

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.

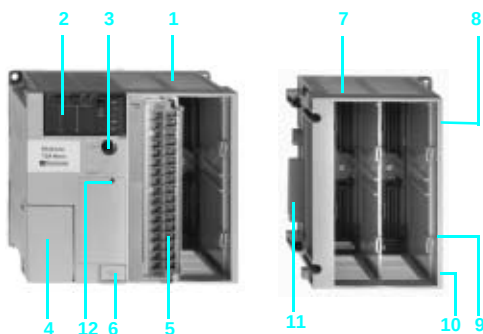
Each TSX 37 10 configuration comprises a rack which integrates a power supply (≈ 24 V or $\sim 100/240$ V), a processor including a 14 Kword RAM memory (program, data and constants), a Flash EPROM backup memory, a real-time clock, a discrete I/O module (28 or 64 I/O) and an available slot. A TSX RKZ 02 mini extension rack enables the number of slots to be increased by 2 (4 positions).

Each available slot can accept:

- 1 standard format discrete I/O module of any type.
- 2 half format discrete I/O, safety, analog I/O or counter modules.

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

Description



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

- 1 2-slot base rack.
- 2 Centralized display block.
- 3 Terminal port (TER) (Uni-Telway, Modbus RTU master/slave protocol or characters string).
- 4 Cover for accessing the power supply terminals.
- 5 28 or 64 discrete I/O module, placed in the first slot (positions 1 and 2).
- 6 Cover for accessing optional battery.
- 7 Mini extension rack with 2 available slots -(positions 5 to 8).
- 8 LED showing presence of ≈ 24 V.
- 9 Power supply terminals protected by removable cover, to connect an auxiliary ≈ 24 V power supply if PLCs are supplied with $\sim 100/240$ 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 1 st slot				Connection		Reference
	Number of inputs		Number of outputs		HE 10 Connector	Screw terminal block	
≈ 24 V	≈ 24 V		$\sim 110/120$ V				
	16		12				TSX 37 10 128DT1
	16		12				TSX 37 10 128DTK1
			16				TSX 37 10 128DR1
$\sim 110/240$ V			32				TSX 37 10 164DTK1
			16				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)					
Preventa safety module	64 inputs/outputs		(2)						
	AS-Interface bus or I/O extension	(3)							
Analog I/O	4 or 8 inputs								
	2 or 4 outputs								
Counter/positioning channels	1 or 2 incremental encoder channels								
	1 absolute encoder channel								
Communication	Ethernet TCP/IP or external Modem					External module			

Possible selection or insertion

(1) With TSX RKZ 02 mini extension rack.

(2) This includes a standard format module to be inserted in the 1st slot of the PLC.

(3) The remote discrete I/O extension modules and AS-Interface bus modules are installed in position 4 which means that their use is mutually exclusive.

Modicon TSX 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 43056/2 et 43056/3.

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

For further details, see pages 42718/2 to 43613/3.

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

For further details, see pages 43615/2 to 43615/5.

Analogue I/O and process control

TSX Micro PLCs offer several ways of performing analogue processing:

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

For further details, see pages 43053/3 and 43053/4.

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

For further details, see pages 43531/2 to 43531/5.

Memory structure

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

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

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

PCMCIA memory extension cards for TSX 37 21/22 PLCs

These cards can be used to extend the PLC internal memory for storing the application program and constants.

Two types of memory card are available:

■ Battery-backed RAM type memory card

Used in particular during application program creation and debugging, this card enables all application transfer and modification services in online mode.

The memory is backed up by a removable battery integrated in the memory card.

■ Flash EPROM type memory card

Used when the debugging of the application program is complete, this card enables one global transfer only of the application and avoids the problems of backup via battery.

A third type of card can also be used to store additional data:

■ Battery-backed RAM type memory card or battery-backed RAM and Flash EPROM

Used particularly in association with the Modem link, these are used to extend the processor's internal memory, and also to store recipe or data log for later consultation via a telephone link.

The RAM memory is backed up by a removable battery integrated in the memory card.

Another type of PCMCIA memory card is available:

■ Backup type memory card (for TSX 37 21/22 PLCs)

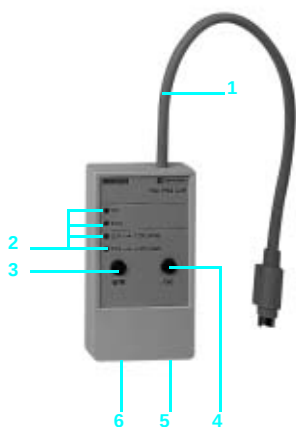
Previously loaded with the application program, this card is used to reload the application program into the internal RAM memory and the internal Flash EPROM memory of the processor, without requiring the use of a programming terminal.

Program loader

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

The front panel of the TSX PRG LDR module comprises:

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



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

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

(2) Maximum number of counting/positioning channels, see page 43054/2.

(3) TSX CTZ counting/positioning modules, only in the TSX Micro base.

(4) PCMCIA to insert in the communication card slot

(5) The remote discrete I/O extension modules and AS-Interface bus modules are installed in position 4 which means that their use is mutually exclusive.

(6) Default size, can be extended, but will have an adverse effect on the size of the application program.

Modicon TSX Micro automation platform

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



TSX MRP 000P

References (continued)

Extension for application memory

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

Extension Flash EPROM PCMCIA memory

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

Backup card (1)

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

Fan modules

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

Separate parts

Description	Use	Quantity	Unity reference	Weight kg
Program loader with terminal port conn. cable	Simplifies duplication, updating or backup of 15 Kwords applications (program) and constants in internal RAM (length: 0.3m)		TSX PRG LDR	0.150
Connection accessories	Discrete I/O		See page 43051/10	–
	Discrete I/O with Telefast 2		See pages 14025/2 and 14025/3	–
	Integrated analog I/O		See page 43053/7	–
	Integrated counter channels		See page 43054/5	–
Backup batteries	TSX 37 05/08/10/21/22	–	TSX PLP 01	0.030
	internal RAM	Pack of 10	TSX PLP 101	0.320
	RAM type PCMCIA memory card	–	TSX BAT M01	0.010
Cover for empty slot	TSX 37 05/08/10/21/22 PLCs	Pack of 10	TSX RAZ 01	0.010
Gripper	Memory extension card (PCMCIA type 1)		TSX P CAP	0.030



TSX FAN 000P



TSX PRG LDR

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