Modicon Premium automation platform
Atrium slot PLCs
Unity

TSX PCI 57 ●●4M

Presentation

Atrium TSX PCI 57 ●●4M slot PLCs are PC format cards (PCI 32-bit/25…33 MHz bus) to be integrated into a PC running under Windows 2000 or Windows XP.
This combination of PLC and PC optimizes performance in applications requiring, for example, a higher level of communication, control or supervision functions. The slot PLC manages the entire PLC station, which comprises the same I/O modules as Premium processors (discrete, analog, application-specific and communication):

- Locally, in one or more racks connected to Bus X on the Atrium slot PLC
- Using remote I/O via the same fieldbuses

Two types of Atrium slot PLC are available. They can both accommodate:

- A maximum of 16 extendable TSX RKY ●●EX racks
- A CANopen master bus function in their external PCMCIA slot

Both have:
- An internal PCMCIA slot (no. 0) to accommodate all types of memory extension card: program and symbols only, or mixed (program, symbols and data storage)
- An external PCMCIA slot (no. 1) to accommodate the network card (Fipway, Modbus Plus) or bus (CANopen, Modbus, Uni-Telway, Fipio Agent and serial link)

This slot can also accommodate the 4 or 8 MB SRAM memory extension card used to store additional data (see page 43519/2).

Their distinguishing characteristics are:

- The short application program execution time
- The program memory and data memory capacity
- 80 or 128 “in-rack” analog I/O
- 24 or 32 application-specific channels: Each application-specific module (counter, motion control, serial link, or weighing) accounts for 1 or a number of application-specific channels.
- 1 or 3 networks (Ethernet TCP/IP, Fipway, Modbus Plus, Ethway types), 1 Ethernet TCP/IP network, 4 or 8 AS-Interface buses V2.1, 1 CANopen bus and 1 or 3 third-party fieldbuses (INTERBUS, Profibus DP)
- 10 or 15 process control channels

Integrated communication

Six means of integrated communication (communication that does not require the external rack to be connected on the slot PLC Bus X) are possible:

- CANopen master, via a PCMCIA card that is inserted into the external slot on the slot PLC
- Fipio manager, via a 9-way SUB-D type connector on the faceplate of the TSX PCI 57 354M slot PLC
- Ethernet TCP/IP, via the TCP/X-Way Windows-compatible gateway software, which communicates with the slot PLC via the PCI bus on the host PC (this software is either connected to an Ethernet port in the host PC, integrated into the motherboard or supplied on a PC format card)
- INTERBUS master generation 4, via an additional PC format card, occupying an ISA bus slot and connected to the slot PLC via a ribbon cable that includes Bus X
- Modbus Plus or Fipway, via a PCMCIA card that is inserted into the external slot on the slot PLC
- Communication via a terminal port (TER) using Uni-Telway or character mode protocol, 19.2 or 115 Kbps (typically a programming terminal or an HMI terminal)

Modicon Premium automation platform
Atrium slot PLCs
Unity

Presentation (continued)

TSX PSI 2010 standalone power supply

In order to enable standalone operation in the event of a PC power outage, a standalone ⎓ 24 V TSX PSI 2010 power supply can be connected to a PCI or ISA bus slot to ensure continuity of service for the automation part of the system (only functions managed by the PC are disabled).

Design and installation of Atrium applications

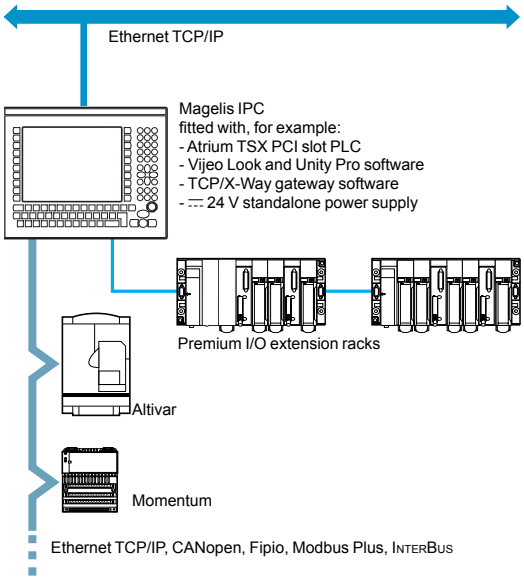
Installation of these new Atrium slot PLCs requires:

■ Unity Pro Medium, Large or Extra Large programming software. This is the same as the software used on the Quantum platform.
■ Optionally, depending on requirements:
□ The Unity Studio software suite used to design distributed applications
□ Unity Application Generator (UAG) specialist software for modeling and generating process applications
□ Unity EFB toolkit software for developing EF and EFB function block libraries in C language
□ Unity SFC View software for displaying and diagnosing applications written in Sequential Function Chart (SFC) language

The Atrium slot PLC is not supplied with any Windows driver or application type software programs. These are supplied with the Unity Pro, Unity Studio, Monitor Pro, Vijeo Look, OFS (OPC Factory Server), etc. software.
They enable connection to the slot PLC via:

■ Uni-Telway and the TER port on the front panel
■ PCIway and the PC host's PCI bus
■ Ethernet TCP/IP (XIP)

Typical architecture



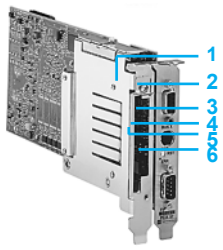
By integrating an Atrium slot PLC card, the architecture shown opposite can be created using any compatible PC (equipped with PCI bus slots) and Magelis IPC industrial PC stations.

This solution can provide a PLC architecture in which the I/O are:

■ Remotely located close to the machine or process via the fieldbus *(1)*:
□ Ethernet TCP/IP via the TLX CD GTW 10M gateway software
□ CANopen with TSX CPP 110 PCMCIA card
□ Fipio with the integrated port on the TSX PCI 57 354M slot PLC
□ Modbus Plus with TSX MBP 100 PCMCIA card
□ INTERBUS with PC format slot PLC card, TSX IBX 100 ISA bus (link to TSX PCI 57 ●●4M slot PLC via ribbon cable)
■ And/or centralized in TSX RKY ●●EX extendable racks. TSX RKY ●●EX extendable racks connected on Bus X permit the use of application-specific modules and the setting up of AS-Interface bus segments. For example:
□ TCP/IP TSX ETY 4103 or TSX ETY 5103 Ethernet TCP/IP module (with Web server, FactoryCast server or TSX WMY 100 module (FactoryCast HMI server))
□ INTERBUS TSX IBY 100 or Profibus DP TSX PBY 100 master module
□ TSX SAY 1000 AS-Interface V2.1 master module
□ TSX CAY, TSX CFY or TSX CSY 84 (SERCOS) motion control modules

(1) Corresponding to an integrated module solution on the host PC, without having to use modules on extension racks on Bus X.

Modicon Premium automation platform
Atrium slot PLCs
Unity



TSX PCI 57 ●●4M

Description

Description of slot PLCs

TSX PCI 57 ●●4M slot PLCs mechanically occupy two consecutive slots on the PCI bus, but only use one electrically *(1)*. They feature:

■ On the faceplate:

1 A PCMCIA slot (no.1) for a communication card or memory extension card for storing additional data

2 A 9-way female SUB-D connector for connecting Bus X to the first rack supporting the I/O modules and application-specific modules

3 An 8-way female mini-DIN connector marked TER for connecting a programming terminal

4 A RESET button causing a cold restart of the slot PLC when it is activated

5 An ERR lamp (red); fault on the slot PLC or its on-board devices (PCMCIA memory or communication cards)

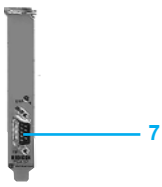
6 A 9-pin male SUB-D connector (on TSX PCI 57 354M model) for Fipio bus manager communication.

■ On the components side of the card:

□ 4 or 5 LEDs indicating the operating status (RUN, TER, BAT, I/O and FIP on the TSX PCI 57 354M)
□ A slot for a backup battery for the slot PLC internal RAM memory
□ A slot (no. 0) for a PCMCIA format memory extension card
□ A Bus X line terminator circuit (type A)
□ A PCI bus connector for connection to the host PC

Supplied with the slot PLC: 1 Bus X line terminator (type B) to be installed at the end of the last of the I/O and application-specific module support racks.

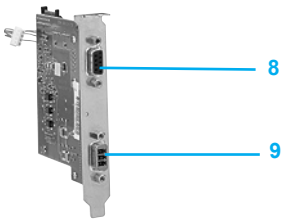
Description of the additional TSX PCI ACC1 remote Bus X faceplate



TSX PCI ACC1

7 An additional faceplate, TSX PCI ACC1, fitted with a 9-way male SUB-D connector, enabling the slot PLC Atrium to be located in the middle of its extension racks rather than at one end of them.

Description of the ⎓ 24 V TSX PSI 2010 power supply



TSX PSI 2010

The ⎓ 24 V TSX PSI 2010 power supply is inserted into a PCI bus slot located next to the TSX PCI 57 ●●4M slot PLC. It occupies one slot mechanically but no slots electrically. It can provide the power supply for one slot PLC. It features the following on the front panel:

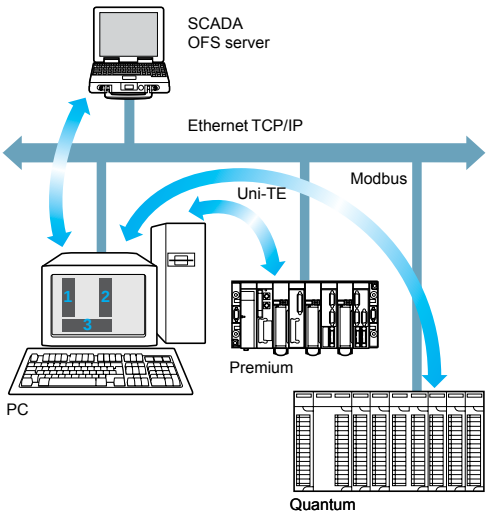
8 A 9-way female SUB-D connector enabling a second remote Bus X to be connected (instead of using the TSX PCI ACC1 faceplate)

9 A 3-way female SUB-D connector for connection to the ⎓ 24 V power supply (male connector supplied)

This power supply includes two ribbon cables for connection to the slot PLC, one for the power supply to the slot PLC and the other to ensure Bus X continuity.

(1) Atrium slot PLCs can also operate using just one PC slot: For this purpose, carefully unscrew and remove the external PCMCIA slot.

Modicon Premium automation platform
Atrium slot PLCs
Unity



1 Atrium slot PLC
2 Ethernet TCP/IP card or integrated port
3 TCP/X-Way software gateway

TCP/X-Way gateway

The TCP/X-Way software gateway performs 2 main functions for Atrium slot PLCs:
■ Communication using the Modbus or Uni-TE TCP/IP protocol via the Ethernet TCP/IP card integrated in the PC
■ Data exchange in both directions with remote stations via the telephone modem in the PC

This software interfaces with the Atrium slot PLC PCIway driver and automatically routes messages. The most common configurations are:
□ Via Ethernet network (diagram opposite). Access is made secure by checking incoming IP addresses, in a similar way to the Premium PLC Ethernet TSX ETY 4103 module. The Global Data and I/O Scanning services are not supported.
□ Via modem link. Incoming calls are checked via the standard Windows password checking mechanisms. In addition to remote access with Unity Pro, the TCP/IP gateway enables communication with other stations that can be connected to a local Ethernet network (RAS *(Remote Access Server)* function).

Setup

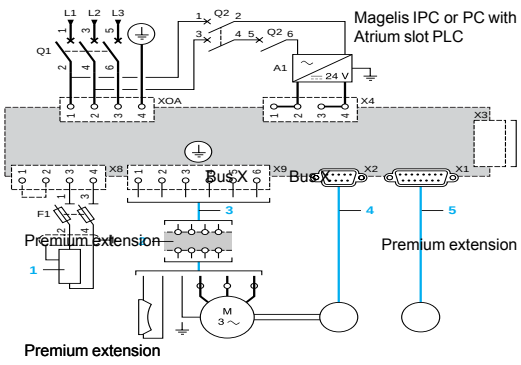
Integration into the host PC

To receive a TSX PCI 57 ●●4M Atrium slot PLC, the host PC must:
■ Run under Windows 2000 or Windows XP
■ Have a 33-bit 33 MHz (⎓ 5 or 3.3 V) PCI bus
■ Have two consecutive slots available on the PCI bus (of which at least one must be a PCI type slot)

The maximum number of slot PLCs per PC depends on the number of available PCI/ISA slots, the PC power supply rating (when the TSX PSI 2010 power supply option is not used) and whether or not PCMCIA cards have been inserted into the slot PLC.

The slot PLC is completely independent of the application running on the PC, in particular:
■ The standard PC command “Restart” *(1)* has no effect on the slot PLC operating modes *(2)*.
■ Switching the PC off and then on again causes a warm restart of the application being managed by the slot PLC (restart without loss of application context).
■ The ⎓ 24 V standalone power supply allows the slot PLC to operate even in the event of a PC power supply outage.

The host PC, equipped with Unity Pro software, can be used as a programming and setup terminal for the TSX PCI 57 Atrium slot PLC.



Logical location on Bus X

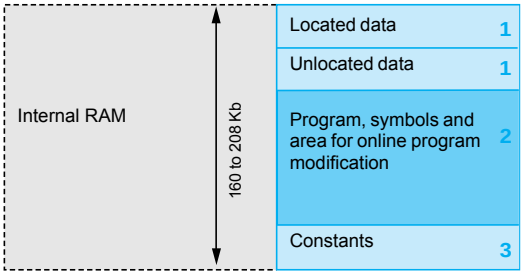
The Atrium TSX PCI 57 slot PLC logically occupies the same 2 slots as a Premium TSX P57 processor of the same type. The 2 slots in the TSX RKY rack with address 0 next to the TSX PSY power supply module must therefore remain unoccupied, see page 1/27.

The TSX PCI ACC1 faceplate or TSX PSI 2010 ⎓ 24 V power supply enables a second Bus X to be connected from Magelis IPC industrial PCs, thus forming a Y structure (see the diagram opposite, where the maximum length of each Bus X segment is 100 m). If they are not used, only one Bus X may be connected.

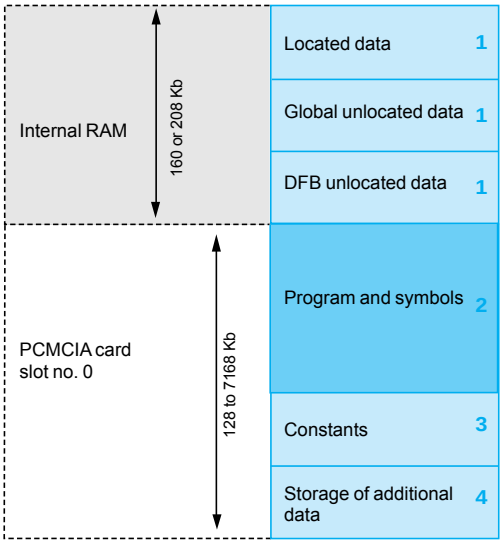
(1) “Ctrl-Alt-Del” command, followed by “Restart” or pressing the “Reset” button on the PC (if there is one).
(2) Causes the loss of the PCI bus connection.

Modicon Premium automation platform
Atrium slot PLCs
Unity

Slot PLC without PCMCIA memory card



Slot PLC with PCMCIA memory card in slot no. 0



Memory structure

The application memory is divided into memory areas physically distributed in the internal RAM memory and on 0, 1 or 2 PCMCIA memory extension cards:

1 The application data area, which may be one of 2 possible types, is always in the internal RAM:
□ Located data corresponding to data defined by an address (e.g. %MW237) to which a symbol may be associated (e.g. Counting_rejects).
□ Global unlocated data corresponding to data defined only by a symbol. This type of addressing removes memory “mapping” management constraints, as address are assigned automatically, and enables data to be structured.
□ DFB unlocated data, corresponding to data from DFB user function blocks. The size of this object zone is only limited by the size of the physical internal RAM memory available.

2 Area in internal RAM or PCMCIA memory card for the program and symbols. In the event of this area being in internal RAM, it also supports the area for modifying the program in online mode *(1)*.
This area contains the program’s executable binary code and IEC source code. The user selects the type of information to be stored in the PLC memory.

3 Constants area in the internal RAM or the PCMCIA memory card (slot no. 0)

4 Storage area for additional data (slot no. 0 or no. 1), e.g. for production data and manufacturing recipes

Two memory structures are possible depending on whether the Atrium slot PLC is fitted with 0, 1 or 2 memory extension cards:

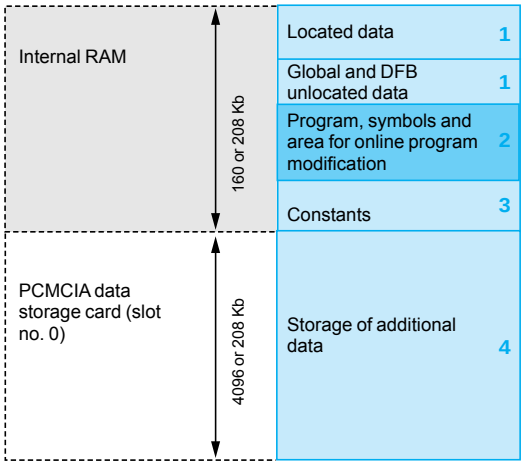
■ Application in internal RAM. In this case, the application is entirely loaded in the processor’s internal battery-backed RAM *(2)*, the capacity of which depends on the processor model (160 or 208 Kb).

■ Application in PCMCIA card. In this case, the internal RAM is reserved for application data. The PCMCIA memory card (slot no. 1) contains the program space (program, symbols and constants areas) (max. 768 or 1792 Kb).
Certain types of PCMCIA memory card host the data storage area (max. 6976 Kb).

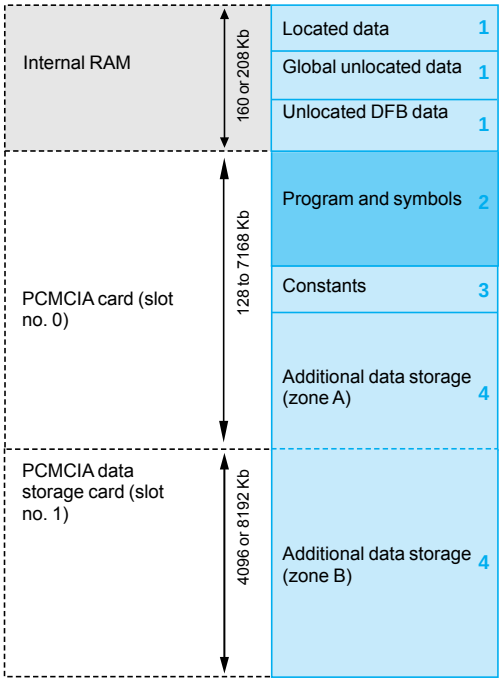
The presence of the symbols area with the program area is optional. Having the application symbols database on the PLC means that, when connected to a programming terminal not containing any applications, all the elements needed to debug or upgrade this PLC are available within the PLC.

(1) If a PCMCIA card has been inserted, the memory used by program modification in online mode is located in this memory card (outside zones 2, 3 and 4 opposite).
(2) The internal RAM memory is backed up by an optional battery (3 years’ battery life) located in the power supply module (see page 43512/2).

Slot PLC with data storage memory card in slot no. 0



Slot PLC with mixed type memory cards in slot no. 0 and data storage type memory cards in slot no. 1



Memory structure (continued)

Extension of the data storage area

Memory cards reserved for data storage (4096 or 8192 Kb) are used to:

■ Access the data storage area when the application is entirely supported by the internal RAM. In this case, the data storage memory card is inserted into PCMCIA slot no. 0.

■ Free up memory space to provide additional program space when the application is in the PCMCIA card (slot no. 0). In this case, the data storage memory card is inserted into PCMCIA slot no. 1 (a part of it can be supported by the memory card in the slot).

Unity Pro programming software assists the application designer with the management of the structure and the occupation of memory space on the Premium PLC.

Protecting the application

Regardless of the PLC memory structure (whether the application is located in the internal RAM or in the PCMCIA memory card), it is possible to protect this in order to prevent it being accessed (read or modify program) by only loading the executable code on the PLC.

A memory protection bit, set in configuration mode, is also available to prevent any program modification (via the programming terminal or downloads).

Program modification in online mode

This function is different from previous versions of Premium PLCs (with PL7 software) and now allows program code and data in different parts of the application to be added or modified in a single modification session (thus making modification unified and consistent with regard to the controlled process).

This increased flexibility comes at a cost in terms of the program memory volume required. Any program modifications made in online mode require available program memory space at least equal in size to the combined size of all sections of the Unity Pro program affected by the same modification session.

Depending on circumstances:

■ For a processor with memory extension card, the memory volume remaining available in the card for online modification is sufficient if the recommendations on page 43519/2 are observed.

■ For a processor without memory extension card, users wishing to have the option of making modifications in online mode may select a processor according to:
□ The anticipated size of the application
□ The number and size of the program sections to be modified in online mode

A memory extension card that only uses Flash Eprom technology (without additional SRAM) cannot provide the function of program modification in online mode.

Modicon Premium automation platform
Atrium slot PLCs
Unity

Characteristics and performance

Type of processor				TSX PCI P57 204M	TSX PCI P57 354M
Maximum configuration	No. of racks	4/6/8 slots		16	
		12 slots		8	
	Max. no. of slots for modules			128	
Functions	Max. no. "in rack" *of (1)*	Discrete I/O		1024	
		Analog I/O		80	128
		Process control channels		10 (up to 30 simple loops)	15 (up to 60 simple loops)
		Application-specific channels (counter, axis, weighing, and serial links) *(2)*		24	32
	Integrated connections	Ethernet TCP/IP		1 (uses the Ethernet TCP/IP port integrated in the host PC via the TLX CD GTW 10M gateway software)	
		Fipio manager		–	1 (127 agents)
		Serial link		1 link with 2 connectors (TER and AUX) 19.2 Kbps	1 link with 2 connectors (TER and AUX), 19.2 or 115 Kbps
	Maximum no. of connections	Network (Ethernet TCP/IP, Fipway, Modbus Plus, Ethway)		2 (including 1 Ethernet TCP/IP integrated into PC)	4 (including 1 Ethernet TCP/IP integrated into PC)
		AS-Interface bus		4	8
		CANopen or Modbus Plus bus		1	
		InterBus or Profibus DP bus		1, none if CANopen is used	3, 2 if CANopen is used
Memories	Maximum capacity	Without PCMCIA card	**Kb**	160 program and data	208 program and data
		With PCMCIA card	**Kb**	768 program 160 data	1792 program 208 data
		Data storage	**Kb**	16,384 (limited to 8192 with current PCMCIA cards)	
	Maximum size of object zones	Located internal bits (% of internal memory)	**bps**	8132	16 384
		Located internal data	**Kb**	64 for internal words %M●Wi, 64 for constant words %K●Wi	
		Global unlocated internal data	**Kb**	Unlimited, within the limits of the memory capacity of the slot PLC	
Application structure		Master task		1	
		Fast task		1	
		Auxiliary tasks		–	
		Event tasks		64 (1 of which has priority)	
Execution time for one instruction	Without PCMCIA card	Boolean	**µs**	0.19	0.12
		On word or fixed-point arithmetic	**µs**	0.25	0.17
		On floating points	**µs**	1.75...2.60 *(3)*	
	With PCMCIA card	Boolean	**µs**	0.21	0.17
		On word or fixed-point arithmetic	**µs**	0.42	0.32
		On floating points	**µs**	1.75...2.60 *(3)*	
Typical program code execution time for 1 Kinstruction		100% Boolean	**Kinst/ ms**	4.76 without PCMCIA card, 3.70 with PCMCIA card	6.72 without PCMCIA card 4.59 with PCMCIA card
		65% Boolean and 35% fixed arithmetic	**Kinst/ ms**	3.71 without PCMCIA card, 2.53 with PCMCIA card	5.11 without PCMCIA card 3.12 with PCMCIA card
System overhead	MAST task		**ms**	1.00	1.00
	FAST task		**ms**	0.30	0.25

(1) Only affects "in-rack" modules. The maximum values for the number of discrete I/O, analog I/O and application-specific channels are cumulative. The remote I/O on the bus or network (CANopen, AS-Interface/Uni-Telway/Fipio/Modbus Plus, etc.) or third-party bus (InterBus or Profibus DP) are not included in this maximum number.
(2) Serial links: Modbus, Uni-Telway, Jnet and asynchronous serial links.
(3) Threshold values according to the type of instruction.

Standalone power supply characteristics

Type of power supply module				TSX PSI 2010
Primary	Voltage	Nominal	**V**	⎓ 24
		Limits (including ripple)	**V**	⎓ 19.2 … 30 (possible up to 36 V)
	Current	Nominal input value 1 rms	**A**	⩽ 1.1 at ⎓ 24 V
	Initial power-up at 25°C	1 inrush	**A**	100 at ⎓ 24 V
		I^2t on triggering	**A^2**	3
		It on triggering	**As**	0.04
	Power line disturbance period		**ms**	⩽ 7 at 24 V, ⩽ 1 at 19.2 V
	Built-in protection			Via a 2 A time-delay fuse (complying with standards)
Conformity to standards				IEC 1131-2
Insulation	Dielectric strength	Primary/secondary and primary/earth	**V rms**	Non-isolated, internal 0 V connected to PC ground
	Insulation resistance	Primary/secondary and primary/earth	**MΩ**	–

Modicon Premium automation platform
Atrium slot PLCs
Unity

TSX PCI 57 204M

TSX PCI 57 354M

TSX PCI 57 slot PLCs

I/O capacity *(1)*	Capacities		Maximum number of bus/network modules	Reference *(2)*	Weight kg
	Memory	Process control channels			
TSX PCI 57 20 16 racks *(3)*					
1024 discrete I/O **80 analog I/O** **24 application-specific channels**	160 Kb integrated Max. 768 Kb on PCMCIA	10	1 network all types 1 Ethernet TCP/IP network 4 AS-Interface buses 1 CANopen bus *(4)* 1 fieldbus *(4)*	**TSX PCI 57 204M**	0.310
TSX PCI 57 35 16 racks *(3)*					
1024 discrete I/O **128 analog I/O** **32 application-specific channels**	208 Kb integrated Max. 1792 Kb on PCMCIA	15	1 integrated Fipio 3 networks all types 1 Ethernet TCP/IP network 8 AS-Interface buses 1 CANopen bus *(4)* 3 third-party buses *(4)*	**TSX PCI 57 354M**	0.340

Software options *(5)*

When connected to an Atrium slot PLC, the TCP/X-Way gateway software offer (supplied on CD-ROM) enables communication under the Modbus or Uni-TE TCP/IP protocol using the Ethernet TCP/IP port integrated into the host PC.

PCMCIA memory extension cards

Atrium slot PLCs can support up to 2 memory extension cards. However, useful memory capacity is limited to the maximum size defined for the slot PLC model. See pages 43519/2 and 43519/3.

Description	Use	Site license	Reference	Weight kg
TCP/X-Way gateway software	Compatible with Windows 2000 or XP	Single-station	**TLX CD GTW 10M**	–
		10 stations	**TLX CD10 GTW 10M**	–
		200 stations	**TLX CDUNT GTW 10M**	–

Separate parts

TSX PCI ACC1

TSX PSI 2010

Description	Use	Sold in lots of	Reference	Weight kg
Faceplate for remote Bus X	Enables a second remote Bus X connection (9-way SUB-D connector)	–	**TSX PCI ACC1**	–
⎓ 24 V standalone power supply	Enables the TSX PCI slot PLC to operate in the event of a PC power supply outage Enables a second remote Bus X connection	–	**TSX PSI 2010**	–
Batteries	Internal RAM memory backup	1	**TSX PLP 01**	0.010
		10	**TSX PLP 101**	0.100

(1) Cumulative maximum values. The number of remote I/O on the bus is not counted.
(2) Product supplied with multilingual installation guide: English, French, German, and Spanish. Supplied without software drivers.
(3) Maximum number of TSX RKY 4EX/6EX/8EX racks (4, 6 or 8 slots). Using the TSX RKY 12 EX rack with 12 slots is the same as using 2 racks with 4, 6 or 8 slots.
(4) Fieldbus: InterBus or Profibus DP.
(5) Other software compatible with Atrium slot PLCs: OFS data server software, see page 43105/5; Vijeo Look/Monitor Pro, supervisory software, see our catalog.