Micro automation platform

TSX 37-05 PLCs

Presentation, description, selection

Presentation

The TSX 37-05 PLC comprises a rack which integrates a $\sim$ 100/240 V power supply, a processor including a 9 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 take :
● 1 standard format discrete I/O module of any type
● 2 half format discrete I/O, safety, analogue I/O or counter modules.

Description
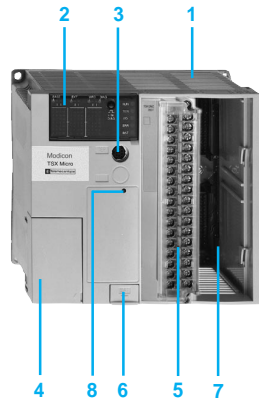
The TSX 37-05 PLC comprises :

1 2-slot rack

2 Centralised display block

3 Terminal port (TER)

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 rack

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 I/O modules	8 I		■		■	■	■
	12 I		■		■	■	■
	32 I	■	■	■		■	■
	4 O		■		■	■	■
	8 O		■		■	■	■
	32 O	■	■	■		■	■
	16 I/O		■		■	■	
	28 I/O	■	■	■		■	■
	64 I/O	■	■	■		■	■
Preventa safety module			■		■	■	■
Analogue I/O	4 I and 8 I		■		■	■	
	2 O and 4 O		■		■	■	
Counter channels	1 channel		■		■	■	
	2 channels		■		■	■	

■ Can be inserted

Micro automation platform

TSX 37-08 PLCs

### Presentation, description, selection

Presentation

The TSX 37-08 comprises a rack which integrates a 100/240 V power supply, a processor including a 9 Kword RAM memory (program, data and constants), 1 Flash EPROM backup memory, two TSX DMZ 28DR discrete I/O modules (16 inputs and 12 relay outputs) and an available slot.

The available slot can take :
- 1 standard format discrete I/O module of any type
- 2 half format discrete I/O, safety, analogue I/O or counter modules

Description
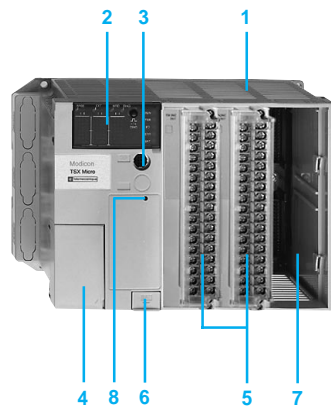
The TSX 37-08 PLC comprises :

1 3-slot rack

2 Centralised display block

3 Terminal port (TER)

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 more than two 16-input/12-output modules present in slots no. 1 and no. 2

Type of module to be inserted		Max number of modules		Format		Connection	
		1	2	Standard	Half	Connector	Term. blk.
Discrete I/O	8 I		■		■		■
	12 I		■		■		■
	32 I	■		■			■
	4 O				■		■
	8 O				■		■
	32 O	■		■			■
	16 I/O		■		■	■	
	28 I/O	■		■			■
	64 I/O		■		■	■	
Preventa safety module			■		■		■
Analogue I/O	4 I and 8 I		■		■		■
	2 O and 4 O		■		■		■
Counter channels	1 channel		■		■	■	
	2 channels		■		■	■	

■ Can be inserted

Micro automation platform

TSX 37-10 PLCs

Presentation, description, selection

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 discrete I/O module (28 or 64 I/O) and an available slot.
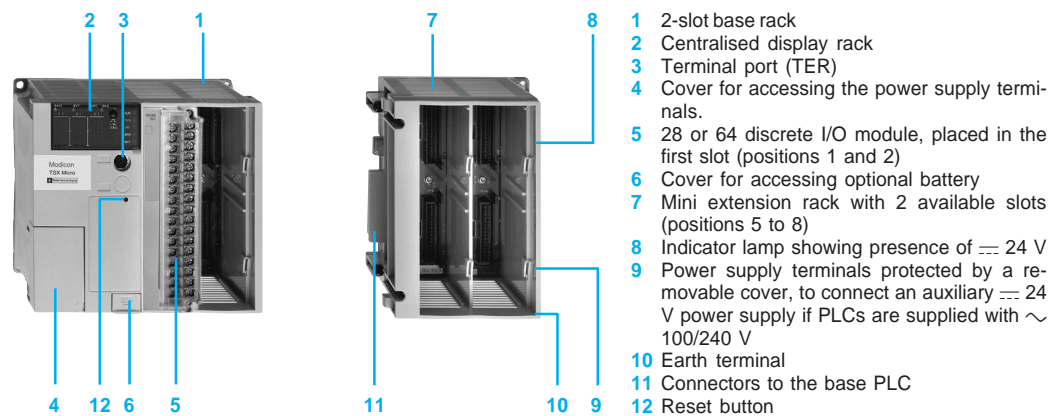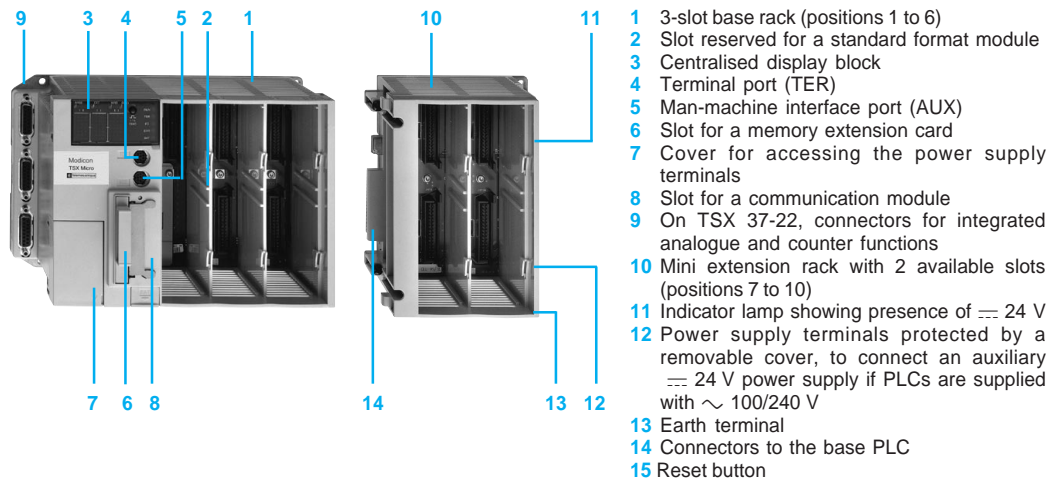
A TSX RKZ 02 mini extension rack enables the number of slots to be increased by 2.

Each available slot can take :
● 1 standard format discrete I/O module of any type
● 2 half format discrete I/O, safety, analogue I/O or counter modules.

Description

TSX 37-10 PLCs and the TSX RKZ 02 mini extension rack comprise :

1 2-slot base rack
2 Centralised display rack
3 Terminal port (TER)
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 Indicator lamp showing presence of === 24 V
9 Power supply terminals protected by a 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

Supply	Discrete I/O module integrated in the first slot				Connection		Reference
	Number of inputs		Number of outputs		Connector	Terminal block	
	=== 24 V	∿ 110/120V	Solid state === 24 V/0.5 A	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 possible

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

Type of module to be inserted		Maximum number of modules (1)				Format		Connection	
		1	2	4	6	Stand.	Half	Connect.	Term. blk
Discrete I/O	8 I					▆			▆
	12 I					▆			▆
	32 I			(2)		▆		▆	▆
	4 O					▆			▆
	8 O					▆			▆
	32 O			(2)		▆		▆	▆
	16 I/O					▆			▆
	28 I/O			(2)		▆			▆
	64 I/O		(2)			▆			▆
Preventa safety module						▆			▆
AS-i bus or I/O extension		(3)					▆		▆
Analogue I/O	4 I and 8 I						▆		▆
	2 O and 4 O		▆				▆		▆
Counter channels	1 channel						▆	▆	▆
	2 channels		▆				▆	▆	▆

▆ Can be inserted
(1) With TSX RKZ 02 mini extension rack.
(2) This includes a standard format module to be inserted in the first 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.

Micro automation platform

TSX 37-21/22 PLCs

Presentation, description, selection

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 $\sim$ 100/240 V), a processor including a 20 Kword RAM memory (program, data and constants), 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.
Each available slot can take :
● 1 standard format discrete I/O module
● 2 half format discrete I/O, analogue I/O or counter modules

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 Centralised display block
4 Terminal port (TER)
5 Man-machine interface port (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 Indicator lamp showing presence of $=$ 24 V
12 Power supply terminals protected by a removable cover, to connect an auxiliary $=$ 24 V power supply if PLCs are supplied with $\sim$ 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 I/O	8 I					(3)				
	12 I					(2)				
	32 I			(2)						
	4 O					(2)				
	8 O					(2)				
	32 O				(2)					
	16 I/O					(2)				
	28 I/O				(2)					
	64 I/O		(2)							
Preventa safety module										
AS-i bus or I/O extension		(3)								
Analogue I/O	4 I and 8 I									
	2 O and 4 O									
Counter channels	1 channel									
	2 channels									
Communication module (PCMCIA card on processor)	Uni-Telway									
	Serial link									
	Modbus									
	Modbus Plus									
	Fipway									
	Fipio Agent									
	Modem									

▇ Can be inserted
(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.

Micro automation platform

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

Functions

Functions

Discrete I/O modules

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 preactuators in the device using cables with flying leads or direct connection to the TELEFAST2 prewired 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 43051/11.

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 43307/3.

Remote discrete I/O extension module

TSX 37-10/21/22 Micro PLCS offer two different possibilities for extending the I/O :

- The TSX STZ 10 remote discrete I/O extension module. The discrete I/O of 4 Nano PLCs or an extension Nano PLC can be used over a distance of up to 200 m. These Nano PLCs can be used as remote discrete I/O or local "slave" PLCs.

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

- 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 42716/2 to 42613/3.

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 half format analogue I/O modules
- To locate analogue I/O remotely via the TSX STZ rackmaster module with TSX 37-10/21/22 PLCs. The latter enables the use of three TSX AMN 400● analogue extensions, each equipped with 3 analogue inputs and one analogue output.

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

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 43100/15.

Micro automation platform

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

Functions (continued)

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).
- Using 10 kHz counter channels integrated into TSX 37-22 PLC bases (2 10 kHZ fast counter channels, with 1 channel having downcounting functions as above
- 40 kHz or 500 kHz TSX CTZ counter modules. These are half format modules inserted into the slots available on the base rack.

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

Communication

Micro PLCs offer two 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 or slave) and character mode, and Modbus slave protocol.
- PCMCIA format communication card for TSX 37-21/22 PLCS. They have a dedicated slot for the PCMCIA format communication card ("Full-duplex" asynchronous serial link, FIPIO, Uni-Telway, or Modbus/Jbus, Modbus Plus and Fipway network as well as a Modem link.)

For further details, see pages 43609/2 to 43598/3.

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 the various hot spots which may exist.
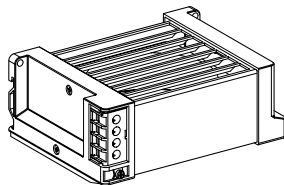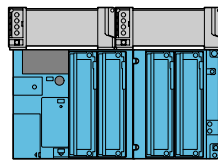

TSX FAN ●●P

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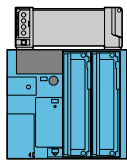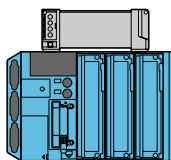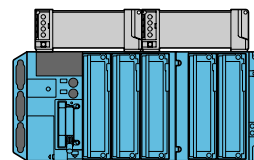

TSX 37-05/10

TSX 37-10 + TSX RKZ 02

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 37-08/21/22

TSX 37-21/22 + TSX RKZ 02

(1) 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

Memory structure

The memory structure of Micro PLCs consists of two distinct zones :

● A 9 Kword (for TSX 37-05/08 PLCs) or 14 Kword (for TSX 37-10 PLCs) or 20 Kword (for TSX 37-21/22 PLCs) internal RAM memory designed to receive the application (data, program and constants)
● A 10 Kword Flash EPROM memory (for TSX 37-05/08 PLCs) and 16Kword (for TSX 37-10/21/22 PLCs) designed to back up the application program (9 or 14 Kwords maximum) and to back up 1024 %MW internal words maximum 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 files or log files (see pages 43598/2 and 43598/3).

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. For further details see pages 43598/2 and 43598/3.
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 (in internal RAM) can be transferred from a PLC to the TSX PGR LDR module (and saved within it), then transferred from the TSX PGR LDR module to a PLC.
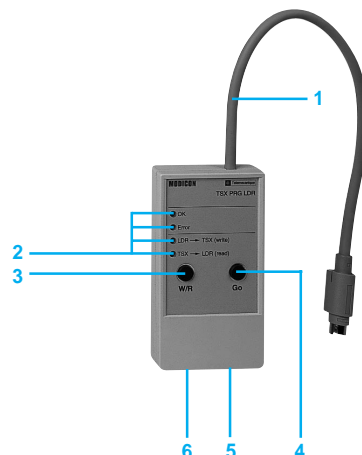
The front panel of the TSX PGR LDR module comprises :

1 A cord for connecting to the PLC terminal port.

2 Four operation indicator lights.

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.

Micro automation platform

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

Memory structure (cont.)

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.

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

TSX 37-05/08/10/21/22 (without PCMCIA card)
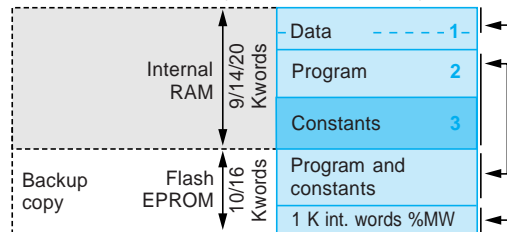
1 Application data (17.5 Kwords maximum).
2 descriptor and executable code for tasks.
3 constant words, initial values and configuration.

TSX 37-21/22 (with PCMCIA card)

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

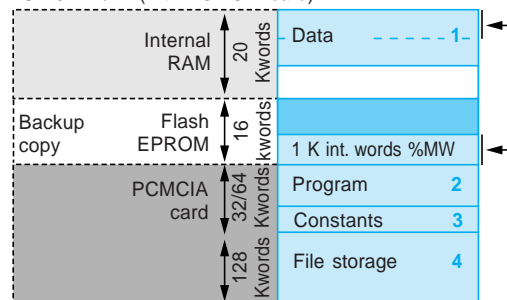**Application in the internal RAM**
The application is loaded entirely in the battery-backed internal RAM of the processor with a capacity of :
- 9 Kwords (TSX 37-05/08) shared, for example, as 2 Kwords of application data and 7 Kwords of the program with its constants
- 14 Kwords (TSX 37-10) shared, for example, as 500 words of application data and 13.5 Kwords of the program with its constants
- 20 Kwords (TSX 37-21/22), shared, for example, as 4 Kwords of application data and 16 Kwords of the program with its constants

Application in the internal Flash EPROM
The total volume is equal to the application volume in RAM, limited to 9 Kwords or 15 Kwords, to which is added the backup of the first 1024 data words(%MW).

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 (see page 43598/3).
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 memory structure of the PLC (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

TSX 37-21/22 Micro PLCs make it possible to save the application (program and constants) on a TSX MFP BAK 032P Backup 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 is executed on a RAM or Flash EPROM PCMCIA memory card.

Micro automation platform

TSX 37-05/08/10/21/22 PLCs
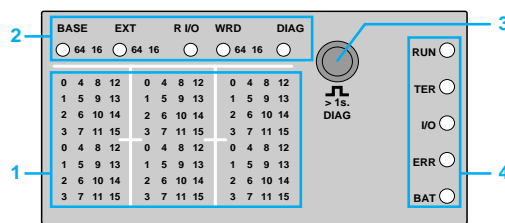
Centralised display, description

Centralised 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 centralised display provides :

- Display of the local or remote I/O channel states (Nano PLC I/O)
- 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 centralised 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 pushbutton 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

Micro automation platform

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

Characteristics

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. EN 61131-2 (IEC 1131-2), CSA 22-2, UL 508
- Merchant navy requirements from the main European bodies : BV, DNV, GL, LROS, RINA, etc
- 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 1131-2), 0…+ 70 with TSX FAN modules
	Storage	°C	-25...+ 70 (conforming to IEC 1131-2)
Relative humidity	Operation		10 %...95 %, without condensation
	Storage		5 %...95 % conforming to IEC 1131-2 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
Withstand to electrostatic discharge	Resistant 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 1131-2

Power supply characteristics

Type of power supply				$\sim$ **power supply**	$=$ **power supply**
Primary	Voltage	Nominal	V	$\sim$ 100...240	$=$ 24
		Limit (including ripple)	V	$\sim$ 90…264	$=$ 19.2…30 V 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 ($\sim$ 100 V), ≤ 0.3 ($\sim$ 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)
		$=$ 24 VR output (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.

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

Characteristics (cont.)

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. (none 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 modules 64 channels	1	1	2	3	
	Safety	Max. no. of Preventa modules	2	2	6	8	
	Analogue	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 (Max. no. of channels see page 43054/2)	Max. no. of modules	2	2	2 (2)	4 (2)	
		No. of integrated channels	–			–	2
		No. of channels on discrete inputs	2				
	Communication	Integrated channel (terminal port)	1 RS 485 channel (Uni-Telway master/slave Modbus or character mode)				
		No. of PCMCIA card	–			1	
	Real-time clock		–			1	
Memory		Internal RAM **Kwords**	9 (see page 43050/9)	9	14	20	
		PCMCIA memory card **Kwords**	–			32/64 + 128 (file storage)	
		Max. memory size **Kwords**	9		14	84	
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)	

Memory capacity			TSX 37-05	TSX 37-08	TSX 37-10	TSX 37-21/22		
	PCMCIA card		–	–	–	–	32 Kwords	64 Kwords
	Data (% MWi)	**Kwords**	1 (3)	1 (3)	1 (3)	1 (3)	17.5	17.5
	Constants (% KWi)	**words**	128 (3)	128 (3)	128 (3)	128 (3)	128 (3)	128 (3)
	File storage	**Kwords**	–	–	–	–	128	128
	Program Ladder (LD)	100 % Boolean **Kinst.**	1.6	1.6	4	6.6	13.5	28.1
		65 % Boolean and 35 % numerical **Kinst.**	0.9	0.9	2.1	3.9	8.8	18.6
	List (IL)	100 % Boolean **Kinst.**	2	2	5.1	8.5	17.2	35.9
		65 % Boolean and 35 % numerical **Kinst.**	1	1	2.4	4.4	10	21
	Structured Text (ST)	100 % Boolean **Kinst.**	1.3	1.3	3.4	5.6	11.5	23.9
		65 % Boolean and 35 % numerical **Kinst.**	1	1	2.4	4.4	10	21
System overhead		**ms**	1.9	1.9	1.9	1.6	2.3	–

(1) 1st value for connection via terminal block, 2nd value via HE 10 type connector.
(2) Counter modules in the base only.
(3) Default size, can be extended, but will have an adverse effect on the size of the application program.

Micro automation platform

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

References

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 memory		Discrete I/O modules		Reference	Weight
	RAM	Flash EPROM	Type	Connection	(1)	kg
~ **100…240 V**	9 Kwords + data memory	10 Kwords	1 module 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 memory		Discrete I/O module integrated in the 1st slot		Reference	Weight
	RAM	Flash EPROM	Type	Connection	(1)	kg
⎓ **24 V**	14 Kwords + data memory	15 Kwords	16 I ⎓ 24 V 12 O solid state 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 O solid state 0.5 A	Via HE 10 type connector	**TSX 37 10 128DTK1**	1.740
			32 I ⎓ 24 V 32 O solid state 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)

Power supply	Integrated memory		Integrated functions	Reference	Weight
	RAM	Flash EPROM		(1)	kg
⎓ **24 V**	20 Kwords + data memory	15 Kwords	–	**TSX 37 21 101**	1.720
			8 analogue inputs 0-10 V 1 analogue 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 analogue inputs 0-10 V 1 analogue output 0-10 V 1 up/down counter 10 kHz 1 counter 10 kHz	**TSX 37 22 001**	1.750

Mini extension rack

Capacity	Use	Maximum number	Reference	Weight
				kg
2 slots (or 4 positions)	TSX 37-10/21/22 PLCs	1 mini rack per PLC	**TSX RKZ 02**	0.630

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

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

References (cont.)

TSX MRP ●●●P

TSX FAN ●●P

TSX PRG LDR

Memory extension cards (PCMCIA type 1)

Extension for application memory

Description	Use	Memory size		Reference	Weight
		Application	File storage		kg
RAM memory	TSX 37-21/22 PLCs	32 Kwords	–	**TSX MRP 032P**	0.030
		64 Kwords	–	**TSX MRP 064P**	0.030
Flash EPROM Memory	TSX 37-21/22 PLCs	32 Kwords	–	**TSX MFP 032P**	0.025
		64 Kwords	–	**TSX MFP 064P**	0.025
Backup card (1)	TSX 37-21/22 PLCs	16 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.

Description	Use	Application	File storage	Reference	Weight kg
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 EPROM memory	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

Fan modules

Description	Power supply	Reference	Weight 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 reference	Weight kg
Program loader with terminal port conn. cable (length 0.3 m)	Simplifies duplication, updating or backup of 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 analogue I/O	See page 43053/5	–
	Integrated counter channels	See page 43054/5	–
Backup batteries	TSX 37-05/08/10/21/22 internal RAM	– **TSX PLP 01**	0.030
		Lots of 10 **TSX PLP 101**	0.320
Cover for empty slot (3)	TSX 37-05/08/10/21/22 PLCs	Order in multiples of 10 **TSX RKA 01**	0.150

(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.
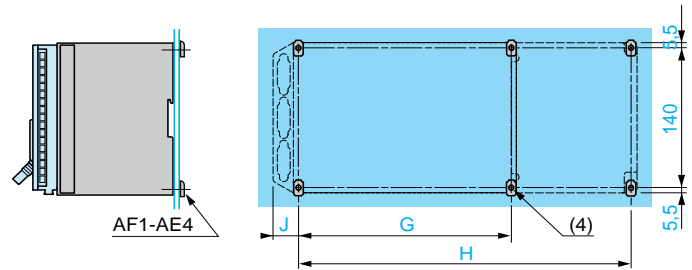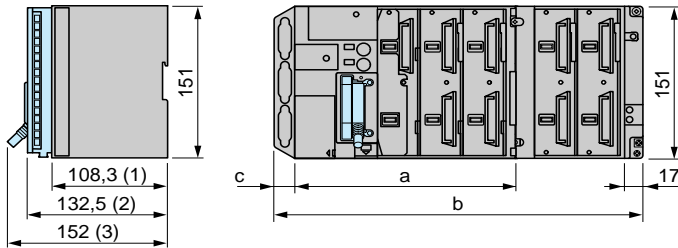
Micro automation platform

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

Dimensions, mounting

Dimensions

Mounting

	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

	G	H	J
TSX 37 05 028DR1	159.2	– $^{+1}_{0}$	5
TSX 37 08 056DR1	198.9	– $^{+1}_{0}$	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
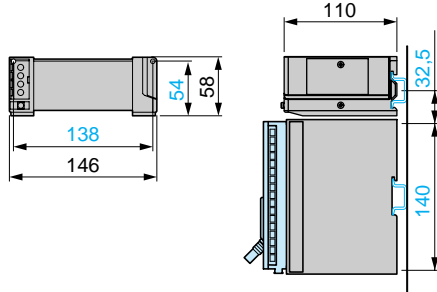
Installation rules
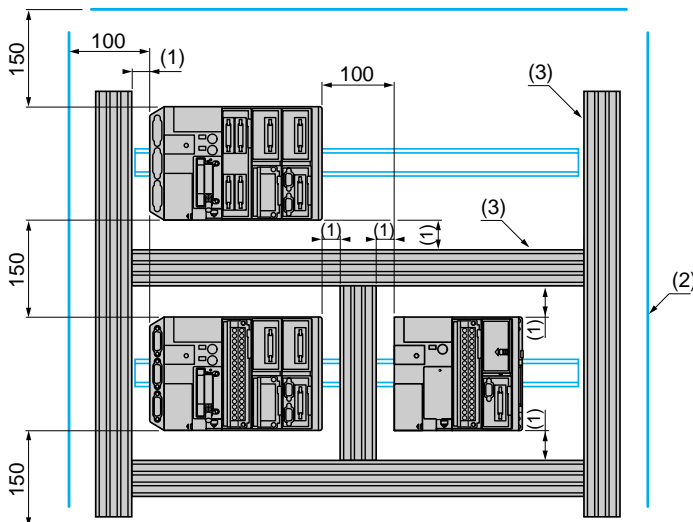
(1) ≥ 50 mm
(2) Switch gear or enclosure
(3) Cable ducting or wiring clip