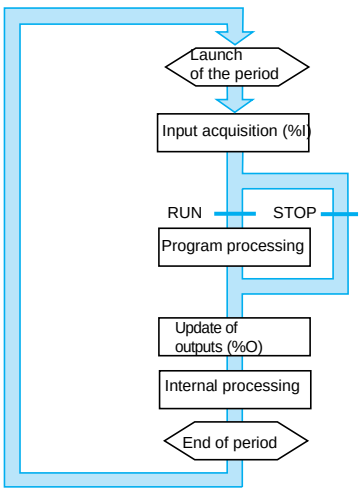
There are two types of cyclic execution:
- Normal cyclic execution. This is the default option.
- Periodic execution. This type of execution, as well as the period, are selected by the user during configuration.



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).

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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.

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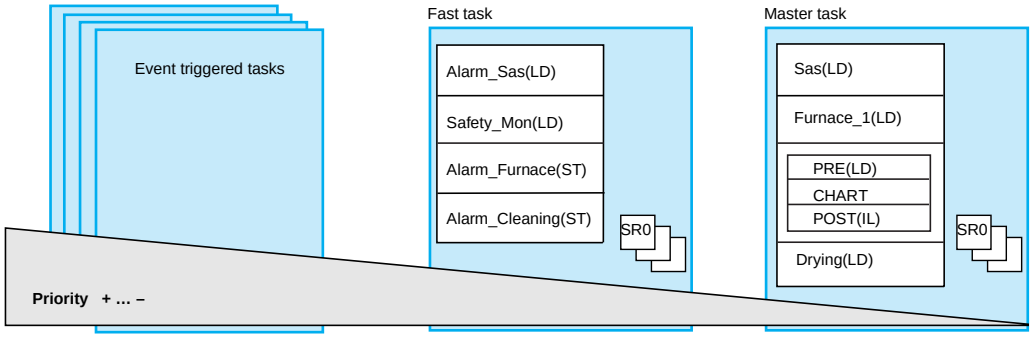

This structure can optimize use of the processing power, and can be used to structure the application and simplify design and debugging, as it is possible to write and debug each task independently of the others.

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, Instruction List language, etc. One section is dedicated to Grafcet language, when 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:
- 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.

Micro TSX 37-21/22 and Premium PLCs have 2 priority levels (EVT0 event has priority over other EVTi events).

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Ladder language (LD)

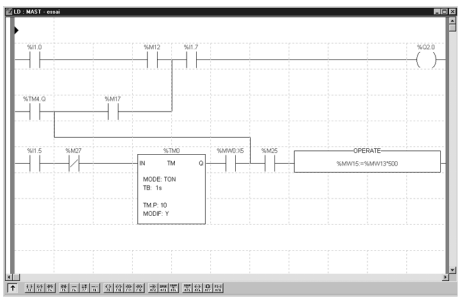
Program structure (section, SR or event-triggered task)

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 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, etc.



- 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.

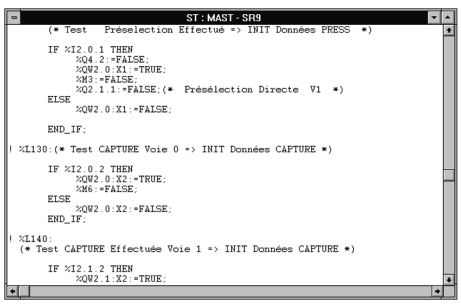
Structured Text language (ST)

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.

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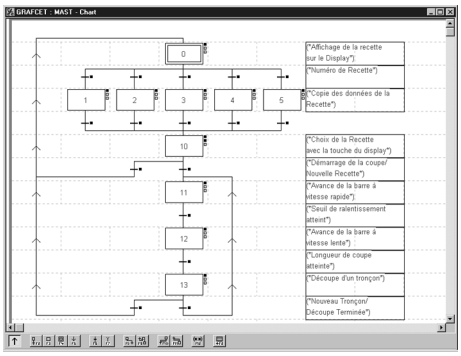
Grafcet language (SFC)

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 43100/6.
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 43100/13.
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.

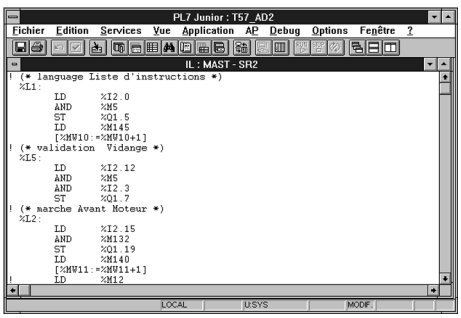
Instruction List language (IL)

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.

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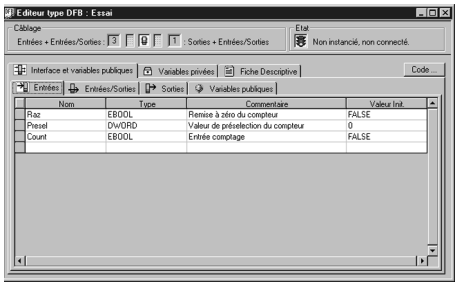
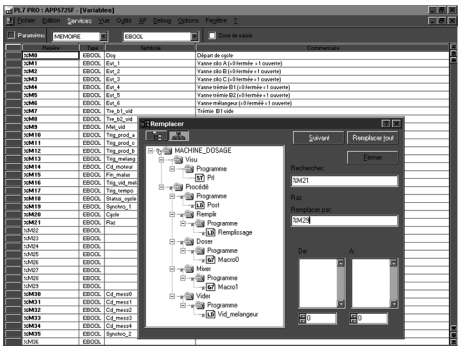


Functions

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.

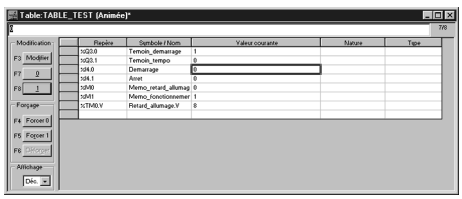


Variables editor

The variables editor is used to:
- Symbolize the various application objects (bits, words, function blocks, I/O, etc.).
- 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).
- 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.
- File import/export in text format (.txt).



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.

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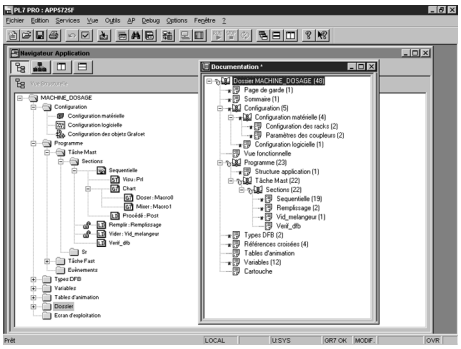


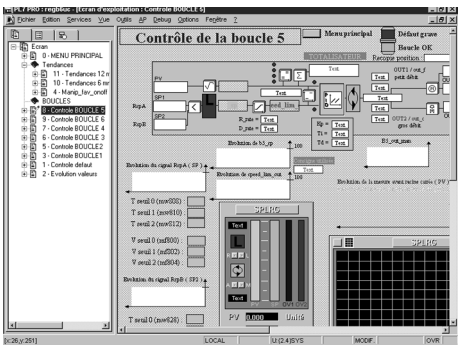
Documentation editor

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.



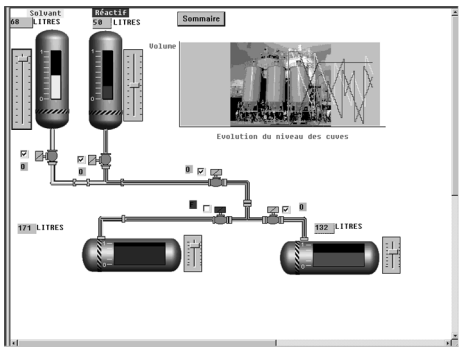
Runtime screens

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, they 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 also enables character string type objects to be displayed.

Synoptics can be displayed on the full screen for ease of viewing.

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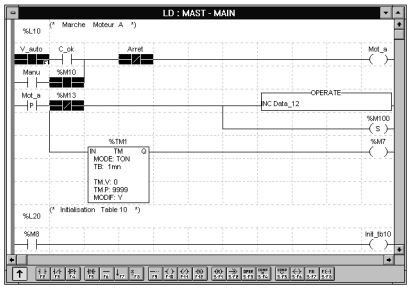
Micro Automation Platform
PL7 Micro/Junior/Pro programming software

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.

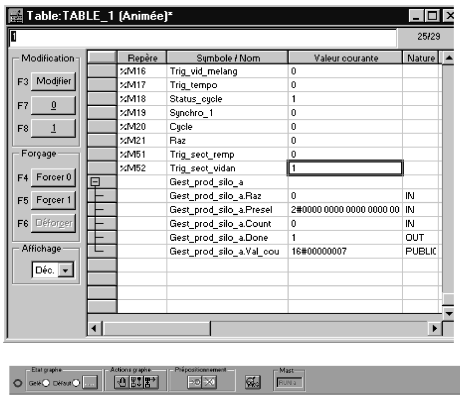


Animation of program elements

Parts of the program are animated directly when the 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.



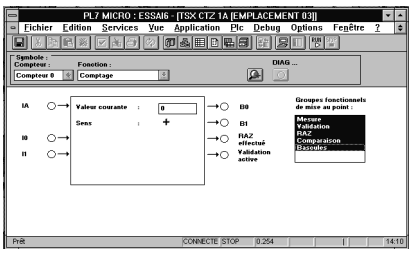
Debugging the DFBs

- 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

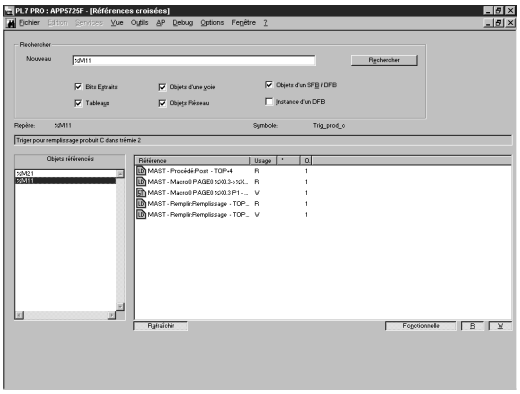
The debug screens provide access to the general module or channel diagnostics.
These screens identify:
Internal module faults.
External faults generated by the application (e.g., range overrun for an analog module).

With version ⩾ V4.0 of PL7, 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, etc), in-rack I/O and remote I/O on the Fipio bus.

Characteristics:
pages 43100/13 to 43100/15

References:
page 43100/17

Micro Automation Platform
PL7 Micro/Junior/Pro programming software



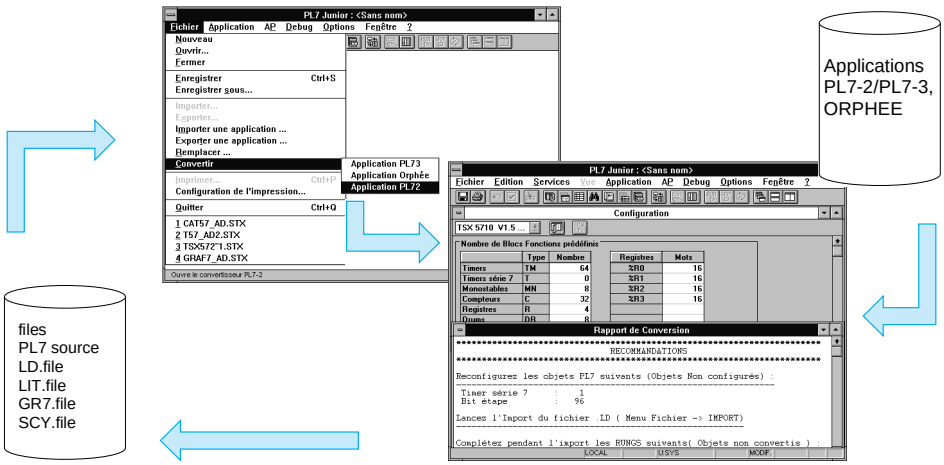
Variable cross-references

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.

Functions	PL7-2 and PL7-3 converters	Series 1000 converter
Program and data conversion	From any TSX Series 7 PLC program	From any ORPHEE program
Conversion of objects	Partial or total All types of data Constants (for PL7-2 and PL7-3 only) Retrieval of symbols and comments Address reassignment service	
I/O addressing	Reassignment of each channel individually or for each module: possibility of having several modules on the same slot (for different modularity)	
Conversion of program	Partial or total Source modules exported from PL7-2 or PL7-3 - Ladder or Structured Text (MAIN, PRE, POST, SRi) - Grafcet (CHART, XMi) Retrieval of all comments	Partial or total Cyclical and background combinational logic - Cyclical and background combination logic - Task event and diagnostic - Processing associated with Grafcet steps Retrieval of all comments

(1) Function requiring PL7 Junior/Pro software.

Characteristics:
pages 43100/13 to 43100/15

References:
page 43100/17

Micro Automation Platform
PL7 Micro/Junior/Pro programming software

Ladder language

Rung	Ladder language graphic symbols
■ 16 lines of 10 contacts with 1 output per line on Premium PLC ■ 7 lines of 10 contacts with 1 output per line on Micro PLC ■ 999 labels (one label per rung) ■ Comments: 222 characters per network	■ Open, closed and edge contacts ■ Direct, inverse, SET, RESET coils ■ Program jump, subroutine call coils ■ Comparison or operation blocks

Instruction List language

Combinational list instructions	Instructions on the program
■ 999 labels (one label per phrase) ■ Comments: 222 characters per phrase ■ **LD**, **LDN**, **LDR**, **LDF**: read bit status (direct, inverse, rising and falling edges) ■ **ST**, **STN**, **S**, **R**: write an output (direct, inverse, set, reset) ■ **AND**, **ANDN**, **ANDR**, **ANDF**: AND logic with one bit (direct, inverse, rising and falling edges) ■ **OR**, **ORN**, **ORR**, **ORF**: OR logic with one bit (direct, inverse, rising and falling edges) ■ **LD (, AND (, OR(,)**: opening and closing of parentheses (8 levels possible) ■ **XOR**, **XORN**, **XORR**, **XORF**: OR exclusive with one bit ■ **N**: negation	■ **END**, **ENDC**, **ENDCN**: program end (conditional or unconditional) ■ **JMP, JMPC, JMPCN**: jump to a label %L (conditional or unconditional) ■ **SRn**: call of subroutine n ($0 \leq n \leq 253$) (conditional or unconditional) ■ **RET, RETC, RETCN**: subroutine end (conditional or unconditional). A “generic” comment can be associated with each subroutine ■ **NOP**: blank instruction, no action performed ■ **MPS**, **MRD**, **MPP**: management of buffer memory for divergence towards the output ■ **HALT**: stop program execution

Structured Text language *(1)*

Structured Text statement	Instructions on bits
■ 4 types: conditional **(IF)**, conditional iteratives ■ **(WHILE**, **REPEAT)** and repetitive **(FOR)** ■ Loop stops WHILE, REPEAT or FOR: **EXIT** ■ Comments: number of comments per phrase not restricted, maximum of 256 characters per comment	■ **% bit**, **NOT**, **RE**, **FE**: direct read bit status, inverse, rising and falling edges ■ **OR**, **AND**, **XOR**: logic operations ■ **:=, SET, RESET**: assignment, setting a bit to 1, setting a bit to 0

Grafcet language

Chart (Micro PLC)	Chart (Premium PLC)
■ 96 steps maximum *(2)* on 8 pages for TSX 37-10 and 128 steps for TSX 37-21/22 ■ 1024 transitions maximum *(2)* ■ 11 elements maximum per divergence/convergence	■ maximum of 250 steps *(2)* on 8 pages ■ 64 macro-steps of 250 steps. ■ A “generic” comment can be associated with each macro-step ■ 1024 transitions maximum *(2)* ■ 11 elements maximum per divergence/convergence ■ 1024 steps maximum in the application

(1) Function requiring PL7 Junior/Pro software.
(2) Number of active steps and number of valid transitions: configurable, within the number of configured steps and the number of transitions configured.

References:
page 43100/17

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 Cyclic programmers: **%DRi** (0 ≤ i ≤ 254) 16 steps

The total number of timers **%TMi** and **%Ti** is limited to 64/255

Logical instructions on words and double words

- Assignment in word, indexed word, bits string: **:=**
- Logics: **AND**, **OR**, **XOR**, **NOT**
- Circular shift to the left and the right: **SHL**, **SHR**, **ROL**, **ROR**

Instructions on word and double word tables

- Assignment in table: **:=**
- Arithmetic: **+**, **–**, **x**, **/**, **REM**
- Arithmetic: **AND**, **OR**, **XOR**, **NOT**
- Summons of the elements of a table: **SUM**
- Comparison of 2 tables: **EQUAL, EQUAL_ARR**
- Search *(2)*: **FIND_EQW**, **FIND_GTW**, **FIND_LTW**,
- **MAX_ARW**, **MIN_ARW**
- Circular shift *(2), (3)*: **ROL_ARW**, **ROR_ARW**
- Tri *(2), (3)*: **SQRT_ARW**
- No. of' occurrences of a value *(2), (3)*: **OCCUR_ARW**
- Calculation of the length of the table*(2), (3)*: **LENGTH_ARW**

Arithmetic instructions on words and double words

- Arithmetics: **+**, **–**, *****, **/**, **REM**, **SQRT**, **ABS**
- Comparison: **>**, **<**, **<=**, **>=**, **=**, **<>**
- Increase, decrease: **INC**, **DEC**.
- Extraction of weak words, strong words: **LW, HW**
- Concatenation of 2 words: **CONCATW**

Instructions on floating point words

- Comparison: **>**, **<**, **<=**, **>=**, **=**, **<>**
- Arithmetic: **+**, **–**, *****, **/**, **SQRT**
- Absolute value, whole floating point: **ABS, TRUNC**
- 16-bit integer conversion: <–> Floating: **INT_TO_REAL**, **REAL_TO_INT**
- 32 bit integers conversion<–> Floating: **DINT_TO_REAL**, **REAL_TO _DINT**
- Floating <–> ASCII conversion: **REAL_TO_STRING**,
- **STRING_TO_REAL**
- Conversion degree <-> radian: **DEG_TO_RAD, RAD_TO_DEG**
- Rounding of a floating value in ASCII format: **ROUND**
- Assignment, initialization of floating words: **:=**
- Find maximum/minimum value in floating tables: **MAX_ARR, MIN-ARR**

Instructions on bit tables

- Assignment between tables <–> tables, word <–> tables, double word <–> table: **:=**.
- Logic operations :**AND_ARX**, **OR_ARX**, **XOR_ARX**, **NOT_ARX**, **COPY_BIT**
- Bits copy table <–> word table: **BIT_W**, **W_BIT**
- Copy of bits table <–> double words table: **BIT_D**, **D_BIT**
- Calculation of the length of the bits table: **LENGTH_ARX**

Character string instructions

- Delete, insert, replace, character extraction: **DELETE, INSERT, REPLACE, MID, LEFT**.
- Comparison, find, length: **EQUAL_STR, FIND, LEN**

Time management instructions

- Read, timer update: **RRTC**, **WRTC, SCHEDULE**
- Read time and date of stop: **PTC**
- Read current day: **DAY_OF_WEEK**
- Addition/removal of a period of time at a date/time of the day: **ADD_DT()**, **SUB_D()**, **ADD_TOD()**
- Difference between 2 dates (with/without time), between 2 times: **DELTA_DT**, **DELTA_D**, **DELTA_TOD**
- Conversion of a time period: **TRANS_TIME**
- Difference between a time period, date with character string: **TIME_TO_STRING**, **DATE_TO_STRING**, **TOD_TO_STRING**, **DT_TO_STRING**

Binary conversion instructions

- BCD 16 bits <–>16 bit integers: **BCD_TO_INT**, **INT_TO_BCD**
- BCD 32 bits <–>16 bit integers: **DBCD_TO_INT**, **INT_TO_DBCD**
- BCD 32 bits <–>32 bit integers: **DBCD_TO_DINT**, **DINT_TO_DBCD**
- Gray –> 16 bit integer: **GRAY_TO_INT**

(1) 1st value for the Micro PLC, 2nd value for the Premium PLC.
*(2) Operation on double word: replace **W** with **D.***
*(3) Operation on floating tables: replace **W** with **R.***

References:
page 43100/17

Functions and instructions *(continued)*

Logarithmic and exponential instructions

- Base 10 natural logarithms: **LOG, LN**
- Exponential nature, real by integer: **EXP, EXPT**

Trigonometric instructions

- angle expressed in radian: **SIN, COS, TAN**
- arc: **ASIN, ACOS, ATAN**

ORPHEE instructions *(1)*

- Shift left on word or double word with retrieval of shifted bits: **WSHL_RBIT**, **DSHL_RBIT**
- Shift right on word or double word with filling with 0s and retrieval of shifted bits: **WSHRZ_C**, **DSHRZ_C**
- Shift right on word or double word with signal extension and retrieval of shifted bits: **WSHR_RBIT**, **DSHR_RBIT**
- Up/Down counting with overrun signal: **SCOUNT**

Character string instructions

- Assignment of a character string: **:=**
- Comparison: **>**, **<**, **<=**, **>=**, **=**, **<>**
- Conversion ASCII <–> 16 bits integer: **STRING_TO_INT**, **INT_TO_STRING**
- ASCII conversion <–> 32 bit integer: **STRING_TO_ DINT**, **DINT_TO_STRING**
- Delete, insert, replace, extract, search for a sub string: **DELETE**, **INSERT**, **REPLACE**, **MID**, **FIND**
- Concatenisation, comparison of 2 strings: **CONCAT**, **EQUAL_STR**
- Character extraction: **LEFT**, **RIGHT**
- Length of character string: **LEN**

Instructions on program

- Call, return of subroutines: **SRi**, **RETURN**
- Jump to a label: **JUMP**
- Halt program execution: **HALT**
- Masking, unmasking of events: **MASKEVT, UNMASKEVT**

Addressable objects *(2)*

Bit objects

- **%I/Qx.i**: I/O module inputs/outputs
- **%Mi**: internal bits
- 256 on Micro TSX 37,
- 3692 on TSX P57 1p3M,
- 8056 on TSX P57 2p3M/T PCX 57 203M
- 16248 on TSX P57 3p3M/453M and T PCX 57 353M
- **%Si**: 128 bit system
- **%Xi**: Grafcet step bits
- 96 on Micro TSX 37-10,
- 128 on 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)
- **%Mpi[%mWj]**: internal words, (single/double length and floating)
- **%Kpi[%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)
- **%ppi:L**: constant internal words (single or double length, floating and words system)
- **%pBi: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, see page 43511/5
(3) 1024 step bits and macro-step step bits.

References:
page 43100/17

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 Micro/Premium automation platforms used.

Utilities/functions	Programming software		
Languages	**PL7 Micro**	**PL7 Junior**	**PL7 Pro**
Instruction List	Micro	Micro/Premium	Micro/Premium
Ladder language	Micro	Micro/Premium	Micro/Premium
Grafcet	Micro	Micro/Premium	Micro/Premium
Grafcet macro-steps		Premium	Premium
Structured Text	Micro	Micro/Premium	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			Micro/Premium
Operation			Micro/Premium
Application converters			
PL7-2	Micro/Premium	Micro/Premium	Micro/Premium
PL7-3		Micro/Premium	Micro/Premium
Orphee		Micro/Premium	Micro/Premium
Software extensions			
SMC (converter)		Micro/Premium	Micro/Premium
SDKC (C language dev)	Micro	Micro/Premium	Micro/Premium
PL7 DIF (comparison of PL7 applications)			Premium
OFS (data server)	Micro	Micro/Premium	Micro/Premium
WSBY (Warm Standby redundancy)			Premium

References

Multilingual software packages (English, French, German, Spanish and Italian) for PC compatibles *(1)* equipped with Windows 95, Windows 98, Windows NT 4.0 or Windows 2000 Professional 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 *(2)*.
- A cable reference TSX PCU 1031, PC compatible to Micro/Premium PLC (length 2.5 m). Not supplied with software upgrade or update packages.
- A multilingual PL7 software start-up and installation guide.
- A CD-ROM containing multilingual technical documentation.
- A CD-ROM containing the Micro/Premium platform operating systems.

For packages for 3 stations, the above quantities are multiplied by three. All documentation reference (software setup manuals) reference TLX DOC PL7 42F should be ordered separately.

(1) Minimum configuration: Pentium 133 MHz processor, 48 Mb of RAM memory with Windows 95/98 or 64 Mb with Windows NT, 50 Mb available on hard disk (25 Mb for software and 25 Mb for temporary directories), CD-ROM drive for installation of the PL7 program, VGA screen or above.
(2) 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.

Characteristics: pages 43100/13 to 43100/15
References: page 43100/17

PL7 Micro software packages

PL7 Micro enables programming in Instruction List, Ladder, Structured text and Grafcet language. It can also be used to set up application-specific functions and undertake maintenance and diagnostics of the developed applications. It includes the PL7-2 application converter.

Description	For PLC	Type	Reference	Weight kg
PL7 Micro software packages	Micro	1-station device	**TLX CD PL7M P 42M**	–
		3-station device	**TLX CD PL7M P 42M**	–
Software updates for previous version of PL7 Micro	Micro	1-station update	**TLX RCD PL7M P 42M**	–
		3-station update	**TLX RCD3 PL7M P 42M**	–

PL7 Junior development software packages

PL7 Junior software enables programming in Instruction List, Ladder, Structured Text and Grafcet language. It can also be used to set up application-specific functions and undertake maintenance and diagnostics of the developed applications. It includes the PL7-2, PL7-3 and ORPHEE application converters.

Description	For PLCs	Type	Reference	Weight kg
PL7 junior software packages	Micro, Premium, PCX Premium	1-station device	**TLX CD PL7J P 42M**	–
		3-station device	**TLX CD3 PL7J P 42M**	–
Software updates for previous version of PL7 Junior	Micro, Premium, PCX Premium	1-station update	**TLX RCD PL7J P 42M**	–
		3-station update	**TLX RCD3 PL7J P 42M**	–
				–
Software upgrade packages from previous version of PL7 Micro	Micro, Premium, PCX Premium	1-station upgrade	**TLX UCD PL7J P 42M**	–
		3-station upgrade	**TLX UCD3 PL7J P 42M**	–

PL7 Pro development software packages

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	Weight kg
PL7 Pro software packages	Micro, Premium, PCX Premium	1-station device	**TLX CD PL7P P 42M**	–
		3-station device	**TLX CD PL7P P 42M**	–
PL7software package Pro OpenTeam (1)	Micro, Premium, PCX Premium	Device with between 3 and 8 user stations for a geographical site team only	**TLX OT PL7P P42M**	–
PL7software package Pro OpenSite (1)	Micro, Premium, PCX Premium	Device > with 8 user stations for a geographical site only	**TLX OS PL7P P42M**	
PL7 software package Pro Servi *(1)*	Micro, Premium, PCX Premium	Client/server network architecture server device. Use of the PL7 Pro via client network stations and using the access	**TLX S PL7P P42M**	–
Software updates for previous version of PL7 Pro	Micro, Premium, PCX Premium	1-station update	**TLX RCD PL7P P 42M**	–
		3-station update	**TLX RCD3 PL7P P 42M**	–
Software upgrade packages from previous version of PL7 Junior	Micro, Premium, PCX Premium	1-station upgrade	**TLX UCD PL7P P 42M**	–
		3-station upgrade	**TLX UCD3 PL7P P 42M**	–

Separated elements

Description	Description	Reference	Weight in kg
X-Way drivers package for compatible PC	CD-Rom including the X-Way drivers package in Windows: Uni-Telway/Fipway/Fipio/Ethway XIP/ISAway in DOS and Windows Uni-Telway for TSX SCP 114 card Terminal port in OS/2	**TSX DRV 12M**	–
PL7 setup manuals package (in English)	Hard copy including PL7 reference manuals, functions, communication, converters and diagnostics	**TLX DOC PL7 42F**	3.410

(1) Software package including an annual software subscription (current year) after return of the registration certificate.

Characteristics: pages 43100/13 to 43100/15
References: page 43100/17

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.

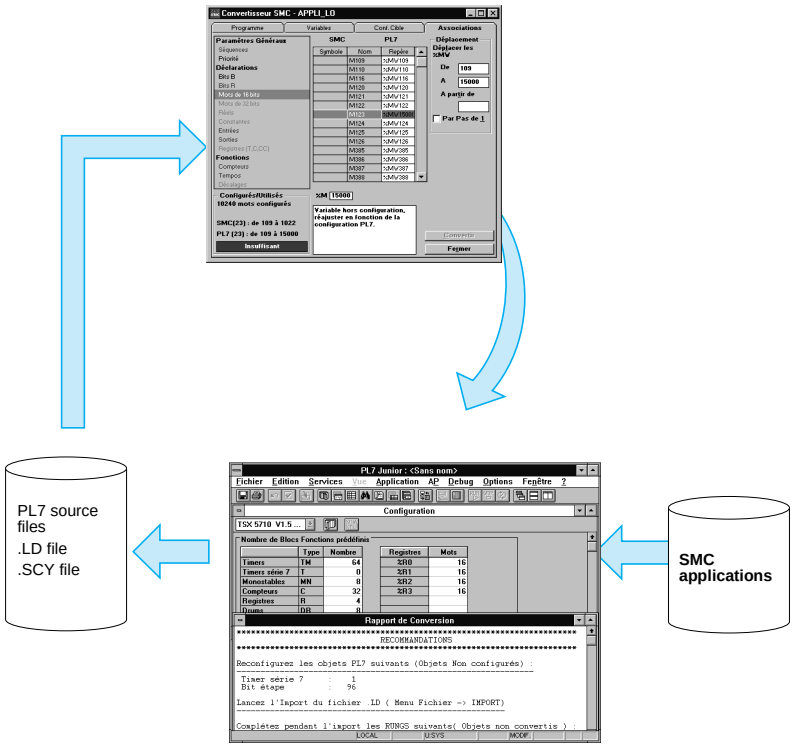
The SMC converter provides the following functions :
- Selection of the application in the directory where SMC applications are stored
- Selection of the program to be converted : sequences to be converted
- Code and data analysis : associations are suggested for SMC variables with PL7 correspondence (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.



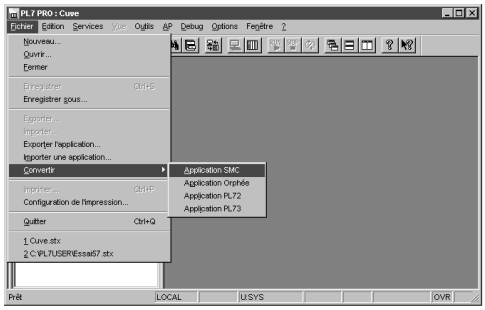
Reference :
page 43103/3

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.

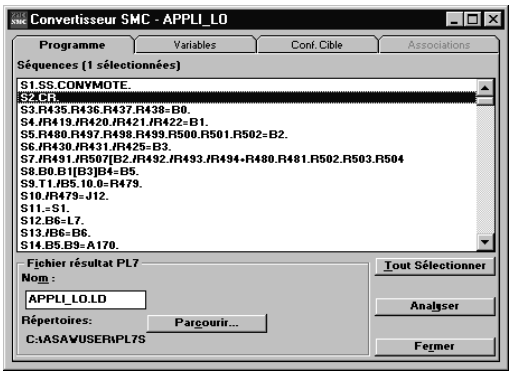


I/O reassignment

The converter in particular enables discrete I/O variables from an SMC PLC to be directly reassigned by module to 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)

Application converter software for SMC PLCs

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

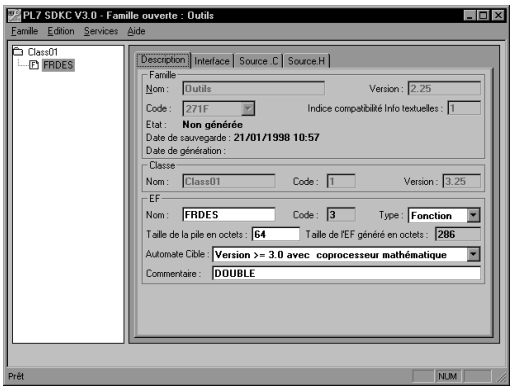
Micro automation platform
SDKC software

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

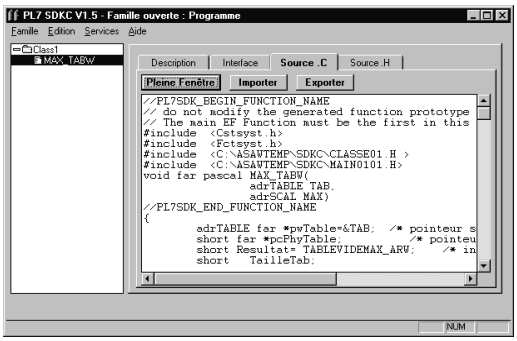
C language development software is a genuine tool for managing the entire function which has been created:
- A user-friendly creation interface, integrated in PL7, with automatic file organisation
- Powerful debug and test tools
- Management of compatibility and software version for the functions created
- 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.

References :
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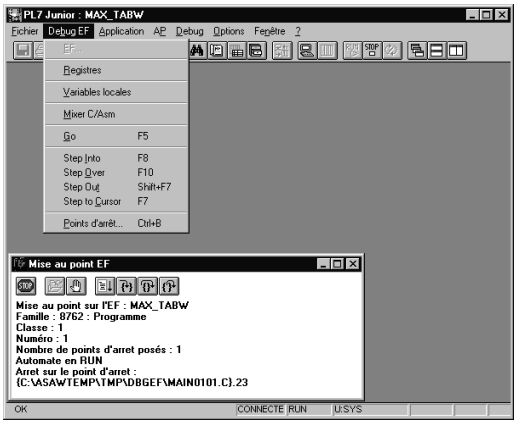
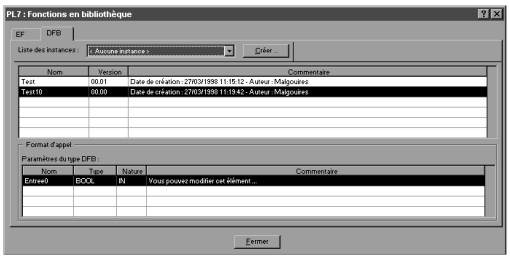


Debugging the functions

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.

Reference

This software extension enables standard functions offered by PL7 Micro, PL7 Junior and PL7 Pro version V4 (TLX CD PL7 ● P40M) 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 Micro/Premium	**TLX L SDKC PL7 40M**	0.930

Micro automation platform
OFS data Server software

Présentation

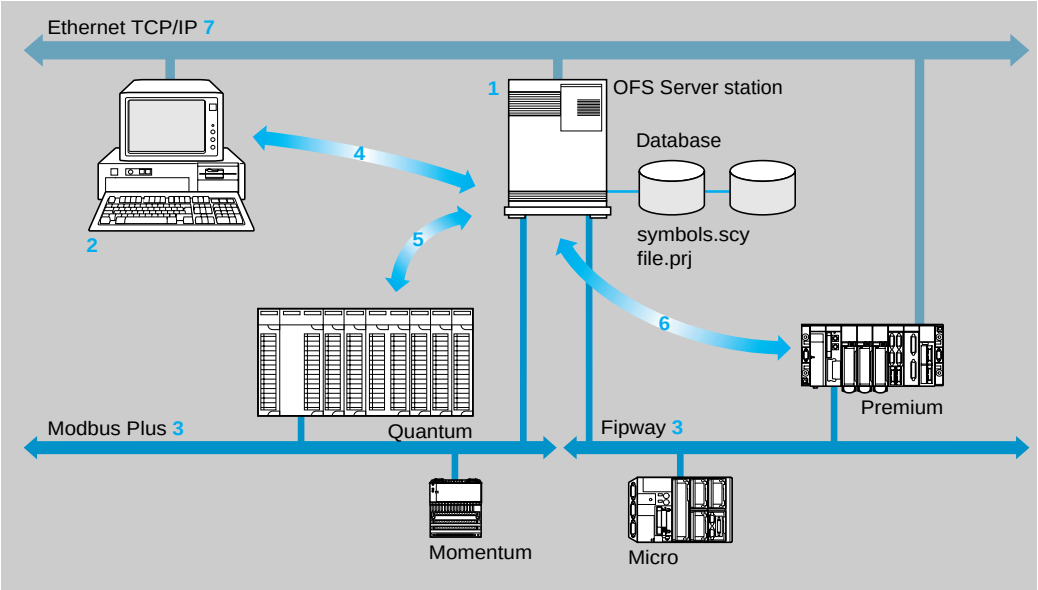
OFS software (OPC Factory Server) uses the OPC (OLE for Process Control) standard which allows data processing applications known as “Clients” (supervisors, databases, spreadsheets) to access data (internal variables) in Schneider Electric PLCs (Nano, Micro, Premium, Momentum, Quantum, TSX Serie 7, April).
OFS software is a multi-PLC data Server which enables several communication protocols to be used by supplying Client application programs with a set of services for accessing the control system variables.

This software is aimed at two types of user in particular:
- “End” users who wish to develop applications on a PC which will need to access PLC data. In this context, it is possible, for example, to create Client applications (supervisory control screens, Excel tables, etc) with access to a number of PLCs connected to the PC supporting these applications
- “Suppliers” of control system or industrial data processing products (supervision, man-machine interfaces, etc) wishing to develop, within their standard products, their OPC Client application which will be able to access data stored in PLCs via the OPC Server

The OFS offer comprises:
- A tool for configuring the OPC Server
- An OPC Server software receiving requests from an OPC Client and retransmitting them to the PLCs
- Low level drivers for communication with Modicon Telemecanique PLCs
- An OPC Client allowing to check the communication between the different elements connected
- A simulator allowing to debug Client applications and this, without automate connected
- The electronic setup documentation

Setup

OFS software can be integrated in control system architectures such as the one shown below :



1 PC running OFS software including the OPC Server
2 PC running the Client application, which accesses the PLC data via OFS
3 Communication networks linking the PC, which supports OFS software, with the PLCs
4 OPC communication protocol
5 Modbus on TCP/IP communication protocol
6 Uni-TE on TCP/IP communication protocol

Depending on the type of use, the Client application and OFS software can be located on the same PC or on 2 different PCs 1 and 2, linked by a TCP/IP Ethernet network 7.

PL7 software generates PLC variable symbol export files. These export files (symbols.scy) should be integrated in the OPC Server.
Concept variables can be accessed directly in the project (file.prj) of the Concept application. This direct link requires Concept (version 2.1) to be installed on the OFS station 1.

Reference :
page 43105/3

Setup (continued)

Development of Client applications

OFS software has 2 interfaces:
- OPC Automation interface
  Particularly suitable for “end” users and enables the development of OPC Client applications in Visual Basic, in Visual Basic under Excel, but also in C++.
- OPC Custom interface
  Used primarily by “suppliers” of control system or industrial communication products. It enables the development of applications in C++ in order to access the OFS software OPC Server. This interface is more suitable for software development experts so that they can integrate the Client application into their standard products. This is more high-performance interface, in terms of access time to the data stored in the OPC Server but requires, for its programming, a good knowledge in C++ programming.

OFS software services

The various OFS software services enable:
- Access to the Server in local or remote mode
- Access to variables in the form of addresses or symbols
- Reading and writing of variables to one or more PLCs present on the communication network connected to the PC supporting the OFS software. These variables can be :
  - system variables (OPC System Group : PLC status, diagnostics, etc)
  - internal variables representing the PLC words or registers (OPC User Group)
- Use of a notification mechanism which transmits change of state values to the Client. Communication between the OPC Server and the PLC is polling or can be, on the initiative of the PLC to decrease the flow of exchanges (“push data”)
- Definition of dead bands for measurement noise filtering (floating variables).

Communication with PLCs

The various variables contained in the PLCs are accessed via Uni-TE and Modbus protocols using the following:
- Uni-Telway bus and Fipway, Uni-TE networks on TCP/IP as well as ISAway when using a PCX coprocessor
- Modbus serial link, Modbus Plus and Modbus networks on TCP/IP.

The various corresponding communication drivers are supplied in the OFS software (except Modbus Plus driver which is supplied with its PC Modbus Plus card).

The link with PL7 or ProWORX variable symbols is created by means of export files for these variables generated by PL7 or ProWORX development software.

Concept variables are accessed directly with the Concept application. In addition, the OFS Server dynamically ensures the consistency of data between the Concept databases and OPC Client applications.

References

The OFS offer comprises:
- An OPC Server software, compatible with the OPC Data Access 2.0 standard
- An OPC Server simulator (for debugging the application when no PLCs are present)
- A tool for configuring the Server on the PC
- A example of OPC Client for setting up applications.
- The drivers for connection to X-Way and Modbus networks TSX DRV 12M
- The setup documentation on CD-Rom.

Supplied on CD-Rom, this software operates autonomously on a PC. Nevertheless, export files for variables generated by PL7 or ProWORX development software need to be present. The direct link with Concept applications requires Concept software (version 2.1) to be installed on the same station.
OFS software for PC compatibles (minimum configuration: Pentium 266 MHz processor, 64 Mb of RAM memory) is compatible with Windows 95 (with Service Pack 1 and DCOM), Windows 98, Windows NT 4.0 (with Service Pack 5) or Windows 2000 operating systems.

Description	Function	Reference	Weight kg
OFS data Server software	Enables the development of Client applications, accessing PLC data (Micro/Premium/Momentum/ Quantum/TSX Serie 7/April) via the OFS Server	**TLX CD ●OFS 25M** *(1)*	0.160
OFS software update	Enables the update for previous version of OFS data Server software	**TLX UCD ●OFS 25M** *(1)*	0,160
User’s manual	Setting multilingual manual (FR, EN and DE) for OFS data Server software (paper format)	**TLX DM OFS 25M**	**-**

(1) To order a site licence for 1 station replace ● by : none character, licence 10 stations: **10***, licence 20 stations:* **20***, licence 200 stations:* **UN**.

Micro automation platform
FTX 117 Adjust terminal

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

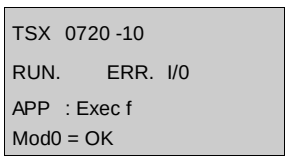
3 A keypad with 35 keys

4 A slot for the type 1 PCMCIA memory card

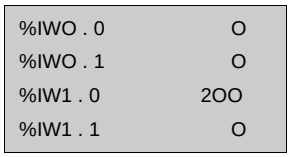
5 Magnets on the rear of the terminal which are used to keep it in a vertical position on a metal support

6 A carrying strap

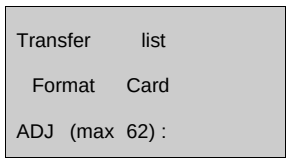
Functions



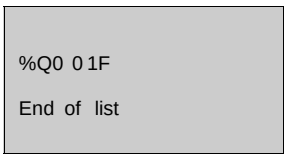
Example of TSX editor



Example of DAT editor



Example of DT-i editor



Example of Frc editor

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 43580/3
Dimensions : page 43580/3

T FTX 117 ADJ 02

T FTX RSM ●●16

Objects which can be accessed by the terminal

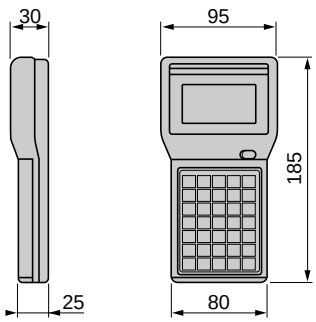
Language element	Type	Symbol	Action *(1)*
Inputs	Input bit	%Ix.i	R, W, F
	Input word (single, double)	%IWi, %IDi *(2)*	R, W
Outputs	Output bit	%Qx.i	R, W, F
	Output word (single, double)	%QWi, %QDi *(2)*	R, W
Internal variables	Internal bit	%Mi	R, W, F *(3)*
	System bit/word (single, double)	%Si, %SWi, %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
Function blocks	Timer, monostable, register, up/down counter, drum controller	%TMi.z, %Mi.z, %Ri.z, %Ci.z, %DRi.z	R, W (dep. on obj.)

References

Description	Use	Description	Reference	Weight kg
Portable mini terminal *(5)*	Adjustment of Nano/Micro/ Premium PLCs	LCD screen, 4 lines of 16 characters, 35-key dust and damp proof keypad Power supply via PLC erminal 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 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/Micro/Premium PLCs T FTX CB1 020 (2 m long) and multilingual installation guide.

Presentation :
page 43580/2

Micro automation platform

Power consumption of Micro PLC modules

The power supplies incorporated into 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 08R5	1/2		25		55/85			
	TSX DSZ 32R5	S		50		115/175		120/175	
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	
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			
Counting									
	TSX CTZ 1A	1/2		100				15	
	TSX CTZ 2A	1/2		120				15	
	TSX CTZ 2AA	1/2		120				15	
Communication									
	TSX STZ 10	1/2		130					
	TSX SAZ 10 (3)	1/2		100					
	TSX MDM 10	–		195					
	TSX SCP 111	–		140					
	TSX SCP 112	–		120					
	TSX SCP 114	–		150					
	TSX FPP 10	–		330					
	TSX FPP 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 43560/3).
(3) Consumption on ⎓ 30 V of the power supply for the AS-i bus : 50 mA typical (100 mA max).