Modicon Premium PLCs using PL7 Software

TSX 57/PCX 57 Processors
Implementation Manual Volume 1

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Document Set

At a Glance

This documentation is made up of 5 Volumes:

- Volume 1
  - Racks/Supplies/Processors
  - Implementation/Diagnostics/Maintenance
  - Standards and operating conditions
  - Process supply
- Volume 2
  - Discrete interfaces
  - Safety
- Volume 3
  - Counting
  - Movement commands
- Volume 4
  - Communication
  - Network and bus interfaces
- Volume 5
  - Analog
  - Weighing

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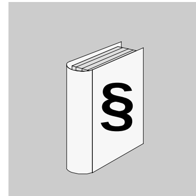
Safety Information



Important Information

NOTICE

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of this symbol to a Danger or Warning safety label indicates that an electrical hazard exists, which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

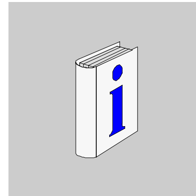
⚠ DANGER
DANGER indicates an imminently hazardous situation, which, if not avoided, **will result** in death or serious injury.

⚠ WARNING
WARNING indicates a potentially hazardous situation, which, if not avoided, **can result** in death, serious injury, or equipment damage.

⚠ CAUTION
CAUTION indicates a potentially hazardous situation, which, if not avoided, **can result** in injury or equipment damage.

PLEASE NOTE Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

About the Book



At a Glance

Document Scope

This manual describes the installation of the Premium range of PLCs and their main accessories:

It is made up of 6 sections:

- 1 General introduction to a TSX P57 PLC station and a PCX 57 PLC station,
- 2 Standard and extendable TSX RKY racks ,
- 3 TSX P57 Premium Processors,
- 4 PCX 57 Atrium Processors,
- 5 TSX PSY power supply modules,
- 6 Process and AS-i Power Supplies.

Validity Note

The updated version of this manual takes the new processors into account.

User Comments

We welcome your comments about this document. You can reach us by e-mail at techpub@schneider-electric.com

Premium and Atrium PLC stations

I

At a Glance

Aim of this Part

The Part gives a general introduction to the Premium TSX P57 PLC station and the Atrium PCX 57 PLC station.

What's in this Part?

This part contains the following chapters:

Introduction to Premium and Atrium PLC stations

1

At a Glance

Aim of this Chapter

This Chapter gives a general introduction to TSX P57 and PCX 57 PLC stations.

What's in this Chapter?

This chapter contains the following topics:

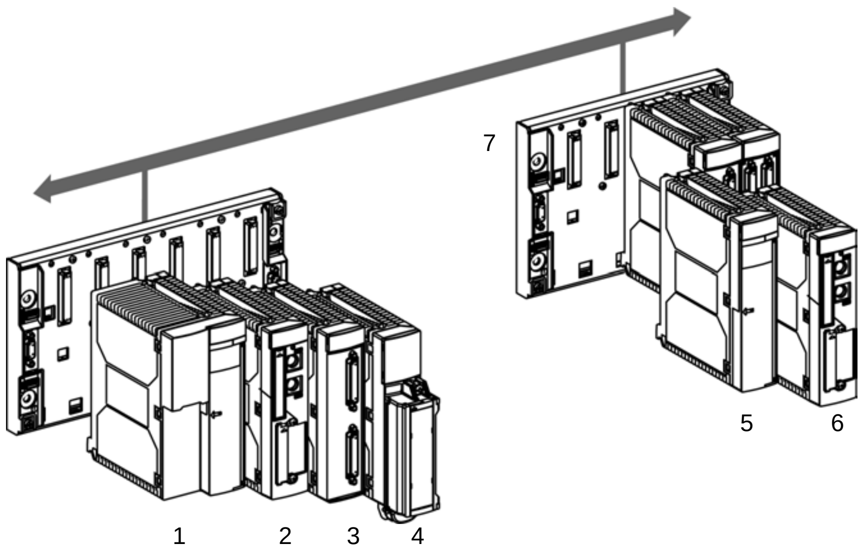
TSX P57 PLC station

General

Premium TSX P57 automated platform processors manage the entire PLC station, which is made up of "Discrete" input/output modules, analog input/output modules and application-specific modules. These can be distributed over one or several racks connected to the bus X or the field bus.

Illustration

Example of a TSX P57 PLC station:



Number table

Description according to the addresses in the diagram above:

Number	Description
1	Double format power supply module.
2	Processor module.
3	Bus X extension module.
4	Input/output module.
5	Standard format power supply module.
6	Processor module.
7	TSX RKY rack.

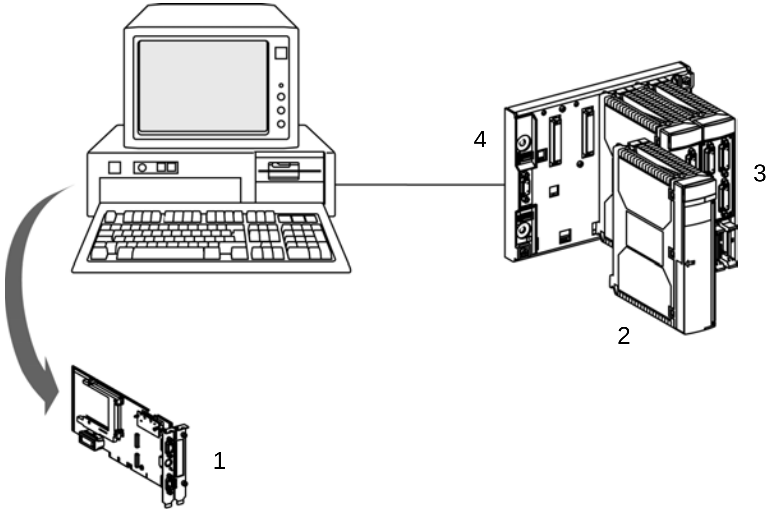
PCX 57 PLC station

General

Atrium PCX 57 coprocessors are built into a PC and manage an entire PLC station composed of the same input/output modules as the Premium processors (i.e. "Discrete", analog, application and communication modules). These modules can be distributed over one or more racks connected to the bus X.

Illustration

Example of a PCX 57 PLC station:



Number table

Description according to the addresses in the diagram above:

Number	Description
1	Coprocessor.
2	Supply module.
3	Input/output modules.
4	TSX RKY rack.

General introduction to the components of a PLC station

2

At a Glance

Aim of this Chapter

The aim of this Chapter is to provide an overview of the different components which may make up a PLC station.

What's in this Chapter?

This chapter contains the following topics:

General Introduction to TSX P57 Processors

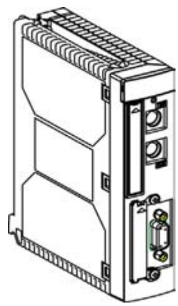
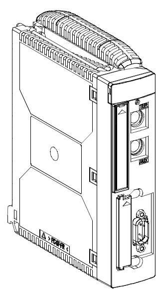
General Points

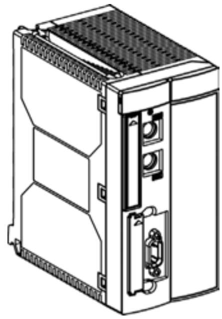
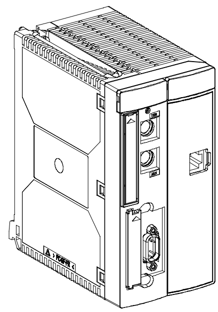
Each PLC station is provided with a processor, chosen according to:

- its integration type: integration on rack or integration in a PC,
- the processing power necessary: number of discrete I/Os, analog I/Os, etc. ,
- memory capacity,
- processing type: sequential or sequential + process control.

See *TSX P57/TSX H57 Premium processors, p. 145*.

Table of different sequential and rack-insertable processor format types:

Processor	**Illustration**
Standard format processors: ● TSX P57 103, ● TSX P57 153.	
Standard format processors with heat sink: ● TSX P57 353 LA,	

Processor	Illustration
Double format processors: ● TSX P57 203, ● TSX P57 253, ● TSX P57 303/303A, ● TSX P57 353/353A, ● TSX P57 453/453A.	
Double format processors with on-board Ethernet: ● TSX P57 2623, ● TSX P57 2823, ● TSX P57 3623/3623A, ● TSX P57 4823/4823A.	

General introduction to PCX 57 processors

General points

Installed on the ISA bus of an industrial or office PC running in a Windows 95 or NT environment, they are used to control a PLC station.

Also, installation of a communication driver enables transparent communication between the host PC and the processor, without the need for another programming terminal.

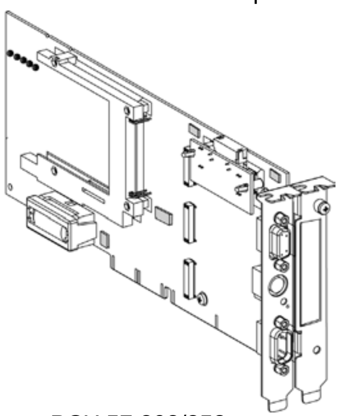
There are two types of sequential Atrium PCX 57 processor that can be integrated in a PC:

- PCX 57 203,
- PCX 57.353.

See *Atrium PCX 57 processors, p. 283*.

Illustration

Illustration of a PCX 57 processor:



PCX 57 203/353

General introduction to TSX RKY racks

General points

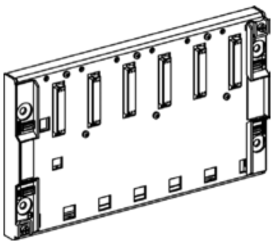
Two families of racks are offered:

- **Standard racks** 6, 8 and 12 positions:
  they are used to build a PLC station which is limited to a single rack,
- **Extendable racks** 4, 6, 8 and 12 positions:
  they are used to make up a PLC station that can contain up to:
  - a maximum of 16 racks if the station is made up of racks with 4, 6, or 8 positions,
  - a maximum of 8 racks if the station is made up of racks with 12 positions.

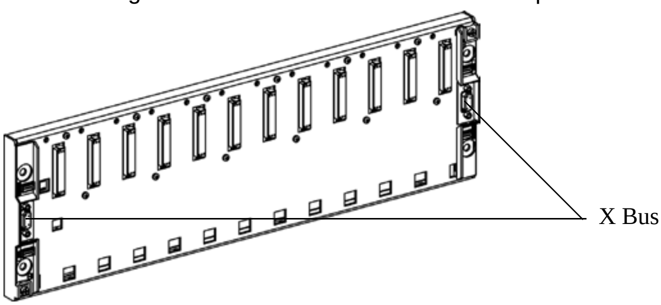
See *TSX RKY.. standard and extendable racks, p. 65*.

Examples

The following illustration shows the standard 6-position TSX RKY rack:



The following illustration shows the extendable 12-position TSX RKY rack:



General introduction to TSX PSY power supply modules

General points

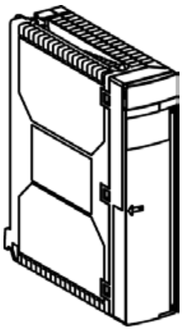
Each rack requires a power supply module (see *TSX PSY supply modules, p. 339*) defined according to the distributed network (alternating or direct current) and the power required for the rack.

There are two types of modules:

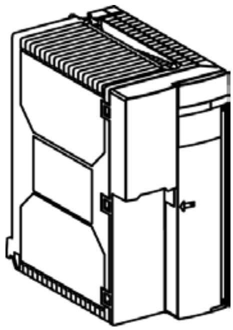
- standard format power supply module,
- double format power supply module.

Illustration

The following illustration shows the two formats for TSX PSY power supply modules:



standard format supply module for alternating or direct current network



double format supply module for alternating or direct current network

General introduction to Process and AS-i TSX SUP and TSX 1021/1051 power supply modules

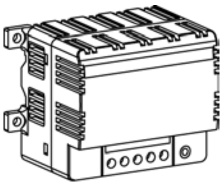
Process power supply modules

A wide range of power supply units and modules are offered to meet your needs in the best possible way. Controlled by Premium TSX/PCX PLCs and designed to supply the peripherals of an automation system with 24 VDC, they can all be mounted on a Telequick AM1-PA mounting board and some can be mounted on a AM1-DP200 / DE 200 central DIN rail.

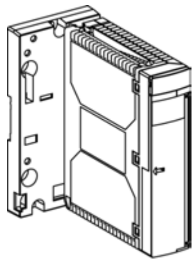
See*Process and AS-i supply, p. 403*.

Illustration

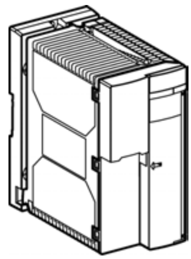
The following illustration shows the various types of TSX SUP and TSX 1021/1051 process power supply modules:



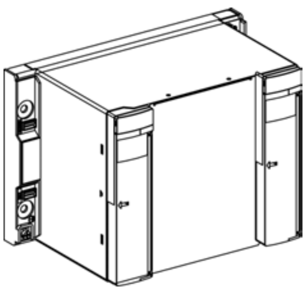
24 VDC / 1A



24 VDC / 1A



24 VDC / 2A
24 VDC / 5A

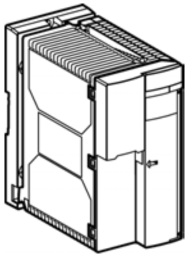


24 VDC / 10A

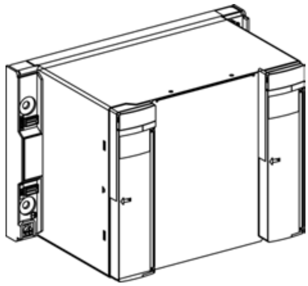
AS-i power supply module

They are designed to supply 30 VDC to components connected to the AS-i field bus.

Illustration:



30 VDC AS-i / 2.4 A



30 VDC AS-i / 5A and 24 VDC

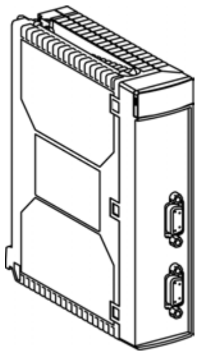
General introduction to the TSX REY bus X extension module

General

This module allows the extension of two bus segments from the rack supporting the processor, up to a maximum distance of 250 meters. Each extended segment is able to support racks distributed along the bus X to a maximum length of 100 meters.

See *X-Bus extension module, p. 125*.

Illustration: TSX REY bus X extension module



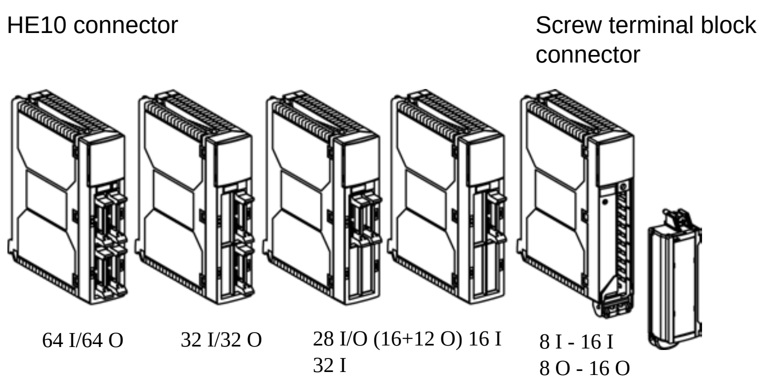
General introduction to TSX DEY/DSY/DMY input/output modules

Discrete inputs/ outputs

A wide range of discrete input/output modules (Installation Manual Volume 2) are available to meet your needs in the best possible way. These modules differ from one another in their:

Characteristics	Description
modularity	8, 16, 28, 32 or 64 channels.
type of inputs	• modules with direct current inputs (24VDC, 48VDC), • modules with alternating current inputs (24VAC, 48VAC, 110VAC, 240VAC).
type of outputs	• modules with relay outputs, • modules with direct current (24VDC / 0.1A - 0.5A - 2A, 48VDC / 0.25A - 1A) static outputs, • modules with alternating current (24VAC / 130VAC / 1A, 48VAC / 240 VAC / 2A) static outputs.
type of connectors	screw terminal blocks and HE10 connectors allow the connection of sensors and pre-actuators via the TELEFAST 2 prewiring system.

Illustration:

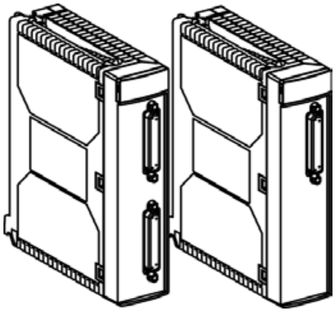


Analog inputs/ outputs

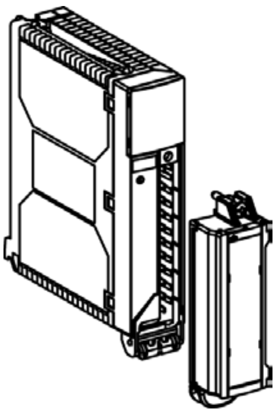
The range of analog input and output modules (Installation Manual Volume 5) can meet your main needs. These modules differ from one another in their:

Characteristics	Description
modularity	4, 8, 16 channels.
performance and range of signals offered	voltage/current, thermoelectric couple, multi-range (thermoelectric couple, heat probe, voltage/current).
type of connectors	screw terminal blocks or 25-pin SUB D connectors allow the connection of the sensors via the TELEFAST 2 prewiring system.

Example: 25-pin SUB D connectors



Example: screw terminal block connectors



General introduction to TSX CTY/CCY counting modules

General points

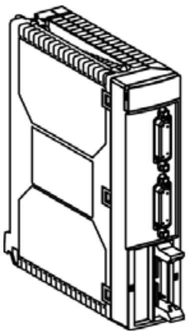
Premium and Atrium PLCs offer main counting functions (down-counting, up-counting, up/down counting) from the application-specific "counting" modules.

Three modules are offered:

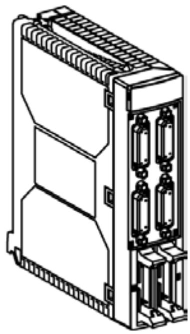
- a 2-channel module and a 4-channel module for the incremental encoder, with a maximum reading frequency of 40 kHz,
- a 2-channel module for:
  - incremental encoder, with a maximum reading frequency of 500 kHz,
  - absolute SSI series encoder, with a maximum reading frequency of 2 MHz.

Illustration

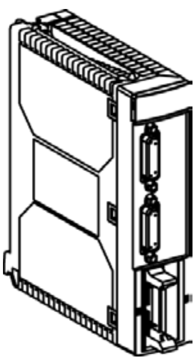
Illustration of different types of TSX CTY/CCY counting modules:



2-channel module



4-channel module



2-channel module (incremental encoder/absolute series encoder).

Introduction to TSX CAY axis control modules

General points

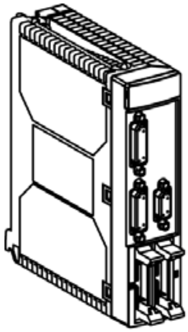
Using the application-specific "axis control" modules (Installation Manual Volume 3), Premium PLCs can be used to manage movement control applications, driven by servomotors and with an analog value speed setpoint (+/- 10V).

Five modules are offered:

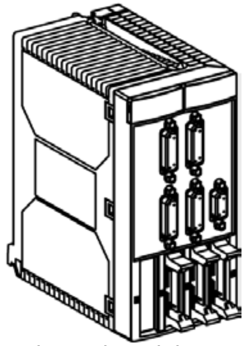
Module	**characteristics**
2-channel module	allows controlled positioning with two independent, linear, limited axes.
2-channel module	allows controlled positioning with two independent, circular, infinite axes.
4-channel module	allows controlled positioning with four independent, linear, limited axes.
4-channel module	allows controlled positioning with four independent, circular axes.
3-channel module	allows positioning on 2 or 3 synchronized axes (linear interpolation).

Illustration

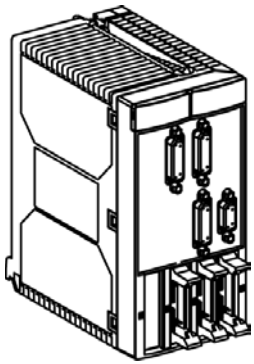
Illustration of different types of TSX CAY axis control modules:



2-channel module



4-channel module



3-channel module

General introduction to TSX CFY step by step control modules

General points

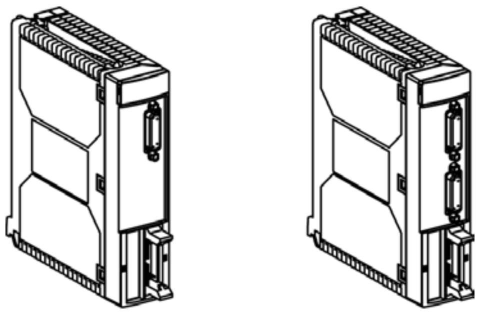
Using application-specific "step by step command" modules (Installation Manual Volume 3), Premium and Atrium PLCs can be used to manage movement control modules, controlled by translators with a frequency speed setpoint.

Two modules are offered:

- a 1-channel module which is used to control a translator,
- a 2-channel module which is used to control two translators,

Illustration

Illustration of different types of TSX CFY modules:



1-channel 2-channel

General introduction to TSX SCY/ETY communication

General points

Different modes of communication (Installation Manual Volume 4)can be used with Premium PLCs:

- **TSX processor communication on the terminal port:**
  these have two terminal ports (TER) and (AUX), a non-insulated RS 485 serial link, UNI-TELWAY or character mode protocol.
  These terminal ports can be used to connect:
  - a programming terminal and/or an operator dialog console (UNI-TELWAY master mode),
  - the station to a multipoint UNITELWAY link (master or slave UNI-TELWAY mode),
  - a printer or a terminal in character mode.

  Note: the communication protocol, as defined in the configuration, is identical for both ports.
- PSX processor communication on the terminal port:
  these have one terminal port (TER), a non-insulated RS 485 serial link, UNI-TELWAY or character mode protocol.
  As with TSX processors, these can be used to connect:
  - a programming terminal or an operator dialog console (UNI-TELWAY master mode),
  - the station to a multipoint UNITELWAY link (master or slave UNI-TELWAY mode),
  - a printer or a terminal in character mode.
- **Master FIPIO communication, built-in to some processors**,
  TSX P57x53 and PCX P57 353 processors feature as standard a master FIPIO link, used to provide remote operation (maximum 15 kms) of devices such as:
  - discrete I/Os,
  - analog I/Os,
  - speed drives,
  - operation and supervising stations,
  - devices,
  - etc.
- **Communication by means of PCMCIA cards which can be built into the processor or the application-specific communication module TSX SCY 21601**: the processors and the application-specific communication module TSX SCY 21601 have a slot which is used for accommodating an extended type III PCMCIA communication card,
- **Communication via application-specific modules**:
  TSX SCY 2160 module:
  This module, which can be integrated in all TSX/PCX Premium PLC station racks, has:

- a built-in communication channel (1), multiprotocol (UNITELWAY, Modbus/ Jbus, character mode), isolated RS 485 serial link,
- a slot (2) for receiving an extended PCMCIA type III format communication card.

TSX ETY 110/4102/5102 module:

Module enabling communication in an Ethernet multi-network architecture with a communication channel providing two types of connection:

- connection to an ETHWAY network,
- connection to an TCP_IP network.

PCMCIA cards

PCMCIA type III format communication cards (see *TSX P57/TSX H57 processors: diagnostics, p. 177*).

Illustrations

The following table illustrates the different modes of communication:

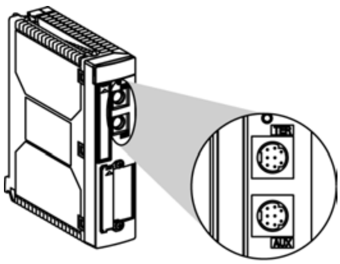
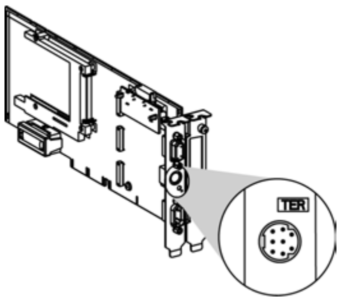
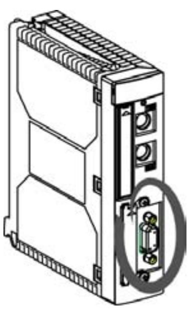
Illustration	Description
	TER and AUX ports on TSX processors.
	TER ports on PCX processors.
	FIPIO link on TSX processors.

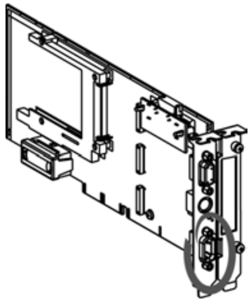
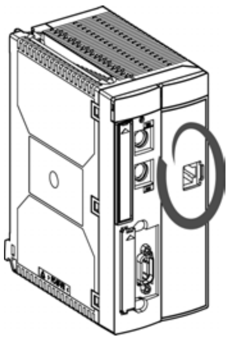
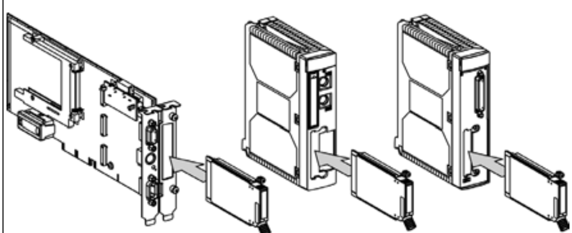
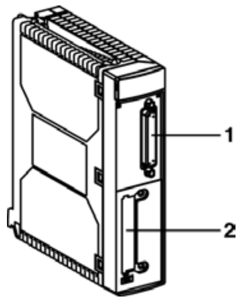
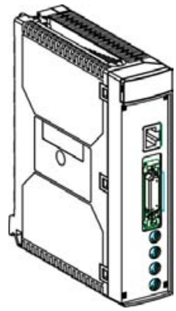
Illustration	Description
	FIPIO link on PCX processors.
	Built-in Ethernet links for TSX P57 ••23 processors.
	Communication by means of PCMCIA cards which can be built in to the processor or the module.

Illustration	Description
	Communication via application-specific module TSX SCY 21601: ● 1 : built-in communication channel, ● 2 : slot for PCMCIA card.
	Communication via application-specific module TSX ETY 110.

General introduction to the AS-i bus interface module: TSX SAY

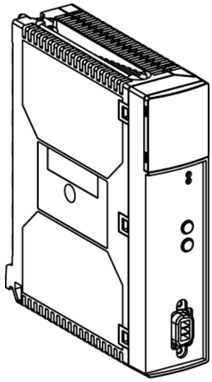
General points

This is a module which is used to connect an AS-i bus to a Premium TSX/PCX PLC station.

This master module (Installation Manual Volume 4) manages and coordinates bus access. It transmits data to all slaves and receives data from them.

Illustration

Illustration of the TSX SAY 100 module:



General introduction to the TSX ISPY weighing module

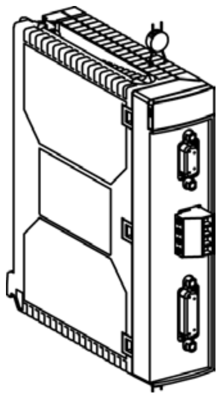
General

Using the TSX ISPY 101 and TSX ISPY 101 application-specific "weighing" modules. Premium PLCs can be used to manage weighing applications: dosage, multi-product dosage, grading, flow control, weight totalizer, etc.

This module offers a measurement input for a maximum of 8 sensors, 2 rapid discrete outputs and a serial link for a displayed report.

Illustration

Illustration of the TSX ISPY 100/101 module:



General introduction to the TSX FAN ventilation module

General

Depending on the rack modularity (4, 6, 8 or 12 positions), one, two or three ventilation modules can be installed above each rack to help cool the different modules by forced convection.

These ventilation units should be used in the following scenarios:

- **Ambient temperature in the 25°C...60°C range**,
- **Ambient temperature in the 60°C70°C range**.

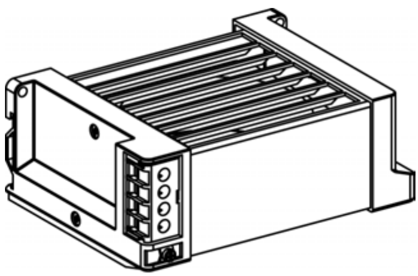
Three types of ventilation module are offered:

- ventilation module with 110 VAC power supply,
- ventilation module with 220 VAC power supply,
- ventilation module with 24 VDC supply,

See *Ventilation module, p. 113*.

Illustration

Illustration of the TSX FAN ventilation module:



General introduction to the TSX PAY emergency stop monitoring module

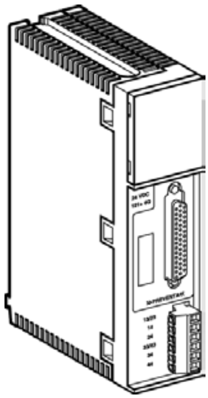
General points

These are modules (Installation Manual Volume 2) designed to control machine emergency stop circuits per category 4 according to the EN 954-1 standard.

Two modules are offered:

- 1 module consisting of 12 inputs and 2 outputs,
- 1 module consisting of 12 inputs and 4 outputs.

Illustration of the TSX PAY module:



General introduction to the different configurations of a PLC station

3

At a Glance

Aim of this Chapter

This Chapter gives a general introduction to the different configurations which are possible for TSX and PCX PLC stations.

What's in this Chapter?

This chapter contains the following topics:

Different types of Premium PLC Stations

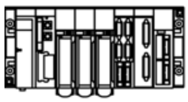
General Points

The choice of rack (standard or extendable) and processor type defines the maximum capacities of a Premium PLC station.

- the TSX P57 stations are composed of TSX P57 103,153 and 353LA single format processors and TSX P57 203/253/2623/2823/303/303A/353/353A/3623/3623A/453/453A/4823/4823A double format processors.

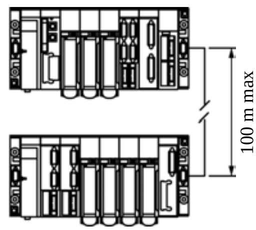
TSX P57 10 Station

Without bus X extension module:

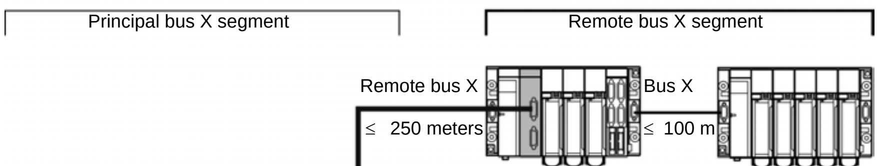


Station with standard rack: 1 rack, 6, 8 or 12 positions.

Station with extendable rack: 2 racks 12 positions or, 4 racks 4, 6 or 8 positions, maximum length of bus X: 100 meters



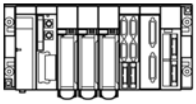
With bus X extension module:



Station with extendable racks: 2 racks 12 positions or, 4 racks 4, 6 or 8 positions, 2 remotes possible, maximum length of a remote: 250 meters, maximum length of the bus X segments: 100 meters.

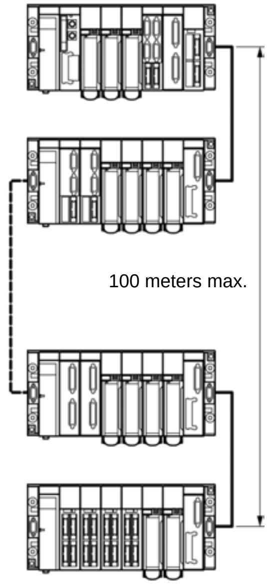
TSX 57 20/30/40 Station

Without bus X extension module:

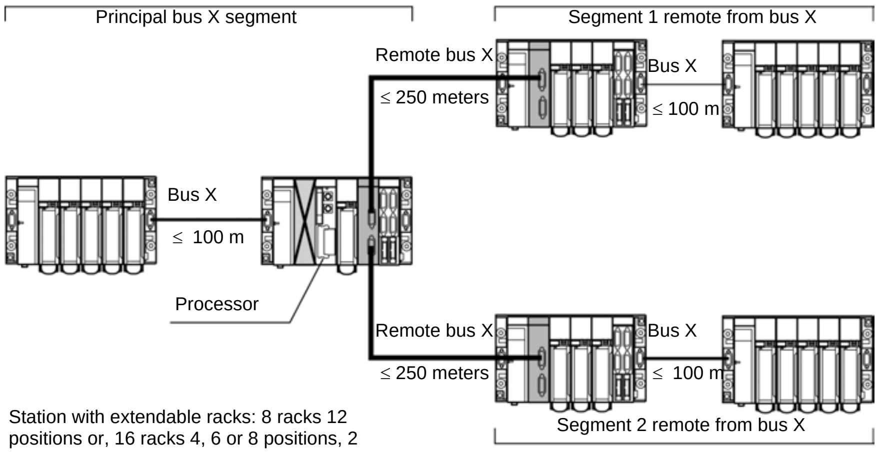


Station with standard rack:
1 rack, 6, 8 or 12 positions.

Station with extendable rack: 8 racks 12 positions or, 16 racks 4, 6 or 8 positions, maximum length of bus X: 100 meters



With bus X extension module:



Station with extendable racks: 8 racks 12 positions or, 16 racks 4, 6 or 8 positions, 2 remotes possible, maximum length of a remote: 250 meters, maximum length of the bus X segments: 100 meters.

Different types of PLC stations with Atrium processors.

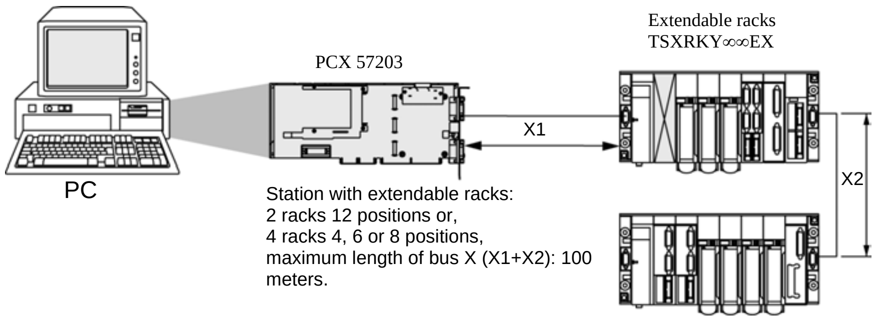
General points

By selecting the PCX 57 203 or 353 processor type, you set the maximum capacities of a Premium PCX PLC station.

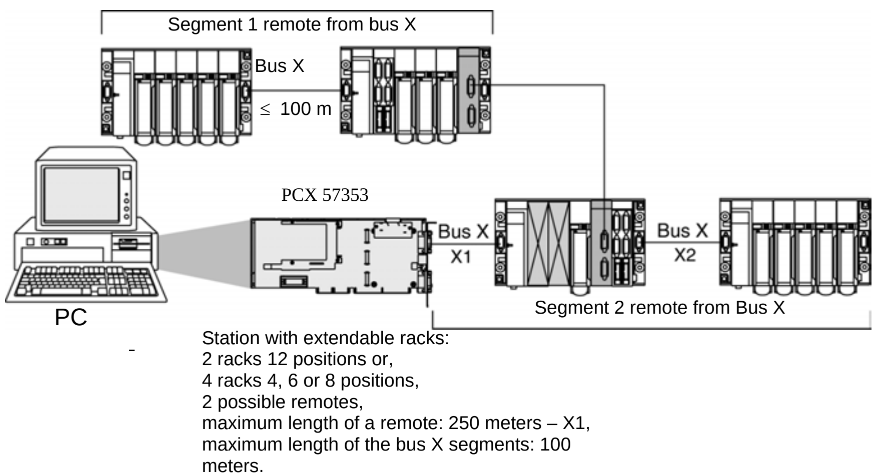
This type of station, with the processor integrated in a PC, will be controlled with extendable racks.

PCX 57 203 station

Without bus X extension module:

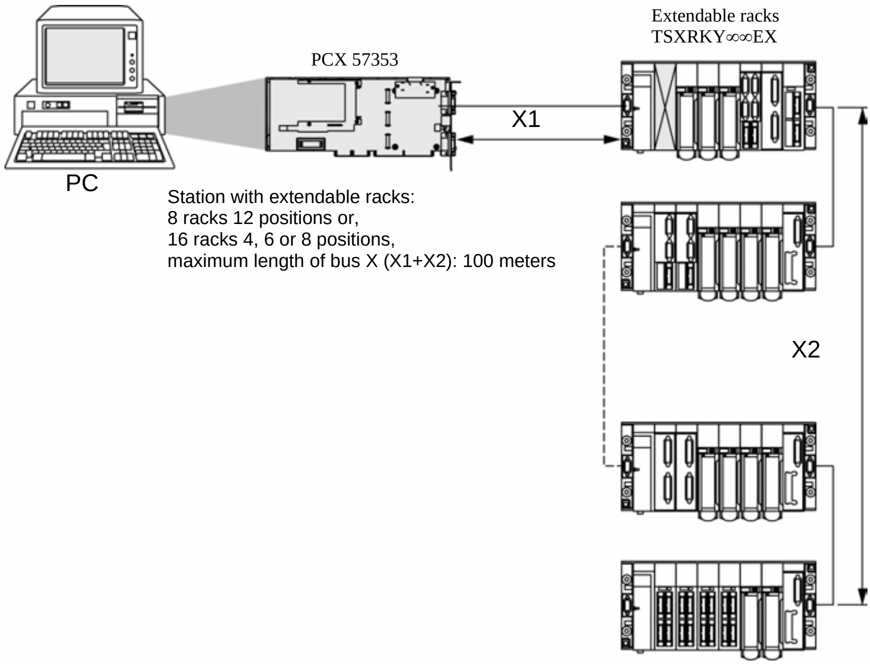


With bus X extension module:

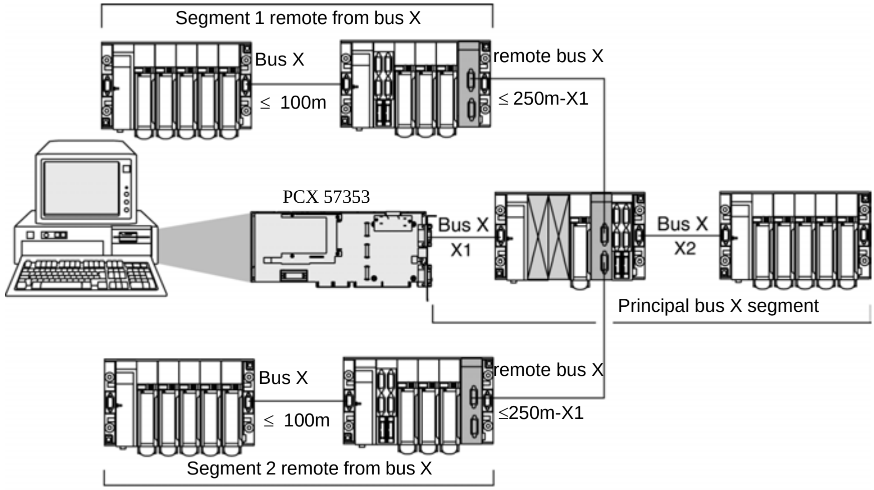


PCX 57 353 station

Without bus X extension module:



With bus X extension module:



Station with extendable racks:
8 racks 12 positions or,
16 racks 4, 6 or 8 positions,
two possible remotes,
maximum length of a remote: 250 meters – X1
maximum length of the bus X segments: 100 meters

Operating Standards and Conditions

4

At a Glance

Aim of this Chapter

This chapter deals with the operating standards and conditions of Premium and Atrium PLCs.

What's in this Chapter?

This chapter contains the following topics:

Standards and Certification

General

Premium and Atrium PLCs have been developed to conform to the principal national and international standards for industrial electronic PLC equipment.

- Programmable PLCs: specific requirements: functional characteristics, resistance, safety etc.
  IEC 61131-2, CSA 22.2 N° 142, UL 508
- Merchant navy requirements of the major international organizations:
  ABS, BV, DNV, GL, LROS, RINA, RRS, CCS etc.
- Adhering to European Directives:
  Low Voltage: 73/23/EEC amendment 93/68/EEC
  Electromagnetic Compatibility: 89/336/EEC amendments 92/31/EEC and 93/68/EEC
- Electric qualities and self-extinguishability of insulating materials: UL 746C, UL 94
- Danger Zones Cl1 Div2 CSA 22.2 N° 213

DANGER

Explosion Hazard:

THIS EQUIPMENT IS SUITABLE FOR USE IN CLASS I, DIVISION 2, GROUPS A, B, C AND D OR NON-HAZARDOUS LOCATIONS ONLY "WARNING: "EXPLOSION HAZARD - DO NOT DISCONNECT WHILE CIRCUIT IS LIVE UNLESS AREA IS KNOWN TO BE NON-HAZARDOUS"

Failure to follow these instructions will result in death or serious injury.

Operating conditions and environmental conditions to be avoided

Operating temperature/ hygrometry/ altitude

Data table:

Ambient temperature when operative	0°C to +60°C (IEC 1131-2 = +5°C to +55°C)
Relative humidity	10% to 95% (without condensation)
Altitude	0 to 2000 meters

Power supply voltages

Data table:

Voltage	nominal	24 VDC	48 VDC	100 to 240VAC	100...120/200...240 VAC
	limit	19 to 30 VDC	19...60VDC (1)	90 to 264 VAC	90 to 140/190 to 264VAC
Frequency	nominal	-	-	50/60 Hz	50/60 Hz
	limit	-	-	47/63 Hz	47/63 Hz
Brown-outs	duration	≤ 1 µs	≤ 1 µs	≤ 1/2 period	≤ 1/2 period
	repetition	≥ 1 s	≥ 1 s	≥ 1 s	≥ 1 s
Harmonic rate		-	-	10%	10%
Residual ripple included		5%	5%	-	-

(1) Possible up to 34 VDC, limited to 1 hour every 24 hours.

For TSX PSY 1610 and TSX PSY 3610 power supplies, and when using relay output modules, this scope is reduced to 21.6V...26.4V.

Human and material safety

Data table:

Test Designation	Norms	Levels	
Dielectric rigidity and Isolation resistance *	IEC 61131-2 UL 508 CSA 22-2 N°142 IEC 60950	24 - 48 V Power supply 100 -220 V Power supply < 48V Discrete I/Os > 48V Discrete I/Os > 10 MΩ	1500 Vrms 2000 Vrms 500 Vrms 2000 Vrms
Maintaining ground connections*	IEC 61131-2 UL 508 CSA 22-2 N°142	< 0.1 Ω / 30 A / 2 min	
Leakage Current *	CSA 22-2 N°142 IEC 60950	< 3.5 mA fixed device	
Enclosures for protection *	IEC 61131-2 CSA 22-2 N°142 IEC 60950	IP 20	
Impact Resistance	CSA 22-2 N°142 IEC 60950	Drop / 1.3 m / 500 g Sphere	
Legend			
***: Tests required by EC directives**			

Note: The devices must be installed and wired according to the directions in the TSX DG KBL• manual.

Resistance of devices to power supply L.F. turbulence

Data table:

Test Designation	Norms	Levels
Voltage and frequency Variation *	EN 50082-1	Un 15% / Nf 5% 30 min x 2 Un 20% / Nf 10% 5 s x 2
Continuous voltage variation *	EN 50082-1	0.85 Un - 1.2 Un 30 + 30 min + 5% ripple maximum
Harmonic 3 *	IEC 61131-2	10% Un 0° / 5 min - 180° / 5 min
Momentary Interruptions *	IEC 61131-2	AC 10 ms DC 1 ms
Voltage peaks and troughs *	IEC 61131-2	Un-0-Un; Un / 60s 3 cycles separated by 10 s Un-0-Un; Un / 5s 3 cycles separated by 1 to 5 s Un-0.9-Un; Un / 60s 3 cycles separated by 1 to 5 s
Legend		
Un: Nominal Voltage Nf: Nominal Frequency Ud: Power-on detection level		
***: Tests required by EC directives**		

Note: The devices must be installed and wired according to the directions in the TSX DG KBL• manual.

Resistance to H.F. turbulence

Data table:

Test Designation	Norms	Levels
Amortized oscillatory wave *	IEC 61131-2 IEC 61000-4-12	AC / DC 1 kV SM 24 V Discrete I/Os 1 kV SM
Fast transients (bursts) *	EN 50082-1 IEC 61000-4-4	AC / DC Power Supply 2 kV WM / CM 48 V > Discrete I/Os 2 kV CM other ports 1 kV CM
Hybrid shockwave	IEC 61000-4-5	AC / DC Power Supply 2 kV WM / 1 kV SM AC Discrete I/Os 2 kV WM / 1 kV SM DC Discrete I/Os 2 kV WM / 0.5 kV SM Shielded Cable 1 kV CM
Electrostatic Discharge *	IEC 61131-2 IEC 61000-4-2	6 kV contact 8 kV air
Electromagnetic Field *	EN 50082-2 IEC 61000-4-3	10 V/m, 80MHz - 2 GHz Sinusoidal modulation amplitude 80% / 1kHz
Conduit Turbulence *	EN 50082-2 IEC 61000-4-6	10 V 0.15 MHz - 80 MHz Sinusoidal modulation amplitude 80% / 1kHz
Legend		
SM: Serial mode CM: Common Mode WM: Wire Mode		
***: Tests required by EC directives**		

Note: The devices must be installed and wired according to the directions in the TSX DG KBL• manual.

Electromagnetic Emissions

Data table:

Test Designation	Norms	Levels
Conduction Limits *	EN55022/55011 EN50081-2	Class A 150 kHz - 500 kHz quasi-peak 79 dB mV average 66 dB mV 500 kHz -30 kHz quasi-peak 73 dB mV average 60 dB mV
Emission Limits *(1)	EN55022/55011 EN50081-2	Class A d = 10 m 30 kHz -230 kHz quasi-peak 30 dB mV/m 230 kHz -1 kHz quasi-peak 37 dB mV/m
Legend		
(1) This test is carried out outside the casing, with the devices secured to a metallic grill and wired as shown in the TSX DG KBL• Manual.		
***: Tests required by EC directives**		

Note: The devices must be installed and wired according to the directions in the TSX DG KBL• manual.

Resistance to climatic variation

Data table:

Test Designation	Norms	Levels
Dry heat	IEC60068-2-2 Bd	60°C / 16h (E.O) 40°C / 16h (E.F)
Cold	IEC60068-2-1 Ad	0°C / 16h
Continuous humid heat	IEC60068-2-30 Ca	60°C / 93% Hr /96h (E.O) 40°C / 93% Hr /96h (E.F)
Cyclical humid heat	IEC60068-2-30 Db	(55°C E.O / 40°C E.F); - 25°C / 93-95% Hr 2 cycles: 12 o' clock - 12h o' clock
Cyclical temperature variations	IEC60068-2-14 Nb	0°C; -60°C / 5 Cycles: 6 o'clock-6 o'clock (E.O.) 0°C; -40°C / 5 Cycles: 6 o'clock-6 o'clock (E.F)
Temperature Rise	IEC61131-2 UL508 CSA22-2 N°142	Ambient temperature: 60°C
Legend		
E.O: Device open E.F: Device closed Hr: Relative Humidity		

Resistance to mechanical constraints

Data table:

Test Designation	Standards	Levels
Sinusoidal vibrations	IEC60068-2-6 Fc	3 Hz - 100 Hz / 1 mm amplitude / 0.7 Gn Endurance: rf / 90 min / axis (Q limit) < 10 3 Hz - 150 Hz / 1.5 mm / 2 Gn Endurance: 10 cycles (1 octave / min)
Half-sinus shocks	IEC60068-2-27 Ea	15 Gn x 11 ms 3 shocks / direct. / axis
Legend		
rf: Resonance Frequency Q: Amplification Coefficient		

Resistance to climatic variation

Data table:

Test Designation	Standards	Levels
Dry heat whilst inoperative	IEC60068-2-2 Bb	70°C / 96h
Cold whilst inoperative	IEC60068-2-1 Ab	-25°C / 96h
Humid heat whilst inoperative	IEC60068-2-30 dB	60°C; - 25°C / 93-95% Hr 2 cycles: 12 o' clock - 12h o' clock
Thermal shocks whilst inoperative	IEC60068-2-14 Na	-25°C; -70°C / 2 Cycles: 3 o'clock - 3 o'clock

Resistance to mechanical constraints

Data table:

Test Designation	Standards	Levels
Flat free drop	IEC60068-2-32 Ed	10 cm / 2 drops
Free drop from controlled position	IEC60068-2-31 Ec	30° or 10 cm / 2 drops
Random free drop (conditioned material)	IEC60068-2-32 Method 1	1 m / 5 drops

Premium PLC protection processing

General points

PLCs in the Premium and Atrium range meet **AP** (all-climate processing) processing requirements.

For installations used in industrial production workshops or in environments which come under the title **HP** (processors in heat and humidity) processing, the Premium PLCs must be inserted into a protection casing (minimum IP54 as outlined by standards IEC 60664 and NF C 20 040).

Premium PLCs have an IP20 protection index. They can thus be installed without a protection casing in restricted-access areas which do not exceed Pollution Degree 2 (control room free of machines or any activity creating dust).

The Atrium card is designed for integration into a host PC. The host device must therefore conform to the IP20 protection index.

⚠ CAUTION

Maintaining IP protection index

For a rack to conform to the IP20 protection index, the unoccupied module slots must be protected by a TSX RKA 02 protection cover.

Failure to follow these instructions can result in injury or equipment damage.

TSX RKY.. standard and extendable racks

II

At a Glance

Subject of this Part

This part concerns **TSX RKY.. standard and extendable racks**

What's in this Part?

This part contains the following chapters:

Introduction to TSX RKY .. standard/extendable racks.

5

At a Glance

Aim of this Chapter

This Chapter deals with:

- general points regarding TSX RKY racks,
- the physical description of these racks.

What's in this Chapter?

This chapter contains the following topics:

Standard and extendable TSX RKY racks

General points

TSX RKY racks form the base unit of Premium PLCs.

These racks serve the following functions:

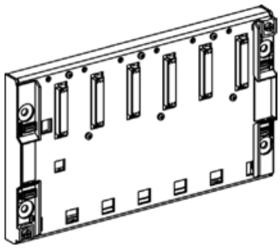
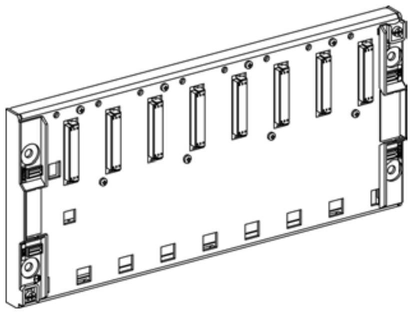
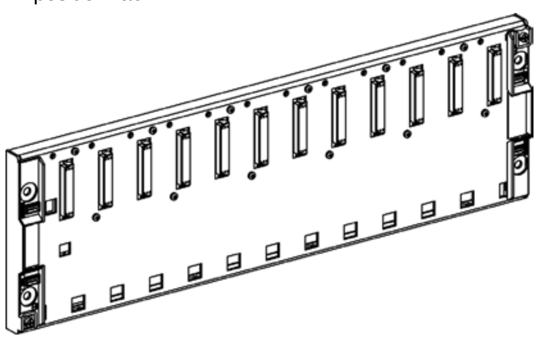
- **Mechanical function:**
  they are used to mount a set of modules for a PLC station (i.e. supply modules, processors, discrete/analog input/output modules, application-specific modules). They can be mounted in cabinets, machine frames or on panels.
- **Electrical function:**
  the racks have a built-in bus, called bus X, which distributes:
  - the required supply for each module on the same rack,
  - service signals and data for the whole PLC station when this is made up of several racks.

Note: two families of racks are offered in several modularities (4, 6, 8 and 12 positions):
- **standard racks**,
- **extendable racks**.

Standard racks

They are used to make up a PLC station which is limited to a single rack.

This table presents the different **standard racks**:

Designation	Illustration
TSX RKY 6	6-position rack 
TSX RKY 8	8-position rack 
TSX RKY 12	12-position rack 

Extendable racks

They are used to make up a PLC station which can have:

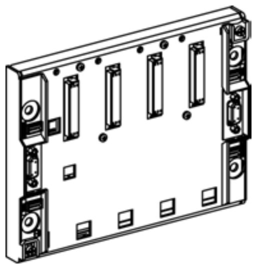
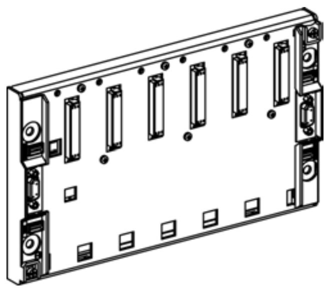
- a maximum of 8 **TSX RKY 12 EX** racks,
- a maximum of 16 **TSX RKY 4EX/6EX/8EX** racks.

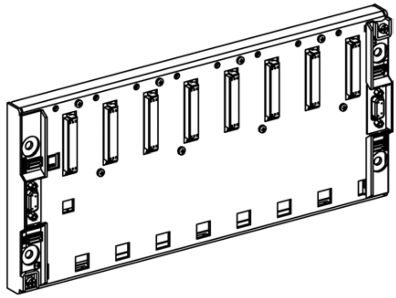
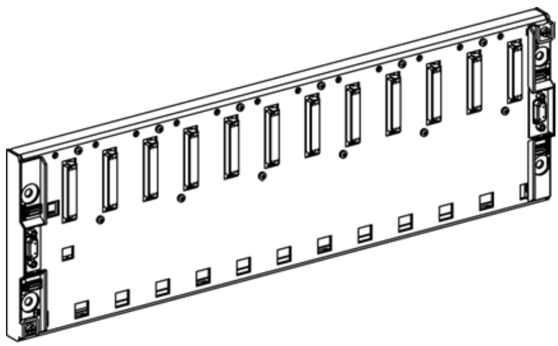
These racks are distributed on a bus called bus X, whose maximum length is limited to 100 meters.

A bus extension cable assures rack-to-rack bus continuity.

For applications which require a greater distance, a bus X extension module allows the extension of two bus X segments from the rack which is supporting the processor to a maximum distance of 250 meters.

This table presents the different **extendable racks**:

Designation	Illustration
TSX RKY 4EX	4-position rack 
TSX RKY 6EX	6-position rack 

Designation	Illustration
TSX RKY 8EX	8-position rack 
TSX RKY 12EX	12-position rack 

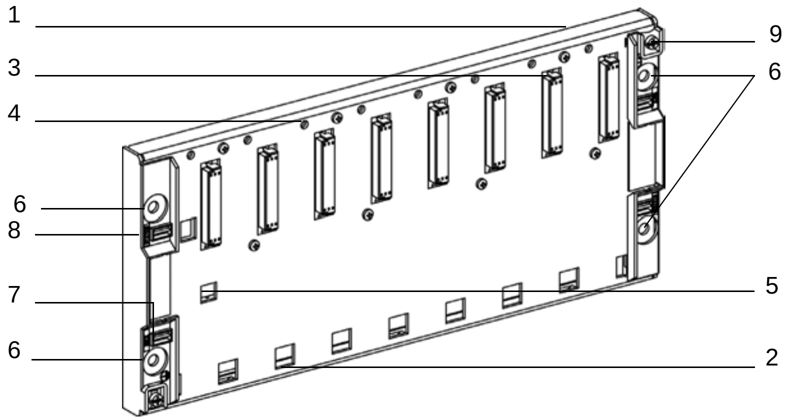
Standard rack: description

At a Glance

They are used to make up a PLC station which is limited to a single rack.

Illustration

Standard rack



Description

The following table describes the different elements of a standard rack.

Number	Description
1	Metal sheet which: ● supports the bus X electronic card, and protects against **EMI** and **ESD** interference. ● supports the modules, ● maintains the rack's physical rigidity.
2	Holes to be used as anchor-points for module pins.
3	Female 48-pin 1/2 DIN connectors for connecting each module to the rack. When racks are delivered, these connectors are protected by covers, which must be removed before modules are installed. The connector on the farthest left marked PS is always dedicated to the rack supply module. The other connectors marked 00 to **..** are for receiving all the other module types.
4	Screw-holes for the module-mounting screws.
5	Guide-hole to assist in mounting the supply module. As supply modules have a projecting part on the back, this module cannot be mounted in any other position.
6	Holes for mounting the rack onto a support. These holes can take M6 screws.
7	Slot to hold the label for the rack address.
8	Slot to hold the label for the station network address.
9	Ground terminals for grounding the rack.

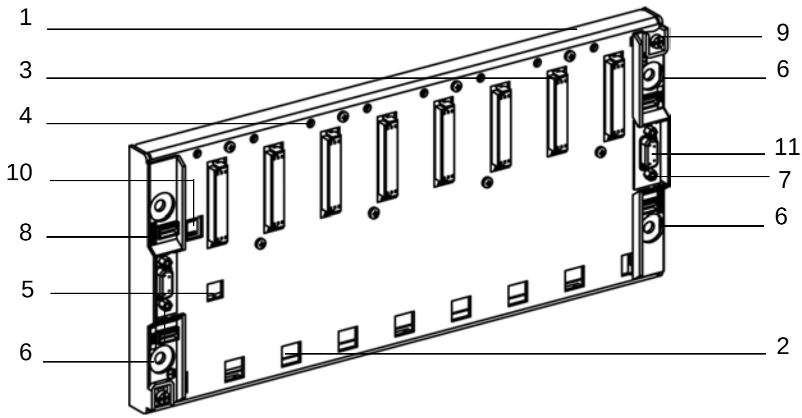
Extendable rack: description

At a Glance

They are used to form a PLC station which can be made up of several racks.

Illustration

Extendable rack



Description

The following table describes the different elements of an extendable rack.

Number	Description
1	Metal sheet which: ● supports the bus X electronic card, and protects against **EMI** and **ESD** interference. ● supports the modules, ● maintains the rack's physical rigidity.
2	Holes to be used as anchor-points for module pins.
3	Female 48-pin 1/2 DIN connectors for connecting each module to the rack. When racks are delivered, these connectors are protected by covers, which must be removed before modules are installed. The connector on the farthest left marked PS is always dedicated to the rack supply module. The other connectors marked 00 to **..** are for receiving all the other module types.
4	Screw-holes for the module-mounting screws.
5	Guide-hole to assist in mounting the supply module. As supply modules have a projecting part on the back, this module cannot be mounted in any other position.
6	Holes for mounting the rack onto a support. These holes can take M6 screws.
7	Slot to hold the label for the rack address.
8	Slot to hold the label for the station network address.
9	Ground terminals for grounding the rack.
10	Microswitch for coding the rack address (extendable racks only).
11	Female 9-pin SUBD connectors for extending the bus X to another rack (extendable rack only).

TSX RKY.. standard and extendable racks : installation/ mounting

6

At a Glance

Aim of this Chapter

This chapter deals with:

- rack installation,
- mounting these racks.

What's in this Chapter?

This chapter contains the following topics:

Installing Racks

Introduction

When mounting **TSX RKY ••** racks, certain installation rules must to be followed.

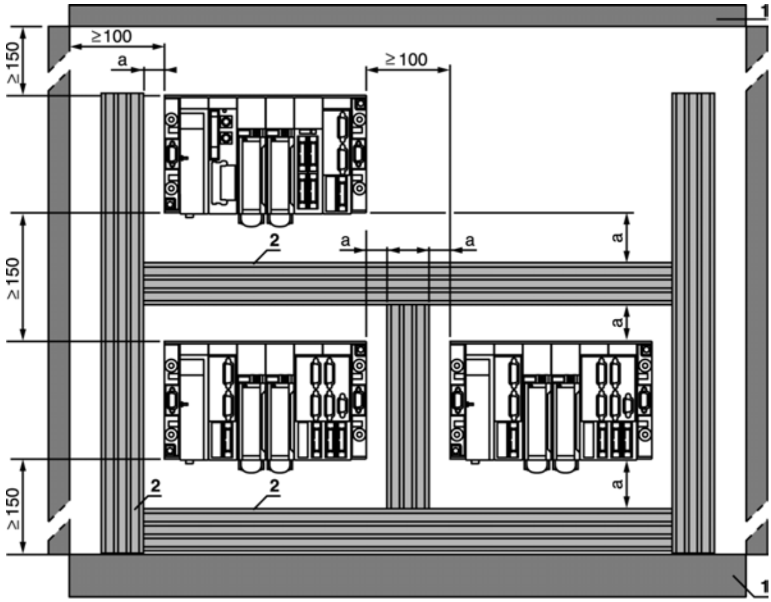
Rack Installation Rules: Description

- **1** As the different modules (e.g. supply, processors, discrete I/O, etc.) are cooled by natural convection, it is **compulsory** in order to facilitate ventilation (see *Ventilation module, p. 113*) **to install the different racks horizontally and vertically**.
- **2** If several racks are installed in the same cabinet, you are advised to comply with the following advice on layout:
  - leave at least 150 mm between two racks placed on top of each other, to allow room for cable troughs and help air circulation.
  - you are advised to install the devices which generate heat (eg transformers, process supply, power contacts, etc.) above the racks,
  - leave at least 100 mm on each side of a rack to allow room for cabling and to help air circulation.

Note: If the hardware, other than the metal electrical cabinet, is installed in an area with emissions limits between 30 MHz and 1GHz (as per EN 55022), you are advised to use racks TSXRKY 8EX or TSXRKY6EX instead of TSXRKY8 and TSXRKY6.

Illustration

The following illustration shows the rules for installation



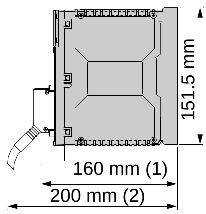
a Greater than or equal to **50 mm**.

1 Installation or casing.

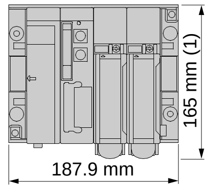
2 Trough or cable tray.

Overall Rack Dimensions: Illustrations

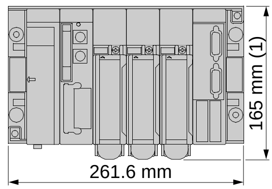
The following illustrations show the overall dimensions of **TSX RKY ••** racks.



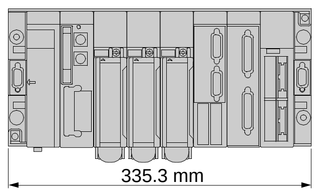
TSX RKY 4EX



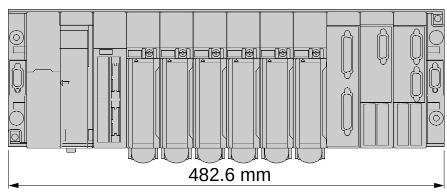
TSX RKY 6/6EX



TSX RKY 8/8EX



TSX RKY 12/12EX



(**1**) With screw terminal block modules.

(**2**) Maximum depth for all types of modules and their associated connectors.

mounting and fixing racks

Introduction

TSX RKY•• and **TSX RKY••EX** racks can be mounted:

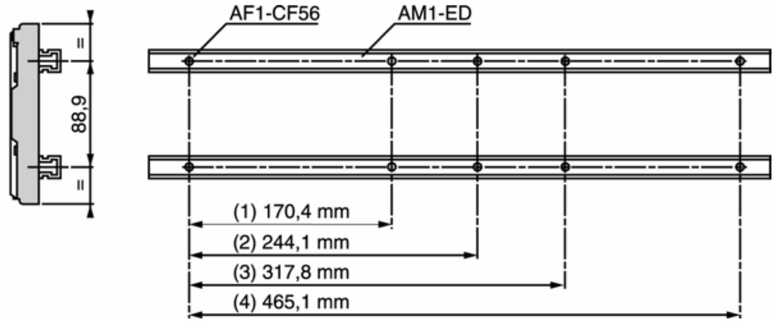
- on a 35 mm wide DIN mounting rail using M6x25 screws,
- on a Telequick mounting grid or on a panel.

The rules for installation (see *Installing Racks, p. 78*) are to be always followed, whatever the type of mounting.

Mounting on 35 mm wide DIN mounting rail

Fixing with four M6x25 screws + washers and AF1-CF56 $^{1}/_{4}$ turn sliding nuts.

Diagram illustrating the mounting



(**1**) TSX RKY 4EX

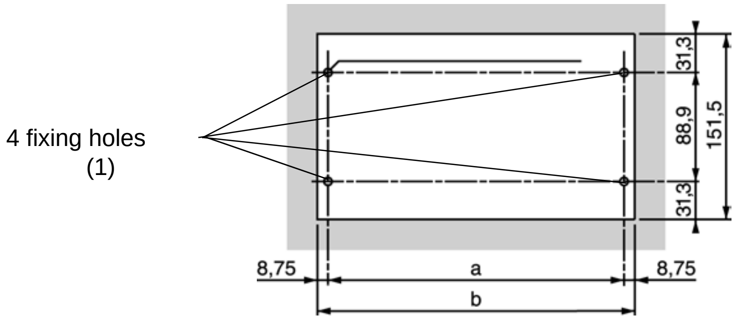
(**2**) TSX RKY6 and TSX RKY 6EX

(**3**) TSX RKY8 and TSX RKY 8EX

(**4**) TSX RKY 12 and TSX RKY 12EX

Mounting on a panel

Plan of screw-holes (dimensions in mm):



(1) the diameter of the fixing holes must be sufficient to take M6 screws.

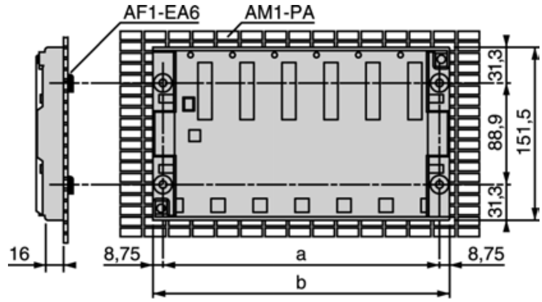
(**1**) The diameter of the fixing holes must be such as to allow M6 screws.

a and **b** see table.

Mounting on an AM1-PA Telequick mounting grid

Fix the rack using four M6x25 screws + washers and AF1-EA6 clips nuts.

Plan of screw-holes (dimensions in mm):



the following table presents mounting characteristics according to the different **TSX RKY** racks:

Racks	a	b	Depth
TSX RKY 4EX	170.4 mm	187.9 mm	16 mm
TSX RKY 6/6EX	244.1 mm	261.6 mm	16 mm
TSX RKY 8/8EX	317.8 mm	335.3 mm	16 mm
TSX RKY 12/12EX	465.1 mm	482.6 mm	16 mm

Note: Maximum tightening torque for fixing screws: 2.0.N.m.(1.6 Lb.-ft.)

Connection of the ground to a TSX RKY rack

Grounding racks

Functional grounding of the racks is provided by the back, which is made of metal.

This means that the PLCs will be guaranteed to conform to environmental norms; assuming, however, that the racks are fixed to a metal support that is correctly connected to ground. The different racks which can make up a TSX P57/TSX H57 PLC station must be mounted either on the same support or on different supports, as long as the latter are correctly interlinked.

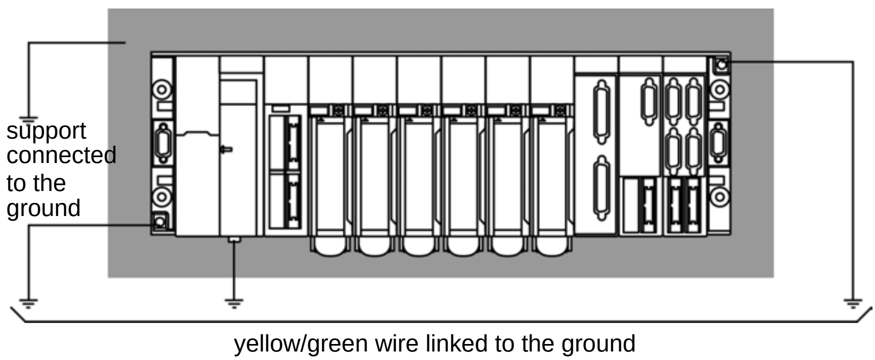
⚠ DANGER

Correct grounding procedure

- Each rack's grounding terminal must be linked to the protective ground.
- Use a green/yellow wire with a minimum section of 2.5 mm (12 AWG) and with the shortest length possible.
- Maximum torque on the ground connection screw: 2.0 N.m (1.5 lb-ft).
- Install to confrom to all local and national codes.

Failure to follow these instructions will result in death or serious injury.

Illustration:



Note: The PLC's internal 0V is linked to the ground connection. The ground connection itself being linked to ground.

TSX RKY.. standard and extendable racks: functions

7

At a Glance

Aim of this Chapter

This chapter describes the different functions of the **TSX RKY..** standard and extendable racks.

What's in this Chapter?

This chapter contains the following topics:

Building a PLC station with Premium processor

Introduction

It is possible to build a PLC station with TSX P57 processor using:

- standard racks (see *Standard racks, p. 69*): TSX RKY 6/8/12,
- extendable racks (see *Extendable racks, p. 70*): TSX RKY 4EX/6EX/8EX/12EX.

Building using standard racks

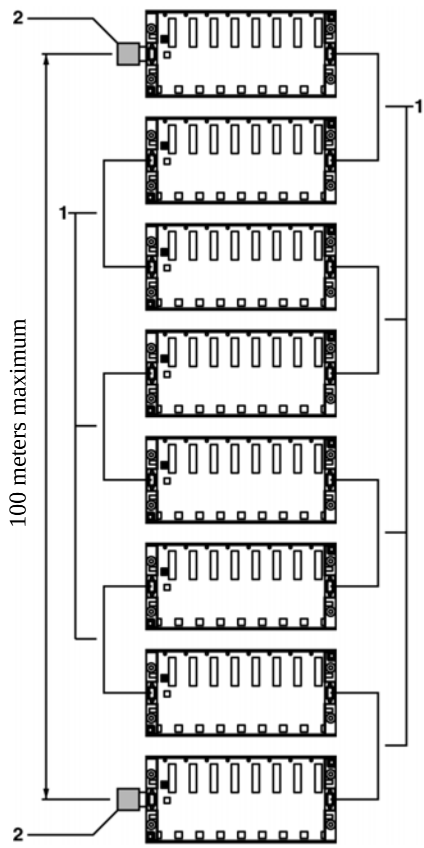
Standard racks can be used to build a TSX P57 PLC station limited to a single rack.

Building using extendable racks: TSX RKY 4EX/6EX/8EX/12EX

Extendable racks can be used to build a PLC station that contains a maximum of:

Station	Number of racks
For a TSX 57 10 station	• 2 TSX RKY 12EX racks, • 4 TSX RKY 4EX/6EX/8EX racks.
For a TSX 5720, 5730 or 5740 station	• 8 TSX RKY 12EX racks, • 16 TSX RKY 4EX/6EX/8EX racks.

Diagram



- **(1)** The same station can contain 4, 6, 8 and 12 position racks that are linked by Bus X extension cables (see *TSX CBY..0K bus X extension cable (II $\geq$ 02), p. 100*) (labeled 1).
- **(2)**The bus X must have a line termination (see *Line terminator TSX TLYEX, p. 105*) (labeled 2) fitted at each end.

Note: The total length of all the TSX CBY ..0K cables used in a PLC station must never exceed 100 meters (328 feet). For applications which require a distance of more than 100 meters between racks, an extension module allows the extension of two bus X segments from the rack supporting the processor, to a maximum distance of 250 meters (820 feet), each bus X segment having a maximum distance of 100 meters.

Bus X extension cable

Racks are connected by means of TSX CBY**..**0K bus X extension cables which are connected to the 9-pin SUB D connectors situated on the right and left of each extendable rack.

Note: As the idea of in and out does not exist at the level of the 9-pin SUB D connector, a cable can enter or leave using either the right or left-hand connector.

Line termination

The two racks situated at the ends of the chain **must always** be fitted with a TSX TL YEX line termination on the unused 9-pin SUB D connectors, labeled **A/** and **/B**.

Building a PLC station with Atrium processor

At a Glance

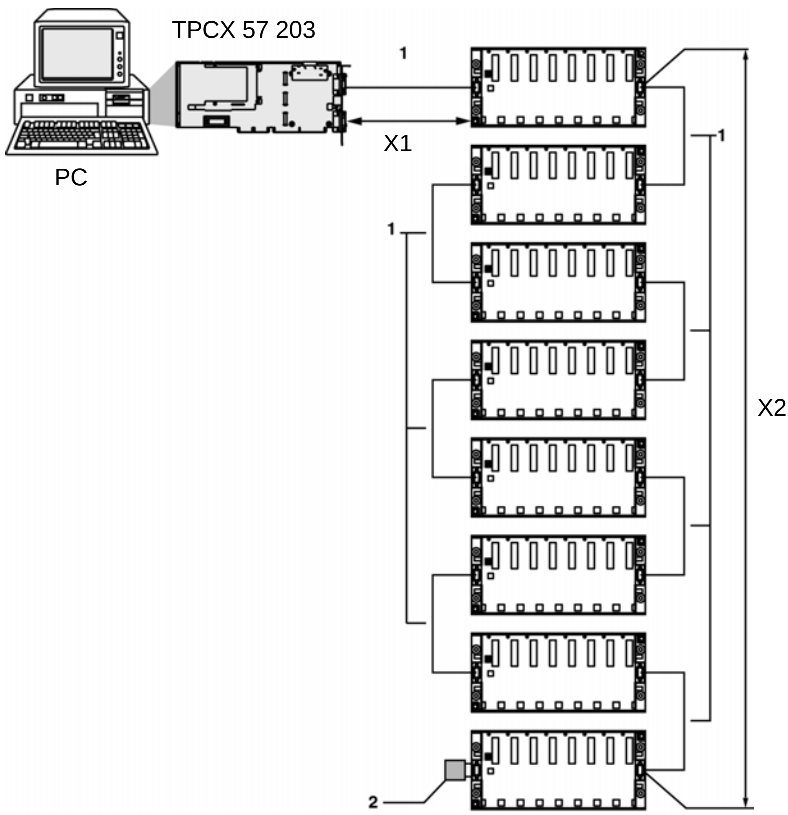
It is possible to build a PLC station with PCX 57 processor using extendable racks: TSX RKY 4EX/6EX/8EX/12EX.

Building using extendable racks

Extendable racks can be used to build a PLC station that contains a maximum of:

Station	Number of racks
For a PCX 57 203 station	• 8 TSX RKY 12EX racks, • 16 TSX RKY 4EX/6EX/8EX racks.
For a PCX 57 353 station	• 8 TSX RKY 12EX racks, • 16 TSX RKY 4EX/6EX/8EX racks.

Diagram:



- **(1)** The same station can contain 4, 6, 8 and 12 position racks that are linked by Bus X extension cables (see *TSX CBY..0K bus X extension cable (II ≥ 02), p. 100*) (labeled 1).
- **(2)** The bus X must have a line termination (see *Line terminator TSX TLYEX, p. 105*) (labeled 2) fitted at each end.

> **Note:** the total length (X1 + X2) of all the TSX CBY ..0K cables used in a PLC station must never exceed 100 meters (328 feet). For applications which require a distance of more than 100 meters between racks, an extension module allows the extension of two bus X segments from the rack supporting the processor, to a maximum distance of 250 meters (820 feet), each bus segment having a maximum distance of 100 meters.

Bus X extension cable

Racks are connected by means of TSX CBY••0K bus X extension cables which are connected to the 9-pin SUB D connectors situated on the right and left of each extendable rack and at the top of the front panel of the processor.

> **Note:** As the idea of in and out does not exist at the level of the 9-pin SUB D connector, a cable can enter or leave using either the right or left-hand connector.

Line termination

At manufacture, the equivalent of the line terminator **/A** is built in to the processor and, due to this, the processor forms a termination of the bus X. The extendable rack located at the end of the chain therefore **must always** have a TSX TLY line terminator, labeled **/B** on its unused 9-pin SUB D connector.

Note on the PCX 57 processor

By default, the PCX 57 processor is equipped to be mounted as the start of the bus X, and thus, the line termination /A is built-in to it in the form of a removable daughterboard.

If an application requires the integration of the processor inside a Bus X section, a mechanical kit is supplied with the processor to satisfy this requirement.

This mechanical kit is in the form of:

- a daughterboard which is mounted in place of the line termination A/,
- a shield equipped with a 9-pin SUB D connector for connecting a bus X TSX CBY••0K cable and a cable for connection to the daughterboard.

PLC station rack addressing

Introduction

Two cases can occur for PLC station rack addressing:

- PLC station built from a standard rack (see *Standard racks, p. 69*),
- PLC station built from extendable racks (see *Extendable racks, p. 70*).

Station built from a standard rack

The station is always limited to a single rack, thus the rack address is implicit and has a value of 0 (no microswitches).

Station built from extendable racks

For each station rack an address must be assigned. This address is coded using 4 microswitches found on the rack.

Microswitches 1 to 3 are used to code the address of the rack on the bus X (0 to 7), microswitch 4 is used to code two racks (4, 6 or 8 positions) on the same address. This latter functionality is managed by the PL7 Junior or PL7 Pro software version **V 3.3** or above.

Diagram showing the microswitch

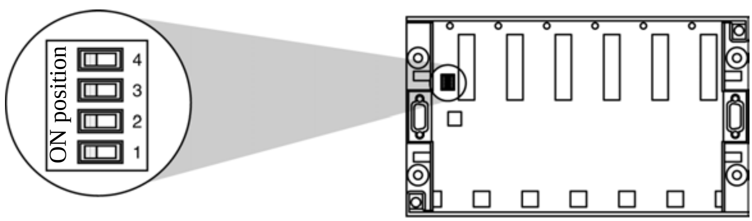


Table of rack addresses

Rack addresses		0	1	2	3	4	5	6	7
Position of the micro-switches	4	ON	ON	ON	ON	ON	ON	ON	ON
	3	ON	ON	ON	ON	OFF	OFF	OFF	OFF
	2	ON	ON	OFF	OFF	ON	ON	OFF	OFF
	1	ON	OFF	ON	OFF	ON	OFF	ON	OFF

Note: On delivery, microswitches 1, 2 and 3 are in the ON position (address 0).

Assigning addresses to different racks

Address 0: this address is always assigned to the rack which supports:

- the TSX P 57 processor physically,
- the PCX 57 processor virtually.

This rack can be located in any position in the chain.

Addresses 1 to 7: they can be assigned in any order to all the other extendable racks in the station.

Note: the rack address coding must be done before mounting the power supply module.

CAUTION

Address conflict

Each rack must have a unique address other than address 0.
Power reset is required after address connection.
Failure to do so will result in the racks affected, as well as all their modules showing a fault.

Failure to follow these instructions can result in injury or equipment damage.

This note only applies to racks with references **TSX RKY..EX**

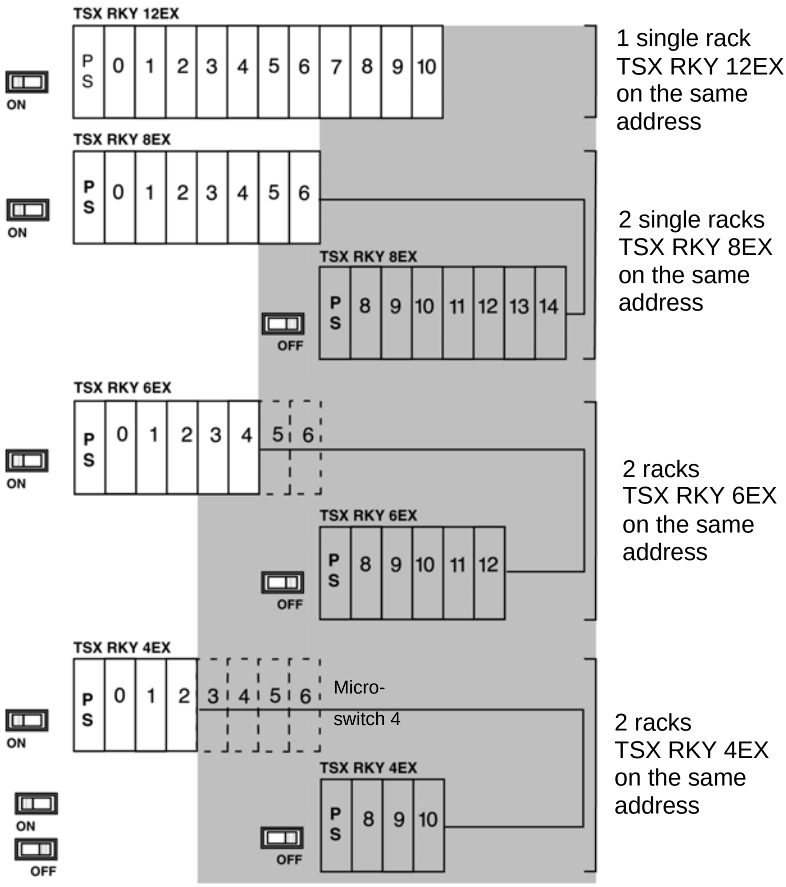
If two or more racks are at address 0, the rack supporting the processor does not show a fault.

Having correctly addressed the racks with faulty addresses, it is necessary to switch off and switch on the rack concerned.

The principle of addressing two racks at the same address

Illustration

The following diagram shows the principle of addressing two racks at the same address.



Note: take into account the following notes:
- TSX RKY 12EX racks cannot have a second rack at the same address.
- TSX RKY 8EX/6EX/4EX racks can be intermixed.
- Two TSX RKY 8EX/6EX/4EX racks at the same address will not necessarily be linked one after the other. The order of physical distribution is not important.

Module addresses

At a Glance

For all standard and extendable racks, the module address is geographical and will depend upon the position of the module on the rack. The address of each position is indicated under each connector - the connector with address PS is always dedicated to the rack power supply.

Several addressing cases are possible:

- module addressing on standard racks (see *Standard racks, p. 69*),
- module addressing on extendable racks (see *Extendable racks, p. 70*).

Module addressing on standard racks

- for a TSX RKY 6: use addresses 00 to 04,
- for a TSX RKY 8: use addresses 00 to 06,
- for a TSX RKY 12: use addresses 00 to 10.

Module addressing on extendable racks

The address of a module will depend upon the position of microswitch 4:

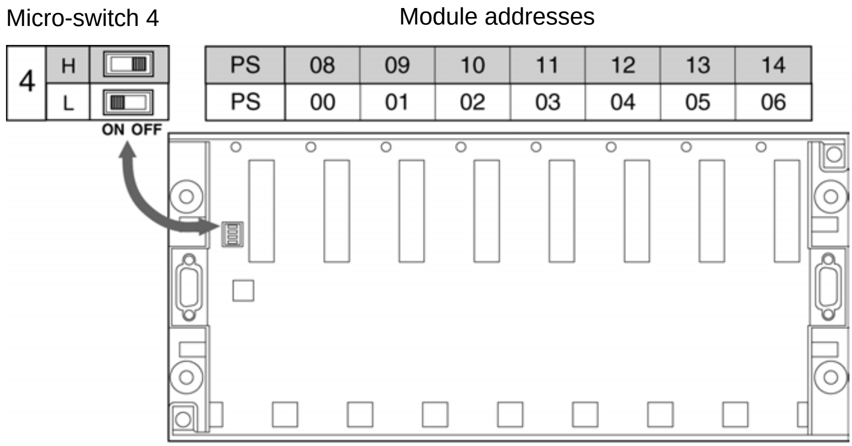
- microswitch 4 in the ON position, the modules will have addresses (00 to x), according to the rack type,
- microswitch 4 in the OFF position, the modules will have addresses (08 to y), according to the rack type. This functionality is only managed by the PL7 Junior or PL7 Pro software version **V 3.3** or above.

the following table shows the addresses in relation to the position of microswitch 4:

Position of microswitch 4	ON	OFF
TSX RKY 4EX racks	00 to 02	08 to 10
TSX RKY 6EX racks	00 to 04	08 to 12
TSX RKY 8EX racks	00 to 06	08 to 14
TSX RKY 12EX racks	00 to 10	unusable

Illustration

Diagram showing the module addresses on rack TSX RKY 8EX



Note: the shaded addresses are only accessible using PL7 Junior or PL7 Pro software version **V 3.3** or above

Installing power supplies, processors and other modules

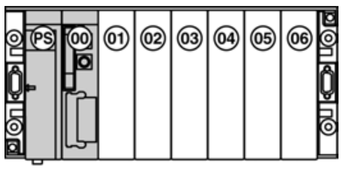
Installation on a standard or extendable rack with address 0 and with a Premium processor

The rack with address 0 must have a power supply module and the processor module. Premium PLCs have two types of power supply (standard format or double format), the position of the processor will depend upon the type of power supply used.

Using a standard format power supply module:

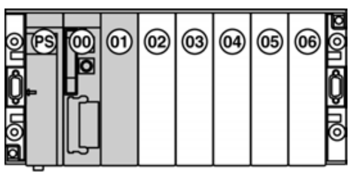
- the power supply module automatically occupies position PS,
- the single format processor module is installed in position 00 (preferred position) or in position 01, if position 00 is unavailable.

Illustration



- the double format processor module is installed in positions 00 and 01 (preferred positions) or in positions 01 and 02, if position 00 is unavailable,
- other modules are installed starting from position 01, 02 or 03 depending on the installation of the processor.

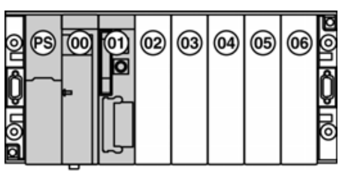
Illustration



Using a double format power supply module:

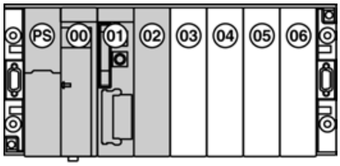
- the power supply module automatically occupies position PS,
- the single format processor module is always installed in position 01.

Illustration



- the double format processor module is installed in positions 01 and 02,
- other modules are installed starting from position 02 or 03 depending on the type of processor.

Illustration



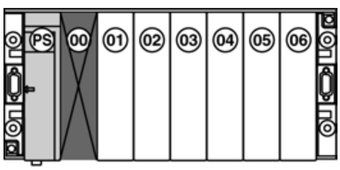
Installation on an extendable rack with address 0 and with an Atrium processor

The PCX 57 processor, which is built in to the PC, occupies a virtual position on the rack with address 0. This virtual position should be unoccupied. Premium PLCs have two types of power supply (standard and double format), the unoccupied position will depend upon the type of power supply used.

Using a standard format power supply module:

- the power supply module automatically occupies position PS,
- position 00, the virtual slot for the processor, must be unoccupied,
- the other modules are installed starting at position 01.

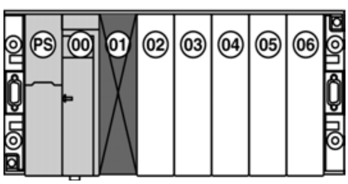
Illustration



Using a double format power supply module:

- the power supply module automatically occupies the positions PS and 00,
- position 01, the virtual location of the processor, must be unoccupied,
- the other modules are installed starting from position 02.

Illustration



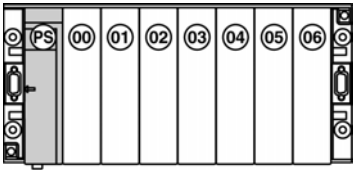
Installation on an extendable rack with address 1 to 7, regardless of processor type

Each rack must be equipped with a power supply module, either standard or double format.

Using a standard format power supply module:

- the power supply module automatically occupies position PS,
- the other modules are installed starting from position 00.

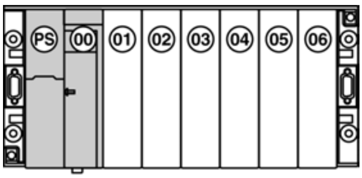
Illustration



Using a double format power supply module:

- the power supply module automatically occupies positions PS and 00,
- the other modules are installed starting at position 01.

Illustration



TSX RKY Racks: accessories

8

At a Glance

Aim of this Chapter

The aim of this chapter is to show the different accessories which go with **TSX RKY..** racks..

What's in this Chapter?

This chapter contains the following topics:

TSX CBY..0K bus X extension cable (II ≥ 02)

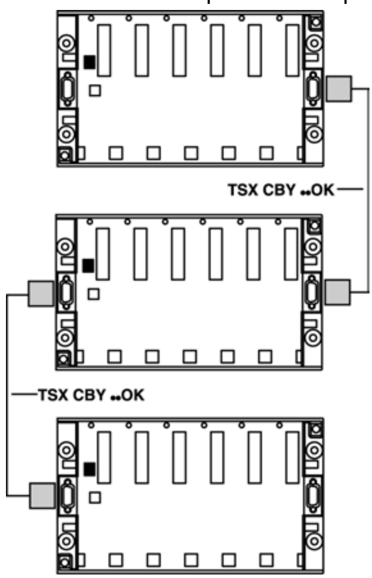
At a Glance

These cables of predetermined length are used to chain **TSX RKY..EX** extendable racks and to transport the different bus X signals.

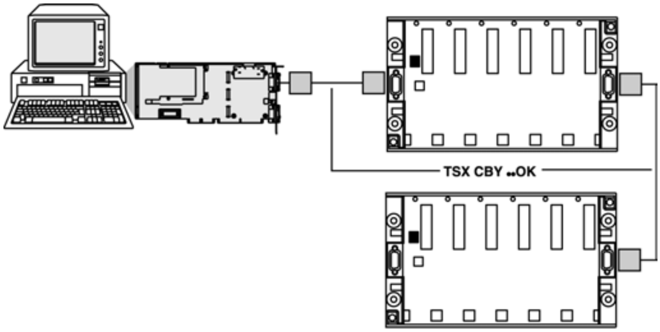
When a PCX 57 processor is used, they can also be used to connect the PC's built-in processor and the first rack in the station.

They are equipped at each end with male 9-pin SUB D connectors, which connect to the female 9-pin SUB D connector on the extendable rack or the PCX 57 processor.

Station with a TSX processor capable of being integrated in the rack



Station with a PCX processor capable of being integrated in a PC



Important:

The cumulative length of all the cables used in a PLC station is limited to 100 meters (328 feet).

⚠ CAUTION

Insertion and extraction under power

- Insertion and extraction of a TSX CBY0K cable must only be done with all the station’s elements switched off (racks, PC, etc.)

Failure to follow these instructions can result in injury or equipment damage.

⚠ CAUTION

Minimum cable radius

- The minimum bend radius of the bus X cable must be:
  - 40 mm (1.57 in) for a static application,
  - 80 mm (3.15 in) for a dynamic application.

Failure to follow these instructions can result in injury or equipment damage.

Different cable types available

To suit different users, several cable lengths are available.

Summary table of different cable types

Product reference	Lengths
TSX CBY 010K (II ≥ 02)	1 meter
TSX CBY 030K (II ≥ 02)	3 meters
TSX CBY 050K (II ≥ 02)	5 meters
TSX CBY 120K (II ≥ 02)	12 meters
TSX CBY 180K (II ≥ 02)	18 meters
TSX CBY 280K (II ≥ 02)	28 meters
TSX CBY 380K (II ≥ 02)	38 meters
TSX CBY 500K (II ≥ 02)	50 meters
TSX CBY 720K (II ≥ 02)	72 meters
TSX CBY 1000K (II ≥ 02)	100 meters

TSX CBY 1000 bus X extension cable

At a Glance

For bus X lengths less than 100 meters but different from those available as cables with connectors, **always** use a **TSX CBY 1000** cable.

This cable must have TSX CBY K9 connectors fitted at both ends by the user. The assembly procedure is described in the instructions supplied with the cable and the connectors.

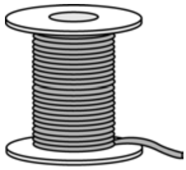
For implementation of these cables the following elements are required:

- 1 TSX CBY 1000 cable,
- 1 set of two TSX CBY K9 9-pin connectors,
- 1 TSX CBY ACC10 kit.

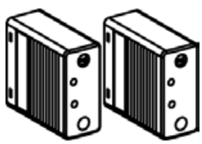
1 TSX CBY 1000 cable,

This cable must include one 100-meter reel of cable and two testers to check the cable once the various connections have been made.

Illustration:



Reel



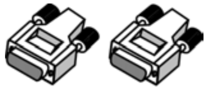
Testers

1 set of two TSX CBY K9 9-pin connectors

For each connector this set must include:

- 1 connector body,
- 1 set of contacts,
- 1 internal screening cap,
- 1 external screening cap,
- 1 ferrule,
- 1 plastic cover with 2 fixing screws.

Illustration:

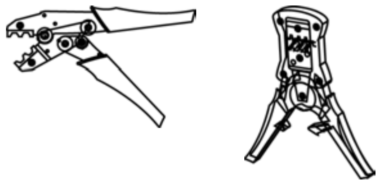


1 TSX CBY ACC10 kit

This kit includes:

- 2 crimping tools,
- a contact extractor to be used in case of errors.

Illustration:



Crimping tools

Line terminator TSX TLYEX

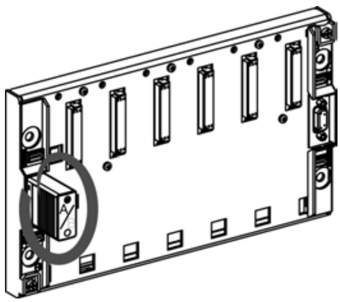
Introduction

When extendable racks (see *TSX RKY.. standard and extendable racks: functions, p. 85*) are used, the bus X must be fitted with a line terminator at each end.

At a Glance

A line terminator is made up of a 9-pin SUB D connector and a cover containing the adaptation components. It is mounted on the 9-pin SUB D 9 connector belonging to the extendable rack at the end of the line.

Illustration:



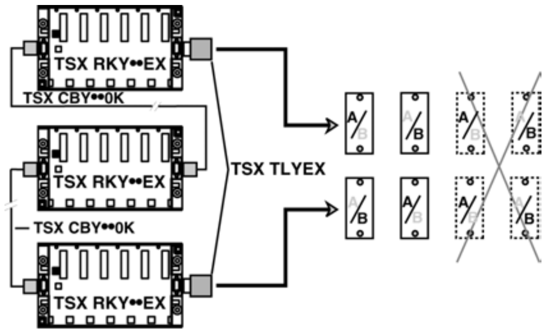
TSX TLYEX line terminations are sold in twos and marked **A/** and **/B**. The bus must be fitted with a terminator **A/** at one end and a terminator **/B** at the other end in no predefined (see *Positioning of line terminators on a station using a Premium processor, p. 106*) order.

⚠ CAUTION
Insertion or extraction of terminator under power
Insertion or extraction of a line terminator must only be done with all the station's racks switched off.
Failure to follow these instructions can result in injury or equipment damage.

Positioning of line terminators on a station using a Premium processor

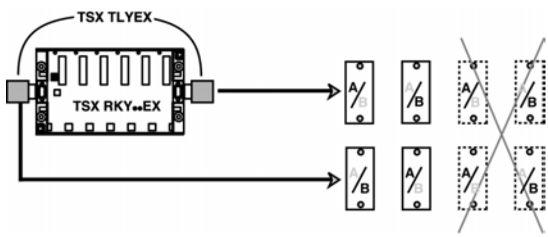
Positioning on a PLC station containing several TSX RKY..EX extendable racks

Diagram showing the principle:



Positioning on a PLC station containing a single TSX RKY..EX extendable rack

Diagram showing the principle:



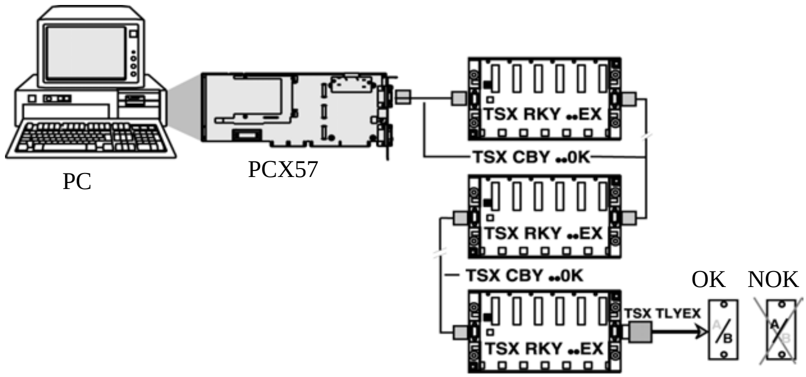
Note: When a single extendable rack is used, a line terminator must always be mounted on each of the rack's 9-pin SUB D connectors.

Positioning of line termination on a station using a Atrium processor

At a Glance

At manufacture, the equivalent of the line terminator **/A** is built in to the processor and, due to this, the processor forms a termination of the bus X. The extendable rack located at the end of the chain therefore must always have a **TSX TLY EX** line terminator labeled **/B** fitted on its unused 9-pin SUB D connector.

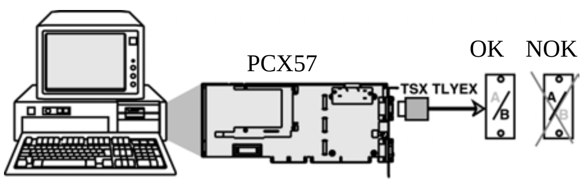
Principle diagram:



Special case.

When no devices are connected to the bus X, the **TSX TLYEX** line terminator /B must be installed on the bus X connector of the **PCX 57** processor.

Illustration:



TSX RKA 02 protective cover for unoccupied positions

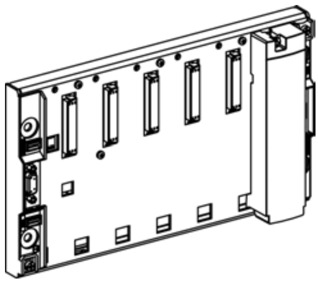
At a Glance

If a position on a rack is unoccupied, it is advisable to mount a **TSX RKA 02** cover designed for this in this position.

This cover is mounted and fixed on the rack like a module with a reduced depth.

TSX RKA 02 covers are sold in indivisible quantities of five.

Illustration



Labeling

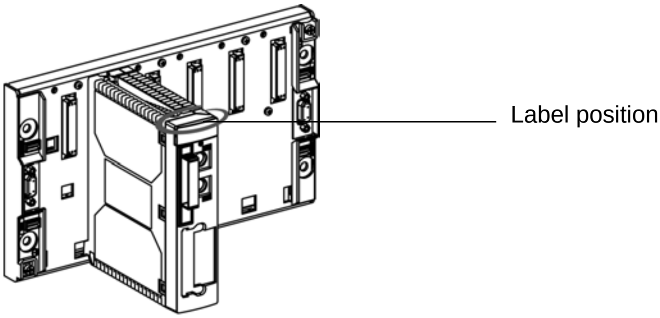
Labeling of module positions on the rack

When the module is in place on the rack, it masks the address of the position, which is printed on the rack.

Due to this and in order to be able to identify the module's position quickly, each rack is delivered with a page of sticky labels which allow you to label the position of each module.

This sticky label is stuck on the upper part of the module when it is in place on the rack.

Illustration: example of processor module labeling



Page of labels:

PS	00	01	020	03	04	05	06
07	08	09	10	11	12	13	14

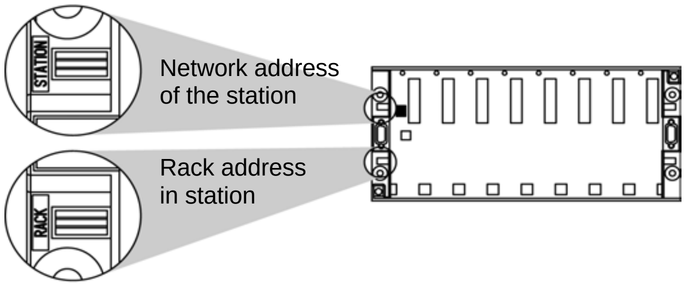
Rack labeling

Each rack is delivered with a set of snap out labels so that for each rack you can label:

- the address of the rack in the station,
- the network address of the station when the station is connected to a communication network.

Therefore each rack has two slots where these addresses can be placed.

Illustration:



Compatibility with the Installed Base

Summary Table

This table shows the compatibility with the installed base in relation to old and new references:

			Configuration already in place with			
			Previous references			New references
			TSX RKY..E TSX CBY..OK (•• 01) TSX TLY (•• 01)	TSX RKY..E TSX CBY..OK (•• 01) TSX TLY A+B (•• 03)	TSX RKY..E TSX CBY..OK (•• 02) TSX CBY 1000 TSX TLY A+B (•• 03)	TSX RKY..EX TSX CBY..OK (•• 02) TSX CBY 1000 TSX TLYEX A/+/B
Development of the configuration	Previous references	2 terminators TSX TLY (•• 01)	YES	NO (1)	NO (1)	NO (3)
		TSX CBY..OK cables (•• 01)	YES	YES	NO (2)	NO (4)
		Terminators TSX TLY A+B (•• 03)	YES	YES	YES	NO (3)
		TSX RKY..E rack(s)	YES	YES	YES	NO (5)
	New references	TSX CBY..OK (•• 02) or CBY 1000 cable(s)	YES	YES	YES	YES
		TSX RKY..EX rack(s)	NO (6)	YES	YES	YES
		Terminators TSX TLYEX A/+/B	YES	YES	YES	YES

Details of incompatibilities:

1. Operation correct but incorrect detection of bus X break. Behavior of outputs not guaranteed for bus break.
2. Correct operation for 50 instead of 100 meters. Correct detection of bus X break.

3. Incorrect bus adaptation, no guarantee of operation. The TLY and TLY A/B adapt the signals in relation to 0V (wire in the bus X cable). The TLY EX A/B adapt the signals in relation to the shielding.
4. Incorrect detection of duplicate address.
5. Operation correct but no detection of duplicate address.
6. Incorrect bus adaptation. TLY EX plugs required for correct operation when a TSXRKY..EX. is used in the configuration.

Note: In a PLC station, the TSX TLY line terminator torque must be of the same index.
•• corresponds to the product version.

9 Ventilation module

At a Glance

Aim of this Chapter

This Chapter deals with the ventilation module and its installation.

What's in this Chapter?

This chapter contains the following topics:

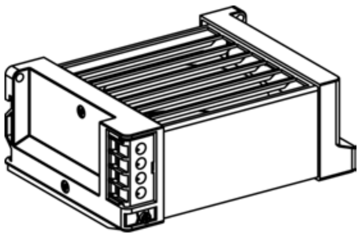
Ventilation module: general introduction

At a Glance

The ventilation modules which are installed above the TSX P57/TSX H57 PLC station racks force air convection in order to make uniform the ambient temperature inside the casing and thus eliminate the various hot spots which may exist.

> **Note:** A temperature probe built into each module informs the user when the ambient temperature has reached its maximum value.

ventilation module:



Use of ventilation modules

The use of these modules is recommended in the following cases:

- **Ambient temperature in the 25°C...60°C range:** the life of the various components of the Premium PLC is increased (MTBF increased by 25%).
- **Ambient temperature in the 60°C...0.70°C range:** the ambient temperature being limited to 60°C without ventilation, forced ventilation makes it possible to lower the temperature inside the modules by 10°C, which brings the internal temperature of the modules back to the equivalent of 60°C at ambient temperature.

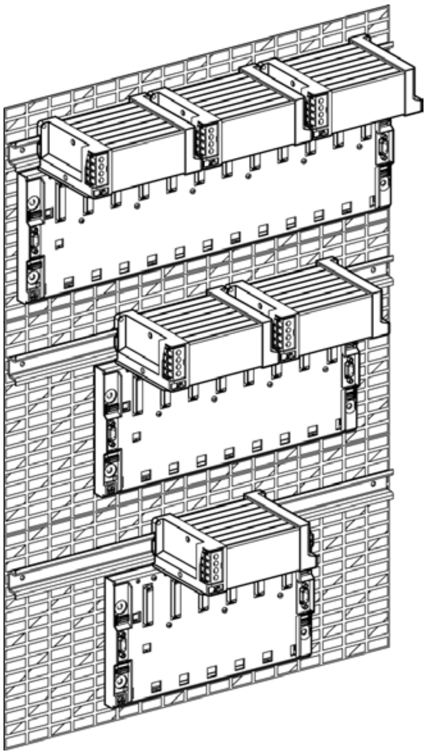
Different module types

Three ventilation modules are available, adapted to the main supply networks: ventilation module with 24 VDC, 110 VAC or 220 VAC power supply.

According to the rack modularity (4, 6, 8 or 12 positions), 1, 2 or 3 ventilation modules are to be fitted above each rack:

- 12-position racks TSX RKY 12/12EX: 3 ventilation modules,
- 8-position racks TSX RKY 8/8EX: 2 ventilation modules,
- 4 and 6-position racks TSX RKY 4EX/6/6EX: 1 ventilation module.

Illustration:



TSX RKY 12/12EX

TSX RKY 8/8EX

TSX RKY 4EX/6/6EX

Ventilation module: physical description

Illustration

Descriptive diagram:

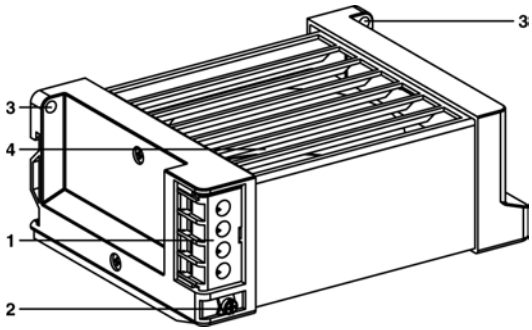


Table of labels

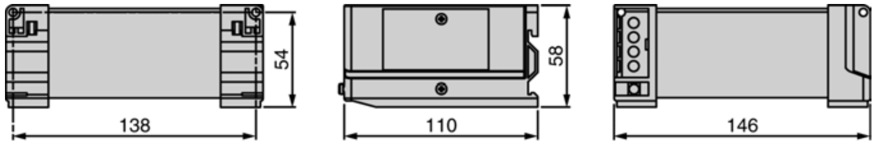
This table gives you descriptions according to the labels:

Label	Description
1	Terminal block for connecting: ● the module power supply, ● the supply for the temperature probe and the associated LED or pre-actuator. Each terminal can receive one 1.5 mm^2 (14 AWG) wire without a wire end ferrule, or two 1 mm^2 (16 AWG) wires with wire end ferrules.
2	Terminal for connecting the module to the ground.
3	Holes for fixing the module (M4 x 12 screws). If these modules are used with Premium PLCs, the ventilation modules must be fixed on an AM1-ED **...** 35 x 15 mounting rail .
4	Louvered slats which send air to the front.

Ventilation module: dimensions

Ventilation module alone

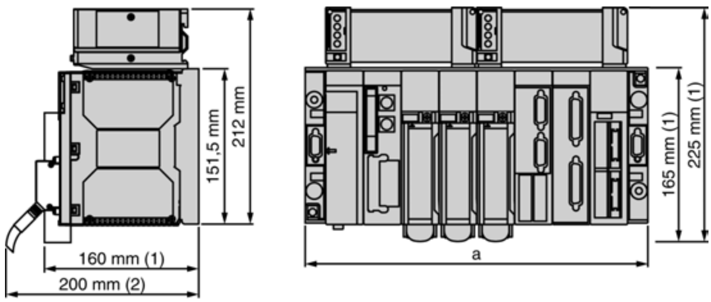
Illustrative diagram (dimensions in millimeters):



Rear view | Right-hand view | Front view

Ventilation module + rack

Illustrative diagram (dimensions in millimeters):



(1) with screw terminal block module,

(2) maximum depth for all types of modules and their associated connectors.

Characteristics table:

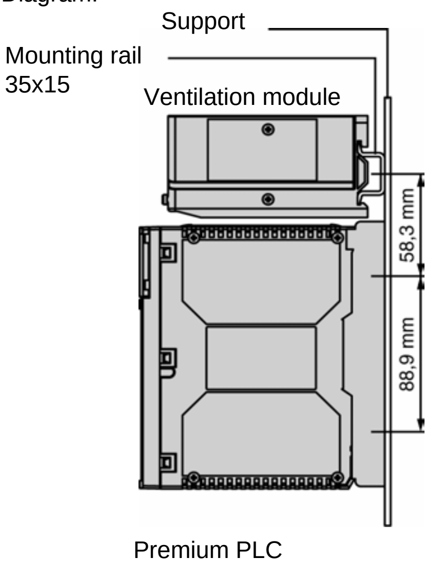
Racks	Number of positions	a
TSX RKY 4EX	4	187.9 mm
TSX RKY 6/6EX	6	261.6 mm
TSX RKY 8/8EX	8	335.3 mm
TSX RKY 12/12EX	12	482.6 mm

Ventilation module: mounting

General points

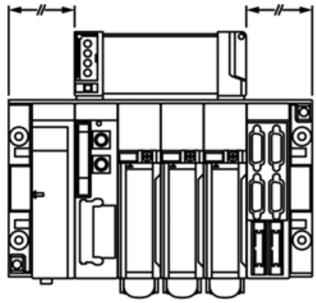
The ventilation modules associated with Premium PLC's must be mounted on 35mm wide and 15mm deep mounting rails (type AM1-ED**...**) in order to compensate for the thickness of the rack (see *mounting and fixing racks, p. 81*).

Diagram:

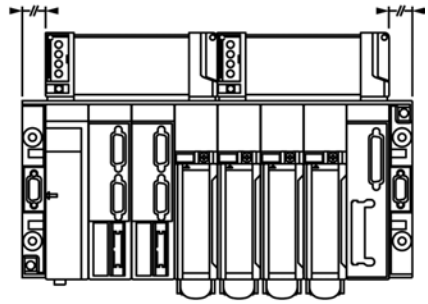


Mounting position

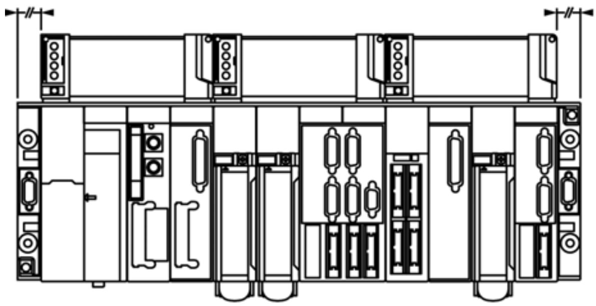
Mounting position for ventilation modules according to rack-type:



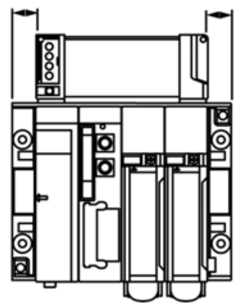
6 position racks (TSX RKY 6/6EX)



8 position racks (TSX RKY 8/8EX)



12 position racks (TSX RKY 12/12EX)

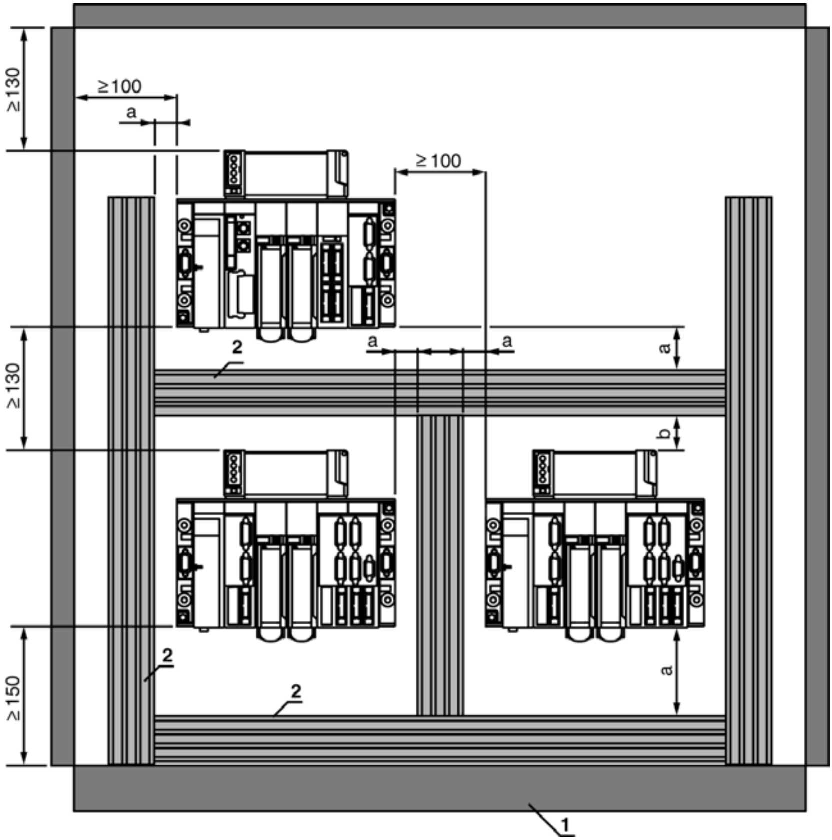


4 position racks (TSX RKY 4EX)

Rules for installing racks fitted with ventilation modules

Illustration

Principle diagram: see *Installing Racks, p. 78*



a = 50 mm   b = 30 mm

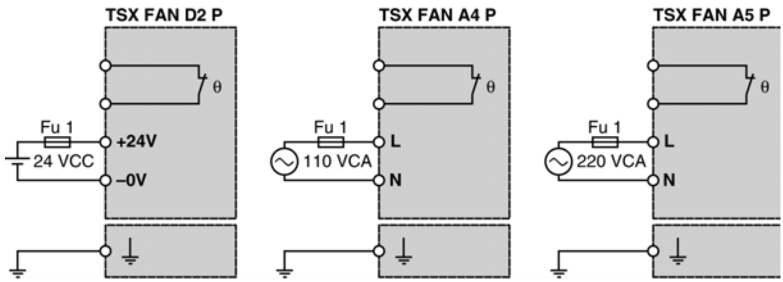
1 Installation or casing.

2 Trough or cable tray.

Ventilation Module: Connections

Connection of the Ventilation Module Power Supply

Illustration:

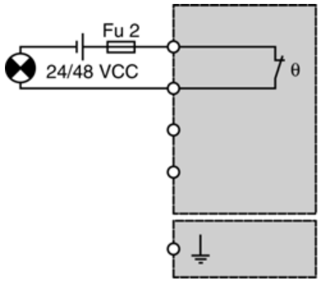


Note: When using several ventilation modules of the same type, use a common power supply for all the ventilation modules.

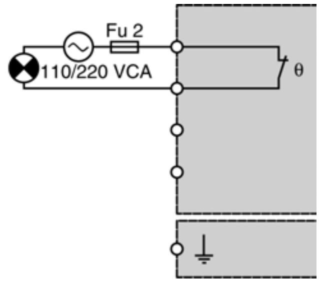
Connection of the Temperature Probe Power Supply

The Temperature probe may be supplied either by a direct current or alternating current and be connected to a LED indicator, a PLC input, etc. .

Diagram:



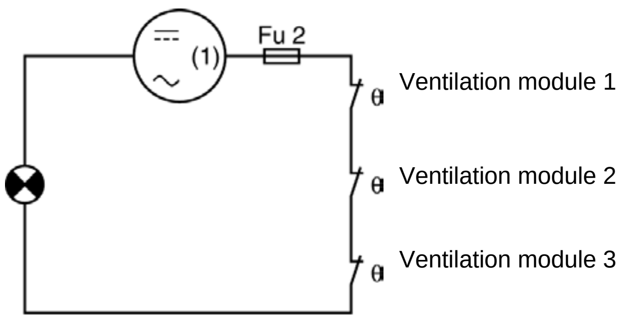
Direct current supply



Alternating current supply

> **Note:** When using several ventilation modules, the probe contacts shall be serialized.

Illustration:

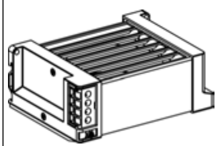
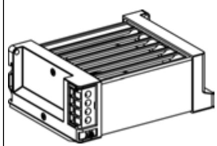
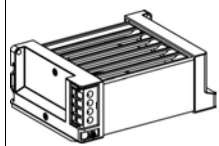


(1) direct 24/28 V or alternating 110/220 V

Ventilation module: characteristics

Table of Characteristics

Table of ventilation module characteristics:

Reference		**TSX FAN D2 P**	**TSX FAN A4P**	**TSX FAN A5P**
				
Supply voltage	Nominal	24 VDC	110 VAC	220 VAC
	Limit	20..27.6 VDC	90120 VAC	180260 VAC
Current consumed at nominal voltage		180 mA	180 mA	100 mA
Temperature probe	Power supply voltage	direct 24/28 VDC or alternating 110/220 VAC		
	Outage power (on resistive load)	1 A at 24 VDC / 10,000 operations 1 A at 48 VDC / 30,000 operations 1 A at 110 VDC / 30,000 operations 0.5 A at 220 VDC / 10,000 operations		
	Deactivation	Temperature>= 75°C +/- 5°C		
	Status	0.5 A at 220 VDC / 10,000 operations Temperature>= 75°C +/- 5°C		
No. of modules per rack		• 1 module on 4 and 6-position racks (TSX RKY 4EX/6/6EX), • 2 modules on 8-position racks (TSX RKY 8/8EX), • 3 modules on 12-position racks (TSX RKY 12/12EX).		

X-Bus extension module

10

At a Glance

Aim of this Chapter

The aim of this Chapter is to introduce the X-Bus extension module and its installation.

What's in this Chapter?

This chapter contains the following topics:

Bus X extension module: introduction

General

The Premium PLC bus X makes it possible to connect 8 racks with 12 positions (TSX RKY 12EX) or 16 racks with 4, 6 or 8 positions (TSX RKY 4EX/6EX/8EX), distributed along a maximum length of 100 meters.

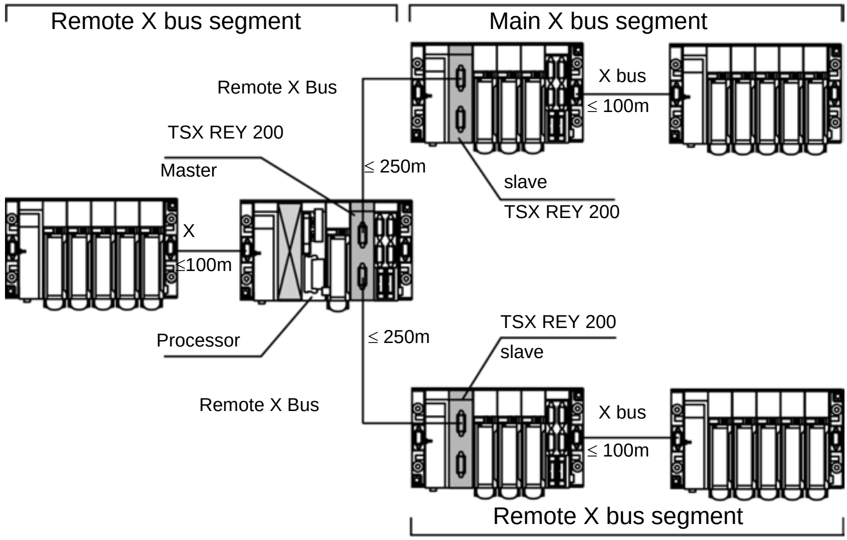
If applications require greater distances between racks, the bus X extension module (TSX REY 200) makes it possible to greatly increase this distance whilst maintaining the characteristics and performance which are inherent in a PLC station which is only made up of a single bus X segment without extension module.

The system consists of:

- **an bus X extension module** (TSX REY 200) called "Master" located on the rack with address 0 (rack supporting the processor) and on the main bus X segment. This module has two channels which allow the two bus X segments to be extended up to a maximum distance of 250 meters,
- **one or two TSX REY 200 modules** called "Slave", each located on a rack on the extended bus segments,
- each of the slave modules is connected to the master module by a **TSX CBRY 2500** cable fitted with TSX CBRY K5 connectors.

Example of topology

Illustration:



Module consumption

Consumption on 5VDC power supply: 500 mA

Dissipated power: 2.5 W.

Rack Extender Module: physical description

Illustration

Descriptive diagram:

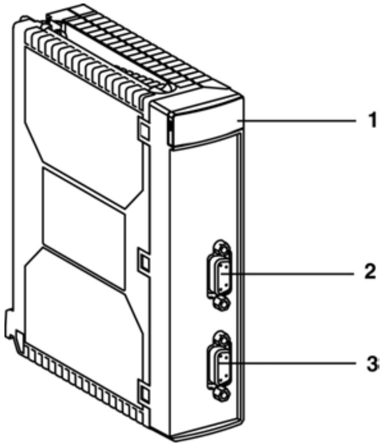


Table of labels

Description table according to number:

Label	Description
1	Display block made up of 6 LEDs: ● **RUN** LED: indicates the operating status of the module, ● **ERR** LED: indicates an error within the module, ● **I/O** LED: indicates an error external to the module, ● **MST** LED: indicates the status of the master or slave function of the module, ● **CH0** LED: indicates the operating status of channel 0, ● **CH1** LED: indicates the operating status of channel 1,
2	Connector for linking channel 0 of the module.
3	Connector for linking channel 1 of the module.

Bus X extension module: installation

Introduction

There are several different cases when installing an bus X extension module:

- installation of a master module on the TSX P57 station,
- installation of a master module on the PCX 57 station,
- installation of a slave module.

Installation of a master module on the TSX P57 station

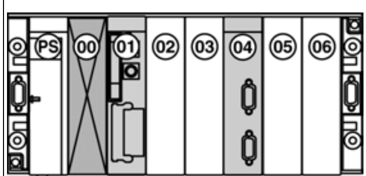
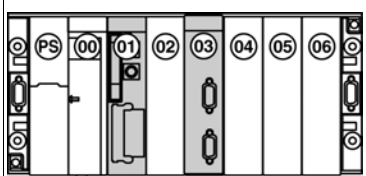
The master module must be installed:

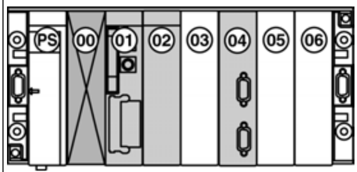
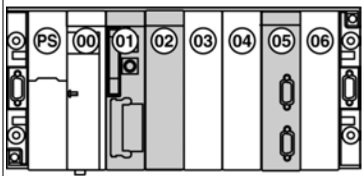
- on the rack which supports the processor (rack with address 00), this rack being located on the main bus X segment,
- in any position on this rack apart from those positions which are dedicated to the power supply and processor modules.

Constraint:

the 00 position of rack with address 0 is prohibited to all modules including the processor module, only a double format power supply is allowed to occupy this position.

The table below indicates the various scenarios according to the format of the power supply module and the processor:

Scenario	Illustration
Rack with address 0 with single format power supply module and processor: • power supply module in position PS, • processor must be in position 01, • position 00 is always unoccupied, • TSX REY 200 module in one of the available positions in the rack.	
Rack with address 0 with double format power supply module and single format processor: • power supply module in positions PS and 00, • processor must be in position 01, • TSX REY 200 module in one of the available positions in the rack.	

Scenario	Illustration
Address rack 0 with single format power supply module and double format processor: ● power supply module in position PS, ● processor must be in positions 01 and 02, ● position 00 is always unoccupied, ● TSX REY 200 module in one of the available positions in the rack.	
Rack with address 0 with double format power supply module and processor: ● power supply module in positions PS and 00, ● processor must be in positions 01 and 02, ● TSX REY 200 module in one of the available positions in the rack.	

Installing a master module on a PCX 57 station

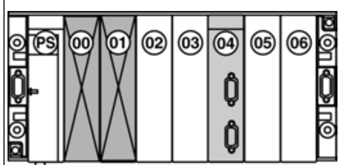
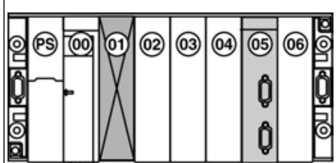
As with a TSX P57 station, the master module must be installed:

- on the rack which supports the processor virtually (rack with address 0), this rack being located on the main bus X segment,
- in any position on this rack apart from the position dedicated to the power supply module and that which is virtually occupied by the processor.

Constraint:

The 00 position of the rack with address 0 is prohibited to all modules, only a double format power supply module is allowed to occupy this position. The virtual position of the processor (unoccupied position) must always be position 01.

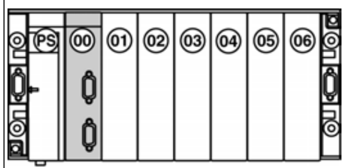
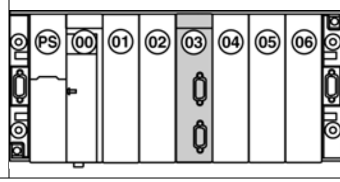
The table below indicates the various scenarios according to the format of the power supply module and the processor:

Scenario	Illustration
Rack with address 0 with single format power supply: ● power supply module in position PS, ● virtual position of the processor must be position 01 (position always unoccupied), ● position 00 is always unoccupied, ● TSX REY 200 module in one of the available positions in the rack.	
Rack with address 0 with double format power supply module: ● power supply module in position PS, ● virtual position of the processor must be position 01 (position always unoccupied), ● TSX REY 200 module in one of the available positions in the rack.	

Installation of a slave module

The slave module can be installed on one of the racks of the bus extension segment and in any position on this rack apart from the one which is dedicated to the power supply module.

The table below indicates the various scenarios according to the format of the power supply module and the processor:

Scenario	Illustration
Rack with address 0 with single format power supply: • power supply module in position PS, • TSX REY 200 module in one of the available positions in the rack.	
Rack with address 0 with double format power supply module: • power supply module in positions PS and 00, • TSX REY 200 module in one of the available positions in the rack.	

Bus X extension module: configuration

General points

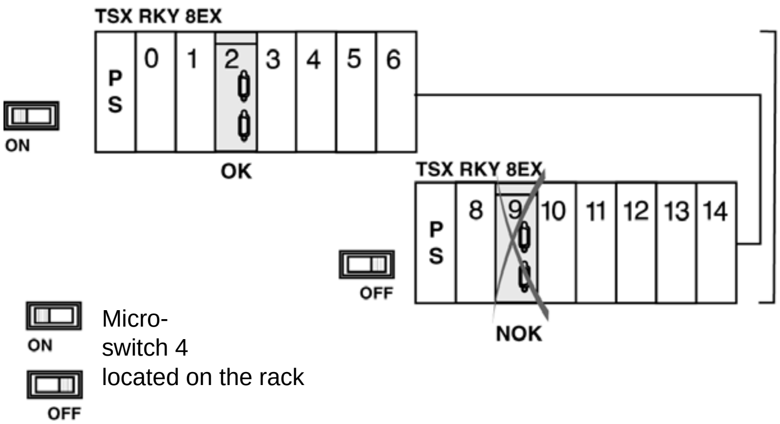
The configuration of the module as a master or slave is automatic:

- if the module is installed on the rack with address 0, it will automatically be declared as master,
- if the module is installed on a rack with an address other than 0, it will automatically be declared as slave.

> **Note:** If 2 racks are declared at address 0, the master module **must** be located on the rack supporting the "low" module addresses, as indicated in the figure below.
> "Low" module addresses:
> - addresses 0 to 6 on TSX RKY 8EX,
> - addresses 0 to 4 on TSX RKY 6EX,
> - addresses 0 to 2 on rack TSX RKY 4EX,

Illustration

Example: 2 TSX RKY 8EX racks at address 0.



> **Note:** If two racks are declared at address 0, the rack supporting the "high" address modules cannot receive a slave extension module.
> "High" address modules:
> - addresses 8 to 14 on rack TSX RKY 8EX,
> - addresses 8 to 12 on rack TSX RKY 6EX,
> - addresses 8 to 10 on rack TSX RKY 4EX.

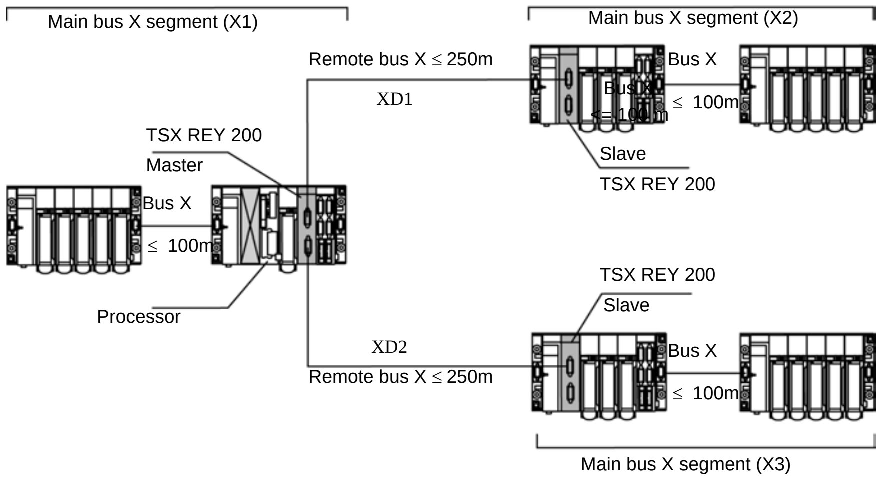
Bus X extension module: maximum distances according to module type

General points

The figure below summarizes the maximum distances authorized for the different bus X segments and bus X extensions:

- for each bus X segment (X1, X2 or X3): maximum length 100 meters,
- for each bus X extension (XD1 or XD2): maximum length 250 meters,

Illustration:



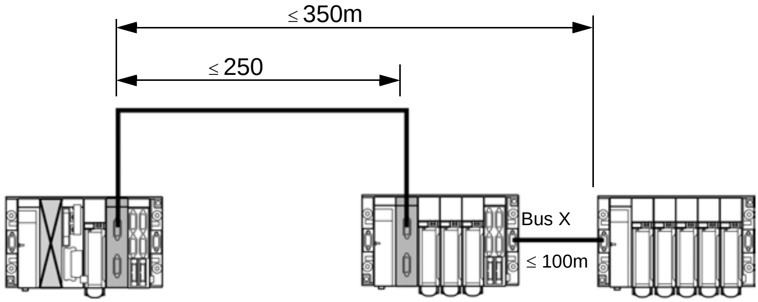
Taking this into account, the maximum distance possible between the processor and the remote modules is 350 meters.

This distance of 350 meters is only possible for single discrete input/output modules. The following illustrations indicate the restrictions in relation to module type.

Note: Extension is prohibited for communication modules TSX SCY •••/TSX ETY•••/TSX IBY •••/TSX PBY •••. These modules must be located on the main segment of the bus X1

Safety and single discrete I/O modules

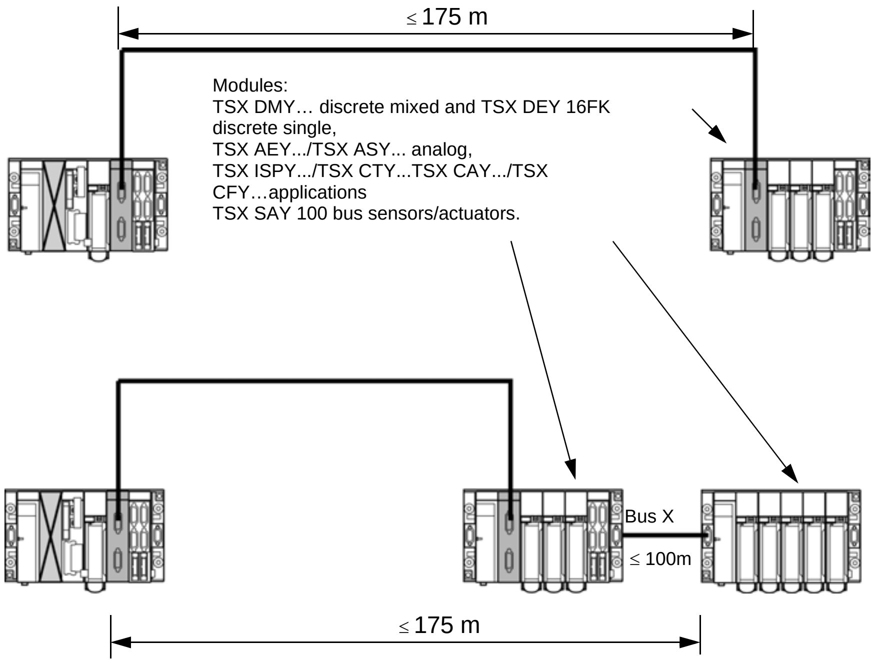
Illustration:



Single discrete I/O modules:
TSX DEY.../TSX DSY...
and TSX PAY… safety modules
Exception: TSX DEY 16FK

Mixed discrete I/O, analog, application-specific and bus sensor/actuator modules

Illustration:



Note: for the following modules:

- TSX DEY 16 FK with PV index≥ 06,
- TSX DMY 28FK / 28RFK,
- TSX AEY 810/1614,
- TSX ASY 410 with PV index ≥ 11,
- TSX ASY 800,
- TSX CTY 2C
- TSX CAY 22/42/33,

maximum distance authorized (extension cable and bus X cable length): 225 meters.

Communication modules

⚠ CAUTION

Specific modules on extension prohibited

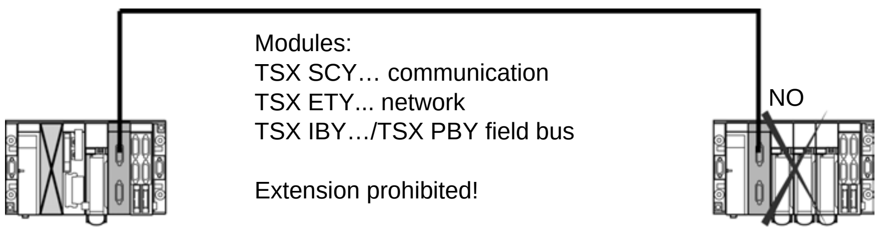
The following modules must be located on the main bus X segment.

- TSX SCY... communication
- TSX ETY... network
- TSX IBY... /TSX PBY field bus

Do not locate them on bus X extensions

Failure to follow these instructions can result in injury or equipment damage.

Illustration:



Bus X extension modules: connections

General points

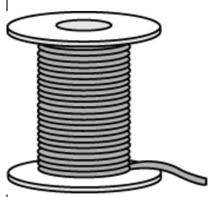
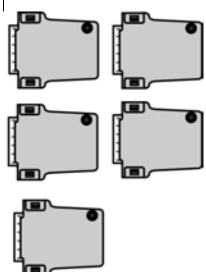
To extend the bus X, you **must** use:

- the kit TSX CBRY 2500 made up of a reel of cable, 250 meters in length,
- the set of connectors TSX CBRY K5.

You must fit the cable with connectors at both ends. The procedure for mounting the connectors on the cable is described in the instructions supplied with the set of connectors TSX CBRT K5.

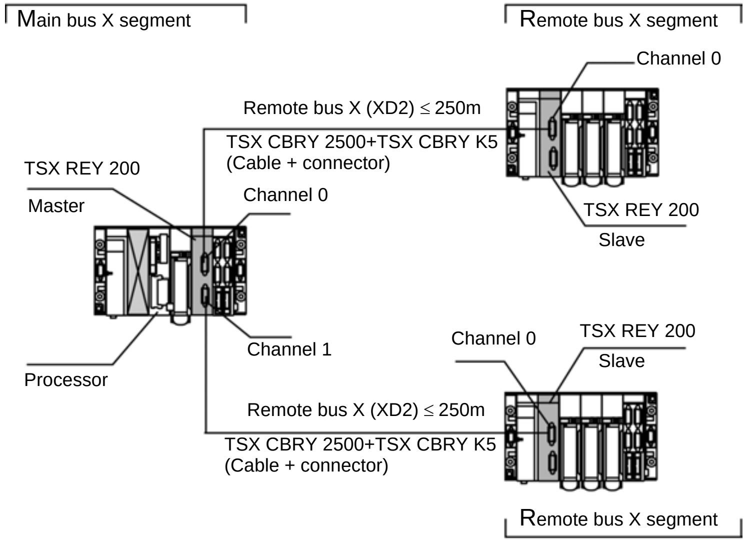
Connecting accessories

Installing an bus X extension requires, therefore, the following elements:

1 TSX CBRY 2500 kit including 1 cable, 250 meters long, supplied on a reel.	
1 set of 5 connectors TSX CBRY K5, which allows you to fit 2 extension cables, leaving you with one connector as a spare.	

Connecting principles

Illustration:



Note: Each bus X segment must have a A/ and B/ line terminator (see *Line terminator TSX TLYEX, p. 105*)at each end.

Bus X extension module: diagnostics

By signaling LEDs

The TSX REY 200 module display panel, located on the front panel of the module, is used for diagnostics on the extension system.

Illustration: display panel

Module functioning as master (positioned on the rack with address 00)

Diagnostics table:

LED status						**Module status**	**Comments**
ERR	**RUN**	**Mst**	**I/O**	**CH0**	**CH1**		
F	N/A	N/A	N/A	N/A	N/A	Fault	No communication with the processor
Off	On	On	Off	On	Off	OK	Channel 0 active Channel 1 inactive
Off	On	On	Off	Off	On	OK	Channel 0 inactive Channel 1 active
Off	On	On	Off	On	On	OK	Channel 0 active Channel 1 active
Off	On	On	On	Off	Off	Fault	Channel 0 inactive Channel 1 inactive

Legend:

On: on

Off: switched off

F: flashing

N/A: Not applicable

Module functioning as slave (positioned on a rack with address other than 00)

Diagnostics table:

LED status						Module status	Comments
ERR	**RUN**	**Mst**	**I/O**	**CH0**	**CH1**		
F	N/A	N/A	N/A	N/A	N/A	Fault	No communication with the processors
Off	On	Off	Off	On	Off	OK	Channel 0 active
Off	On	Off	On	Off	Off	Fault	Channel 0 inactive

Legend:

On: on

Off: switched off

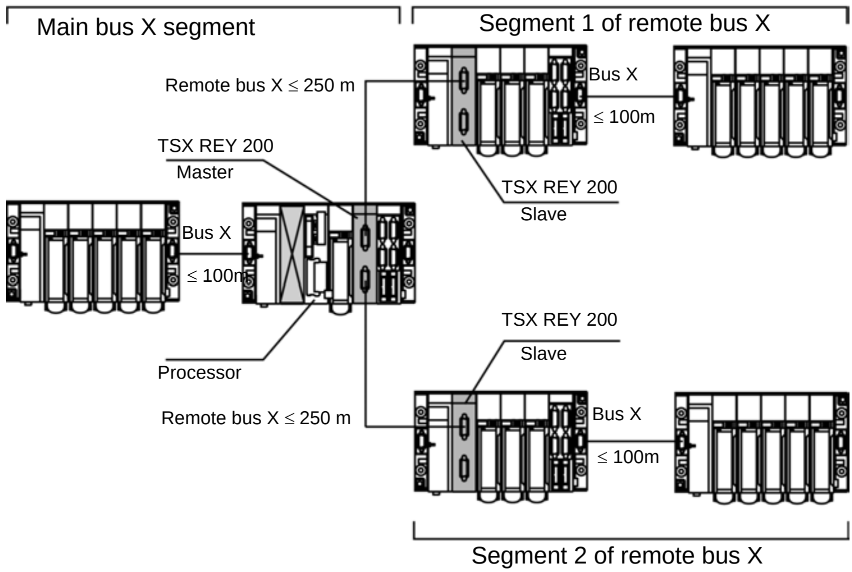
F: flashing

N/A: not determined

Topology of a PLC station with extension module

TSX P57 station

Illustration:

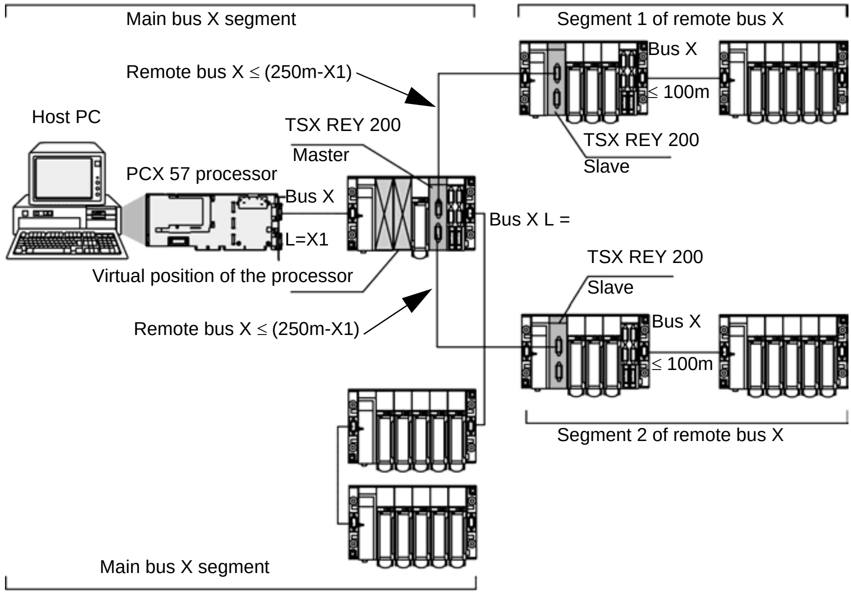


Maximum station capacity:

- With TSX P57 10 processors:
  - 2 TSX RKY 12 EX racks,
  - 4 TSX RKY 4EX/6EX/8EX racks.
- With TSX P57 20/30/40 processors:
  - 8 TSX RKY 12 EX racks,
  - 16 TSX RKY 4EX/6EX/8EX racks.

PCX 57 station

Illustration:



Maximum station capacity:

- With TSX P57 10 processors:
  - 2 TSX RKY 12 EX racks,
  - 4 TSX RKY 4EX/6EX/8EX racks.
- With TSX P57 30 processors:
  - 8 TSX RKY 12 EX racks,
  - 16 TSX RKY 4EX/6EX/8EX racks.

Note: In every case, the length of bus X extension segments is defined in relation to the location of the processor. This maximum distance is 250 meters (820 feet). In the special case of the PCX 57 processor, when it is located in the PC, the extension distance of the bus X segments in relation to the rack with address 0, is equal to 250 meters minus the distance (X1) between the processor and rack with address 0. Main bus X segment = (X1+X2) ≤ 100 meters (328 feet).

Managing a power supply module fitted with an bus X extension module

General

⚠ CAUTION

Use of a extension module

If an bus X extension module (TSX REY 200) is used in an instalation, all the racks configured in the application must be connected, powered and functioning when managing the software application.

Failure to follow these instructions can result in injury or equipment damage.

Note: All use of an bux X extension module (TSX REY 200) in an installation makes management of the installation or the machine subject to all the racks configured in the application being present.
In order to do this, an application check must be carried out to make sure that all the application racks are present by testing the bit %MWxy MOD 2 X6 (explicit exchanges) on at least one module on each rack. This test allows the racks to be cleared of all incorrect declarations in the rack addressing and, in particular, if two racks bear the same address by mistake.
This test only comes into play after the installation has completely restarted (switched on, installation modified, processor RESET, configuration changed).

TSX P57/TSX H57 Premium processors

III

At a Glance

Subject of this Part

The aim of this part is to describe the Premium TSX P57/TSX H57 processors and their installation.

What's in this Part?

This part contains the following chapters:

TSX P57/TSX H57 processors: introduction

11

At a Glance

Aim of this Chapter

The aim of this chapter is to introduce the TSX P57/TSX H57 processors.

What's in this Chapter?

This chapter contains the following topics:

General Introduction

Introduction

A wide range of TSX P57 processors of different levels of performance and specifications are available to meet your various requirements.

General Points

TSX P57 sequential processors can be integrated into TSX RKY... racks (see *Standard and extendable TSX RKY racks, p. 68*).

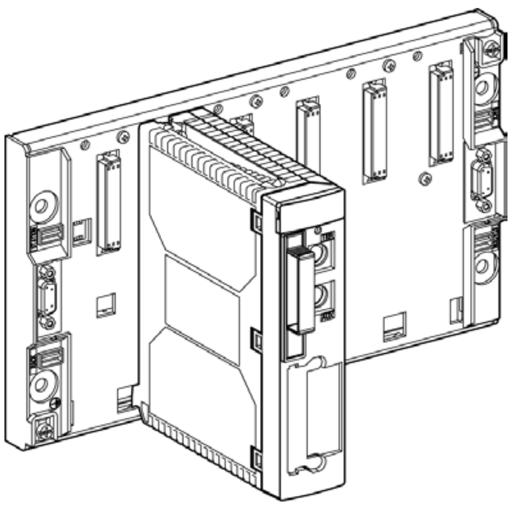
List of TSX P57 processors:

- TSX P57 103, TSX P57 153,
- TSX P57 203, TSX P57 253, TSX P57 2623, TSX P57 2823,
- TSX P57 303, TSX P57 303A, TSX P57 353, TSX P57 353LA, TSX P57 353A, TSX P57 3623, TSX P57 3623A,
- TSX P57 453, TSX P57 453A, TSX P57 4823, TSX P57 4823A.

Note: Processors from families 20, 30 and 40 have built-in process control functions.

Illustration

TSX P57 standard format in TSX RKY 6EX rack:



Functions

Premium TSX P57 processors manage a complete PLC station which is made up of:

- discrete input/output modules,
- analog input/output modules,
- application-specific modules (i.e. counting, axis control, step by step control, communication, etc.),

which can be distributed over one or more racks connected to the bus X.

The application is designed using PL7 Junior or PL7 Pro running Windows. This offers:

- four programming languages: Grafcet, Ladder, Structured Text and List,
- a multitask software structure: Master, Fast, Event processing,
- a change function for programs being executed,
- etc.

Table of TSX P57 Processors

All processors in the TSX P57 range can be found in the following table.

Type	Physical format	Maximum number of discrete I/Os	Maximum memory size	Built-in master FIPIO link	Built-in Ethernet link
TSX P57 103	Single	512	96K16	-	-
TSX P57 153	Single	512	96K16	X	-
TSX P57 353LA	Single	1024	96K16	X	-
TSX P57 203	Double	1024	208K16	-	-
TSX P57 253	Double	1024	224K16	X	-
TSX P57 2623	Double	1024	208K16	-	X
TSX P57 2823	Double	1024	224K16	X	X
TSX P57 303/303A	Double	1024	464K16	-	-
TSX P57 353/353A	Double	1024	480K16	X	-
TSX P57 3623/ 3623A	Double	1024	464K16	-	X
TSX P57 453/453A	Double	2048	688K16	X	-
TSX P57 4823/ 4823A	Double	2048	688K16	X	X

Legend:

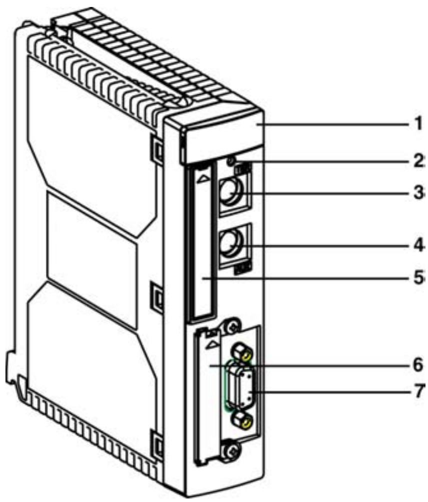
X: available.

-: unavailable.

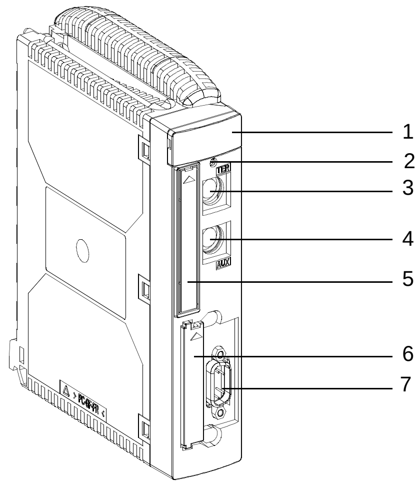
Physical Description of TSX P57 Processors

Illustration

These diagrams label the different components of a TSX P57 processor module in standard format:

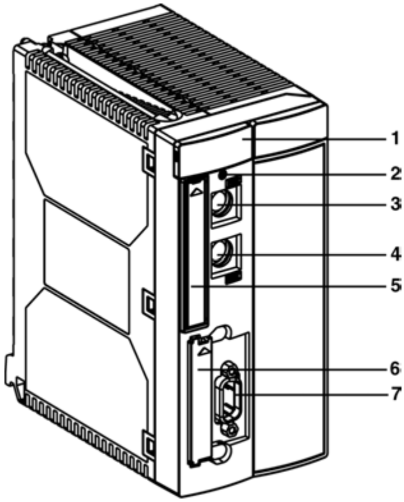


Standard format processor:
TSX P57 103 / 153

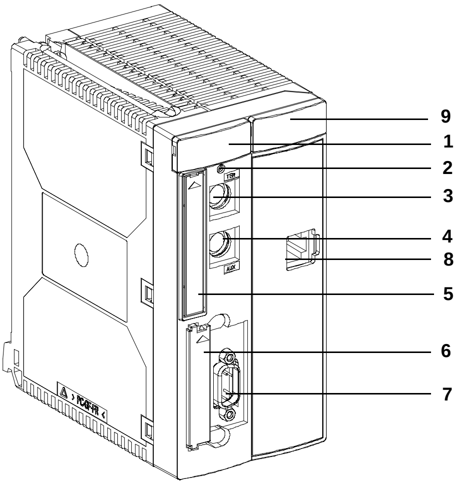


Standard format processor:
TSX P57 353LA

These diagrams label the different components of a TSX P57 processor module in double format:



Double format processor:
TSX P57 203/253/303/303A/353
TSX P57 353A/453/453A



Double format processors with on-board Ethernet: TSX P57 2623/2823/3623/3623A/ 4823/4823A

Description

This table describes the components of a processor module

Number	Function
1	Display panel containing four or five LEDs.
2	Recessed **RESET** button which when pressed causes a cold startup. • **Processor working normally:** cold startup in **STOP** or **RUN** mode, depending on the procedure defined at configuration. • **Processor error:** forced startup in **STOP** mode.
3	Terminal port (**TER Connector** (8-pin mini-DIN)): this is used to connect an FTX type or PC compatible terminal, or to connect the PLC to the UNI-TELWAY bus through the TSX P ACC 01 insulation unit. This connector is used to supply 5V to the peripheral which is linked to it (limited by the available current provided by the power supply).
4	Terminal port (**AUX Connector** (8-pin mini-DIN)): this is used to connect a peripheral with its own power supply (terminal, operator dialog console or printer (no voltage is supplied to this connector)).
5	Slot for a type 1 PCMCIA memory extension card. If there is no memory card, this slot is fitted with a cover which **must** be kept in place; **as the processor will stop if it is removed**.
6	Slot for a type 3 PCMCIA card. This slot can accept either of the following: • a memory extension card, • a communication card allowing the processor to be connected to a FIPWAY, FIPIO Agent, UNI-TELWAY or serial link communication channel. If there is no card, this slot is fitted with a cover.
7	9-pin SUB D connector for connecting a FIPIO bus master. This connector is only present on TSX P57 •53 processors.
8	RJ 45 connector for connecting to the Ethernet network. This connector is only present on TSX P57 •23 processors.
9	The ETY PORT display panel comprising 6 LEDs.

Note: The (**TER**) and (**AUX**) connectors propose master UNI-TELWAY communication mode at 19200 bauds by default and can be configured for slave UNI-TELWAY or ASCII character mode.

Real-time clock

At a Glance

Each processor (TSX P57 or PCX 57) has a savable real-time clock which manages:

- the current date and time,
- the date and time of when the application last stopped.

The date and time are managed even when the processor is switched off, on condition that:

- the TSX P57 processor is mounted on the rack with its power supply module in place and is equipped with a back-up battery,
- the PCX 57 processor is equipped with a back-up battery.

Current date and time

the processor keeps the current date and time up to date in the system words %SW49 to %SW53. This data is coded in BCD.

System words	Most significant byte	Least significant byte
%SW49	00	Days of the week from 1 to 7 (1 for Monday and 7 for Sunday)
%SW50	Seconds (0 to 59)	00
%SW51	Hours (0 to 23)	Minutes (0 to 59)
%SW52	Month (1 to 12)	Days of the month (1 to 31)
%SW53	Century (0 to 99)	Year (0 to 99)

Note: %SW49 is read-only.

Accessing the date and time

The date and time can be accessed:

- via the processor debug screen,
- via the program:
  - **read:** system words %SW49 to %SW53, if the system bit %S50 = 0,
  - **immediate update:** write system words %SW50 to %SW53, if the system bit %S50 = 1,
  - **incremental update:** the system word %SW59 is used to change the date and time, field by field, from the current value, if the system bit %S59 = 1, or is used to carry out a global increment/decrement.

Bit value table:

bit0 = 1 globally increments of the days of the week from 1 to 7 (1 for Monday 7 for Sunday)	**bit8** = 1 globally decrements of the days of the week from 1 to 7 (1 for Monday 7 for Sunday)
bit1 =1, increments the seconds	**bit9** =1, decrements the seconds
bit2 =1, increments the minutes	**bit10** =1, decrements the minutes
bit3 =1, increments the hours	**bit11** =1, decrements the hours
bit4 =1, increments the days	**bit12** =1, decrements the days
bit5 =1, increments the months	**bit13** =1, decrements the months
bit6 =1, increments the years	**bit14** =1, decrements the years
bit7 =1, increments the centuries	**bit15** =1, decrements the centuries

(1) all fields are updated.

Note: The processor does not automatically manage the change between winter and summer time.

The date and time of when the application last stopped

The date and time of when the application last stopped are stored in BCD in the system words %SW54 to %SW58.

System words	Most significant byte	Least significant byte
%SW54	Seconds (0 to 59)	00
%SW55	Hours (0 to 23)	Minutes (0 to 59)
%SW56	Month (1 to 12)	Days of the month (1 to 31)
%SW57	Century (0 to 99)	Year (0 to 99)
%SW58	Day of the week (from 1 to 7)	Reason for the last application stop

- to access the date and time of the last application stop:
  read the system words %SW54 to %SW58,
- to find the reason for the last application stop:
  read the least significant byte of the system word %SW58 (value saved in BCD).

Table of %SW58 system words:

%SW58 = 1	application switched to STOP mode,
%SW58 = 2	application stopped due to a software error,
%SW58 = 4	power outage or power supply RESET button has been pressed
%SW58 = 5	stop due to hardware fault
%SW58 = 6	application stopped due to HALT instruction

TSX P57/TSX H57 processors: installation

12

At a Glance

Aim of this Chapter

This Chapter deals with the installation of **TSX P57/TSX H57** processor modules and the **PCMCIA** extension card.

What's in this Chapter?

This chapter contains the following topics:

Positioning of the processor module

Introduction

You may face two possible scenarios when positioning a processor module on a rack:

- positioning of a standard format processor module,
- positioning of a double format processor module.

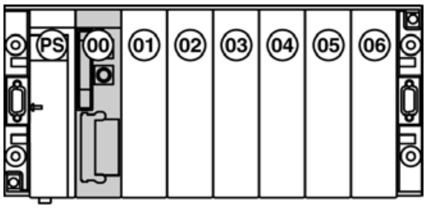
Positioning of a standard format processor module

A standard format processor module is always installed on the **TSX RKY..** rack with address 0 and in position 00 or 01 depending on whether the rack is equipped with a standard format or double format supply module.

Rack with standard format supply module: TSX PSY 2600/1610.

In this case, the processor module shall be installed in position 00 (preferred position) or position 01, in the latter case, position 00 should not be occupied.

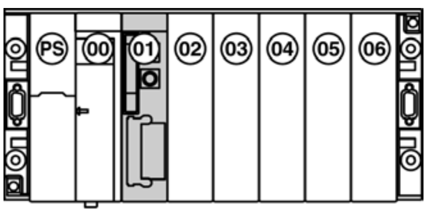
Illustration



Rack with double format supply module: TSX PSY 3610/5500/5520/8500.

In this case, as the supply module occupies two positions (PS and 00), the processor shall be installed in position 01.

Illustration



> **Note:** If the CPU is intended to replace an ATRIUM module in your PLC configuration, make sure that the surplus electrical consumption on the rack which is caused by this modification does not lead to the replacement of your power supply module by a more powerful module.

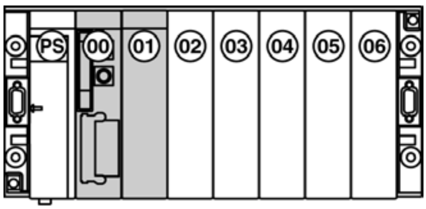
Positioning of a double format processor module

A double format processor module is always installed on the **TSX RKY..** rack with address 0 and in position 00 and 01 or 01 and 02 depending on whether the rack is equipped with a standard format or double format supply module.

Rack with standard format supply module: TSX PSY 2600/1610 .

In this case, the processor module shall be installed in position 00 and 01 (preferred position) or position 01 and 02, in the latter case, position 00 should not be occupied.

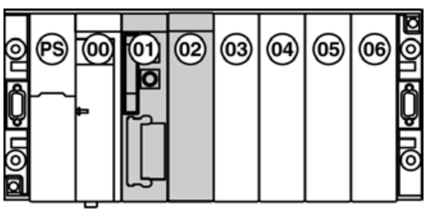
Illustration



Rack with double format supply module: TSX PSY 3610/5500/5520/8500 .

In this case, as the supply module occupies two positions (PS and 00), the processor shall be installed in position 01 and 02.

Illustration



Note: The rack on which the processor is installed always has the address 0.

How to mount processor modules

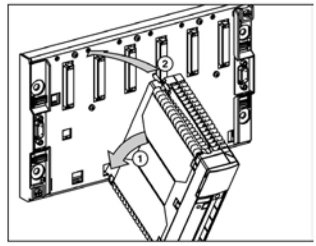
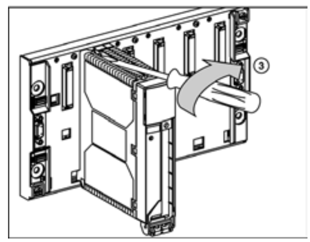
Introduction

CAUTION
Mounting or removing processor when powered
Do not mount or remove processor modules with power switch on
Failure to follow these instructions can result in injury or equipment damage.

Note: Mounting and removing processor modules is otherwise identical to mounting and removing other modules.
when extracting/inserting modules with the power on, the terminal block or HE10 connector must be disconnected. You must also take care to shut off the sensor/pre-actuator supply.

Installing a processor module onto a rack

Carry out the following steps:

Step	Action	Illustration
1	Place the pins at the back of the module into the centering holes on the lower part of the rack (number 1, see diagram 1).	
2	Swivel the module to bring it into contact with the rack (number 2).	
3	Fix the processor module to the rack by tightening the screw on the upper part of the module (number 3).	

Note: the mounting of processor modules is identical to the mounting of other modules.

Note: Maximum tightening torque: 2.0 Nm (1.5 lb. ft.)

⚠ CAUTION

Mounting processor when powered

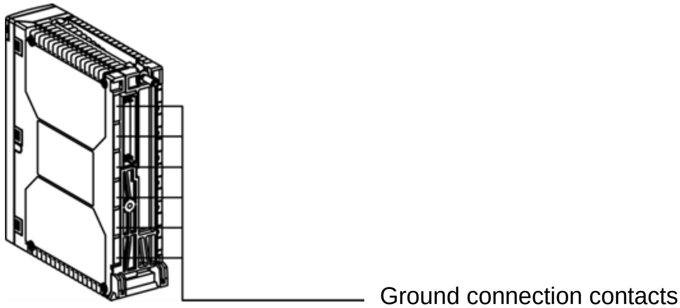
A processor module must always be mounted with the rack power supply switched off.

Failure to follow these instructions can result in injury or equipment damage.

Grounding modules

Processor modules are grounded using metal plates at the rear of the module. When the module is in place, these metal plates are in contact with the metal of the rack. This ensures the link with the ground connection.

Illustration



Mounting/Removing a PCMCIA Memory Extension Card on a TSX P57 Processor

Introduction

A clip is needed to insert a PCMCIA memory card into its slot on the TSX P57 processor.

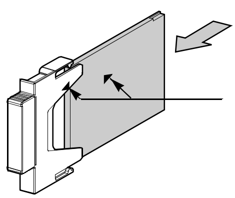
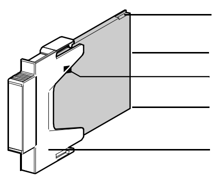
Position of the PCMCIA Cards in the Processors

The following table describes the possible slots for the different types of PCMCIA cards in the PLC processors:

PCMCIA card	Slot A (top)	Slot B (bottom)
Standard: TSX MRPP• and MFPP•	Yes	No
Application and Files: TSX MRPC• and MCPC•	Yes	No
Data or Files: TSX MRPF•	Yes	Yes

Mounting of the Card in the Clip

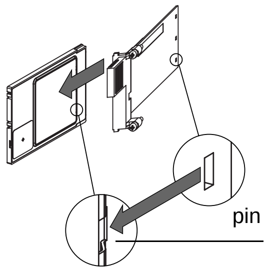
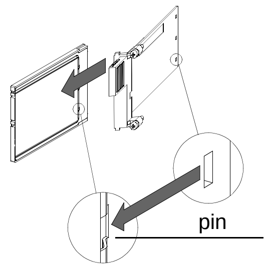
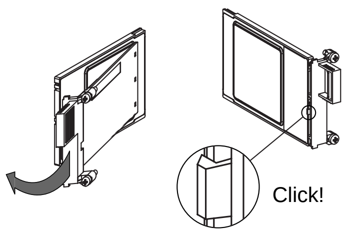
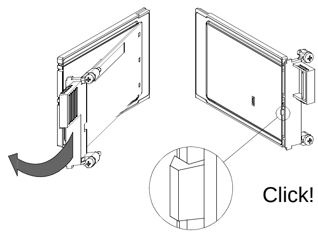
For TSX P57 1•3 to TSX P57 4•3 Premium PLCs, the memory cards (*) are mounted in the clip as follows:

Step	Action	Illustration
1	Place the end of the memory card (opposite end to the connector) between the arms of the clip. The markers (in the form of a triangle) on both the clip and the card label must be facing same way.	
2	Slide the memory card into the clip until it stops. The card is now firmly attached to the clip.	

(*) Note: This mounting procedure is only for TSX MRPF data or file-type cards. See mounting procedure below.

Mounting of the TSX MRP F• Card in the Extractor

For TSX P57 1•3 to TSX P57 4•3 Premium PLCs, the TSX MRP F• memory cards inserted in slot B (bottom) are mounted in the extractor as follows:

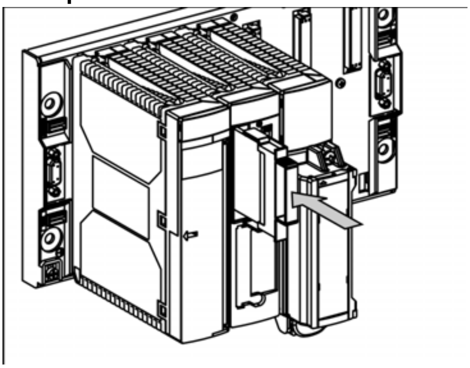
Step	Action	Illustration Card with a PV ≤ 03 (1)	Illustration Card with a PV > 03 (1)
1	Guide the memory card into the extractor from an oblique angle, placing the 2 pins on the card into the 2 grooves on the extractor.		
2	Swivel the extractor on the card until it is fully locked.		
Legend			
(1) : the **Product Version (PV)** is shown on the label affixed to the PCMCIA card.			

Mounting of the Memory Card in the PLC

Carry out the following steps to install the memory card into the processor:

Step	Action
1	Remove the protective cover by unlocking it and then pulling it forwards out of the PLC.
2	Place the PCMCIA card fitted with its clip into the opened slot. Slide the whole thing in until the card can go no further, then press the clip to connect the card.

Example: Position of the card in slot A for TSX 57 1•3 to 4•3.



Note: For **TSX 57 1•3\2•3\3•3\4•3** processors, check that the mechanical locating devices are positioned correctly:
- 1 edge on top,
- 2 edges at the bottom.

For **TSX 57 5•3** processors, two guides allow that the PCMCIA card is correctly positioned in its slot.

Note: If the program contained in the PCMCIA memory card contains the **RUN AUTO** option, the processor will automatically restart in **RUN** mode after the card has been inserted.

Processing on Insertion/Extraction of a PCMCIA Memory Card on a Premium PLC

General

⚠ CAUTION

Operation without cover

The front panels of Premium PLC processors have removable covers to prevent the accidental intrusion of objects which could damage the connector. It is essential to leave the covers in place when no card is inserted in these slots.

Failure to follow these instructions can result in injury or equipment damage.

TSX P57 1•3 to 4•3 PLCs

Memory cards located in slot A (top)

The extraction (or absence) of the cover or memory card and clip causes the PLC to stop without saving the application context. Module outputs switch to fallback mode.

Inserting the cover or memory card with clip will cause the PLC to perform a cold start.

⚠ DANGER

Unexpected equipment operation

If the program contained in the PCMCIA memory card includes the RUN AUTO option, the processor will automatically restart in RUN after the card is inserted. Ensure work area is clear before applying power.

Failure to follow these instructions will result in death or serious injury.

Memory cards located in slot B (bottom)

The PCMCIA memory card should be inserted into slot B of the processor while the **PLC power is off**. Ignoring this requirement could cause the processor to malfunction.

Standard and Backup Memory Cards for PLCs

Standard Memory Cards

There are 3 types of standard memory cards:

- Saved RAM memory extension cards.
- Flash Eprom memory extension cards.
- Flash Eprom Backup memory cards.

Saved RAM memory extension cards:

used particularly when generating and debugging an application program. They are used for all application transfer and modification services when online.

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

Flash Eprom memory extension cards:

used when the application program debugging has finished. It allows only a global transfer of the application and avoids the problems associated with battery back-ups.

Flash Eprom Backup memory cards:

used to save the project from the controller's internal RAM to the Backup Flash Eprom card. The internal RAM memory can thus be reloaded using the contents of the Backup Flash Eprom card without having to use a terminal.

WARNING

write protection switch operation with power on

It is essential that any modification of the position of the PCMCIA card write protection switch be performed when the controller is powered down.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Product References for Standard and Flash Eprom Extension Memory Cards

The following table shows the compatibility of the cards with the processors:

References	**Type/Capacity**	**Processor compatibility**		
		TSX P57 1•3	TSX P57 2•3/2•23 PCX 57 2•3	TSX P57 3•3/3•3A/353LA/3623/ 3623A TSX P57 4•3/4•3A/4823/4823A PCX 57 353
TSX MRP P 128K (1) TSX MRP 032P	RAM/32K16	Yes	Yes	Yes
TSX MRP P 224K (1) TSX MRP 064P	RAM/64K16	Yes	Yes	Yes
TSX MRP C 448K (1) TSX MRP 0128P	RAM/128K16	No	Yes	Yes
TSX MRP C 001M (1) TSX MRP 0256P	RAM/256K16	No	Yes	Yes
TSX MRP C 003M (1) TSX MRP 0512P	RAM/512K16	No	Yes	Yes
TSX MFP P 128K (1) TSX MFP 032P	Flash Eprom/ 32K16	Yes	Yes	Yes
TSX MFP P 224K (1) TSX MFP 064P	Flash Eprom/ 64K16	Yes	Yes	Yes
TSX MFP 064 P2 TSX MFP 064P	Flash Eprom/ 64K16	Yes (2)	Yes (2)	Yes (2)
TSX MFP P 384K (1) TSX MFP 0128P	Flash Eprom/ 128K16	No	Yes	Yes
TSX MFP 0128 P2 TSX MFP 0128P	Flash Eprom/ 128K16	No	Yes (2)	Yes (2)
TSX MFP P 001M	Flash Eprom/ 256K16 Flash Eprom/ 384K16 (3) Flash Eprom/ 512K16 (4)	No	Yes	Yes
Legend				
TSX M•• • •••K new references to replace the old TSX M•P •••P type references.				

(2) The application found on the TSX MFP* ****2 card can only be read if the card is in a processor version < 6.1. If the card is in a processor version ≥ 6.1, the card application is available in read and write mode.	
(3) 384 K16 are only available for TSX P57 3•3M and TSX P57 3•3AM processors.	
(4) 512 K16 are only available for TSX P57 4•3M processors.	

Note: Memory capacity: K16= K words (16-bit word).

Product References for Backup Extension Memory Cards

The following table shows the compatibility of the cards with the processors:

References	Type/Capacity	Processor compatibility		
		TSX P57 103	TSX P57 2•3/2•23 PCX 57 2•3	TSX P57 3•3/3•3A/353LA/3623/ 3623A TSX P57 4•3/4•3A/4823/4823A PCX 57 353
TSX MFP B 096K (1) TSX MFP BAK032P	BACKUP/32K16	Yes	Yes	Yes
Legend				
TSX MFP B 096K new references to replace the old TSX MFP BAK032P type references.				

Note: Memory capacity: K16= K words (16-bit word).

Application + Files Type Memory Cards

Application + Files Type Memory Extension Cards

In addition to the conventional application storage area (program + constants), these memory cards also have a file area for archiving/restoring the data by program.

Application examples:

- automatic storage of application data and remote consultation by modem link,
- storage of manufacturing formulas.

There are two types of memory card:

- **saved RAM memory extension cards**: application + files. The memory is saved by a removable battery built into the memory card,
- **Flash Eprom memory extension card**: application + files. In this instance, the data storage area is in saved RAM which implies that this type of card must be equipped with a back-up battery.

⚠ WARNING

Write protection switch operation with power on

It is essential that any modification of the position of the PCMCIA card write protection switch be performed when the controller is powered down.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Cards for Harsh Environments

Three cards have been developed especially for use in harsh environments. These are the TSX MRP C 001MC, TSX MRP C 003MC, TSX MRP C 007MC whose characteristics are identical to the TSX MRP C 001M, TSX MRP C 003M, TSX MRP C 007M.

Product References for Application + Files Extension Memory Cards

The following table shows the compatibility of the cards with the processors:

References	Technology type	Type/Capacity			Processor compatibility			
		Application zone	File zone (RAM type)	Symbol area (RAM type)	TSX P57 1•3	TSX P57 2•3/2•23	TSX P57 3•3/ 3•3A/ 3623/ 3623A	TSX P57 453/ 453A/ 4823/ 4823A
TSX MRP C 448K (1) TSX MRP 232 P	RAM	32K16	128K16	-	yes	yes	yes	yes
TSX MRP C 384K (1) TSX MRP 264 P	RAM	64K16	128K16	-	yes	yes	yes	yes
TSX MRP C 768K (1) TSX MRP 2128 P	RAM	128K16	128K16	128K16	no	yes	yes	yes
TSX MRP C 01M7 (1) TSX MRP 3256 P	RAM	256K16	640K16 (5x128K16)	128K16	no	yes (2)	yes	yes
TSX MRP C 002M (1) TSX MRP 3384 P	RAM	384K16	640K16	-	no	yes (2)	yes	yes
TSX MRP C 003M (1) TSX MRP 0512 P	RAM	512K16	-	256K16	no	yes (2)	yes (3)	yes
TSX MRPC 007M	RAM	960K16	384K16	640K16	no	no	no	yes (4)
TSX MCP C 224K (1) TSX MFP 232 P	Flash EPROM	32K16	128K16	-	yes	yes	yes	yes
TSX MCP C 224K (1) TSX MFP 264 P	Flash Eprom	64K16	128K16	-	yes	yes	yes	yes

Legend
TSX M•• C •••• new references to replace the old TSX M•P •••P type references.
(2) The usable application size is limited to 160K16 which conforms to the characteristics of this processor.
(3) The usable application size is limited to 384K16 which conforms to the characteristics of this processor, the size of the symbol area is limited to 120K16.
(4) Reserved.

Note: For the TSX MRPC 007M, the 960K16 application area is divided into 2*480K16:

- 480K16 for the executable code,
- 480K16 for comments and graphic information.

File Type Memory Card: TSX MRP F 004M Replaces Card TSX MRP DS 2048 P

At a Glance

This card is used for archiving application data.

Application examples:

- storage of manufacturing formulas,
- making a library.

The TSX MRP F 004M card has a Saved RAM capacity of 4 Mb. Saving is carried out by a removable battery built into the memory card.

Compatibility

The TSX MRP F 004M memory card must be used in one of the following processors:

- TSX P57 203 and TSX P57 2623,
- TSX P57 253 and TSX P57 2823,
- TSX P57 303/303A and TSX P57 3623/3623A,
- TSX P57 353/353A/353LA,
- TSX P57 453/453A and TSX P57 4823/4823A.

Correspondence Table

At a Glance

Depending on the type of memory card the characteristics are detailed:

- See *Standard Memory Cards, p. 168*,
- See *Product References for Backup Extension Memory Cards, p. 170*,
- See *Application + Files Type Memory Cards, p. 171*,
- See *File Type Memory Card: TSX MRP F 004M Replaces Card TSX MRP DS 2048 P, p. 174*.

Table

The following table gives the correspondence between the references of the old cards and the new references, depending on the type of card:

Memory card type:	Old reference	New reference
Standard and Flash Eprom	TSX MRP 032P	**TSX MRP P 128K**
	TSX MRP 064P	**TSX MRP P 224K**
	TSX MRP 0128P	**TSX MRP C 448K**
	TSX MRP 0256P	**TSX MRP C 001M**
	TSX MRP 0512P	**TSX MRP C 003M**
	TSX MFP 032P	**TSX MFP P 128K**
	TSX MFP 064P	**TSX MFP P 224K/ TSX MFP 064 P2**
	TSX MFP 0128P	**TSX MFP P 384K/ TSX MFP 0128 P2**
Backup	TSX MFP BAK032P	**TSX MFP B 096K**
Application + Files	TSX MRP 232 P	**TSX MRP C 448K**
	TSX MRP 264 P	**TSX MRP C 384K**
	TSX MRP 2128 P	**TSX MRP C 768K**
	TSX MRP 3256 P	**TSX MRP C 01M7**
	TSX MRP 3384 P	**TSX MRP C 002M**
	TSX MRP 0512 P	**TSX MRP C 003M**
	TSX MRPC 007M	**TSX MRPC 007M**
	TSX MFP 232 P	**TSX MCP C 224K**
	TSX MFP 264 P	**TSX MCP C 224K**
File	TSX MRP DS 2048 P	**TSX MRP F 004M**

TSX P57/TSX H57 processors: diagnostics

13

At a Glance

Aim of this Chapter

This Chapter deals with diagnostics for TSX P57/TSX H57 processors.

What's in this Chapter?

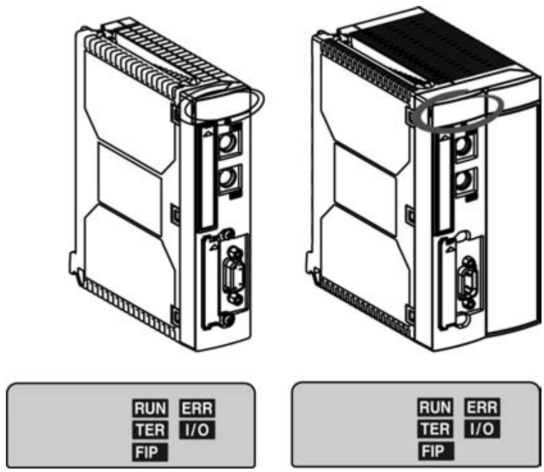
This chapter contains the following topics:

Viewing

At a Glance

There are five display LEDs on the front panel of the processor for a quick diagnostic of the status of the PLC controller.

Illustration



Description

The following table describes the role of each LED

⊗	LED flashing
●	LED on.
○	LED off.
	LED status not important

RUN (green)	ERR (red)	I/O (red)	TER (yellow)	FIP (yellow)	Description
⊗	⊗	⊗			self-testing in progress.
	●		●		reset (for processor versions ≥4.0).
	●	●	●		reset (for processors version <4.0).
⊗	⊗				blocking software fault.
	⊗	⊗			fault on Bus X (for processor versions ≥4.0).
	⊗	⊗	●		fault on Bus X (for processor version <4.0).
	●	●	●		hardware fault or fault on BusX. In this case, do a reset. If the three LEDs are still on after the reset, then it is a hardware fault.
●					PLC working normally, run the program.
	●				processor or system fault
	○	●			I/O fault from a module or channel or a configuration error.
			⊗		terminal port link active. The intensity of the flashing depends on the traffic.
				⊗	FIPIO bus link active. The intensity of the flashing depends on the traffic.
○	⊗	○			PLC not configured (application absent, not valid or incompatible).
	○				normal state, no internal fault.

RUN (green)	**ERR (red)**	**I/O (red)**	**TER (yellow)**	**FIP (yellow)**	**Description**
		○			normal state, no I/O fault.
			○		inactive link.
				○	inactive link.

Note:
- the FIP LED is only present on TSX P57 •53 and TSX P57 •823 processors.

Precautions to be taken when replacing a TSX P57/TSX H57 processor

Important

DANGER

Unexpected equipment operation

If the TSX P57 processor is being replaced by another processor which is not blank (the processor has already been programmed and contains an application), the power for all the PLC station’s control units must be switched off.
Before restoring power to the control units, check that the processor contains the required application.

Failure to follow these instructions will result in death or serious injury.

Changing the RAM memory backup battery on TSX P57

At a Glance

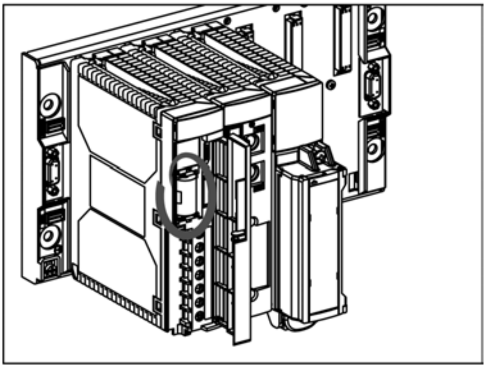
This battery, which is in the TSX PSY … power supply module (see *Supply modules: description, p. 344*), ensures that the internal RAM memory of the processor and the real-time clock are saved in case of a voltage power outage. It is delivered in the same packaging as the power supply module and must be installed by the user.

Installing the battery

Carry out the following steps:

Step	Action
1	Open the access flap on the front of the power supply module.
2	Place the battery in its slot, taking care to respect polarities as marked on the module.
3	Close the access flap.

Illustration



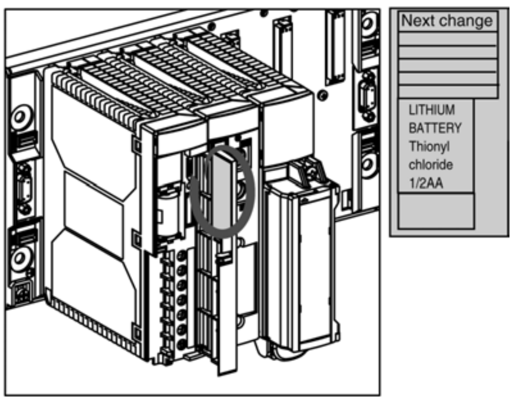
Changing the battery

The battery can be changed every year as a preventative measure or when the **BAT** LED is lit.

To do this, use the same procedure as for installation, and carry out the following steps:

Step	Action
1	Open the access flap for the battery.
2	Remove the old battery from its slot.
3	Put the new battery into place.
4	Close and lock the access flap.

Illustration



If there is a power outage while the battery is being changed, the RAM memory is saved by the processor, as it has its own offline independent save function.

Note: so as not to forget to change the battery, you are advised to record the date of the next change in the space provided on the inside of the flap.

How often must the battery be changed?

Period of battery backup

The length of time during which the battery provides backup of the processor's internal RAM memory and the real-time clock depends on two factors:

- the percentage of time for which the PLC is switched off and therefore the battery is being used,
- the ambient temperature when the PLC is switched off.

Summary table:

Ambient temperature when inoperative		$\leq$ **30°C**	**40°C**	**50°C**	**60°C**
Backup time	**PLC off for 12 hours per day**	5 years	3 years	2 years	1 year
	PLC off for 1 hour per day	5 years	5 years	4.5 years	4 years

Independent saving by the processor

The processors have their own offline independent save function to save the processor's internal RAM memory and the real-time clock, which allows the removal of:

- the battery, the power supply or the TSX P57 processor.

The backup time depends on the ambient temperature.

Assuming that the processor was switched on previously, the backup time varies in the following way:

Ambient temperature when switching off	**20°C**	**30°C**	**40°C**	**50°C**
Backup time	2h	45mn	20mn	8mn

Changing the Battery of a RAM Memory PCMCIA Card on the TSX P57

Introduction

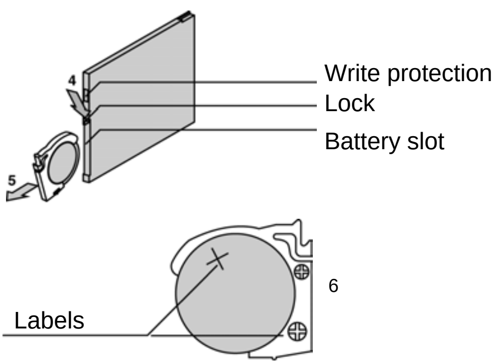
Some RAM memory PCMCIA cards (TSX MRP etc.) have a single battery (reference TSX BAT M01) which needs to be changed. The various memory card references are found in a summary table (see *Correspondence Table, p. 175*).

How to change the battery

Carry out the following steps:

Step	Action
1	Remove the card from its slot by pulling the clip forwards out of the PLC.
2	Separate the PCMCIA card from its clip by pulling the two components (card and clip) in opposite directions.
3	Hold the PCMCIA card so you can access the battery slot. This is at the end of the card without the connector.
4	Unlock the battery holder, which is at the end of the card without the connector. To do this, press the lock towards the bottom of the card (the opposite direction to the write protection micro-switch) while pulling towards the back (see illustration).
5	Remove the battery and holder unit from its slot (see illustration).
6	Swap the old battery for an identical 3V battery. Polarities must be observed by placing the + labels on the holder and the battery on the same side.
7	Place the battery and holder unit back in its slot, then lock it. To do this, carry out the removal procedure in reverse.
8	Fix the PCMCIA card into its clip.
9	Put the card with its clip back into the PLC.

Illustration



Battery life

See the following table:

PCMCIA card stored in normal conditions (-20°C to 70°C)	12 months
PCMCIA card fitted in an operating PLC (0°C to 60°C)	36 months

Note: During operation, the processor’s ERR LED flashes if the PCMCIA card battery needs replacing.

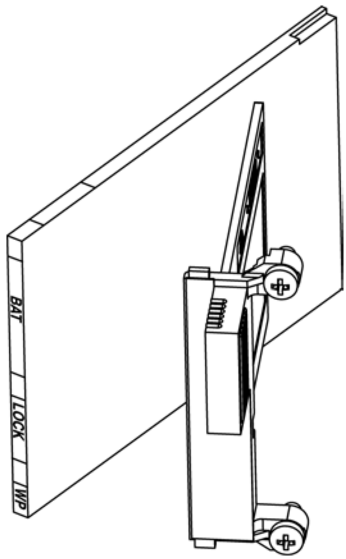
Changing the Battery of a TSX MRP DS 2048 P RAM Memory Card

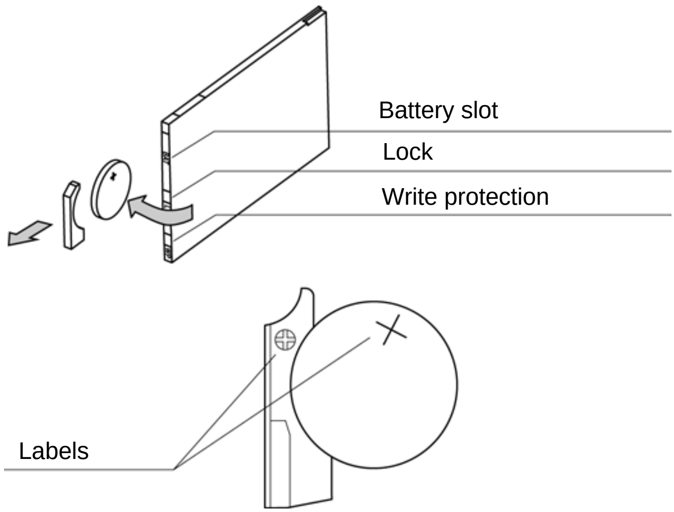
Introduction

The TSX MRP DS 2048 P memory extension card must have a battery (product ref. TSX BAT M01) in order to help ensure data is saved.

How to Change the Battery

Carry out the following steps:

Step	Action
1	Remove the card from its slot by pulling the clip forwards out of the PLC.
2	Open the PCMCIA card clip. 
3	Hold the PCMCIA card so you can access the battery slot. This is at the end of the card without the connector.
4	Unlock the battery flap located at the edge of the card. To do this press the lock towards the top of the card (the opposite direction to the write protection micro-switch.

Step	Action
5	Take off the battery flap. To do this, slightly rotate the socket as shown in the diagram. Take the card out of its slot. 
6	Swap the old battery for an identical 3V battery. It is essential to respect the polarities as detailed on the memory card label.
7	Replace and then lock the battery hatch. To do this, carry out the removal procedure in reverse.
8	Close the PCMCIA card clip.
9	Put the card with its clip back into the PLC.

Note: For the new card reference TSX MRP F 004M, (replacing card TSX MRP DS 2048 P),
- with PV lower than or equal to 03, see (Installation Manual Volume 1),
- with PV greater than or equal to 03, see *Changing the Batteries of a PCMCIA Memory Card, p. 189*,

Battery Life

See the following table:

PCMCIA card stored in normal conditions.	12 months
PCMCIA card fitted in an operating PLC (0°C to 60°C)	36 months

Changing the Batteries of a PCMCIA Memory Card

General Points

Memory cards:

- TSX MRP P• standard RAM
- TSX MRP C• RAM for files and application and TSX MCP C• Flash EPROM
- TSX MRP F• data and file-type

have 2 backup batteries TSX BAT M02 (main) and TSX BAT M03 (auxiliary) that need to be changed.

Two methods exist:

- A preventive method of periodic battery changing that does not involve checking the condition of the batteries,
- A predictive method, based on the signal sent by a system bit. This method is only available in certain memory cards.

Preventive Method

This method is valid for all memory card versions and for all the PLCs using these cards (i.e. Premium, Atrium). Change both batteries following the indications related to the PCMCIA PV, how the PLC is used and the battery life (see *Battery Lifetimes for the PCMCIA Memory Card, p. 193*). The two batteries may be changed in any order: the application will be saved by the memory card. Battery changing procedure: see the instructions provided with the memory cards.

Note:
- Batteries should not be removed from their positions simultaneously. One battery backs up the data and applications, while the other is being replaced.
- The memory card should never remain more than 24 hours without a main battery in working state.
- To economize, auxiliary batteries may only be changed every 1.5 years which is the standard battery life.
- The battery lives shown above are calculated at ambient operating temperature around 60°C, and PLC only powered up 21% of total annual time (i.e. 8 hours a day, with 30 days maintenance per year).

Predictive method

This maintenance method uses the %S67 and %S75 bits and the ERR diode on the Premium interface. This method implies that the auxiliary battery is changed every 18 months. It can only be implemented:

- on low or medium capacity PV06 RAM memory cards (see product version on the card label), having the following storage capacity when used with a PL7 ≤ 768K (TSX MRP P •••• K, TSX MCP C •••• K, TSX MRP C 448 K, TSX MRP C 768 K),
- providing the card is installed in the top PCMCIA slot on all the Premium processors.
- providing the card is installed in the bottom PCMCIA slot on Premium TSX P57 4•• and Premium TSX P57 5•• processors.

%S67 system bit (top slot card) or %S75 system bit (bottom slot card) on 1 or flashing processor interface ERR diode indicate main battery low. The main battery must be replaced within 8 days, as indicated in the instructions provided with the memory cards.

Note:
If the PLC is to remain switched off or the memory card is removed for more than 8 days, and the main battery has exceeded its standard life, save the application under PL7.

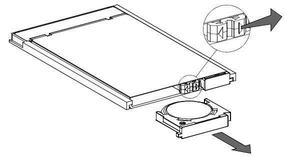
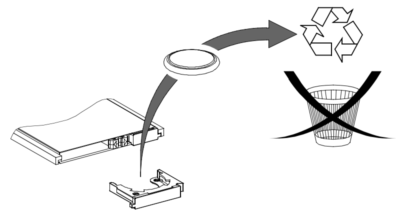
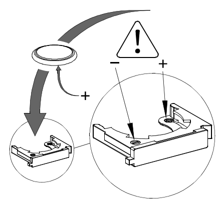
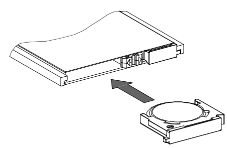
Changing the Batteries

Perform the following steps:

Step	Action
1	Take the card out of its slot (see *Mounting/Removing a PCMCIA Memory Extension Card on a TSX P57 Processor, p. 164*).
2	Separate the PCMCIA card (see *Mounting/Removing a PCMCIA Memory Extension Card on a TSX P57 Processor, p. 164*) from its clip (or caddy).
3	Hold the PCMCIA card so you can access the battery slot. This is at the end of the card without the connector.
4	Replacement of the TSX BAT M02 battery: see table 1. Replacement of the TSX BAT M03 battery: see table 2.
5	Attach the PCMCIA card (see *Mounting/Removing a PCMCIA Memory Extension Card on a TSX P57 Processor, p. 164*) to its clip (or caddy).
6	Place the card back in the PLC. (see *Mounting/Removing a PCMCIA Memory Extension Card on a TSX P57 Processor, p. 164*)

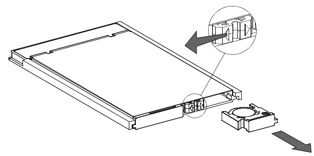
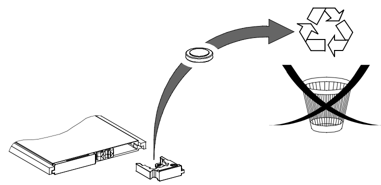
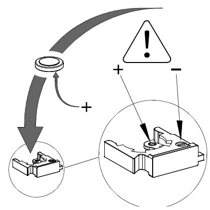
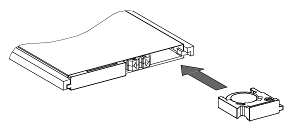
Procedure for the TSX BAT M02 Battery:

The following table shows the procedure for changing the main battery:

Step	Action	Illustration
1	Toggle the changeover lever toward the **TSX BAT M03** (AUX) battery in order to remove the drawer of the main battery.	
2	Remove the used battery from its holder:	
3	Place the new battery in the holder, taking care to respect the polarity.	
4	Insert the holder containing the battery in the card.	

Procedure for the TSX BAT M03 Battery:

The following table shows the procedure for changing the auxiliary battery:

Step	Action	Illustration
1	Toggle the changeover lever toward the **TSX BAT M02** (MAIN) battery in order to remove the drawer of the battery.	
2	Remove the used battery from its holder:	
3	Place the new battery in the holder, taking care to respect the polarity.	
4	Insert the holder containing the battery in the card.	

Battery Lifetimes for the PCMCIA Memory Card

Purpose

The purpose of this document is to give detailed information about the lifetime of batteries inside PCMCIA memory cards. The estimation of these lifetimes are based on data from component manufacturers.

Scope

The lifetime information is estimated for:

- RAM PCMCIA memory cards,
- The three different cases of Product Version (PV): PV1/2/3, PV4/5 and PV6,
- Four ambient temperatures for the PLC location: 25°C / 40°C / 50°C / 60°C,
- Four different usage cases of the PCMCIAs: 100%, 92%, 66% and 33% of PLC power-up time. These values are for the following customer configurations:
  - 100%: PLC powered up all year long or during 51 weeks,
  - 92%: PLC powered up all year long except during one month of maintenance,
  - 66%: PLC powered up all year long except during all weekends plus one month of maintenance,
  - 33%: PLC powered up all year long 12 hours a day, except during all weekends plus one month of maintenance.
- A Min (minimum) and a Typical lifetime value:
  - The Min value comes from the most unfavorable characteristics given by the component manufacturers. The actual observed lifetime will be greater than this value.
  - The typical value comes from the typical characteristics of the component.

Main Battery Lifetime of PV1/2/3 PCMCIA (in Years)

The table below presents the lifetime of main battery TSX BAT M01(PV1/2/3) for PCMCIA memory cards:

PV1/2/3	For a 25°C PLC ambient temperature							
	100% powered up		92% PU (30d maint.		66% PU (WE. 30d maint.		33% PU (12h.WE. 30d maint.	
	Typical	Min	Typical	Min	Typical	Min	Typical	Min
TSX MCP C 224K	7.10	7.10	6.71	5.58	5.77	3.36	4.82	2.20
TSX MCP C 512K	7.10	7.10	6.71	5.65	5.77	3.46	4.82	2.28
TSX MCP C 002M	7.10	7.10	6.29	3.82	4.66	1.57	3.45	0.88
TSX MRP P128K	7.10	7.10	6.71	5.58	5.77	3.36	4.82	2.20
TSX MRP P224K	7.10	7.10	6.71	5.65	5.77	3.46	4.82	2.28
TSX MRP P384K	7.10	7.10	6.71	4.99	5.77	2.60	4.82	1.59
TSX MRP C448K	7.10	7.10	6.29	4.65	4.66	2.24	3.45	1.33
TSX MRP C768K	7.10	7.10	6.29	4.65	4.66	2.24	3.45	1.33
TSX MRP C001M	7.10	7.10	5.91	3.95	3.91	1.66	2.68	0.94
TSX MRP C01M7	7.10	7.10	5.58	3.43	3.36	1.32	2.20	0.72
TSX MRP C002M	7.10	7.10	5.91	3.34	3.91	1.26	2.68	0.69
TSX MRP C003M	7.10	7.10	5.58	2.60	3.36	0.87	2.20	0.47
TSX MRP C007M	7.10	7.10	4.56	1.59	2.16	0.46	1.27	0.24
TSX MRP F004M	7.10	7.10	5.58	2.60	3.36	0.87	2.20	0.47
TSX MRP F008M	7.10	7.10	4.56	1.59	2.16	0.46	1.27	0.24

PV1/2/3	For a 40°C PLC ambient temperature							
	100% powered up		92% PU (30d maint.		66% PU (WE. 30d maint.		33% PU (12h.WE. 30d maint.	
	Typical	Min	Typical	Min	Typical	Min	Typical	Min
TSX MCP C 224K	3.55	3.55	3.54	3.20	3.54	2.46	3.48	1.87
TSX MCP C 512K	3.55	3.55	3.54	3.22	3.54	2.51	3.48	1.93
TSX MCP C 002M	3.55	3.55	3.42	2.53	3.08	1.34	2.71	0.82
TSX MRP P128K	3.55	3.55	3.54	3.20	3.54	2.46	3.48	1.87
TSX MRP P224K	3.55	3.55	3.54	3.22	3.54	2.51	3.48	1.93
TSX MRP P384K	3.55	3.55	3.54	3.00	3.54	2.02	3.48	1.41
TSX MRP C448K	3.55	3.55	3.42	2.87	3.08	1.80	2.71	1.20
TSX MRP C768K	3.55	3.55	3.42	2.87	3.08	1.80	2.71	1.20
TSX MRP C001M	3.55	3.55	3.30	2.59	2.74	1.40	2.21	0.87

PV1/2/3	For a 40°C PLC ambient temperature							
	100% powered up		92% PU (30d maint.		66% PU (WE. 30d maint.		33% PU (12h.WE. 30d maint.	
	Typical	Min	Typical	Min	Typical	Min	Typical	Min
TSX MRP C01M7	3.55	3.55	3.20	2.35	2.46	1.15	1.87	0.69
TSX MRP C002M	3.55	3.55	3.30	2.31	2.74	1.11	2.21	0.65
TSX MRP C003M	3.55	3.55	3.20	1.93	2.46	0.80	1.87	0.45
TSX MRP C007M	3.55	3.55	2.84	1.31	1.75	0.44	1.16	0.24
TSX MRP F004M	3.55	3.55	3.20	1.93	2.46	0.80	1.87	0.45
TSX MRP F008M	3.55	3.55	2.84	1.31	1.75	0.44	1.16	0.24

PV1/2/3	For a 50°C PLC ambient temperature							
	100% powered up		92% PU (30d maint.		66% PU (WE. 30d maint.		33% PU (12h.WE. 30d maint.	
	Typical	Min	Typical	Min	Typical	Min	Typical	Min
TSX MCP C 224K	2.35	2.35	2.42	2.25	2.69	2.02	3.10	1.75
TSX MCP C 512K	2.35	2.35	2.42	2.26	2.69	2.05	3.10	1.81
TSX MCP C 002M	2.35	2.35	2.36	1.90	2.42	1.20	2.47	0.80
TSX MRP P128K	2.35	2.35	2.42	2.25	2.69	2.02	3.10	1.75
TSX MRP P224K	2.35	2.35	2.42	2.26	2.69	2.05	3.10	1.81
TSX MRP P384K	2.35	2.35	2.42	2.15	2.69	1.71	3.10	1.34
TSX MRP C448K	2.35	2.35	2.36	2.09	2.42	1.55	2.47	1.15
TSX MRP C768K	2.35	2.35	2.36	2.09	2.42	1.55	2.47	1.15
TSX MRP C001M	2.35	2.35	2.31	1.93	2.20	1.25	2.05	0.85
TSX MRP C01M7	2.35	2.35	2.25	1.80	2.02	1.04	1.75	0.67
TSX MRP C002M	2.35	2.35	2.31	1.77	2.20	1.01	2.05	0.64
TSX MRP C003M	2.35	2.35	2.25	1.54	2.02	0.75	1.75	0.44
TSX MRP C007M	2.35	2.35	2.07	1.12	1.51	0.42	1.11	0.23
TSX MRP F004M	2.35	2.35	2.25	1.54	2.02	0.75	1.75	0.44
TSX MRP F008M	2.35	2.35	2.07	1.12	1.51	0.42	1.11	0.23

PV1/2/3	For a 60°C PLC ambient temperature							
	100% powered up		92% PU (30d maint.		66% PU (WE. 30d maint.		33% PU (12h.WE. 30d maint.	
	Typical	Min	Typical	Min	Typical	Min	Typical	Min
TSX MCP C 224K	1.57	1.57	1.63	1.56	1.91	1.54	2.40	1.50
TSX MCP C 512K	1.57	1.57	1.63	1.56	1.91	1.56	2.40	1.54

PV1/2/3	For a 40°C PLC ambient temperature							
	100% powered up		92% PU (30d maint.		66% PU (WE. 30d maint.		33% PU (12h.WE. 30d maint.	
	Typical	Min	Typical	Min	Typical	Min	Typical	Min
TSX MRP C01M7	3.55	3.55	3.20	2.35	2.46	1.15	1.87	0.69
TSX MRP C002M	3.55	3.55	3.30	2.31	2.74	1.11	2.21	0.65
TSX MRP C003M	3.55	3.55	3.20	1.93	2.46	0.80	1.87	0.45
TSX MRP C007M	3.55	3.55	2.84	1.31	1.75	0.44	1.16	0.24
TSX MRP F004M	3.55	3.55	3.20	1.93	2.46	0.80	1.87	0.45
TSX MRP F008M	3.55	3.55	2.84	1.31	1.75	0.44	1.16	0.24

PV1/2/3	For a 50°C PLC ambient temperature							
	100% powered up		92% PU (30d maint.		66% PU (WE. 30d maint.		33% PU (12h.WE. 30d maint.	
	Typical	Min	Typical	Min	Typical	Min	Typical	Min
TSX MCP C 224K	2.35	2.35	2.42	2.25	2.69	2.02	3.10	1.75
TSX MCP C 512K	2.35	2.35	2.42	2.26	2.69	2.05	3.10	1.81
TSX MCP C 002M	2.35	2.35	2.36	1.90	2.42	1.20	2.47	0.80
TSX MRP P128K	2.35	2.35	2.42	2.25	2.69	2.02	3.10	1.75
TSX MRP P224K	2.35	2.35	2.42	2.26	2.69	2.05	3.10	1.81
TSX MRP P384K	2.35	2.35	2.42	2.15	2.69	1.71	3.10	1.34
TSX MRP C448K	2.35	2.35	2.36	2.09	2.42	1.55	2.47	1.15
TSX MRP C768K	2.35	2.35	2.36	2.09	2.42	1.55	2.47	1.15
TSX MRP C001M	2.35	2.35	2.31	1.93	2.20	1.25	2.05	0.85
TSX MRP C01M7	2.35	2.35	2.25	1.80	2.02	1.04	1.75	0.67
TSX MRP C002M	2.35	2.35	2.31	1.77	2.20	1.01	2.05	0.64
TSX MRP C003M	2.35	2.35	2.25	1.54	2.02	0.75	1.75	0.44
TSX MRP C007M	2.35	2.35	2.07	1.12	1.51	0.42	1.11	0.23
TSX MRP F004M	2.35	2.35	2.25	1.54	2.02	0.75	1.75	0.44
TSX MRP F008M	2.35	2.35	2.07	1.12	1.51	0.42	1.11	0.23

PV1/2/3	For a 60°C PLC ambient temperature							
	100% powered up		92% PU (30d maint.		66% PU (WE. 30d maint.		33% PU (12h.WE. 30d maint.	
	Typical	Min	Typical	Min	Typical	Min	Typical	Min
TSX MCP C 224K	1.57	1.57	1.63	1.56	1.91	1.54	2.40	1.50
TSX MCP C 512K	1.57	1.57	1.63	1.56	1.91	1.56	2.40	1.54

PV1/2/3	**For a 60°C PLC ambient temperature**							
	100% powered up		**92% PU (30d maint.**		**66% PU (WE. 30d maint.**		**33% PU (12h.WE. 30d maint.**	
	Typical	**Min**	**Typical**	**Min**	**Typical**	**Min**	**Typical**	**Min**
TSX MCP C 002M	1.57	1.57	1.61	1.38	1.77	1.01	2.00	0.74
TSX MRP P128K	1.57	1.57	1.63	1.56	1.91	1.54	2.40	1.50
TSX MRP P224K	1.57	1.57	1.63	1.56	1.91	1.56	2.40	1.54
TSX MRP P384K	1.57	1.57	1.63	1.51	1.91	1.36	2.40	1.19
TSX MRP C448K	1.57	1.57	1.61	1.47	1.77	1.25	2.00	1.04
TSX MRP C768K	1.57	1.57	1.61	1.47	1.77	1.25	2.00	1.04
TSX MRP C001M	1.57	1.57	1.58	1.40	1.65	1.05	1.72	0.78
TSX MRP C01M7	1.57	1.57	1.56	1.33	1.54	0.90	1.50	0.63
TSX MRP C002M	1.57	1.57	1.58	1.31	1.65	0.87	1.72	0.60
TSX MRP C003M	1.57	1.57	1.56	1.18	1.54	0.67	1.50	0.42
TSX MRP C007M	1.57	1.57	1.47	0.92	1.23	0.40	1.00	0.23
TSX MRP F004M	1.57	1.57	1.56	1.18	1.54	0.67	1.50	0.42
TSX MRP F008M	1.57	1.57	1.47	0.92	1.23	0.40	1.00	0.23

Main Battery Lifetime of PV4/5 PCMCIA (in Years)

The table below presents the lifetime of main battery TSX BAT M02 (PV4/5) for PCMCIA memory cards:

PV4/5	For a 25°C PLC ambient temperature							
	100% powered up		92% PU (30d maint.		66% PU (WE. 30d maint.		33% PU (12h.WE. 30d maint.	
	Typical	Min	Typical	Min	Typical	Min	Typical	Min
TSX MCP C 224K	7.22	7.22	7.15	6.27	7.02	4.48	6.76	3.23
TSX MCP C 512K	7.22	7.22	7.15	6.33	7.02	4.59	6.76	3.35
TSX MCP C 002M	7.22	7.22	6.83	4.69	5.90	2.25	4.96	1.33
TSX MRP P128K	7.22	7.22	7.15	6.27	7.02	4.48	6.76	3.23
TSX MRP P224K	7.22	7.22	7.15	6.33	7.02	4.59	6.76	3.35
TSX MRP P384K	7.22	7.22	7.15	5.77	7.02	3.57	6.76	2.36
TSX MRP C448K	7.22	7.22	6.83	5.47	5.90	3.12	4.96	1.99
TSX MRP C768K	7.22	7.22	6.83	5.47	5.90	3.12	4.96	1.99
TSX MRP C001M	7.22	7.22	6.54	4.82	5.09	2.37	3.91	1.41
TSX MRP C01M7	7.22	7.22	6.27	4.30	4.48	1.91	3.23	1.10
TSX MRP C002M	7.22	7.22	6.54	4.20	5.09	1.83	3.91	1.04
TSX MRP C003M	7.22	7.22	6.27	3.41	4.48	1.29	3.23	0.71
TSX MRP C007M	7.22	7.22	5.39	2.21	3.02	0.70	1.91	0.37
TSX MRP F004M	7.22	7.22	6.27	3.41	4.48	1.29	3.23	0.71
TSX MRP F008M	7.22	7.22	5.39	2.21	3.02	0.70	1.91	0.37

PV4/5	For a 40°C PLC ambient temperature							
	100% powered up		92% PU (30d maint.		66% PU (WE. 30d maint.		33% PU (12h.WE. 30d maint.	
	Typical	Min	Typical	Min	Typical	Min	Typical	Min
TSX MCP C 224K	4.63	4.63	4.72	4.32	5.09	3.61	5.59	2.94
TSX MCP C 512K	4.63	4.63	4.72	4.35	5.09	3.68	5.59	3.04
TSX MCP C 002M	4.63	4.63	4.58	3.51	4.48	2.00	4.30	1.28
TSX MRP P128K	4.63	4.63	4.72	4.32	5.09	3.61	5.59	2.94
TSX MRP P224K	4.63	4.63	4.72	4.35	5.09	3.68	5.59	3.04
TSX MRP P384K	4.63	4.63	4.72	4.08	5.09	2.99	5.59	2.20
TSX MRP C448K	4.63	4.63	4.58	3.93	4.48	2.68	4.30	1.87
TSX MRP C768K	4.63	4.63	4.58	3.93	4.48	2.68	4.30	1.87
TSX MRP C001M	4.63	4.63	4.45	3.58	4.00	2.10	3.49	1.35

PV4/5	For a 40°C PLC ambient temperature							
	100% powered up		92% PU (30d maint.		66% PU (WE. 30d maint.		33% PU (12h.WE. 30d maint.	
	Typical	Min	Typical	Min	Typical	Min	Typical	Min
TSX MRP C01M7	4.63	4.63	4.32	3.29	3.61	1.73	2.94	1.06
TSX MRP C002M	4.63	4.63	4.45	3.23	4.00	1.66	3.49	1.01
TSX MRP C003M	4.63	4.63	4.32	2.74	3.61	1.21	2.94	0.69
TSX MRP C007M	4.63	4.63	3.89	1.91	2.60	0.67	1.80	0.36
TSX MRP F004M	4.63	4.63	4.32	2.74	3.61	1.21	2.94	0.69
TSX MRP F008M	4.63	4.63	3.89	1.91	2.60	0.67	1.80	0.36

PV4/5	For a 50°C PLC ambient temperature							
	100% powered up		92% PU (30d maint.		66% PU (WE. 30d maint.		33% PU (12h.WE. 30d maint.	
	Typical	Min	Typical	Min	Typical	Min	Typical	Min
TSX MCP C 224K	2.58	2.58	2.69	2.56	3.12	2.50	3.89	2.39
TSX MCP C 512K	2.58	2.58	2.69	2.56	3.12	2.53	3.89	2.45
TSX MCP C 002M	2.58	2.58	2.64	2.25	2.88	1.61	3.22	1.16
TSX MRP P128K	2.58	2.58	2.69	2.56	3.12	2.50	3.89	2.39
TSX MRP P224K	2.58	2.58	2.69	2.56	3.12	2.53	3.89	2.45
TSX MRP P384K	2.58	2.58	2.69	2.47	3.12	2.18	3.89	1.88
TSX MRP C448K	2.58	2.58	2.64	2.41	2.88	2.01	3.22	1.63
TSX MRP C768K	2.58	2.58	2.64	2.41	2.88	2.01	3.22	1.63
TSX MRP C001M	2.58	2.58	2.60	2.28	2.68	1.67	2.74	1.23
TSX MRP C01M7	2.58	2.58	2.56	2.15	2.50	1.42	2.39	0.98
TSX MRP C002M	2.58	2.58	2.60	2.13	2.68	1.38	2.74	0.94
TSX MRP C003M	2.58	2.58	2.56	1.90	2.50	1.05	2.39	0.66
TSX MRP C007M	2.58	2.58	2.40	1.46	1.97	0.62	1.58	0.35
TSX MRP F004M	2.58	2.58	2.56	1.90	2.50	1.05	2.39	0.66
TSX MRP F008M	2.58	2.58	2.40	1.46	1.97	0.62	1.58	0.35

PV4/5	For a 60°C PLC ambient temperature							
	100% powered up		92% PU (30d maint.		66% PU (WE. 30d maint.		33% PU (12h.WE. 30d maint.	
	Typical	Min	Typical	Min	Typical	Min	Typical	Min
TSX MCP C 224K	1.75	1.75	1.84	1.78	2.21	1.88	2.95	2.00
TSX MCP C 512K	1.75	1.75	1.84	1.78	2.21	1.90	2.95	2.04

PV4/5	For a 60°C PLC ambient temperature							
	100% powered up		92% PU (30d maint.		66% PU (WE. 30d maint.		33% PU (12h.WE. 30d maint.	
	Typical	Min	Typical	Min	Typical	Min	Typical	Min
TSX MCP C 002M	1.75	1.75	1.82	1.62	2.09	1.33	2.55	1.06
TSX MRP P128K	1.75	1.75	1.84	1.78	2.21	1.88	2.95	2.00
TSX MRP P224K	1.75	1.75	1.84	1.78	2.21	1.90	2.95	2.04
TSX MRP P384K	1.75	1.75	1.84	1.73	2.21	1.70	2.95	1.63
TSX MRP C448K	1.75	1.75	1.82	1.71	2.09	1.59	2.55	1.44
TSX MRP C768K	1.75	1.75	1.82	1.71	2.09	1.59	2.55	1.44
TSX MRP C001M	1.75	1.75	1.80	1.64	1.98	1.37	2.24	1.11
TSX MRP C01M7	1.75	1.75	1.78	1.57	1.88	1.20	2.00	0.91
TSX MRP C002M	1.75	1.75	1.80	1.56	1.98	1.17	2.24	0.87
TSX MRP C003M	1.75	1.75	1.78	1.44	1.88	0.92	2.00	0.62
TSX MRP C007M	1.75	1.75	1.70	1.17	1.56	0.57	1.40	0.34
TSX MRP F004M	1.75	1.75	1.78	1.44	1.88	0.92	2.00	0.62
TSX MRP F008M	1.75	1.75	1.70	1.17	1.56	0.57	1.40	0.34

Main Battery Lifetime of PV6 PCMCIA (in Years)

The table below presents the lifetime of main battery TSX BAT M02 (PV6) for PCMCIA memory cards:

PV6	**For a 25°C PLC ambient temperature**							
	100% powered up		**92% PU (30d maint.**		**66% PU (WE. 30d maint.**		**33% PU (12h.WE. 30d maint.**	
	Typical	**Min**	**Typical**	**Min**	**Typical**	**Min**	**Typical**	**Min**
TSX MCP C 224K	7.2	7.2	7.2	6.3	7.0	4.5	6.8	3.2
TSX MCP C 512K	7.2	7.2	7.2	6.5	7.0	5.1	6.8	3.9
TSX MCP C 002M	7.2	7.2	6.8	5.8	5.9	3.6	5.0	2.4
TSX MRP P128K	7.2	7.2	7.2	6.3	7.0	4.5	6.8	3.2
TSX MRP P224K	7.2	7.2	7.2	6.5	7.0	5.1	6.8	3.9
TSX MRP P384K	7.2	7.2	7.2	6.5	7.0	5.1	6.8	3.9
TSX MRP C448K	7.2	7.2	6.8	5.8	5.9	3.6	5.0	2.4
TSX MRP C768K	7.2	7.2	6.8	5.8	5.9	3.6	5.0	2.4
TSX MRP C001M	7.2	7.2	6.5	5.2	5.1	2.8	3.9	1.7
TSX MRP C01M7	7.2	7.2	6.3	4.7	4.5	2.3	3.2	1.4
TSX MRP C002M	7.2	7.2	6.5	5.2	5.1	2.8	3.9	1.7
TSX MRP C003M	7.2	7.2	6.3	4.7	4.5	2.3	3.2	1.4
TSX MRP C007M	7.2	7.2	5.4	3.5	3.0	1.3	1.9	0.7
TSX MRP F004M	7.2	7.2	6.3	4.7	4.5	2.3	3.2	1.4
TSX MRP F008M	7.2	7.2	5.4	3.5	3.0	1.3	1.9	0.7

PV6	**For a 40°C PLC ambient temperature**							
	100% powered up		**92% PU (30d maint.**		**66% PU (WE. 30d maint.**		**33% PU (12h.WE. 30d maint.**	
	Typical	**Min**	**Typical**	**Min**	**Typical**	**Min**	**Typical**	**Min**
TSX MCP C 224K	4.6	4.6	4.7	4.3	5.1	3.6	5.6	2.9
TSX MCP C 512K	4.6	4.6	4.7	4.4	5.1	4.0	5.6	3.5
TSX MCP C 002M	4.6	4.6	4.6	4.1	4.5	3.0	4.3	2.2
TSX MRP P128K	4.6	4.6	4.7	4.3	5.1	3.6	5.6	2.9
TSX MRP P224K	4.6	4.6	4.7	4.4	5.1	4.0	5.6	3.5
TSX MRP P384K	4.6	4.6	4.7	4.4	5.1	4.0	5.6	3.5
TSX MRP C448K	4.6	4.6	4.6	4.1	4.5	3.0	4.3	2.2
TSX MRP C768K	4.6	4.6	4.6	4.1	4.5	3.0	4.3	2.2
TSX MRP C001M	4.6	4.6	4.4	3.8	4.0	2.4	3.5	1.6

PV6	For a 40°C PLC ambient temperature							
	100% powered up		92% PU (30d maint.		66% PU (WE. 30d maint.		33% PU (12h.WE. 30d maint.	
	Typical	Min	Typical	Min	Typical	Min	Typical	Min
TSX MRP C01M7	4.6	4.6	4.3	3.5	3.6	2.0	2.9	1.3
TSX MRP C002M	4.6	4.6	4.4	3.8	4.0	2.4	3.5	1.6
TSX MRP C003M	4.6	4.6	4.3	3.5	3.6	2.0	2.9	1.3
TSX MRP C007M	4.6	4.6	3.9	2.8	2.6	1.2	1.8	0.7
TSX MRP F004M	4.6	4.6	4.3	3.5	3.6	2.0	2.9	1.3
TSX MRP F008M	4.6	4.6	3.9	2.8	2.6	1.2	1.8	0.7

PV6	For a 50°C PLC ambient temperature							
	100% powered up		92% PU (30d maint.		66% PU (WE. 30d maint.		33% PU (12h.WE. 30d maint.	
	Typical	Min	Typical	Min	Typical	Min	Typical	Min
TSX MCP C 224K	2.6	2.6	2.7	2.6	3.1	2.5	3.9	2.4
TSX MCP C 512K	2.6	2.6	2.7	2.6	3.1	2.7	3.9	2.7
TSX MCP C 002M	2.6	2.6	2.6	2.5	2.9	2.2	3.2	1.9
TSX MRP P128K	2.6	2.6	2.7	2.6	3.1	2.5	3.9	2.4
TSX MRP P224K	2.6	2.6	2.7	2.6	3.1	2.7	3.9	2.7
TSX MRP P384K	2.6	2.6	2.7	2.6	3.1	2.7	3.9	2.7
TSX MRP C448K	2.6	2.6	2.6	2.5	2.9	2.2	3.2	1.9
TSX MRP C768K	2.6	2.6	2.6	2.5	2.9	2.2	3.2	1.9
TSX MRP C001M	2.6	2.6	2.6	2.4	2.7	1.9	2.7	1.5
TSX MRP C01M7	2.6	2.6	2.6	2.3	2.5	1.6	2.4	1.2
TSX MRP C002M	2.6	2.6	2.6	2.4	2.7	1.9	2.7	1.5
TSX MRP C003M	2.6	2.6	2.6	2.3	2.5	1.6	2.4	1.2
TSX MRP C007M	2.6	2.6	2.4	1.9	2.0	1.1	1.6	0.7
TSX MRP F004M	2.6	2.6	2.6	2.3	2.5	1.6	2.4	1.2
TSX MRP F008M	2.6	2.6	2.4	1.9	2.0	1.1	1.6	0.7

PV6	For a 60°C PLC ambient temperature							
	100% powered up		92% PU (30d maint.		66% PU (WE. 30d maint.		33% PU (12h.WE. 30d maint.	
	Typical	Min	Typical	Min	Typical	Min	Typical	Min
TSX MCP C 224K	1.8	1.8	1.8	1.8	2.2	1.9	3.0	2.0
TSX MCP C 512K	1.8	1.8	1.8	1.8	2.2	2.0	3.0	2.2

PV6	For a 60°C PLC ambient temperature							
	100% powered up		92% PU (30d maint.		66% PU (WE. 30d maint.		33% PU (12h.WE. 30d maint.	
	Typical	Min	Typical	Min	Typical	Min	Typical	Min
TSX MCP C 002M	1.8	1.8	1.8	1.7	2.1	1.7	2.5	1.6
TSX MRP P128K	1.8	1.8	1.8	1.8	2.2	1.9	3.0	2.0
TSX MRP P224K	1.8	1.8	1.8	1.8	2.2	2.0	3.0	2.2
TSX MRP P384K	1.8	1.8	1.8	1.8	2.2	2.0	3.0	2.2
TSX MRP C448K	1.8	1.8	1.8	1.7	2.1	1.7	2.5	1.6
TSX MRP C768K	1.8	1.8	1.8	1.7	2.1	1.7	2.5	1.6
TSX MRP C001M	1.8	1.8	1.8	1.7	2.0	1.5	2.2	1.3
TSX MRP C01M7	1.8	1.8	1.8	1.6	1.9	1.3	2.0	1.1
TSX MRP C002M	1.8	1.8	1.8	1.7	2.0	1.5	2.2	1.3
TSX MRP C003M	1.8	1.8	1.8	1.6	1.9	1.3	2.0	1.1
TSX MRP C007M	1.8	1.8	1.7	1.4	1.6	0.9	1.4	0.6
TSX MRP F004M	1.8	1.8	1.8	1.6	1.9	1.3	2.0	1.1
TSX MRP F008M	1.8	1.8	1.7	1.4	1.6	0.9	1.4	0.6

Minimum Lifetime of the Main Battery, in a Powered Down PLC

In a powered down PLC, the minimum lifetime of the main battery is 6 months in PV6 PCMCIAs.

Auxiliary Battery Lifetime

The auxiliary battery TSX BATM 03 is included in the PCMCIA product. Whatever the usage cases and ambient temperature, the lifetime of the auxiliary battery is:

- 5 years in PV1/2/3
- 1.7 years in PV4/5
- 5 years in PV6

What happens after you press the processor RESET button

General

All processors have a RESET button on their front panel, which when pressed, causes a cold start of the PLC, in RUN or in STOP mode (starting in RUN or in STOP mode is defined at configuration), on the application contained in the memory card (or in the internal RAM)…

RESET following a fault detected by the processor

As soon as a processor detects a fault, the alarm relay on rack 0 (with TSX 57 processor) is deactivated (open contact) and the module outputs switch to fallback position or are maintained in the current state depending on the selection made in configuration. Pressing the RESET button causes the PLC, forced into STOP, to cold start.

Note: When the RESET button is pressed, and during the PLC cold start, the terminal link is deactivated.

Finding errors using processor state LEDs

General

The state LEDs situated on the processor enable the user to be informed about the operating mode of the PLC but on possible errors.

Errors detected by the PLC concerned:

- circuits constituting the PLC and/or its modules: internal errors,
- the process controlled by the PLC or the cabling of the process: external errors,
- functioning of the application executed by the PLC: internal or external errors.

Error detection

Detecting errors is carried out during start-up (autotest) or during functioning (this is the case for most hardware errors), during exchanges with modules or during the execution of a program instruction.

Certain "serious" errors require the PLC to be restarted, others are controlled by the user who decides on the behavior to adopt according to the desired level of application function.

There are three types of error:

- non blocking,
- blocking,
- processor or system error.

Non blocking errors

General

This concerns an anomaly, provoked by an input/output error on the bus X, on the FIPIO bus or by the execution of an instruction. It can be processed by the user program and does not change the PLC state.

Non blocking errors linked to inputs/outputs

The identification of a non blocking error linked to the inputs/outputs is signaled by:

- **the I/O state LED** of the processor is lit,
- **the I/O state LEDs** of the modules responding to a fault are lit, (on bus X and FIPIO bus),
- **the bits and error words associated to the channel:**
  - Inputs/Outputs on bus X:
    %Ixy.i.ERR bit = 1 indicates a detected channel fault (implicit exchanges),
    %Mwxy.i.2 words indicate the type of channel error (explicit exchanges),
  - Inputs/Outputs on FIPIO bus:
    %I\p.2.c\m.v.ERR bit = 1 indicates a detected channel fault (implicit exchanges),
    %MW\p.2.c\m.v.2 words indicate the type of channel errors (explicit exchanges),
- **bits and error words associated with the module:**
  - Module on bus X:
    %Ixy.MOD.ERR bit = 1 indicates a detected channel fault (implicit exchanges),
    %MWxy.MOD.2 words indicate the type of channel error (explicit exchanges),
  - Module on FIPIO bus:
    %I\p.2.c\0.MOD.ERR bit = 1 indicates a detected channel fault (implicit exchanges),
    %MW\p.2.c\0.MOD.2 words indicate the type of channel error (explicit exchanges),
- **system bits:**
  %S10: I/O error (on bus X or FIPIO bus),
  %S16: I/O error (on bus X and FIPIO bus) in the task in progress,
  %S40 à %S47: I/O error in racks at addresses 0 to 7 on the bus X.

Diagnostics table:

Status LED			System bits	Errors
RUN	ERR	I/O		
i	i	To	%S10	Input/output error: channel supply fault, channel disjointed, module not conforming to configuration, out of service, module supply fault.
i	i	To	%S16	Error on input/output in a task.

i	i	To	%S40 to %S47	Error on inputs/outputs at rack level (%S40: rack 0, %S47: rack 7)

Legend:

To: Lit LED,

I: State not determined.

Non blocking errors linked to program execution

The indication of a non blocking error linked to program execution is signaled by setting to state 1 of one or several system bits %S15, %S18, %S20.

The test and setting to state 0 of the system bits are controlled by the user.

Diagnostics table:

Status LED			**System bits**	**Errors**
RUN	**ERR**	**I/O**		
To	i	i	%S15=1	Character string manipulation error.
To	i	i	%S18=1	Capacity overrun, error on floating point or division by 0.
To	i	i	%S20=1	Index overflow.

Legend:

To: Lit LED,

I: State not determined.

Note: The program diagnostics function, accessible through the PL7 Pro software, enables certain non blocking errors linked to the program execution, to be turned into blocking errors. The nature of the error is indicated in the system word %SW 125.

Blocking errors

General

These errors, provoked by the application program, disable its execution but do not cause system errors. On such an error, the application stops immediately and goes to HALT state (the tasks are all stopped in their current instruction).

There are two possibilities for restarting the application:

- by the command INIT through the PL7 Junior or PL7 Pro software,
- by the processor RESET button.

The application is thus in a preliminary state: the data has its preliminary values, the tasks are stopped at the end of the cycle, the input image is updated and the outputs are commissioned in fallback position, the RUN command enables application restart.

The indication of a blocking error is signaled by the state LEDs (ERR and RUN) flashing and according to the nature of the error by the setting to 1 of one or several of the system bits %S11 and %S26. The nature of the error is indicated in the system word %SW 125.

Diagnostics table:

State LEDs			**System**	**Bits Errors**
RUN	**ERR**	**I/O**		
C	C	i	%S11=1	Watchdog overrun
C	C	i	%S26=1	Overrun of the grafcet activity table Step, Grafcet not resolved
C	C	i		Executing the HALT instruction
C	C	i		Executing a non resolved JUMP

Legend:

C: blinking

i: not determined

Processor or system errors

General

These serious faults on either **processor** (hardware or software), or on **bus X cabling** no longer allow that the system will function correctly. They cause the PLC to restart in ERROR which requires a cold restart. The next cold restart will be forced into STOP to avoid the PLC falling back into error.

Diagnostics table:

State LEDs			**System word %SW124**	**Errors**
RUN	**ERR**	**I/O**		
E	To	To	H’80’	System watchdog error or error on bus X cabling
E	C	C	H’81’	Cabling error on bus X
E	To	To		System code error, unforeseen error Overrun of the system task batteries Overrun of the PL7 task batteries

Legend:

To: on

C: blinking

E: not determined

Diagnostics of processor errors:

When the PLC has stopped in error, it is no longer able to communicate with a diagnostics device. The information relating to the errors is only accessible after a cold restart (see system word %SW124). In general, the information is not used by the user, only the information H’80’ and H’81’ can be used to diagnose a cabling error on the bus X.

TSX P57 103 processor

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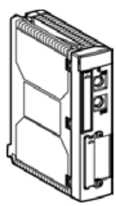
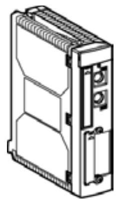
General characteristics of TSX P 57 103 processors

TSX P 57 103 processors

The following table gives the general characteristics of the TSX P 57 103 processor.

<table>
<tr><th>Reference</th><th colspan="3">TSX P 57 103</th></tr>
<tr><td></td><td colspan="3"></td></tr>
<tr><td rowspan="4">Maximum configuration</td><td colspan="2">Maximum number of TSX RKY 12EX racks</td><td>2</td></tr>
<tr><td colspan="2">Maximum number of TSX RKY 4EX/6EX/8EX racks</td><td>4</td></tr>
<tr><td rowspan="2">Maximum number of slots</td><td>with TSXRKY 12EX</td><td>21</td></tr>
<tr><td>with TSXRKY 4EX, 6EX, 8EX</td><td>27</td></tr>
</table>

Reference	**TSX P 57 103**		
			
Functions	I/O profile (1)		fixed
	Maximum number of channels	In-rack discrete I/O	512
		In-rack analog I/O	24
		Applications (counting, axis, etc.)	8
	Maximum number of connections	Built-in UNI-TELWAY (terminal port, Ethernet)	1
		Network (ETHWAY, FIPWAY, Modbus Plus)	1
		Master FIPIO (built-in)	-
		Third party field bus	-
		AS-i field bus	2
	Savable real-time clock		yes
Memory capacity	Processor internal RAM		32K16
	PCMCIA memory card (maximum capacity)	Application area	64K16
		Symbol Zone	-
		File area	128K16
Application structure	Master task		1
	Fast task		1
	Event processing (of which 1 has priority)		32
Application code execution time for a 1K instruction	Internal RAM	100% Boolean	0.66 ms
		65% Boolean + 35% digital	0.95 ms
	PCMCIA card	100% Boolean	0.85 ms
		65% Boolean + 35% digital	1.18 ms
System overhead	MAST task		1.5 ms
	FAST task		0.8 ms

fixed I/O profile (1): the number of discrete I/Os, and application-specific and analog channels can be accumulated

TSX P57 153 processor

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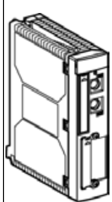
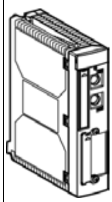
General characteristics of TSX P57 153 processors

TSX P 57 153 processors

The following table gives the general characteristics of the TSX P 57 153 processor.

Reference	TSX P 57 153		
			
Maximum configuration	Maximum number of TSX RKY 12EX racks		2
	Maximum number of TSX RKY 4EX/6EX/8EX racks		4
	Maximum number of slots	with TSXRKY 12EX	21
		with TSXRKY 4EX, 6EX, 8EX	27
Functions	I/O profile (1)		fixed
	Maximum number of channels	In-rack discrete I/O	512
		In-rack analog I/O	24
		Applications (counting, axis, etc.)	8
	Maximum number of connections	Built-in UNI-TELWAY (terminal port)	1
		Network (ETHWAY, FIPWAY, Modbus Plus, Ethernet)	1
		Master FIPIO (built-in)	63
		Third party field bus	-
		AS-i field bus	2
	Savable real-time clock		yes

Reference	**TSX P 57 153**		
			
Memory capacity	Processor internal RAM		32K16
	PCMCIA memory card (maximum capacity)	Application area	64K16
		Symbol Zone	-
		File area	128K16
Application structure	Master task		1
	Fast task		1
	Event processing (1 has priority)		32
Application code execution time for a 1K instruction	Internal RAM	100% Boolean	0.66 ms
		65% Boolean + 35% digital	0.95 ms
	PCMCIA card	100% Boolean	0.85 ms
		65% Boolean + 35% digital	1.18 ms
System overhead	MAST task	without using the FIPIO bus	1.5 ms
		using the FIPIO bus	3.1 ms
	FAST task		0.8 ms

fixed I/O profile (1): the number of discrete I/Os, and application-specific and analog channels can be accumulated

TSX P57 203 processor

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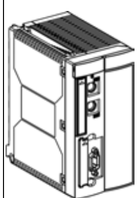
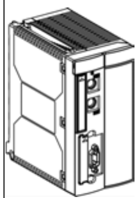
General characteristics of TSX P57 203 processors

TSX P 57 203 processors

The following table gives the general characteristics of the TSX P 57 203 processor.

<table>
<tr><td>Reference</td><td colspan="3">TSX P 57 203</td></tr>
<tr><td></td><td colspan="3"></td></tr>
<tr><td rowspan="4">Maximum configuration</td><td colspan="2">Maximum number of TSX RKY 12EX racks</td><td>8</td></tr>
<tr><td colspan="2">Maximum number of TSX RKY 4EX/6EX/8EX racks</td><td>16</td></tr>
<tr><td rowspan="2">Maximum number of slots</td><td>with TSXRKY 12EX</td><td>86</td></tr>
<tr><td>with TSXRKY 4EX, 6EX, 8EX</td><td>110</td></tr>
<tr><td rowspan="10">Functions</td><td colspan="2">I/O profile (1)</td><td>fixed</td></tr>
<tr><td rowspan="3">Maximum number of channels</td><td>In-rack discrete I/O</td><td>1024</td></tr>
<tr><td>In-rack analog I/O</td><td>80</td></tr>
<tr><td>Applications (counting, axis, etc.)</td><td>24</td></tr>
<tr><td rowspan="5">Maximum number of connections</td><td>Built-in UNI-TELWAY (terminal port)</td><td>1</td></tr>
<tr><td>Network (ETHWAY, FIPWAY, Modbus Plus, Ethernet)</td><td>1</td></tr>
<tr><td>Master FIPIO (built-in)</td><td>-</td></tr>
<tr><td>Third party field bus</td><td>1</td></tr>
<tr><td>AS-i field bus</td><td>4</td></tr>
<tr><td colspan="2">Savable real-time clock</td><td>yes</td></tr>
</table>

Reference	**TSX P 57 203**		
			
Memory capacity	Processor internal RAM		48K16
	PCMCIA memory card (maximum capacity)	Application area	160K16
		Symbol Zone	256K16
		File area	640K16 channel 0+ 2048K16 channel 1
Application structure	Master task		1
	Fast task		1
	Event processing (of which 1 has priority)		64
Application code execution time for a 1K instruction	Internal RAM	100% Boolean	0.21 ms
		65% Boolean + 35% digital	0.28 ms
	PCMCIA card	100% Boolean	0.27 ms
		65% Boolean + 35% digital	0.40 ms
System overhead	MAST task		1 ms
	FAST task		0.35 ms

fixed I/O profile (1): the number of discrete I/Os, and application-specific and analog channels can be accumulated

TSX P57 253 processor

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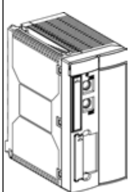
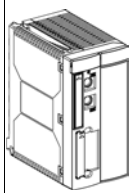
General characteristics of TSX P57 253 processors

TSX P57 253 processor

The following table gives the general characteristics of the TSX P 57 253 processor.

Reference	**TSX P57 253**		
			
Maximum configuration	Maximum number of TSX RKY 12EX racks		8
	Maximum number of TSX RKY 4EX/6EX/8EX racks		16
	Maximum number of slots	with TSXRKY 12EX	86
		with TSXRKY 4EX, 6EX, 8EX	110
Functions	I/O profile (1)		fixed
	Maximum number of channels	In-rack discrete I/O	1024
		In-rack analog I/O	80
		Applications (counting, axis, etc.)	24
	Maximum number of connections	Built-in UNI-TELWAY (terminal port)	1
		Network (ETHWAY, FIPWAY, Modbus Plus, Ethernet)	1
		Master FIPIO (built-in)	127
		Third party field bus	1
		AS-i field bus	4
	Savable real-time clock		yes

Reference	**TSX P57 253**		
			
Memory capacity	Processor internal RAM		64K16
	PCMCIA memory card (maximum capacity)	Application area	160K16
		Symbol Zone	256K16
		File area	640K16 channel 0+ 2048K16 channel 1
Application structure	Master task		1
	Fast task		1
	Event processing (of which 1 has priority)		64
Application code execution time for a 1K instruction	Internal RAM	100% Boolean	0.21 ms
		65% Boolean + 35% digital	0.28 ms
	PCMCIA card	100% Boolean	0.27 ms
		65% Boolean + 35% digital	0.40 ms
System overhead	MAST task	without using the FIPIO bus	1 ms
		using the FIPIO bus	1.2 ms
	FAST task		0.35 ms

fixed I/O profile (1): the number of discrete I/Os, and application-specific and analog channels can be accumulated

TSX P57 2623 processor

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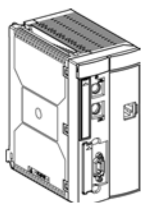
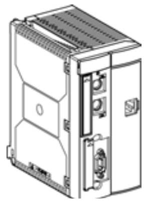
TSX P57 2623 Processors: General Characteristics

TSX P 57 2623 Processors

The following table gives the general characteristics of the TSX P 57 2623 processor.

Reference	**TSX P 57 2623**		
			
Maximum configuration	Maximum number of TSX RKY 12EX racks		8
	Maximum number of TSX RKY 4EX/6EX/8EX racks		16
	Maximum number of slots	with TSXRKY 12EX	86
		with TSXRKY 4EX, 6EX, 8EX	110

Reference	**TSX P 57 2623**		
			
Functions	I/O profile (1)		fixed
	Maximum number of channels	In-rack discrete I/O	1024
		In-rack analog I/O	80
		Applications (counting, axis, etc.)	24
	Maximum number of connections	Built-in UNI-TELWAY (terminal port)	1
		Network (ETHWAY, FIPWAY, Modbus Plus, embedded Ethernet (2))	1
		Master FIPIO (built-in)	-
		Third party field bus	1
		AS-i field bus	4
	Savable real-time clock		yes
Memory capacity	Processor internal RAM		48K16
	PCMCIA memory card (maximum capacity)	Application area	160K16
		Symbol Zone	256K16
		File area	640K16 channel 0 + 2048K16 channel 1
Application structure	Master task		1
	Fast task		1
	Event processing (of which 1 has priority)		64
Application code execution time for a 1K instruction	Internal RAM	100% Boolean	0.21 ms
		65% Boolean + 35% digital	0.28 ms
	PCMCIA card	100% Boolean	0.27 ms
		65% Boolean + 35% digital	0.40 ms
System overhead	MAST task		1 ms
	FAST task		0.35 ms

(1) Fixed I/O profile: the number of discrete I/Os, and application-specific and analog channels can be accumulated.

(2) One of which is occupied by the TSX ETY PORT of the CPU.

TSX P57 2823 processor

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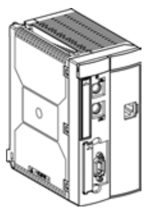
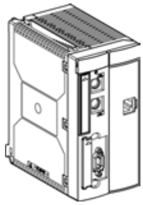
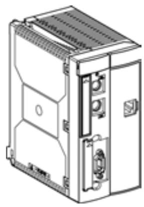
TSX P57 2823 Processors: General Characteristics

TSX P57 2823 Processor

The following table gives the general characteristics of the TSX P 57 2823 processor.

<table>
<tr><th>Reference</th><th colspan="3">TSX P57 2823</th></tr>
<tr><td></td><td colspan="3"></td></tr>
<tr><td rowspan="4">Maximum configuration</td><td colspan="2">Maximum number of TSX RKY 12EX racks</td><td>8</td></tr>
<tr><td colspan="2">Maximum number of TSX RKY 4EX/6EX/8EX racks</td><td>16</td></tr>
<tr><td rowspan="2">Maximum number of slots</td><td>with TSXRKY 12EX</td><td>86</td></tr>
<tr><td>with TSXRKY 4EX, 6EX, 8EX</td><td>110</td></tr>
</table>

Reference	**TSX P57 2823**		
			
Functions	I/O profile (1)		fixed
	Maximum number of channels	In-rack discrete I/O	1024
		In-rack analog I/O	80
		Applications (counting, axis, etc.)	24
	Maximum number of connections	Built-in UNI-TELWAY (terminal port)	1
		Network (ETHWAY, FIPWAY, Modbus Plus, embedded Ethernet (2))	1
		Master FIPIO (built-in)	127
		Third party field bus	1
		AS-i field bus	4
	Savable real-time clock		yes
Memory capacity	Processor internal RAM		64K16
	PCMCIA memory card (maximum capacity)	Application area	160K16
		Symbol Zone	256K16
		File area	640K16 channel 0 + 2048K16 channel 1
Application structure	Master task		1
	Fast task		1
	Event processing (of which 1 has priority)		64
Application code execution time for a 1K instruction	Internal RAM	100% Boolean	0.21 ms
		65% Boolean + 35% digital	0.28 ms
	PCMCIA card	100% Boolean	0.27 ms
		65% Boolean + 35% digital	0.40 ms

Reference	**TSX P57 2823**		
			
System overhead	MAST task	without using the FIPIO bus	1 ms
		using the FIPIO bus	1.2 ms
	FAST task		0.35 ms

(1) Fixed I/O profile: the number of discrete I/Os, and application-specific and analog channels can be accumulated

(2) One of which is occupied by the TSX ETY PORT of the CPU.

TSX P57 303 processor

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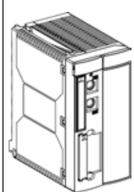
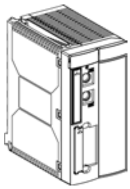
General characteristics of TSX P57 303 processors

TSX P57 303 processor

The following table gives the general characteristics of the TSX P 57 303 processor.

Reference	**TSX P57 303**		
			
Maximum configuration	Maximum number of TSX RKY 12EX racks		8
	Maximum number of TSX RKY 4EX/6EX/8EX racks		16
	Maximum number of slots	with TSXRKY 12EX	86
		with TSXRKY 4EX, 6EX, 8EX	110
Functions	I/O profile (2)		fixed
	Maximum number of channels	In-rack discrete I/O	1024
		In-rack analog I/O	128
		Applications (counting, axis, etc.)	32
	Maximum number of connections	Built-in UNI-TELWAY (terminal port)	1
		Network (ETHWAY, FIPWAY, Modbus Plus, Ethernet)	3
		Master FIPIO (built-in)	-
		Third party field bus	2
		AS-i field bus	8
	Savable real-time clock		yes

Reference	**TSX P57 303**		
			
Memory capacity	Processor internal RAM		64K16/80K16(1)
	PCMCIA memory card (maximum capacity)	Application area	384K16
		Symbol Zone	256K16
		File area	640K16 channel 0 + 2048K16 channel 1
Application structure	Master task		1
	Fast task		1
	Event processing (of which 1 has priority)		64
Application code execution time for a 1K instruction	Internal RAM	100% Boolean	0.15 ms
		65% Boolean + 35% digital	0.21 ms
	PCMCIA card	100% Boolean	0.22 ms
		65% Boolean + 35% digital	0.32 ms
System overhead	MAST task		1 ms
	FAST task		0.25 ms

(1) 1st figure when the application is in internal RAM, 2nd figure when the application is in card memory.

fixed I/O profile (2): the number of discrete I/Os, and application-specific and analog channels can be accumulated.

TSX P57 303A processor

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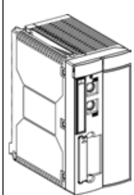
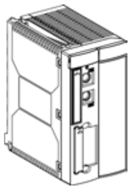
General characteristics of TSX P57 303A processors

TSX P57 303A processor

The following table gives the general characteristics of the TSX P 57 303A processor.

Reference	**TSX P57 303A**		
			
Maximum configuration	Maximum number of TSX RKY 12EX racks		8
	Maximum number of TSX RKY 4EX/6EX/8EX racks		16
	Maximum number of slots	with TSXRKY 12EX	86
		with TSXRKY 4EX, 6EX, 8EX	110

Reference	**TSX P57 303A**		
			
Functions	I/O profile (2)		fixed
	Maximum number of channels	In-rack discrete I/O	1024
		In-rack analog I/O	128
		Applications (counting, axis, etc.)	32
	Maximum number of connections	Built-in UNI-TELWAY (terminal port)	1
		Network (ETHWAY, FIPWAY, Modbus Plus, Ethernet)	3
		Master FIPIO (built-in)	-
		Third party field bus	2
		AS-i field bus	8
	Savable real-time clock		yes
Memory capacity	Processor internal RAM		64K16/80K16(1)
	PCMCIA memory card (maximum capacity)	Application area	384K16
		Symbol Zone	256K16
		File area	640K16 channel 0 + 2048K16 channel 1
Application structure	Master task		1
	Fast task		1
	Event processing (of which 1 has priority)		64
Application code execution time for a 1K instruction	Internal RAM	100% Boolean	0.15 ms
		65% Boolean + 35% digital	0.21 ms
	PCMCIA card	100% Boolean	0.22 ms
		65% Boolean + 35% digital	0.32 ms
System overhead	MAST task		1.15 ms
	FAST task		0.29 ms

(1) 1st figure when the application is in internal RAM, 2nd figure when the application is in card memory.

fixed I/O profile (2): the number of discrete I/Os, and application-specific and analog channels can be accumulated.

TSX P57 353 processor

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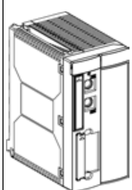
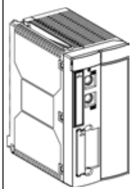
General characteristics of TSX P57 353 processors

TSX P57 353 processor

The following table gives the general characteristics of the TSX P 57 353 processor.

Reference	**TSX P57 353**		
			
Maximum configuration	Maximum number of TSX RKY 12EX racks		8
	Maximum number of TSX RKY 4EX/6EX/8EX racks		16
	Maximum number of slots	with TSXRKY 12EX	86
		with TSXRKY 4EX, 6EX, 8EX	110
Functions	I/O profile (2)		fixed
	Maximum number of channels	In-rack discrete I/O	1024
		In-rack analog I/O	128
		Applications (counting, axis, etc.)	32
	Maximum number of connections	Built-in UNI-TELWAY (terminal port)	1
		Network (ETHWAY, FIPWAY, Modbus Plus, Ethernet)	3
		Master FIPIO (built-in)	127
		Third party field bus	2
		AS-i field bus	8
	Savable real-time clock		yes

Reference	**TSX P57 353**		
			
Memory capacity	Processor internal RAM		80K16/96K16(1)
	PCMCIA memory card (maximum capacity)	Application area	384K16
		Symbol Zone	256K16
		File area	640K16 channel 0 + 2048K16 channel 1
Application structure	Master task		1
	Fast task		1
	Event processing (of which 1 has priority)		64
Application code execution time for a 1K instruction	Internal RAM	100% Boolean	0.15ms
		65% Boolean + 35% digital	0.21ms
	PCMCIA card	100% Boolean	0.22ms
		65% Boolean + 35% digital	0.32ms
System overhead	MAST task	without using the FIPIO bus	1 ms
		using the FIPIO bus	1 ms
	FAST task		0.25 ms

(1) 1st figure when the application is in internal RAM, 2nd figure when the application is in card memory.

fixed I/O profile (2): the number of discrete I/Os, and application-specific and analog channels can be accumulated.

TSX P57 353A processor

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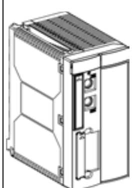
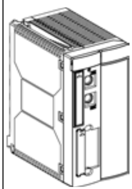
General characteristics of TSX P57 353A processors

TSX P57 353A processor

The following table gives the general characteristics of the TSX P 57 353A processor.

Reference	TSX P57 353A		
			
Maximum configuration	Maximum number of TSX RKY 12EX racks		8
	Maximum number of TSX RKY 4EX/6EX/8EX racks		16
	Maximum number of slots	with TSXRKY 12EX	86
		with TSXRKY 4EX, 6EX, 8EX	110

Reference	**TSX P57 353A**		
			
Functions	I/O profile (2)		fixed
	Maximum number of channels	In-rack discrete I/O	1024
		In-rack analog I/O	128
		Applications (counting, axis, etc.)	32
	Maximum number of connections	Built-in UNI-TELWAY (terminal port)	1
		Network (ETHWAY, FIPWAY, Modbus Plus, Ethernet)	3
		Master FIPIO (built-in)	127
		Third party field bus	2
		AS-i field bus	8
	Savable real-time clock		yes
Memory capacity	Processor internal RAM		80K16/96K16(1)
	PCMCIA memory card (maximum capacity)	Application area	384K16
		Symbol Zone	256K16
		File area	640K16 channel 0 + 2048K16 channel 1
Application structure	Master task		1
	Fast task		1
	Event processing (of which 1 has priority)		64
Application code execution time for a 1K instruction	Internal RAM	100% Boolean	0.15ms
		65% Boolean + 35% digital	0.21ms
	PCMCIA card	100% Boolean	0.22ms
		65% Boolean + 35% digital	0.32ms
System overhead	MAST task	without using the FIPIO bus	1.15 ms
		using the FIPIO bus	1.15 ms
	FAST task		0.29 ms

(1) 1st figure when the application is in internal RAM, 2nd figure when the application is in card memory.

fixed I/O profile (2): the number of discrete I/Os, and application-specific and analog channels can be accumulated.

TSX P57 353LA Processor

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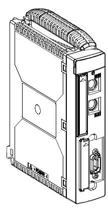
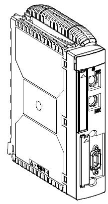
General Characteristics of TSX P57 353LA Processors

TSX P57 353LA Processor

The following table gives the general characteristics of the TSX P 57 353LA processor.

Reference	TSX P57 353LA		
			
Maximum configuration	Maximum number of TSX RKY 12EX racks		8
	Maximum number of TSX RKY 4EX/6EX/8EX racks		16
	Maximum number of slots	with TSXRKY 12EX	86
		with TSXRKY 4EX, 6EX, 8EX	110

Reference	TSX P57 353LA		
			
Functions	I/O profile (2)		fixed
	Maximum number of channels	In-rack discrete I/O	1024
		In-rack analog I/O	128
		Applications (counting, axis, etc.)	32
	Maximum number of connections	Built-in UNI-TELWAY (terminal port)	1
		Network (ETHWAY, FIPWAY, Modbus Plus, Ethernet)	3
		Master FIPIO (built-in)	127
		Third party field bus	2
		AS-i field bus	8
	Savable real-time clock		yes
Memory capacity	Processor internal RAM		80K16/96K16(1)
	PCMCIA memory card (maximum capacity)	Application area	384K16
		Symbol Zone	256K16
		File area	640K16 channel 0 + 2048K16 channel 1
Application structure	Master task		1
	Fast task		1
	Event processing (of which 1 has priority)		64
Application code execution time for a 1K instruction	Internal RAM	100% Boolean	0.21 ms
		65% Boolean + 35% digital	0.28 ms
	PCMCIA card	100% Boolean	0.27 ms
		65% Boolean + 35% digital	0.40 ms
System overhead	MAST task	without using the FIPIO bus	1 ms
		using the FIPIO bus	1.2 ms
	FAST task		0.35 ms

(1) 1st figure when the application is in internal RAM, 2nd figure when the application is in card memory.

fixed I/O profile (2): the number of discrete I/Os, and application-specific and analog channels can be accumulated.

TSX P57 3623 processor

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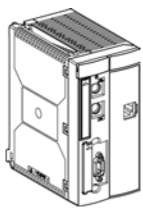
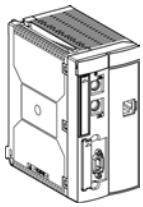
TSX P57 3623 Processors: General Characteristics

TSX P57 3623 Processor

The following table gives the general characteristics of the TSX P 57 3623 processor.

<table>
<tr><th>Reference</th><th colspan="3">TSX P57 3623</th></tr>
<tr><td></td><td colspan="3"></td></tr>
<tr><td rowspan="4">Maximum configuration</td><td colspan="2">Maximum number of TSX RKY 12EX racks</td><td>8</td></tr>
<tr><td colspan="2">Maximum number of TSX RKY 4EX/6EX/8EX racks</td><td>16</td></tr>
<tr><td rowspan="2">Maximum number of slots</td><td>with TSXRKY 12EX</td><td>86</td></tr>
<tr><td>with TSXRKY 4EX, 6EX, 8EX</td><td>110</td></tr>
</table>

Reference	TSX P57 3623		
			
Functions	I/O profile (2)		fixed
	Maximum number of channels	In-rack discrete I/O	1024
		In-rack analog I/O	128
		Applications (counting, axis, etc.)	32
	Maximum number of connections	Built-in UNI-TELWAY (terminal port)	1
		Network (ETHWAY, FIPWAY, Modbus Plus, embedded Ethernet (3))	3
		Master FIPIO (built-in)	-
		Third party field bus	2
		AS-i field bus	8
	Savable real-time clock		yes
Memory capacity	Processor internal RAM		80K16/96K16(1)
	PCMCIA memory card (maximum capacity)	Application area	384K16
		Symbol Zone	256K16
		File area	640K16 channel 0 + 2048K16 channel 1
Application structure	Master task		1
	Fast task		1
	Event processing (of which 1 has priority)		64
Application code execution time for a 1K instruction	Internal RAM	100% Boolean	0.15 ms
		65% Boolean + 35% digital	0.21 ms
	PCMCIA card	100% Boolean	0.22 ms
		65% Boolean + 35% digital	0.32 ms
System overhead	MAST task		1 ms
	FAST task		0.25 ms

(1) 1st figure when the application is in internal RAM, 2nd figure when the application is in card memory.

(2) Fixed I/O profile: the number of discrete I/Os, and application-specific and analog channels can be accumulated.

(3) One of which is occupied by the TSX ETY PORT of the CPU.

TSX P57 3623A processor

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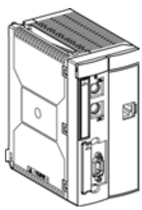
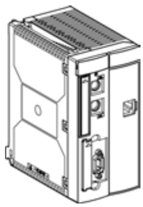
TSX P57 3623A Processors: General Characteristics

TSX P57 3623A Processor

The following table gives the general characteristics of the TSX P 57 3623A processor.

<table>
<tr><th>Reference</th><th colspan="3">TSX P57 3623A</th></tr>
<tr><td></td><td colspan="3"></td></tr>
<tr><td rowspan="4">Maximum configuration</td><td colspan="2">Maximum number of TSX RKY 12EX racks</td><td>8</td></tr>
<tr><td colspan="2">Maximum number of TSX RKY 4EX/6EX/8EX racks</td><td>16</td></tr>
<tr><td rowspan="2">Maximum number of slots</td><td>with TSXRKY 12EX</td><td>86</td></tr>
<tr><td>with TSXRKY 4EX, 6EX, 8EX</td><td>110</td></tr>
</table>

Reference	TSX P57 3623A		
			
Functions	I/O profile (2)		fixed
	Maximum number of channels	In-rack discrete I/O	1024
		In-rack analog I/O	128
		Applications (counting, axis, etc.)	32
	Maximum number of connections	Built-in UNI-TELWAY (terminal port)	1
		Network (ETHWAY, FIPWAY, Modbus Plus, embedded Ethernet (3))	3
		Master FIPIO (built-in)	-
		Third party field bus	2
		AS-i field bus	8
	Savable real-time clock		yes
Memory capacity	Processor internal RAM		80K16/96K16(1)
	PCMCIA memory card (maximum capacity)	Application area	384K16
		Symbol Zone	256K16
		File area	640K16 channel 0 + 2048K16 channel 1
Application structure	Master task		1
	Fast task		1
	Event processing (of which 1 has priority)		64
Application code execution time for a 1K instruction	Internal RAM	100% Boolean	0.15 ms
		65% Boolean + 35% digital	0.21 ms
	PCMCIA card	100% Boolean	0.22 ms
		65% Boolean + 35% digital	0.32 ms
System overhead	MAST task		1.15 ms
	FAST task		0.29 ms

(1) 1st figure when the application is in internal RAM, 2nd figure when the application is in card memory.

(2) Fixed I/O profile: the number of discrete I/Os, and application-specific and analog channels can be accumulated.

(3) One of which is occupied by the TSX ETY PORT of the CPU.

TSX P57 453 processor

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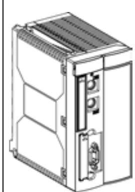
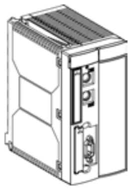
General characteristics of TSX P57 453 processors

TSX P57 453 processor

The following table gives the general characteristics of the TSX P 57 453 processor.

Reference	**TSX P57 453**		
			
Maximum configuration	Maximum number of TSX RKY 12EX racks		8
	Maximum number of TSX RKY 4EX/6EX/8EX racks		16
	Maximum number of slots	with TSXRKY 12EX	86
		with TSXRKY 4EX, 6EX, 8EX	110
Functions	I/O profile (2)		flexible
	Maximum number of channels	In-rack discrete I/O	2048
		In-rack analog I/O	256
		Applications (counting, axis, etc.)	64
	Maximum number of connections	Built-in UNI-TELWAY (terminal port)	1
		Network (ETHWAY, FIPWAY, Modbus Plus, Ethernet)	4
		Master FIPIO (built-in)	127
		Third party field bus	2
		AS-i field bus	8
	Savable real-time clock		yes

<table>
<tr><th>Reference</th><th colspan="3">TSX P57 453</th></tr>
<tr><td></td><td colspan="3"></td></tr>
<tr><td rowspan="4">Memory capacity</td><td colspan="2">Processor internal RAM</td><td>96K16/176K16(1)</td></tr>
<tr><td rowspan="3">PCMCIA memory card (maximum capacity)</td><td>Application area</td><td>512K16</td></tr>
<tr><td>Symbol Zone</td><td>256K16</td></tr>
<tr><td>File area</td><td>640K16 channel 0 + 2048K16 channel 1</td></tr>
<tr><td rowspan="3">Application structure</td><td colspan="2">Master task</td><td>1</td></tr>
<tr><td colspan="2">Fast task</td><td>1</td></tr>
<tr><td colspan="2">Event processing (of which 1 has priority)</td><td>64</td></tr>
<tr><td rowspan="4">Application code execution time for a 1K instruction</td><td rowspan="2">Internal RAM</td><td>100% Boolean</td><td>0.07ms</td></tr>
<tr><td>65% Boolean + 35% digital</td><td>0.11ms</td></tr>
<tr><td rowspan="2">PCMCIA card</td><td>100% Boolean</td><td>0.07ms</td></tr>
<tr><td>65% Boolean + 35% digital</td><td>0.11ms</td></tr>
<tr><td rowspan="2">System overhead</td><td colspan="2">MAST task</td><td>1 ms</td></tr>
<tr><td colspan="2">FAST task</td><td>0.20 ms</td></tr>
</table>

(1) 1st figure when the application is in internal RAM, 2nd figure when the application is in card memory.

flexible I/O profile (2): the maximum number of discrete I/Os, and application-specific and analog channels cannot be accumulated. These area distributed according to a formula.

TSX P57 453A processor

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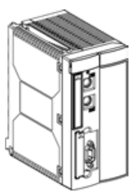
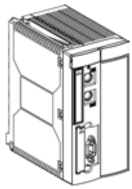
General characteristics of TSX P57 453A processors

TSX P57 453A processor

The following table gives the general characteristics of the TSX P 57 453A processor.

<table>
<tr><th>Reference</th><th colspan="3">TSX P57 453A</th></tr>
<tr><td></td><td colspan="3"></td></tr>
<tr><td rowspan="4">Maximum configuration</td><td colspan="2">Maximum number of TSX RKY 12EX racks</td><td>8</td></tr>
<tr><td colspan="2">Maximum number of TSX RKY 4EX/6EX/8EX racks</td><td>16</td></tr>
<tr><td rowspan="2">Maximum number of slots</td><td>with TSXRKY 12EX</td><td>86</td></tr>
<tr><td>with TSXRKY 4EX, 6EX, 8EX</td><td>110</td></tr>
</table>

Reference	**TSX P57 453A**		
			
Functions	I/O profile (2)		flexible
	Maximum number of channels	In-rack discrete I/O	2048
		In-rack analog I/O	256
		Applications (counting, axis, etc.)	64
	Maximum number of connections	Built-in UNI-TELWAY (terminal port)	1
		Network (ETHWAY, FIPWAY, Modbus Plus, Ethernet)	4
		Master FIPIO (built-in)	127
		Third party field bus	2
		AS-i field bus	8
	Savable real-time clock		yes
Memory capacity	Processor internal RAM		96K16/176K16(1)
	PCMCIA memory card (maximum capacity)	Application area	512K16
		Symbol Zone	256K16
		File area	640K16 channel 0 + 2048K16 channel 1
Application structure	Master task		1
	Fast task		1
	Event processing (of which 1 has priority)		64
Application code execution time for a 1K instruction	Internal RAM	100% Boolean	0.07ms
		65% Boolean + 35% digital	0.11ms
	PCMCIA card	100% Boolean	0.07ms
		65% Boolean + 35% digital	0.11ms
System overhead	MAST task		1.15 ms
	FAST task		0.23 ms

(1) 1st figure when the application is in internal RAM, 2nd figure when the application is in card memory.

flexible I/O profile (2): the maximum number of discrete I/Os, and application-specific and analog channels cannot be accumulated. These area distributed according to a formula.

TSX P57 4823 processor

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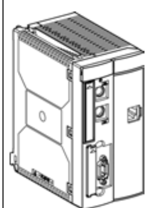
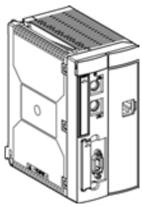
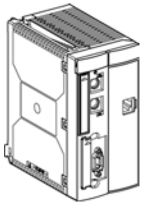
TSX P57 4823 Processors: General Characteristics

TSX P57 4823 Processor

The following table gives the general characteristics of the TSX P 57 4823 processor.

Reference	TSX P57 4823		
			
Maximum configuration	Maximum number of TSX RKY 12EX racks		8
	Maximum number of TSX RKY 4EX/6EX/8EX racks		16
	Maximum number of slots	with TSXRKY 12EX	86
		with TSXRKY 4EX, 6EX, 8EX	110

Reference	**TSX P57 4823**		
			
Functions	I/O profile (2)		flexible
	Maximum number of channels	In-rack discrete I/O	2048
		In-rack analog I/O	256
		Applications (counting, axis, etc.)	64
	Maximum number of connections	Built-in UNI-TELWAY (terminal port)	1
		Network (ETHWAY, FIPWAY, Modbus Plus, embedded Ethernet (3))	4
		FIPIO master (built-in), number of devices	127
		Third party field bus	2
		AS-i field bus	8
	Savable real-time clock		yes
Memory capacity	Processor internal RAM		96K16/176K16(1)
	PCMCIA memory card (maximum capacity)	Application area	512K16
		Symbol Zone	256K16
		File area	640K16 channel 0 + 2048K16 channel 1
Application structure	Master task		1
	Fast task		1
	Event processing (of which 1 has priority)		64
Application code execution time for a 1K instruction	Internal RAM	100% Boolean	0.07ms
		65% Boolean + 35% digital	0.11ms
	PCMCIA card	100% Boolean	0.07ms
		65% Boolean + 35% digital	0.11ms

Reference	TSX P57 4823	
		
System overhead	MAST task	1 ms
	FAST task	0.19 ms

(1) 1st figure when the application is in internal RAM, 2nd figure when the application is in card memory.

(2) Flexible I/O profile: the maximum number of discrete I/Os, and application-specific and analog channels cannot be accumulated. These area distributed according to a formula.

(3) One of which is occupied by the TSX ETY PORT of the CPU.

TSX P57 4823A processor

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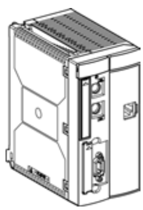
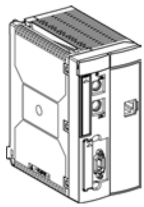
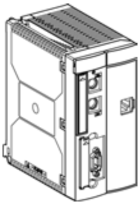
TSX P57 4823A Processors: General Characteristics

TSX P57 4823A Processor

The following table gives the general characteristics of the TSX P 57 4823A processor.

<table>
<tr><th>Reference</th><th colspan="3">TSX P57 4823A</th></tr>
<tr><td></td><td colspan="3"></td></tr>
<tr><td rowspan="4">Maximum configuration</td><td colspan="2">Maximum number of TSX RKY 12EX racks</td><td>8</td></tr>
<tr><td colspan="2">Maximum number of TSX RKY 4EX/6EX/8EX racks</td><td>16</td></tr>
<tr><td rowspan="2">Maximum number of slots</td><td>with TSXRKY 12EX</td><td>86</td></tr>
<tr><td>with TSXRKY 4EX, 6EX, 8EX</td><td>110</td></tr>
</table>

Reference	**TSX P57 4823A**		
			
Functions	I/O profile (2)		flexible
	Maximum number of channels	In-rack discrete I/O	2048
		In-rack analog I/O	256
		Applications (counting, axis, etc.)	64
	Maximum number of connections	Built-in UNI-TELWAY (terminal port)	1
		Network (ETHWAY, FIPWAY, Modbus Plus, embedded Ethernet (3))	4
		FIPIO master (built-in), number of devices	127
		Third party field bus	2
		AS-i field bus	8
	Savable real-time clock		yes
Memory capacity	Processor internal RAM		96K16/176K16(1)
	PCMCIA memory card (maximum capacity)	Application area	512K16
		Symbol Zone	256K16
		File area	640K16 channel 0 + 2048K16 channel 1
Application structure	Master task		1
	Fast task		1
	Event processing (of which 1 has priority)		64
Application code execution time for a 1K instruction	Internal RAM	100% Boolean	0.07ms
		65% Boolean + 35% digital	0.11ms
	PCMCIA card	100% Boolean	0.07ms
		65% Boolean + 35% digital	0.11ms

Reference	**TSX P57 4823A**	
		
System overhead	MAST task	1.15 ms
	FAST task	0.22 ms

(1) 1st figure when the application is in internal RAM, 2nd figure when the application is in card memory.

(2) Flexible I/O profile: the maximum number of discrete I/Os, and application-specific and analog channels cannot be accumulated. These area distributed according to a formula.

(3) One of which is occupied by the TSX ETY PORT of the CPU.

Premium TSX P57/TSX H57 processor: general characteristics

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At a Glance

Aim of this Chapter

The aim of this Chapter is to introduce the characteristics of devices that can be used when installing a TSX P57/TSX H57 station.

What's in this Chapter?

This chapter contains the following topics:

Electrical Characteristics of TSX P57 Processors

General

As the processors can be fitted with certain devices which do not have their own power supply, the consumption of these devices must be taken into account when establishing a global breakdown of power consumption.

- Devices without their own power supply which can be connected to the terminal port:
  - adjustment terminal: **T FTX 117 ADJUST**,
  - TSX P ACC01 unit for connecting to the UNI-TELWAY bus.
- Devices without their own power supply which can be built into the processor:
  - PCMCIA communication cards TSX FPP 10/20,
  - PCMCIA communication card TSX SCP 111/112/114,
  - PCMCIA communication card TSX MBP 100,

Power Consumption

This table shows the consumption of the TSX PSY supply module at 5VDC:

Processor + PCMCIA memory card	Typical consumption	Maximum consumption
TSX P57 103	440 mA	610 mA
TSX P57 153	530 mA	740 mA
TSX P57 203	750 mA	1050 mA
TSX P57 253/353LA	820 mA	1140 mA
TSX P57 2623	1110 mA	1450 mA
TSX P57 2823	1180 mA	1540 mA
TSX P57 303/303A	1000 mA	1400 mA
TSX P57 353/353A	1060 mA	1480 mA
TSX P57 3623/3623A	1360 mA	1800 mA
TSX P57 453/453A	1080 mA	1510 mA
TSX P57 4823/4823A	1440 mA	1910 mA

Dissipated Power

This table states the dissipated power for **TSX P57** processors:

Processor + PCMCIA memory card	typical	maximum
TSX P57 103	2.2 W	3.1 W
TSX P57 153	2.7 W	3.7 W
TSX P57 203	3.8 W	5.3 W
TSX P57 253/353LA	4.1 W	5.7 W
TSX P57 2623	5.6 W	7.4 W
TSX P57 2823	5.9 W	7.8 W
TSX P57 303/303A	5.0 W	7.0 W
TSX P57 353/353A	5.3 W	7.4 W
TSX P57 3623/3623A	6.8 W	9.1 W
TSX P57 453/453A	5.4 W	7.6 W
TSX P57 4823/4823A	7.2 W	9.7 W

Configuration of Premium PL7 Processors

Specifications

A Premium processor comprises:

- selection of processor
- a dedicated command control processor.

The following table gives the general characteristics of the TSXP570244 processors:

TSXP57454 processor	Original processor	General usage processor frequency (MHz)	Dedicated command control processor	Frequency of the dedicated command control processor (MHz).
TSX P57 103	-	-	SONIX	48
TSX P57 153	-	-	SONIX	48
TSX P57 203	INTEL or AMD 486	48	SONIX	48
TSX P57 253	INTEL or AMD 486	48	SONIX	48
TSX P57 2623	INTEL or AMD 486	48	SONIX	48
TSX P57 2823	INTEL or AMD 486	48	SONIX	48
TSX P57 303	INTEL or AMD 486	72	SONIX	48
TSX P57 303A	INTEL or AMD 486	72	SONIX	48
TSX P57 353	INTEL or AMD 486	72	SONIX	48
TSX P57 353A	INTEL or AMD 486	72	SONIX	48
TSX P57 353LA	INTEL or AMD 486	48	SONIX	48
TSX P57 3623	INTEL or AMD 486	72	SONIX	48
TSX P57 3623A	INTEL or AMD 486	72	SONIX	48
TSX P57 453	INTEL or AMD 486	96	SONIX	48
TSX P57 453A	INTEL or AMD 486	96	SONIX	48
TSX P57 4823	INTEL or AMD 486	96	SONIX	48
TSX P57 4823A	INTEL or AMD 486	96	SONIX	48

Devices which can be connected to or built into the processor

Tables of consumption and dissipated power

Consumption:

Consumption at 5VDC from the power supply module TSX PSY ...		Typical	Maximum
Devices without their own power supply which can be connected to the terminal port (TER)	TFTX 117 ADJUST	310mA	340 mA
	TSXPACC01	150mA	250 mA
PCMCIA communication card which can be built into the processor	TSXFPP10	330 mA	360 mA
	TSXFPP20	330 mA	360 mA
	TSXSCP111	140 mA	300 mA
	TSXSCP112	120 mA	300 mA
	TSXSCP114	150 mA	300 mA
	TSXMBP100	220 mA	310 mA

Dissipated power:

Dissipated power		Typical	Maximum
Devices without their own power supply which can be connected to the terminal port (TER)	TFTX 117 ADJUST	1.5 W	1.7 W
	TSXPACC01	0.5 W	1.25 W
PCMCIA communication card which can be built into the processor	TSXFPP10	1.65 W	1.8 W
	TSXFPP20	1.65 W	1.8 W
	TSXSCP111	0.7 W	1.5 W
	TSXSCP112	0.6 W	1.5 W
	TSXSCP114	0.75 W	1.5 W
	TSXMBP100	1.1 W	1.55 W

Defining and counting application-specific channels

Summary table

Applications:

Application		**Module/card**	**Application-specific channels**	**Number**
Counting		TSXCTY2A	Yes	2
		TSXCTY2C	Yes	2
		TSXCTY4A	Yes	4
Movement control		TSXCAY21	Yes	2
		TSXCAY41	Yes	4
		TSXCAY22	Yes	2
		TSXCAY42	Yes	4
		TSXCAY33	Yes	3
		TSXCSY84	Yes	32
Step by step control		TSXCFY11	Yes	1
		TSXCFY21	Yes	2
Weighing		TSXISPY100	Yes	2
Communication Serial link		TSXSCP11. in the processor	No	0(*)
		TSXSCP11. in the TSXSCY21.	Yes	1
		TSXSCP11. in the TSXSCY21.	Yes	1
		TSXSCY 21 (built-in channel)	Yes	1
	FIPIO agent	TSXFPP10 in the processor	No	0(*)
	Master FIPIO	Built into the processor	No	0(*)

(*) Although these channels are application-specific, they should not be taken into account when calculating the maximum number of application-specific channels which can be supported by the processor.

Note: Only channels configured from PL7 Junior or PL7 Pro software can be counted.

Processor performance

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At a Glance

Aim of this Chapter

This Chapter describes processor performance.

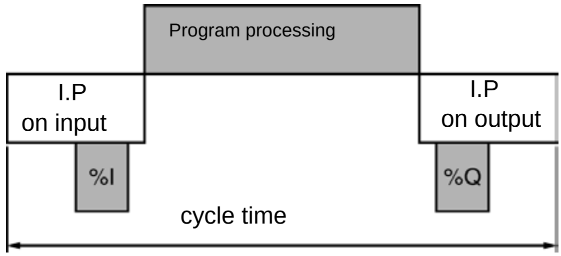
What's in this Chapter?

This chapter contains the following topics:

MAST task cycle time: introduction

Explanatory diagram

The following diagram describes the MAST task cycle time:



IP = internal

MAST CYCLE TIME = Program processing time (Ppt) + input/output internal processing time (Ipt):

MAST Task Cycle Time: Program Processing Ppt

Definition of Ppt Program Processing Time

Ppt = Application code execution time (Apcet) + Grafcet overhead time (OtG7).

Application Code Execution Time (Apcet)

Apcet = sum of the times of each instruction carried out by the application program in each cycle.

The execution time of each instruction as well as the type of application which was used to check them are given in the PL7 reference manual.

The table opposite gives the execution times in milliseconds (ms) for a 1K instruction (1024 instructions):

Processors	**Application code execution time Apcet (1)**			
	Internal RAM		**PCMCIA card**	
	100% Boolean	65% Boolean + 35% numerical	100% Boolean	65% Boolean + 35% numerical
TSX P57 103 TSX P57 153	0.66 ms	0.95 ms	0.83 ms	1.18 ms
TSX P57 2•3/2•23/ 353LA TPCX 57 203	0.21 ms	0.28 ms	0.27 ms	0.40 ms
TSX P57 3•3/3•3A/ 3623/3623A TPCX 57 353	0.15 ms	0.21 ms	0.22 ms	0.32 ms
TSX P57 453/453A/ 4823/4823A	0.07 ms	0.11 ms	0.07 ms	0.11 ms

(1) with all the instructions executed in each PLC cycle.

Grafcet Overhead Time (OtG7)

OtG7 = GFT + (AST x number of simultaneous active steps) + (OTT x number of transitions occurring simultaneously).

Summary table:

Processors	**GFT**	**AST**	**OTT**
TSX P57 103 TSX P57 153	0.243 ms	0.088 ms	0.359 ms
TSX P57 2•3/2•23/353LA TPCX 57 203	0.075 ms	0.029 ms	0.109 ms
TSX P57 3•3/3•3A/3623/3623A TPCX 57,353	0.047 ms/ 0.054 ms (A)	0.018 ms/ 0.021 ms (A)	0.069 ms/ 0.079 ms (A)
TSX P57 453/453A//4823/4823A	0.039 ms/ 0.045 ms (A)	0.015 ms/ 0.017 ms (A)	0.058 ms/ 0.067 ms (A)

GFT: Grafcet time

AST: active step time

OTT: occurring transition time

MAST Task Cycle Time: Input/Output Internal Processing

Definition of Input and Output Internal Processing Time (Ipt)

Ipt = MAST task overhead system time (Mtost)
+
max [receiving communication system Time (rcomT); management time on input of implicit I/O %I (mTi%I)]
+
max [sending communication system Time (scomT); management time on output of implicit I/O %Q (Mto%Q)]

MAST Task Overhead System Time (Mtost)

Summary table:

Processors	Time without FIPIO application	Time with FIPIO application
TSX 57 103	1.5 ms	-
TSX 57 153	1.5 ms	3.1 ms
TSX P57 203 / 2623 TPCX 57 203	1 ms	-
TSX P57 253/2823/353LA	1 ms	1.2 ms
TSX P57 303/303A/3623/3623A	1 ms/ 1.15 ms (A)	-
TSX P57 353/353A TPCX 57 353	1 ms/ 1.15 ms (A)	1 ms/ 1.15 ms (A)
TSX P57 453/453A/4823/4823A	1 ms/ 1.15 ms (A)	1 ms/ 1.15 ms (A)

Management Time on Input/ Output of Implicit I/O %I and %Q

mTi%I = 60 micro seconds + sum of the IN times of each module.

mTo%Q = 60 micro seconds + sum of the OUT times of each module.

Management time on input (IN) and on output (OUT) for each module:

Type of module	Management time		
	On input (IN)	On output (OUT)	Total (IN+OUT)
8 channel discrete inputs	27 µs	-	27 µs
16 channel discrete inputs (all modules except TSX DEY 16FK)	27 µs	-	27 µs
32 channel discrete inputs	48 µs	-	48 µs
64 channel discrete inputs	96 µs	-	96 µs
Fast discrete inputs (8 channels used) (module TSX DEY 16FK/TSXDMY 28FK)	29 µs	16 µs	45 µs
Fast discrete inputs (16 channels used) (module TSX DEY 16FK/TSXDMY 28FK/ 28RFK)	37 µs	22 µs	59 µs
8 channel discrete outputs	26 µs	15 µs	41 µs
16 channel discrete outputs	33 µs	20 µs	53 µs
32 channel discrete outputs	47 µs	30 µs	77 µs
64 channel discrete outputs	94 µs	60 µs	154 µs
Analog inputs (in groups of 4 channels)	84 µs	-	84 µs
Analog outputs (4 channels)	59 µs	59 µs	118 µs
Counting (TSX CTY 2A/4A), by channel	55 µs	20 µs	75 µs
Counting (TSX CTY 2C), by channel	65 µs	21 µs	86 µs
Step by step control (TSX CFY **..**), by channel	75 µs	20 µs	95 µs
Axis control (TSX CAY **..**), by channel	85 µs	22 µs	107 µs

Note: Discrete input/output module times are given in the theory that all channels of the module are assigned to the same task.
Example: using module TSX DEY 32 D2 K
- if the 32 channels are assigned to the same task, use the «32 channel discrete inputs» time,
- if only 16 channels are assigned to the same task, use the «16 channel discrete inputs» time and not the «32 channel discrete input» time divided by 2.

Communication System Time

Communication (except telegram) is made during MAST task «Internal Processing» phases:

- on input for receiving messages (rcomT),
- on outputs for sending messages (scomT).

The MAST task cycle time is therefore affected by communication traffic. Communication time through each cycle varies considerably according to:

- traffic generated by the processor: the number of simultaneously active communication EF,
- traffic generated from other devices to the processor or for which the processor provides a traffic routing function like the master.

This time only occurs in the cycles where there is a new message to be managed.

Examples of Communication System Time

Terminal connected to PL7 Junior software and open animation table

Processors	Average time per cycle	Maximum time per cycle
TSX P57 103 / 153	2.5 ms	3.5 ms
TSX P57 2•3/2•23/353LA TPCX 57 203	2 ms	2.5 ms
TSX P57 3•3/3•3A/3623/3623A TPCX 57 353	1.3 ms / 1.4 ms (A)	1.8 ms / 2.1 ms (A)
TSX P57 453/453A/4823/4823A	1 ms / 1.1 ms (A)	1.5 ms / 1.7 ms (A)

1 OF SEND_RQ (mirror request, 100 characters)

Instruction execution time: 0.5 ms (for a TSX P57 203 processor), to be included in the application code execution time for cycles where the EF is executed in real-time.

Communication System Time

Data table:

Processors	Sending time	Receiving time
TSX P57 103 / 153	800 µs	800 µs
TSX P57 2•3/2•23/353LA TPCX 57 203	220 µs	220 µs
TSX P57 3•3/3•3A/3623/3623A TPCX 57 353	150 µs / 170 µs (A)	150 µs / 170 µs (A)
TSX P57 453/453A/4823/4823A	120 µs / 140 µs (A)	120 µs / 140 µs (A)

Note: These times cannot be combined in the same cycle. Transmission occurs in the same cycle as instruction execution as long as communication traffic remains light, but the reply is not received in the same cycle.

Example of the calculation of cycle times of a MAST task under the following conditions

Introduction

An application with the following characteristics:

- TSX P57 203 processor,
- Execution of a program in PLC internal RAM,
- 10 K instructions: 65% Boolean + 35% numerical,
- 1 OF communication type SEND_REQ,
- 128 discrete inputs distributed over: 7 TSX DEY 16D2 modules + 1 TSX DEY 16FK module,
- 80 discrete outputs distributed over: 5 TSX DSY 16T2 modules,
- 32 analog inputs distributed over: 2 TSX AEY 1600 modules,
- 16 analog outputs distributed over: 4 TSX ASY 410 modules,
- 2 counting channels distributed over: 1 TSX CTY 2A module.

Calculation of the different times

Application code execution time (APCET):

- without communication OF: 10 x 0.28 = 2.8 ms
- with 1 OF of SEND_REQ type communication (execution of an EF = 2 ms) = (10x0.28) + 2 = 4.8 ms

Overhead system time (Ost) = 1ms

Input and output management time for implicit I/O %I and %Q:

Module product references	Module type	Number of modules	Input management time (IN)	Output management time (OUT)
TSX DEY 16D2	16 channel discrete inputs	7	238 micro seconds	-
TSX DEY 16 FK	16 channel discrete inputs (fast inputs)	1	37 micro seconds	22 micro seconds
TSX DSY 16T2	16 channel discrete outputs	5	165 micro seconds	100 micro seconds
TSX AEY 1600	Analog inputs	2 (32 channels)	672 micro seconds	-
TSX ASY 410	Analog outputs	4 (16 channels)	236 micro seconds	236 micro seconds
TSX CTY 2A	Counting	1 (2 channels)	110 micro seconds	40 micro seconds
Total management time			1458 micro seconds	398 micro seconds

Input management time: Imt%I = 60 microseconds + 1458 microseconds = 1518 microseconds = 1.52 ms.

Output management time: Omt%Q = 60 microseconds +398 microseconds = 458 microseconds = 0.46 ms.

Communication system time:

- Sending a request: scomT = 0.22 ms,
- Receiving the reply: rcomT = 0.22 ms.

Cycle time without execution of the communication OF

TcyM = Apcet + Most + Imt%I + Omt%Q

= 2.8 ms +1 ms + 1.52 ms + 0.46 ms = 5.78 ms

Cycle time with execution of the communication OF and sending of the request

McyT = Apcet + Texec EF + Most +Imt%I + Omt%Q + scomT

= 2.8 ms + 2 ms + 1 ms + 1.52 ms + 0.46 ms + 0.22ms = 8 ms

Cycle time with reception of reply

Mcyt = Apcet + Texec EF + Most +Imt%I + Omt%Q + rcomT

= 2.8 ms + 2 ms + 1 ms + 1.52 ms + 0.46 ms + 0.22ms = 8 ms

FAST Task Cycle Time

Definition

FAST cycle time = Program processing time (Ppt) + input and output internal processing time (Ipt).

Definition of Ppt Program Processing Time

Ppt = Application code execution time relative to the FAST (Apcet).

Application code execution time: see *Application Code Execution Time (Apcet), p. 273*.

Definition of Input and Output Internal Processing Time (Ipt)

Ipt = FAST task overhead system time + input and output management time for implicit I/O %I and %Q.

FAST task overhead system time (FosT)

Processors	FAST task overhead system time
TSX P57 103 PCX 57 203	0.8 ms
TSX P57 2•3/2•23/353LA TSX P57 3•3/3•3A/3623/3623A PCX 57 353	0.6 ms/ 0.69 ms (A)
TSX P57 453/453A/4823/4823A	0.2 ms / 0.23 ms (A)

Input and output management time for implicit I/O %I and %Q: see *MAST Task Cycle Time: Input/Output Internal Processing, p. 275*.

Event Response Time

General

Definition: time between an edge on an event input and the corresponding edge on an output positioned by the program in the event task.

Example: program with 100 Boolean instructions and input module TSX DEY 16 FK

Processors	**Response time**					
	Module TSX DSY 08T22			**Module TSX DSY 32T2K**		
	Minimum	Typical	Maximum	Minimum	Typical	Maximum
TSX P57 103 PCX 57 203	1.2 ms	1.3 ms	2.8 ms	1.9 ms	2.4 ms	4.2 ms
TSX P57 2•3/2•23/353LA TSX P57 3•3/3•3A/3623/3623A PCX 57 353	1 ms / 1.1 ms (A)	1.1 ms / 1.2 ms (A)	2.2 ms / 2.4 ms (A)	1.8 ms / 2 ms (A)	2.2 ms / 2.4 ms (A)	3.7 ms / 4.1 ms (A)
TSX P57 453/453A/4823/4823A	0.7 ms / 0.8 ms (A)	0.8 ms / 0.9 ms (A)	0.8 ms / 0.9 ms (A)	1.5 ms / 1.7 ms (A)	1.9 ms / 2.1 ms (A)	2.1 ms / 2.3 ms (A)

Atrium PCX 57 processors

IV

At a Glance

Aim of this Part

The aim of this Part is to describe PCX 57 processors and their installation.

What's in this Part?

This part contains the following chapters:

PCX 57 Processors: introduction

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At a Glance

Aim of this Chapter

The aim of this Chapter is to introduce PCX 57 processors.

What's in this Chapter?

This chapter contains the following topics:

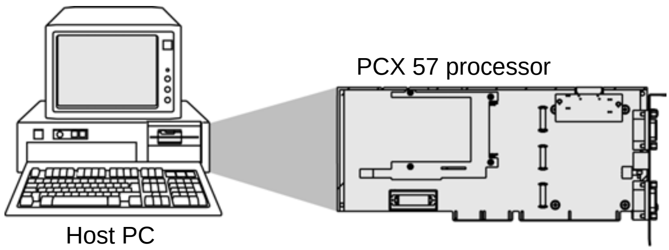
General introduction

At a Glance

Integrated into a host PC (1) running Windows 95/98/2000 or Windows NT with a 16-bit ISA bus, PCX 57 processors manage, using PL7 Junior or PL7 Pro software, a complete PLC station made up of racks, discrete input/output modules, analog input/output modules and application modules, which can be distributed over one or more racks connected to an bus X.

Note: The PCX 57 processor communicates with the PC in which it is installed via the 16-bit ISA bus. To do this, a communication driver (**ISAWAY 95/98/2000 or ISAWAY NY** must be installed.

Illustration



Two types of processor are available to meet your different requirements:

- **PCX 57 203 processor:** a processor with specifications and performance identical to the TSX P57 203 processor,
- **PCX 57 353 processor:** a processor with specifications and performance identical to the TSX P57 353 processor.

Characteristics of the host PC

To support a PCX 57 processor, the host PC must:

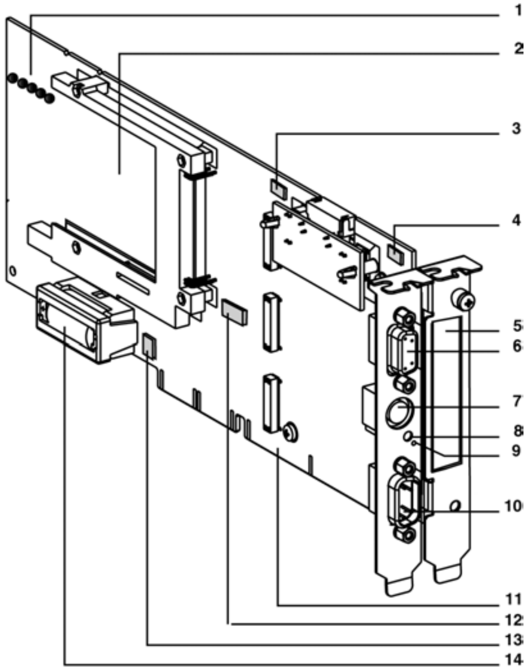
- operate under Windows 95/98 or Windows NT,
- have a 16-bit 8 MHz ISA bus,
- have two standard slots available on the ISA bus (consecutive and 20.32mm apart), of sufficient height and width.
  As the shape of the PCX 57 processor card is exactly the same as the shape of a 16-bit ISA PC card,
- the host PC must respond to ISA norms (signals, power supply, etc.).

Note: (1) the term "host PC" means a Schneider Electric industrial PC or any other office PC that has the characteristics defined above.

Physical description of PCX 57 processors

Illustration

This diagram labels the different components of a PCX 57 processor module



Description

This table describes the components of a processor module:

Number	Function
1	RUN, TER, BAT, I/O and FIP LEDs for signaling (the FIP LED is only present on the TPCX 57 353 model).
2	Slot for a PCMCIA type 1 memory extension card.
3	Micro-switches for coding the module's position on the rack.
4	Micro-switches for coding the rack address on the bus X.
5	Slot for a PCMCIA type 3 communication card.
6	Female 9-pin SUB D connector used to extend the bus X to an extendable rack.
7	Terminal port (**TER** Connector (8-pin mini-DIN)): this is used to connect an FTX type or PC compatible terminal, or to connect the PLC to the UNI-TELWAY bus through the TSX P ACC 01 insulation unit. This connector is used to supply 5V to the peripheral which is linked to it (limited by the available current provided by the PC's power supply).
8	Recessed **RESET** button which leads to a cold startup of the PLC, when it is activated. • **Processor working normally:** cold startup in STOP or RUN mode, according to the procedure defined in the configuration, • **Processor error:** forced startup in STOP mode. **The RESET button must be pressed using a non-conductive object.**
9	ERR LED.
10	Male 9-pin SUB D connector for linking up to a master FIPIO bus. This connector is only present on TSX P57 353 processors.
11	16-bit ISA connector, used for linking up to the host PC.
12	Micro-switches for coding the PCX 57 processor address on the ISA bus (I/O space).
13	Contacts for selecting the interrupt (IRQ**..**), used by the processor on the ISA bus.
14	Slot for a battery which allows that the processor's internal RAM memory to be saved.

Note: The **TER** terminal port offers master UNI-TELWAY communication mode by default, and can be configured for slave UNI-TELWAY or ASCII character mode.

Real-time clock

At a Glance

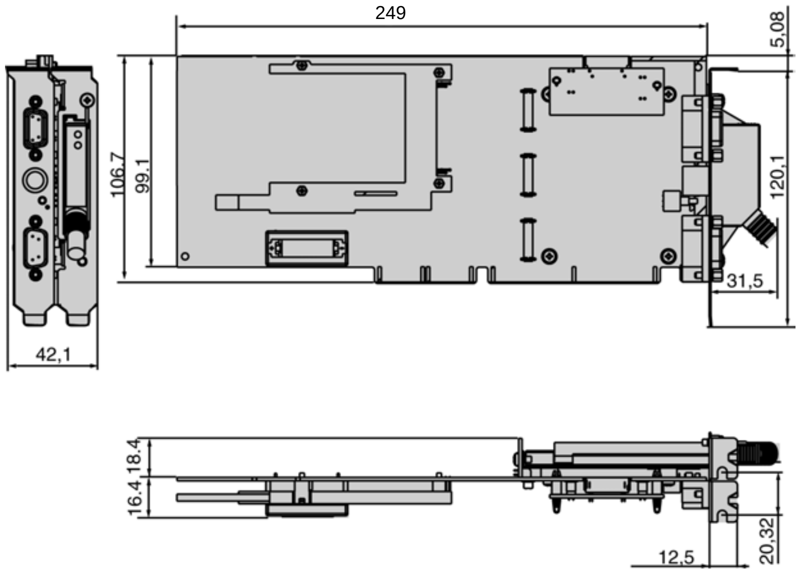
PCX 57 processors have a real-time clock.

See *Real-time clock, p. 153* in the **TSX P57 Premium processor** section.

Dimensions of PCX 57 processor cards

Diagrams

The various following diagrams show the dimensions, in millimeters, of PCX 57 processor cards.



Note: A PCX 57 processor uses two slots on the PC ISA bus. These slots must be adjacent and 20.32mm apart.

The different components of a PCX 57 card

Illustration

This diagram shows the various components which make up a PCX 57 processor card

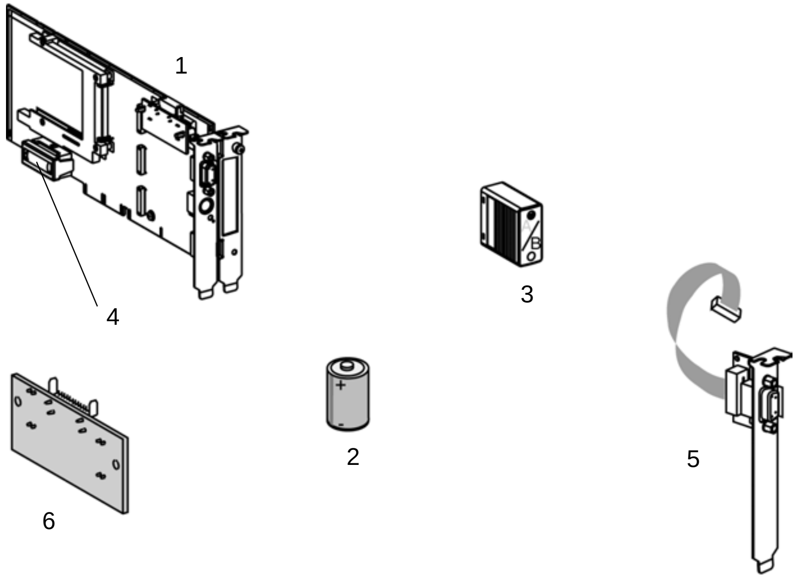


Table of components and their descriptions

The following table gives the names and descriptions of the various components which make up the PCX 57 processor card:

Address	Element	Description
1	PCX 57 processor card	associated with a mechanical sub-assembly used to house a PCMCIA type 3 communication card.
2	battery	the battery (see *Changing the PCX 57 RAM memory backup battery, p. 320*) allows the processor RAM memory to be saved, and it should be mounted in the appropriate slot on the processor card.
3	line terminator	TSX TLYEX /B (see *Line terminator TSX TLYEX, p. 105*) line terminator.
4	removable cover	a removable cover for a PCMCIA communication card specific to the PCX 57 processor.
5	shield	shield equipped with a 9-pin SUB D connector to link a TSX CBY..0K (see *TSX CBY..0K bus X extension cable (II $\geq$ 02), p. 100*) bus X extension cable, and a cable for linking to the PCX 57 processor. This accessory is for connecting the PCX 57 processor inside a section of the bus X.
6	daughterboard	interfaces between the above shield and the PCX 57 processor card. This accessory should be used with the above shield. It is fitted instead of the A/ line terminator which is built into the processor as standard.

Note: In addition to the components given above, the following are provided with the PCX 57 card:
- diskettes containing the ISAWAY drivers and OFS software package,
- instructions for installing the PCX 57 processor.

PCX 57 Processors: installation

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At a Glance

Aim of this Chapter

This Chapter deals with the installation of **PCX 57** processors and the **PCMCIA** extension card.

What's in this Chapter?

This chapter contains the following topics:

Precautions to be taken during installation

General

You are advised to limit charges of static electricity, which can cause significant damage to electronic circuits. To do this the following rules should be observed:

⚠ CAUTION

ELECTROSTATIC DISCHARGE

- hold the card by the edges. Do not touch the connectors or any of the circuits that are visible,
- do not take the card out of its protective anti-static packaging before you are ready to install it in the PC,
- ground yourself during handling, if possible,
- do not put the card on a metal surface,
- avoid unnecessary movements, as static electricity is generated by clothing, carpets and furniture.

Failure to follow these instructions can result in injury or equipment damage.

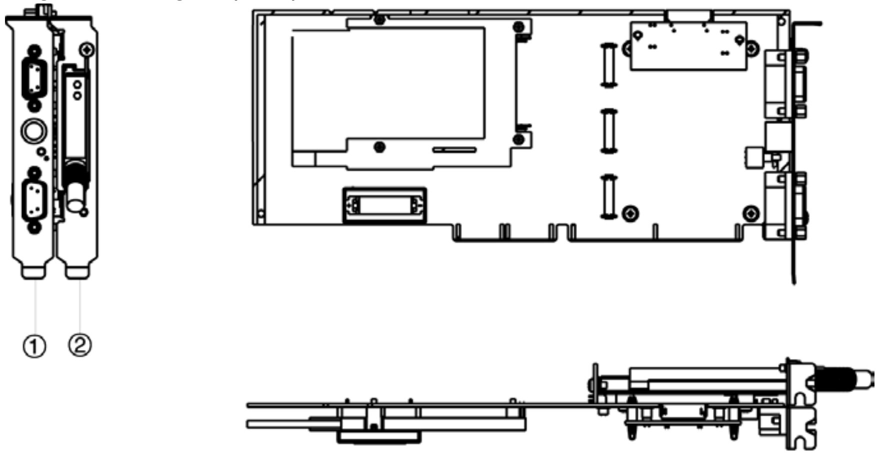
Physical installation of the PCX 57 processor in the PC

General

The PCX 57 processor physically occupies two consecutive slots, slots 1 and 2, on the ISA bus but only uses one of them, slot 1, electrically. Slot 2 is used by the PCMCIA communication card.

Illustration

Diagram showing the principle:



Note: two PCX 57 processors can be installed in the same PC.

Logical installation of the PCX 57 processor on the bus X

Logical installation on the Bus X

The PCX 57 processor logically occupies the same slot as a TSX P57 processor (rack with address 0, position 00 or 01).

The TSX RKY••EX rack with address 0 must have a power supply module and the position which is normally taken up by a TSX P57 processor will be unoccupied (virtual slot for the PCX 57 processor).

Premium PLCs have two types of power supply (standard and double format). The unoccupied position on the rack with address 0 will be depend upon the type of power supply used.

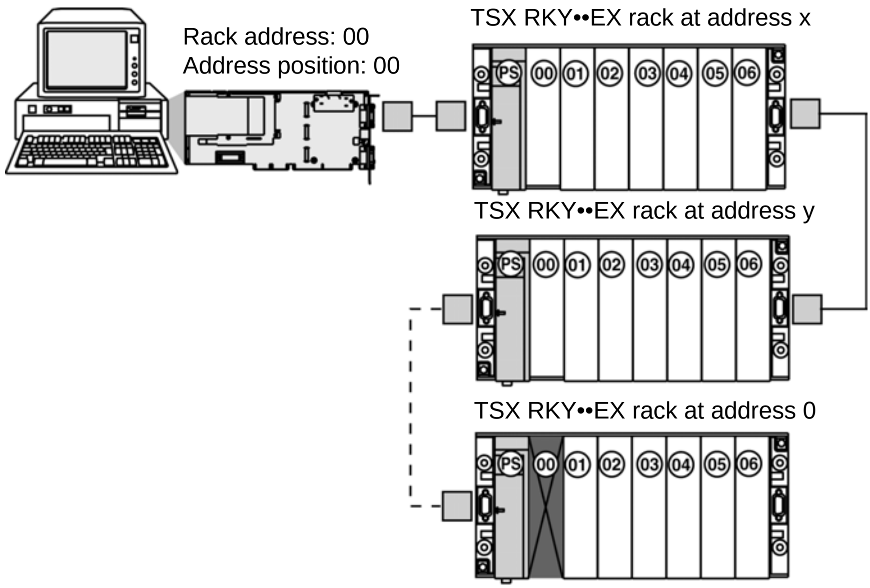
Note:
- The slot corresponding to the PCX 57 processor address (physically free on the rack) must not be used by another module.
- The bus X address (see *How to configure the PCX 57 processor address on the bus X, p. 302*) must be configured using the micro-switches on the processor card, so that the PCX 57 processor is aware of its address on the bus X.

Using a standard format power supply module

In this case, the installation rule for the rack with address 0 is as follows:

- the power supply module automatically occupies position PS,
- position 00, the virtual slot for the processor, must be unoccupied,
- the other modules are installed starting at position 01.

The following diagram shows the module installation rule when a single format power supply module is used.

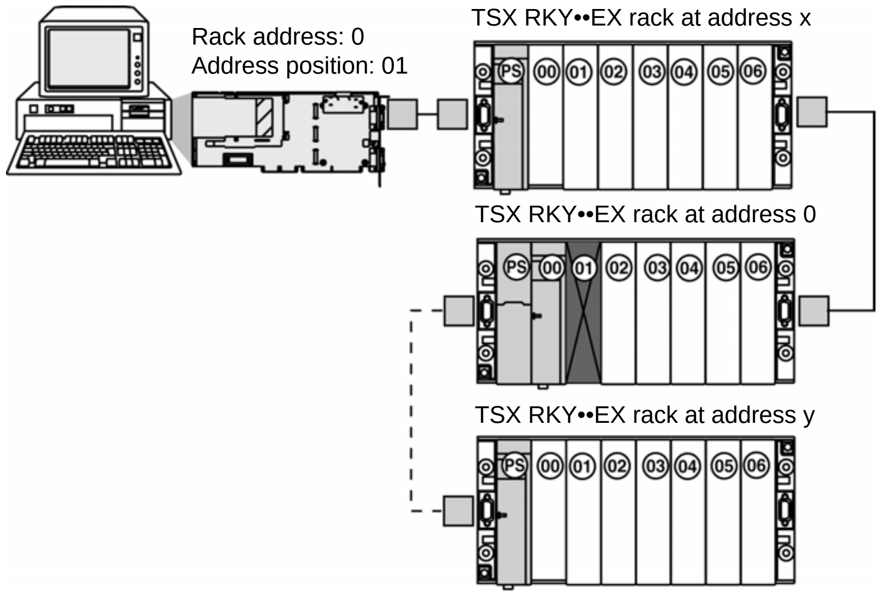


Using a double format power supply module

In this case, the installation rule for the rack with address 0 is as follows:

- the power supply module automatically occupies positions PS and 00,
- position 01, the virtual slot for the processor, must be unoccupied,
- the other modules are installed starting from position 02.

The following diagram shows the module installation rule when a single format power supply module is used.



Operations to be carried out before installation

General

Certain operations must be performed before a processor card is installed in the PC:

- if necessary, insert the battery into the slot provided (see *Changing the PCX 57 RAM memory backup battery, p. 320*),
- if necessary, insert the PCMCIA memory card (see *How to install/remove the memory extension card on the PCX 57 processor, p. 313*),
- configure the address of the processor on the bus X (see *How to configure the PCX 57 processor address on the bus X, p. 302*),
- configure the processor's standard I/O address on the ISA bus (see *How to configure the processor's standard I/O address on the ISA bus, p. 304*).

How to configure the PCX 57 processor address on the bus X

General points

This address must be the same as the one which will be configured in the configuration screen of the PL7 Junior or PL7 Pro software. This configuration is carried out using micro-switches found on the processor card.

Rack address: the processor's virtual slot is always situated on the rack with address 0.

Processor position: the virtual position of the processor will depend upon the type of power supply installed on the rack:

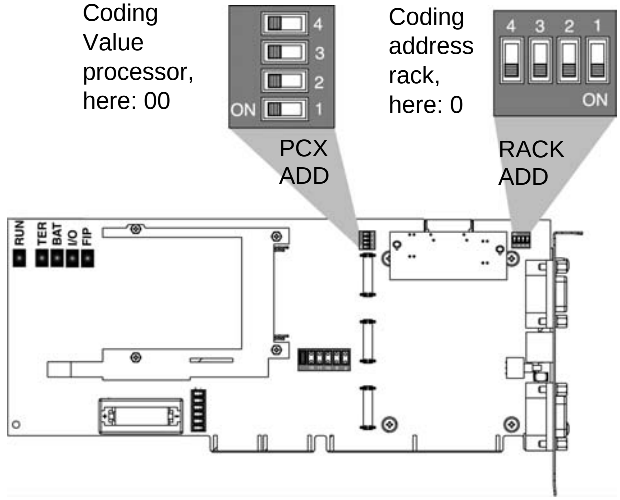
- single format power supply: virtual position of processor = 00,
- double format power supply: virtual position of processor = 01.

Default configuration:

- rack address = 0,
- module position = 00.

Illustration

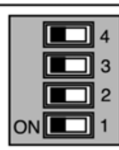
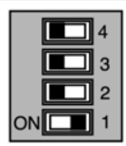
Explanatory diagrams:



Position of the RACK ADD micro-switches in relation to the rack address:

Rack	0	1	2	3	4	5	6	7
Position of the micro-switches PCX ADD								
		Addresses not used						

Position of the PCX ADD micro-switches in relation to the processor's position on the rack:

Position of the processor	00	01
Position of the micro-switches PCX ADD		

How to configure the processor’s standard I/O address on the ISA bus

General points

The PCX 57 processor uses:

- eight consecutive addresses in the ISA bus’s I/O space,
- an interrupt (IRQ**..**).

Before configuring the PCX 57 processor, it is a good idea to establish an I/O space and an available IT in the PC using the standard utilities under Windows 95/98 or Windows NT.

When the available resources are determined, PCX 57 is configured as follows:

- the standard address of the PCX 57 processor on the ISA bus is configured,
- the interrupt used by the processor on the ISA bus is configured (IRQ**..**).

⚠ CAUTION

IMPROPER CONFIGURATION

An improper configuration can lead to the PC malfunctioning.

Failure to follow these instructions can result in injury or equipment damage.

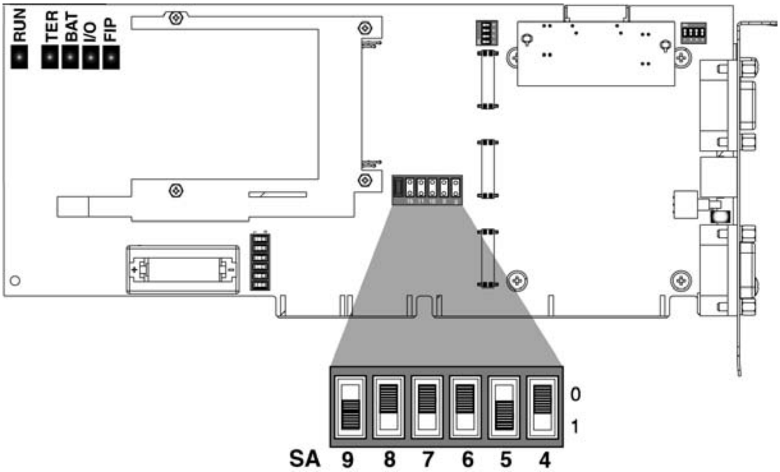
Configuring the standard address of the PCX 57 processor on the ISA bus

This configuration is carried out using the 6 micro-switches located near the PCX 57's ISA connector. They represent from left to right the bits with addresses SA9 to SA4.

The address H'220' is configured by default.

Note: This address must be the same as the one which will be configured in the configuration screen of the ISAWAY driver.

Illustration: the PCX 57 card and its micro-switches which are used to configure the address



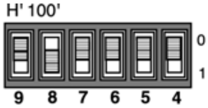
Example of PCX 57 address coding on the ISA bus

This table shows various address codings

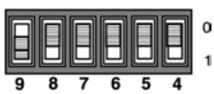
Switch			**9 8**	**7 6 5 4**	**3 2 1 0**
Coding of the address	H’000’	0	0 0	0 0 0 0	0 0 0 0
	H’110’	1	0 1	0 0 0 1	0 0 0 0
	H’220’	2	1 0	0 0 1 0	0 0 0 0
	H’330’	3	1 1	0 0 1 1	0 0 0 0
		4		0 1 0 0	0 0 0 0
		5		0 1 0 1	0 0 0 0
		6		0 1 1 0	0 0 0 0
		7		0 1 1 1	0 0 0 0
		8		1 0 0 0	0 0 0 0
		9		1 0 0 1	0 0 0 0
		To		1 0 1 0	0 0 0 0
		B		1 0 1 1	0 0 0 0
		C		1 1 0 0	0 0 0 0
		D		1 1 0 1	0 0 0 0
		E		1 1 1 0	0 0 0 0
		F		1 1 1 1	0 0 0 0

Illustration: coding using the micro-switches

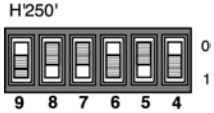
H' 100'



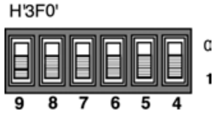
H'200'



H'250'



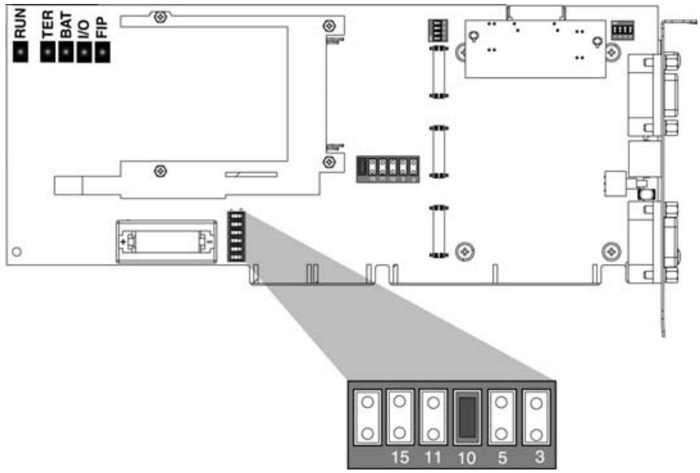
H'3F0'



Configuring the interrupt used by the processor on the ISA bus (IRQ..)

This is configured using a jack-plug which should be placed over the interrupt to be selected. **IRQ 10** is selected by default.

Illustration: PCX 57 card with micro-switches which are used to configure the IRQ.



How to install the PCX 57 processor card in the PC

Preliminary conditions

Preliminary addressing operations (see *Operations to be carried out before installation, p. 301*) must be performed.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

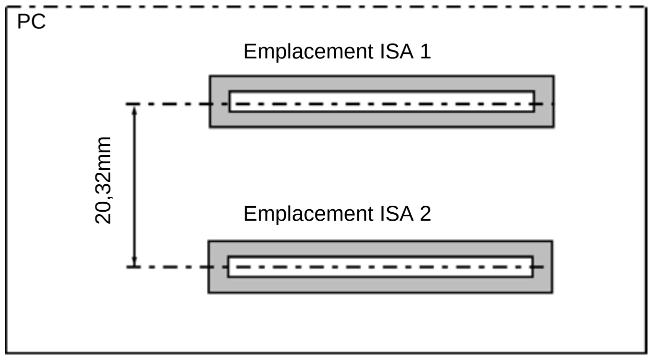
Disconnect all power before servicing equipment.
When installing the processor in the PC, the PC must always be switched off.

Failure to follow these instructions will result in death or serious injury.

Procedure to be followed

The following table describes the procedure for installing the processor card in the PC:

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Once the PC’s electrical power supply has been switched off, remove the computer casing and find two free adjacent ISA slots.

As an installation constraint, the PC must conform to the following standard:

</td></tr>
<tr><td>2</td><td>Remove the protective covers and mounting screws already in place which correspond to the available slots.</td></tr>
<tr><td>3</td><td>Install the card in the planned free slots.</td></tr>
<tr><td>4</td><td>Fix the card to the PC by tightening the mounting screws you removed previously.</td></tr>
<tr><td>5</td><td>Place the casing back on the computer again and replace all the cables and accessories which had to be switched off:
● Bus X cable and /B line terminator TSX TLYEX
Important: The processor switches to a blocking fault, if the line terminator /B is not installed:
● on the PCX 57 processor, if this is not linked to a rack by a TSX CBY .. bus X cable. . In this case, a /B line terminator (see Line terminator TSX TLYEX, p. 105) must be installed on the processor’s bus X output.
● on the available connector of the last rack of the station, if the PCX 57 processor is linked to a rack by a TSX CBY .. bus X cable. . In this case, a /B line terminator must be installed.
This device is used to show that the bus X has not been adapted.
● FIPIO Bus cable and PCMCIA communication card, if necessary.</td></tr>
<tr><td>6</td><td>Switch the PC on and start installing the various software packages:
● ISAWAY driver which corresponds to the OS installed: WINDOWS 95/98 or Windows NT, (see the service instructions provided with the processor),
● OFS data server if used,
● PL7 Junior or PL7 Pro software if used.</td></tr>
</table>

Integrating a PCX 57 processor into an bus X section

General

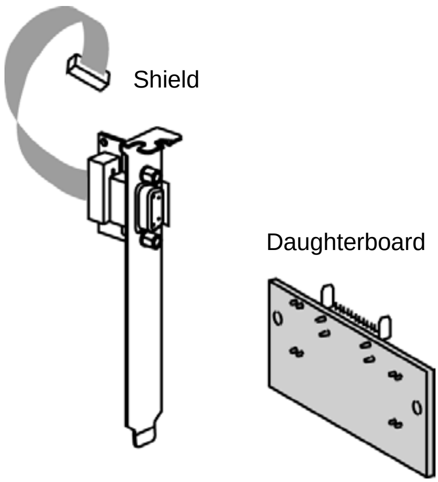
As standard, the PCX 57 processor is equipped to be built into the start of the X Bus line, and for this reason it has a built-in A/ line terminator.

If you want to integrate the processor into an bus X section, the module is supplied with two accessories which make this possible:

- **a shield equipped with:**
  - a 9-pin SUB D connector for linking up a **TSX CBY•** bus X cable,
  - a cable for connecting the 9-pin SUB D connector to the processor card,
- **a daughterboard** equipped with two connectors which interface between the PCX 57 card and the 9-pin SUB D connector of the aforementioned shield. This daughterboard is fitted instead of the A/ line terminator, mounted on the PCX 57 card as standard.

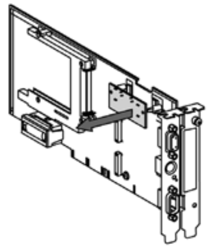
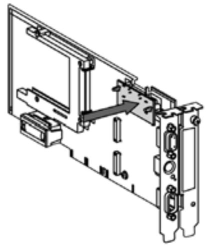
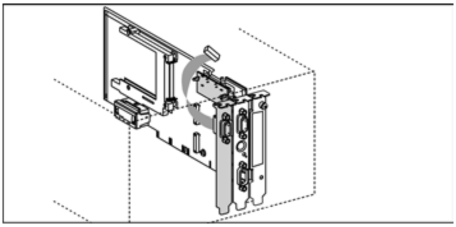
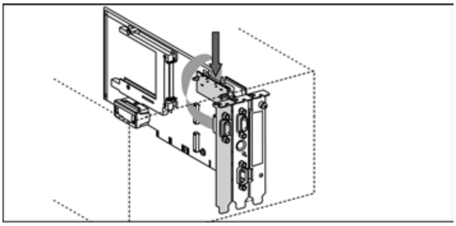
Illustration

Shield and daughterboard:



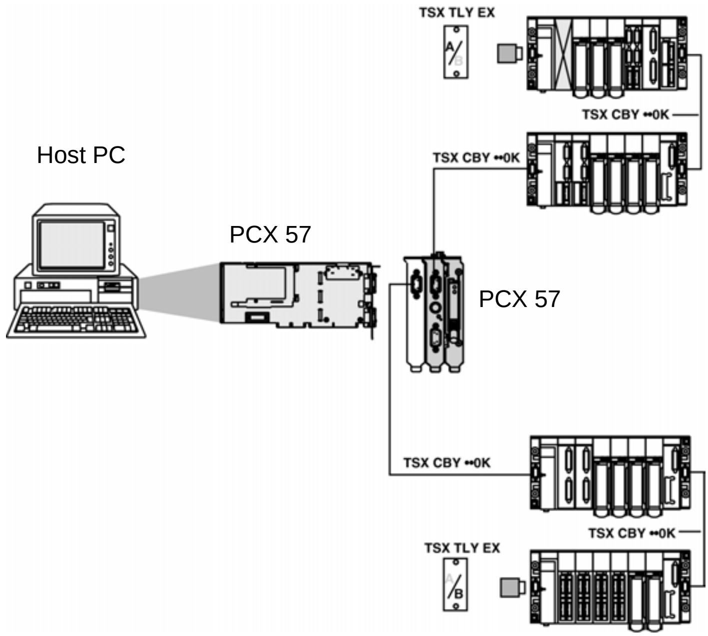
Installation procedure

Carry out the following steps

Step	Action	Illustration
1	Remove the A/ line terminator from its slot on the processor.	
2	Fit the daughterboard in place of the A/ line terminator.	
3	Once the processor card is in place in the PC, fix the shield in the available slot situated immediately to the left of the processor card, as indicated in the diagram below.	
4	Connect the cable to the connector of the daughterboard which was installed in step 2	

Example of the topology of a PCX 57 station with the processor integrated in an bus X section

Diagram



Note: In this example, as the PCX 57 processor is no longer integrated at the start of the line, the **TSX TLY EX A/** and **/B** line terminators must be installed on each of the racks situated at the end of the lines.

How to install/remove the memory extension card on the PCX 57 processor

Principle

Perform the following steps to install the memory card on the PCX 57 processor:

Step	Action
1	Place the PCMCIA card in its allocated slot.
2	Slide it in until it can go no further.
3	Position the card in the PC with the power turned off.

⚠ CAUTION

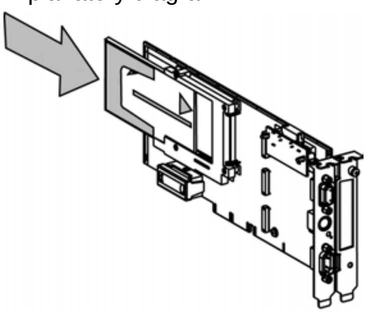
INSTALLING MEMORY EXTENSION CARD WITH POWER ON

The memory extension card must be installed on the processor card with the power switched off and before the processor card is installed in the PC.

Failure to follow these instructions can result in injury or equipment damage.

Illustration

Explanatory diagram:



Note: If the program in the PCMCIA memory cartridge contains the **RUN AUTO** option, the processor will automatically restart in RUN mode after the cartridge is inserted and the PC is turned on.

Processing on insertion/extraction of a PCMCIA memory card on a PCX 57 PLC

General

⚠ WARNING

UNEXPECTED EQUIPMENT OPERATION

Do no insert or extract the PCMCIA memory card into or from a PCX 57 when it is powered-up.
These actions, although they will not damage the processor or any other device, will cause random processor behavior.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

⚠ WARNING

UNEXPECTED EQUIPMENT OPERATION

If the program contained in the PCMCIA memory card includes the RUN AUTO option, the processor will automatically restart in RUN mode after the card is inserted and the PC is switched on.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Memory cards for PCX 57 processors

General

See *Standard and Backup Memory Cards for PLCs, p. 168* and *Application + Files Type Memory Cards, p. 171*:

Precautions to be taken when replacing a PCX 57 processor

Important

⚠ WARNING

UNEXPECTED EQUIPMENT OPERATION

If the PCX P57 processor is being replaced by another processor which is not blank (the processor has already been programmed and contains an application), the power for all the PLC station's control units must be switched off.
Before restoring power to the control units, check that the processor contains the required application.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

PCX 57 processors: Diagnostics

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At a Glance

Aim of this Chapter

This Chapter deals with PCX 57 processor diagnostics.

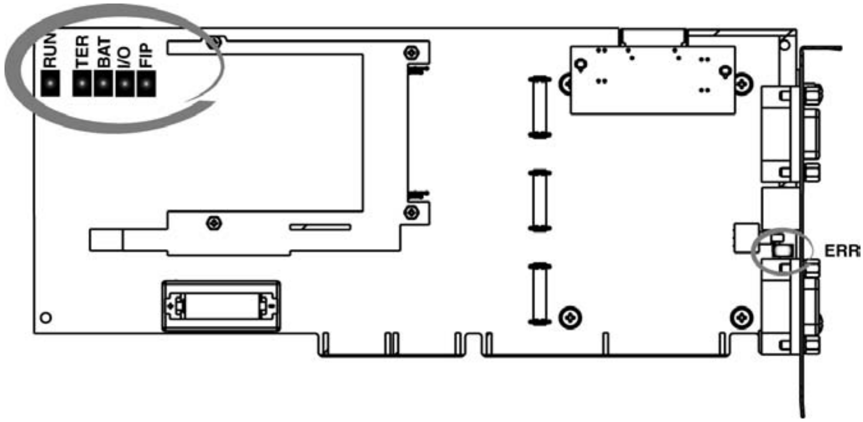
What's in this Chapter?

This chapter contains the following topics:

Description of PCX 57 processor LEDs

Labeling of the LEDs

Six LEDs (RUN, TER, BAT, I/O, FIP and ERR) found on the processor card enable fast diagnostics of the status of the PLC station.



Due to the small amount of space available on the shield, only the ERR LED is visible when the PC housing the processor is closed.

To make it more user-friendly, the state of the RUN, I/O, ERR and FIP LEDs is displayed via a utility in the task bar in Windows 95/98 or Windows NT on the PC with the processor card. This functionality is only available when the host PC is running (ISAWAY driver installed)

Description

The following table describes the role of each LED:

Display LED	Lit ●	Flashing ⊗	Off ○
BAT (red)	• battery missing, • battery flat, • battery the wrong way round, • wrong type of battery.	-	running normally.
RUN (green)	PLC running normally, program executing.	PLC in STOP mode or blocked by software error.	• PLC not configured: application missing, invalid or incompatible, • PLC error: processor or system error.
TER (yellow)	-	terminal port link active. The rate of flashing is relative to the amount of traffic.	link not active.
I/O (red)	input/output errors coming from a module, a channel or a configuration error.	Bus X error (1).	normal state, no internal error.
FIP (yellow)	-	FIPIO bus link active. The rate of flashing is relative to the amount of traffic.	link not active.
ERR (red)	processor or system error.	• PLC not configured (application missing, invalid or incompatible), • PLC blocked by a software error, • memory card battery error, • Bus X error (1).	normal state, no internal error.

Note:
- (1) a bus X error is indicated by simultaneous flashing of the ERR and I/O LEDs.
- the FIP LED is only present on TPCX P57 353 processor.

Changing the PCX 57 RAM memory backup battery

Introduction

This battery on the PCX 57 processor module ensures that the processor internal RAM memory and the real-time clock are saved in the event of a power outage. It is delivered in the same packaging as the processor and must be installed by the user.

Note: With a PCX 57 processor, there is no point in putting a battery into the rack power supply which usually houses the processor (rack with address 0).

Installing the battery for the first time

To install the battery, carry out the following:

Step	Action
1	Remove the cover by squeezing the sides.
2	Put the battery in its slot taking care to observe polarities.
3	Replace the cover which keeps the battery in its slot.

Changing the battery

The battery can be changed every year as a preventative measure or when the **BAT** LED is lit. However the LED is not visible when the PC is closed, but you have a %S68 system bit (0 = backup battery OK) which can be used by the application program to generate an alarm to warn that the battery needs changing.

To change the battery, carry out the following:

Step	Action
1	Switch the PC off.
2	Disconnect the different cables linked to the processor.
3	Open the PC.
4	Take the card out of its slot.
5	Remove the cover.
6	Remove the old battery from its slot.
7	Put in the new battery, observing the polarities.
8	Replace the cover.
9	Put the card back in its slot, close the PC, connect external components and switch on.

⚠ CAUTION

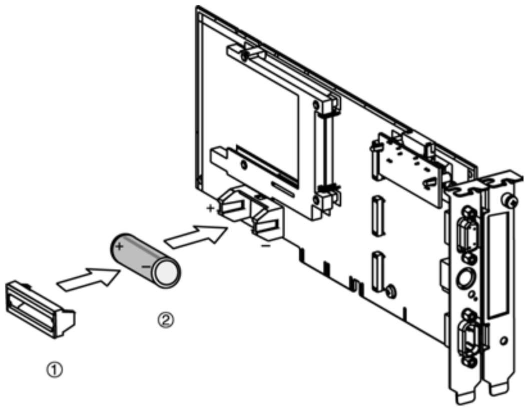
PROLONGED BATTERY CHANGE TIME

Changing the battery should not exceed the limit stated in this document for the PC being switched off. Exceeding this limit may cause data in RAM memory to be lost.

Failure to follow these instructions can result in injury or equipment damage.

Illustration

The following diagram shows how the battery is installed:



1: cover

2: battery

How often must the battery be changed?

Period of battery backup

The length of time during which the battery ensures backup of the processor's internal RAM memory and the real-time clock depends on two factors:

- the percentage of time for which the PLC is switched off and as a result the battery is being used,
- the ambient temperature when the PLC is switched off.

Summary table:

Ambient temperature when inoperative		$\leq$ **30°C**	**40°C**	**50°C**	**60°C**
Backup time	**PLC off for 12 hours per day**	5 years	3 years	2 years	1 year
	PLC off for 1 hour per day	5 years	5 years	4.5 years	4 years

Independent saving by the processor

The processors have their own offline independent save function to save the processor internal RAM memory and the real-time clock, which allows the removal of:

- the PCX 57 processor battery.

The backup time depends on the ambient temperature.

Assuming that the processor was switched on previously, the guaranteed time varies in the following way:

Ambient temperature when switching off	**20°C**	**30°C**	**40°C**	**50°C**
Backup time	2h	45mn	20mn	8mn

Changing the PCX 57 RAM memory PCMCIA card battery

Introduction

RAM memory PCMCIA cards (TSX MRP etc.) must have a battery (reference TSX BAT M01) which needs to be changed.

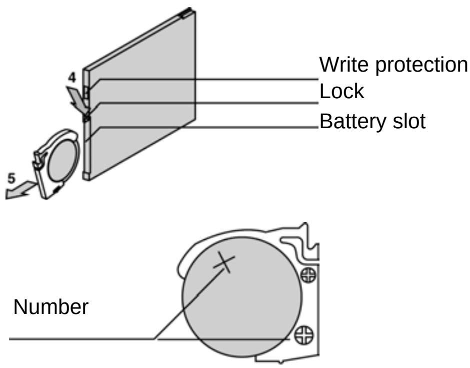
How to change the battery

Carry out the following steps:

Step	Action
1	Take the card out of its slot.
2	Hold the PCMCIA card so you can access the battery slot. This is at the end of the card without the connector.
3	Unlock the battery holder, which is at the end of the card without the connector. To do this press the lock towards the bottom of the card (the opposite direction to the write protection micro-switch) while pulling towards the back.
4	Remove the battery and holder unit from its slot.
5	Swap the old battery for an identical 3V battery. Polarities must be observed by placing the + labels on the holder and the battery on the same side.
6	Place the battery and holder unit back in its slot, then lock it. To do this, carry out the removal procedure in reverse.
7	Put the memory card back in its allocated slot on the PCX 57 card.

Illustration

Principle diagram:



Battery life

See the following table:

PCMCIA card stored in normal conditions (-20°C to 70°C)	12 months
PCMCIA card fitted in an operating PLC (0°C à 60°C).	36 months

Note: During operation, the processor's ERR LED flashes if the PCMCIA card battery is old.

What happens after you press the processor RESET button

General

All processors have a RESET button on their front panel, which when pressed, causes a PLC cold start, in RUN or in STOP mode (1), in the application contained on the memory card (or in internal RAM).

RESET following a processor fault

As soon as a processor fault appears, the alarm relay on rack 0 (2) is deactivated (open contact) and the module outputs switch to fallback position or are maintained in the current state depending on the selection made at configuration. Pressing the RESET button causes the PLC, forced into STOP mode, to cold start.

(1) Start in RUN or in STOP mode is defined at configuration.

(2) With the PCX 57 processor, this relay is not controlled.

> **Note:** When the RESET button is pressed, and during the PLC cold start, the terminal link is deactivated.

How the PCX 57 behaves after an action on the PC

General

The following table describes the different actions on the PC and what implications they have for the PCX 57:

Action on the PC	PCX 57 behavior
Switching off/on	warm restart if the application environment has not changed
Micro-outages on the network supplying the PC	As the PCX 57 does not have a filtering mechanism for micro-outages, every micro-outage not filtered by the PC's internal power supply causes a warm restart of the PCX 57, if the application environment has not changed
Pressing the RESET button	generally, and subject to the PC's RESET button activating the RSTDRV signal on the ISA bus, pressing the PC RESET button causes a warm restart of the PCX 57, if the application environment has not changed.
PC's software RESET (CTRL ALT DEL)	these actions have no effect on the current state of the PCX 57 processor (if the PCX 57 processor is in RUN, it stays in , etc.) and does not cause a warm restart or cold restart

Note: A PC software blockage has no effect on the current state of the PCX 57 processor (identical behavior to a PC software RESET).

Finding errors via the processor status LEDs

General

See:

- *Finding errors using processor state LEDs, p. 205*,
- *Non blocking errors, p. 206*,
- *Blocking errors, p. 208*,
- *Processor or system errors, p. 209*.

PCX 57 203 processor

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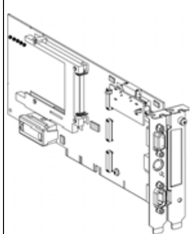
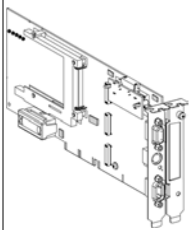
General characteristics of the PCX 57 203 processor

PCX 57 203 processor

The following table gives the general characteristics of the PCX 57 203 processor.

Reference	**PCX 57 203**		
			
Maximum configuration	Maximum number of TSX RKY 12EX racks		8
	Maximum number of TSX RKY 4EX/6EX/8EX racks		16
	Maximum number of slots	with TSXRKY 12EX	87
		with TSXRKY 4EX, 6EX, 8EX	111
Functions	Maximum number of channels	In-rack discrete I/O	1024
		In-rack analog I/O	80
		Application (counting, axis, etc.)	24
	Maximum number of connections	Built-in UNI-TELWAY (terminal port)	1
		Network (ETHWAY, FIPWAY, Modbus+)	1
		Master FIPIO (built-in)	-
		Third party field bus	1
		AS-i field bus	4
	Savable real-time clock		yes

Reference	**PCX 57 203**		
			
Memory capacity	Savable internal RAM		48K16
	PCMCIA memory card (maximum capacity)	Application area	160K16
		Symbol Zone	-
		File area	128K16 or 640K16
Application structure	Master task		1
	Fast task		1
	Event processing (of which 1 has priority)		64
Application code execution time for a 1K instruction	Internal RAM	100% Boolean	0.21 ms
		65% Boolean + 35% digital	0.28 ms
	PCMCIA card	100% Boolean	0.27 ms
		65% Boolean + 35% digital	0.40 ms
System overhead	MAST task		1 ms
	FAST task		0.35 ms

PCX 57 353 processor

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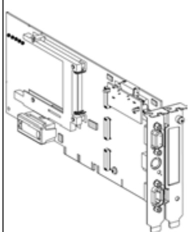
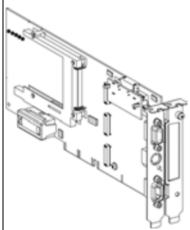
General characteristics of the PCX 57 353 processor

PCX 57 353 processor

The following table introduces the general characteristics of the PCX 57 353 processor.

Reference	PCX 57 353		
			
Maximum configuration	Maximum number of TSX RKY 12EX racks		8
	Maximum number of TSX RKY 4EX/6EX/8EX racks		16
	Maximum number of slots	with TSXRKY 12EX	87
		with TSXRKY 4EX, 6EX, 8EX	111
Functions	Maximum number of channels	In-rack discrete I/O	1024
		In-rack analog I/O	128
		Application (counting, axis, etc.)	32
	Maximum number of connections	Built-in UNI-TELWAY (terminal port)	1
		Network (ETHWAY, FIPWAY, Modbus+)	3
		FIPIO master (built-in), number of devices	127
		Third party field bus	2
		AS-i field bus	8

<table>
<tr><th>Reference</th><th colspan="3">PCX 57 353</th></tr>
<tr><td></td><td colspan="3"></td></tr>
<tr><td></td><td colspan="2">Savable real-time clock</td><td>yes</td></tr>
<tr><td rowspan="4">Memory capacity</td><td colspan="2">Savable internal RAM</td><td>80K16 or 96K16 (1)</td></tr>
<tr><td rowspan="3">PCMCIA memory card (maximum capacity)</td><td>Application area</td><td>384K16</td></tr>
<tr><td>Symbol Zone</td><td>-</td></tr>
<tr><td>File area</td><td>128K16 or 640K16</td></tr>
<tr><td rowspan="3">Application structure</td><td colspan="2">Master task</td><td>1</td></tr>
<tr><td colspan="2">Fast task</td><td>1</td></tr>
<tr><td colspan="2">Event processing (of which 1 has priority)</td><td>64</td></tr>
<tr><td rowspan="4">Application code execution time for a 1K instruction</td><td rowspan="2">Internal RAM</td><td>100% Boolean</td><td>0.15 ms</td></tr>
<tr><td>65% Boolean + 35% digital</td><td>0.21 ms</td></tr>
<tr><td rowspan="2">PCMCIA card</td><td>100% Boolean</td><td>0.22 ms</td></tr>
<tr><td>65% Boolean + 35% digital</td><td>0.32 ms</td></tr>
<tr><td rowspan="2">System overhead</td><td colspan="2">MAST task</td><td>1 ms</td></tr>
<tr><td colspan="2">FAST task</td><td>0.25 ms</td></tr>
</table>

(1) 1st figure when the application is in internal RAM, 2nd figure when the application is in card memory.

Atrium PCX 57 CPU: general characteristics

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At a Glance

Aim of this Chapter

The aim of this Chapter is to introduce you to the characteristics of devices that can be used when installing a PCX 57 station.

What's in this Chapter?

This chapter contains the following topics:

Electrical characteristics of PCX 57 processors

General

As the processors can be fitted with certain devices which do not have their own power supply, the consumption of these devices must be taken into account when establishing a global breakdown of power consumption.

- Devices without their own power supply which can be connected to the terminal port:
  - adjustment terminal: **T FTX 117 ADJUST**,
  - unit TSX P ACC01 for connecting to the UNI-TELWAY bus.
- Devices without their own power supply which can be built into the processor:
  - PCMCIA communication cards TSX FPP 10/20,
  - PCMCIA communication card TSX SCP 111/112/114,
  - PCMCIA communication card TSX MBP 100,
  - PCMCIA modem card TSX MDM 10.

Feature of PCX 57 processors

PCX 57 processors have their own 5VDC power supply, which is generated from the host PC's 12 VDC power supply. As a result of this, the 12 VDC power supply from the host PC must have sufficient power to accommodate a PCX 57 processor.

Power consumption

This table shows consumption of the host PC at 12VDC:

Processor + PCMCIA memory card	Typical consumption	Maximum consumption
TPCX P57 203	400 mA	560 mA
TPCX P57 353	550 mA	770 mA

Dissipated power

This table states the dissipated power for **PCX 57** processors:

Processor + PCMCIA memory card	Typical consumption	Maximum consumption
TPCX P57 203	4,8W	6,72W
TSX P57 353	6,6W	9,24W

Characteristics of Atrium PL7 processors

Specifications

Behavior of the Atrium processor

- selection of processor
- a dedicated command control processor.

The following table gives the general characteristics of the TSXP570244 processors.

TSXP57454 processor	Original processor	General usage processor frequency (MHz)	Dedicated command control processor	Frequency of the dedicated command control processor (MHz).
T PCX 57 203	INTEL or AMD 486	48	SONIX	48
T PCX 57 353	INTEL or AMD 486	72	SONIX	48

Devices which can be connected to or built into the processor

Tables of consumption and dissipated power

Consumption:

Consumption at 12VDC from host PC		**Typical**	**Maximum**
Devices without their own power supply which can be connected to the terminal port (TER)	TFTX 117 ADJUST	144 mA	157 mA
	TSXPACC01	69 mA	116 mA
PCMCIA communication card which can be built into the processor	TSXFPP10	153 mA	167 mA
	TSXFPP20	153 mA	167 mA
	TSXSCP111	65 mA	139 mA
	TSXSCP112	56 mA	139 mA
	TSXSCP114	69 mA	139 mA
	TSXMBP100	102 mA	144 mA
	TSXMDM10	90 mA	-

Dissipated power:

Dissipated power		**Typical**	**Maximum**
Devices without their own power supply which can be connected to the terminal port (TER)	TFTX 117 ADJUST	1.7 W	1.9 W
	TSXPACC01	0.8 W	1.4 W
PCMCIA communication card which can be built into the processor	TSXFPP10	1.8 W	2.0 W
	TSXFPP20	1.8 W	2,0W
	TSXSCP111	0.8 W	1.7 W
	TSXSCP112	0.7 W	1.7 W
	TSXSCP114	0.8 W	1.7 W
	TSXMBP100	1.2 W	1.7 W
	TSXMDM10	1.1 W	-

Defining and Counting Application-specific channels

Summary table

Applications:

Application		**Module/card**	**Application-specific channels**	**Number**
Counting		TSXCTY2A	Yes	2
		TSXCTY2C	Yes	2
		TSXCTY4A	Yes	4
		CCY 1128	Yes	1
Movement commands		TSXCAY21	Yes	2
		TSXCAY41	Yes	4
		TSXCAY22	Yes	2
		TSXCAY42	Yes	4
		TSXCAY33	Yes	3
		CSY 84	Yes	32
Step by step control		TSXCFY11	Yes	1
		TSXCFY21	Yes	2
Weighing		TSXISPY100 / TSXISP101	Yes	2
Communication	Serial link	TSXSCP11. in the processor	No	0(*)
		TSXSCP11. in the TSXSCY21.	Yes	1
		TSXSCP11. in the TSXSCY21.	Yes	1
		TSXSCY 21 (built-in channel)	Yes	1
	Modem	TSXMDM10	Yes	1
	FIPIO agent	TSXFPP10 in the processor	No	0(*)
	Master FIPIO	Built into the processor	No	0(*)

(*) Although these channels are application-specific, they should not be taken into account when calculating the maximum number of application-specific channels which can be supported by the processor.

Note: Only channels configured from PL7 Junior or PL7 Pro software can be counted.

Processor performance

General

See *Processor performance, p. 271*:

TSX PSY supply modules

V

At a Glance

Subject of this Part

This part describes TSX PSY **...** supply modules and their implementation.

What's in this Part?

This part contains the following chapters:

TSX PSY… supply modules: introduction

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At a Glance

Aim of this Chapter

The aim of this Chapter is to introduce the TSX PSY**…** supply modules .

What's in this Chapter?

This chapter contains the following topics:

General introduction

At a Glance

TSX PSY… supply modules are designed to supply each **TSX RKY…** rack and its modules. The supply module is chosen according to the distribution network (direct or alternating current) and the power required (standard or double format model).

There are several types of supply modules:

- **supply modules for an alternating current network**,
- **supply modules for a direct current network**.

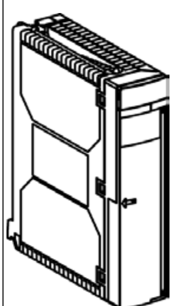
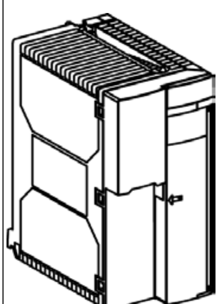
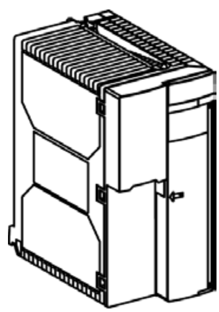
Auxiliary functions of supply modules

Each supply module has auxiliary functions:

- a display panel,
- an alarm relay,
- a slot for a battery for saving the data in the processor’s RAM memory,
- a recessed button which, when pressed, simulates a power-supply outage, and launches a warm restart of the application,
- a 24 VDC sensor supply (only on models supplied from an alternating current network).

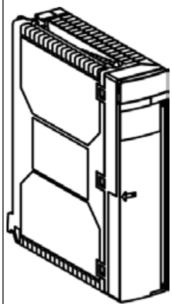
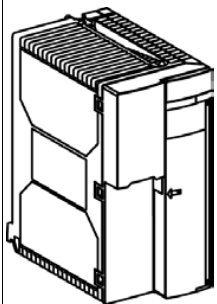
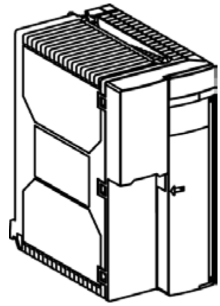
Supply modules for an alternating current network

The following table displays the types of supply module according to their format:

Standard format model	**Double format model**
 TSX PSY 2600 100...240 VCA	 TSX PSY 5500 100...120 VCA  TSX PSY 8500 200...240 VCA

Supply modules for a direct current network

The following table displays the types of supply module according to their format:

Standard format model	Double format model
 TSX PSY 1610 24 VCC non-insulated	 TSX PSY 3610 24 VCC non-insulated  TSX PSY 5520 24...48 VCC insulated

Supply modules: description

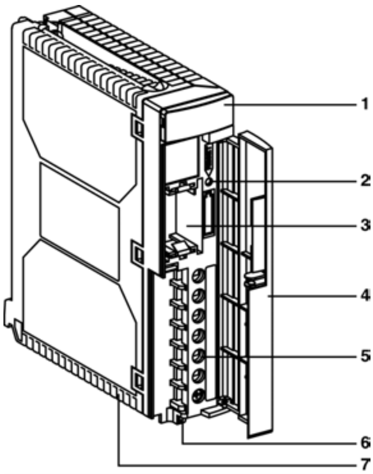
At a Glance

The supply models take the form of:

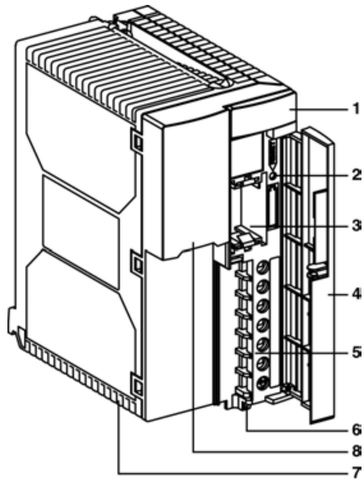
- standard format modules, for TSX PSY 2600 and TSX PSY 1610 modules,
- double format modules for TSX PSY 5500/3610/5520/8500 modules.

Illustration

These illustrations label the different components of a standard supply module and a double format supply module:



Standard format



Double format

Description

This table describes the components of a supply module:

Number	Function
1	Display block containing: ● an **OK** LED (green), lit if the voltages are present and correct, ● a **BAT** LED (red), lit when the battery is worn out or missing, ● a 24V LED (green), lit when the voltage sensor is present. This LED is only present on alternating current supply modules TSX PSY 2600/5500/8500.
2	Recessed **RESET** button which, when pushed, triggers a warm restart of the application.
3	Slot for a battery which allows the processor's internal **RAM** memory to be saved.
4	Flap for protecting the front panel of the module.
5	Screw terminal block for linking up to: ● the supply network, ● the alarm relay contact, ● the sensor supply for alternating current supply modules TSX PSY 2600/5500/8500.
6	Hole for a cable-tightening clip to go through.
7	Fuse located under the module protecting: ● the 24VR voltage on the direct current supply module TSX PSY 3610, ● the primary voltage on the direct current supply module TSX PSY 1610, **Note:** on the TSX PSY 2600/5500/5520/8500 supply modules, the primary voltage protection fuse is inside the module and cannot be accessed.
8	110/220 voltage selector, only present on alternating current supply modules TSX PSY 5500/8500. On delivery, the selector is set to 220.

TSX PSY … supply modules: installation

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At a Glance

Aim of this Chapter

This Chapter deals with the installation of TSX PSY **…** power supply modules.

What's in this Chapter?

This chapter contains the following topics:

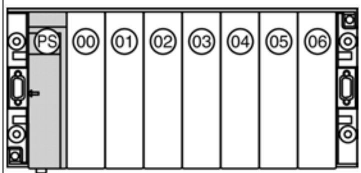
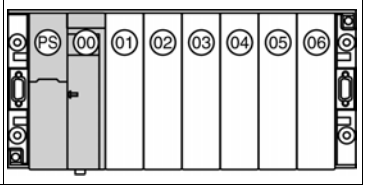
Installation/mounting TSX PSY … supply modules .

Mounting

The mounting of the TSX PSY… power supply module is identical to the mounting of processor modules and, in general terms, the same as the mounting of other modules (see *How to mount processor modules, p. 161*).

Installation

This table describes the principles of installing power supply modules:

Type of supply module	**Description**	**Illustration**
Standard format: TSX PSY 2600/1610	installed in the first slot in each TSX RKY rack and occupy the **PS** position.	
Double format: TSX PSY 3610/5500/ 5520/8500	installed in the first two slots in each TSX RKY rack and occupy the **PS** and **00** positions.	

Note: Each supply module is provided with a locating device that only allows the module to be installed in the slot designated above.

Note: the TSX PSY 8500 supply module does not provide 24VR voltage. Because of this, a rack fitted with this supply module will not be able to accommodate some modules, such as relay output and weighing modules

Rules for connecting TSX PSY supply modules

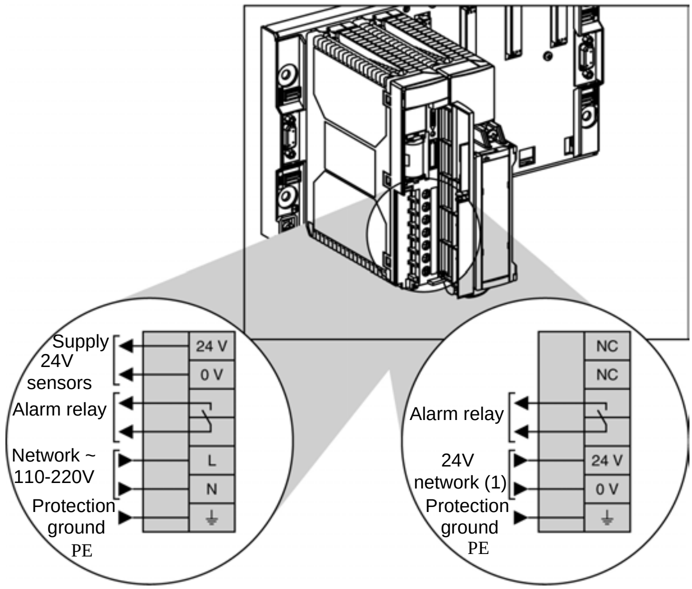
General points

The TSX PSY ••• power supply modules on each rack are equipped with a non-removable terminal block, provided with a cover, which is used to connect the power supply, the alarm relay, the protection ground and, for alternating current supplies, the supply of the 24 VDC sensors.

This screw terminal block is equipped with captive clamp screws which can connect a maximum of 2 wires with a cross-sectional area of 1.5 mm^2 (14 AWG) with wire end ferrules, or one wire with a cross-sectional area of 2.5 mm^2 (12 AWG) (maximum tightening torque on screw terminal: 0.8 N.m (0.6 lb-ft)).

The wires come out vertically towards the bottom. These wires can be kept in place with a cable-clip.

Illustration This diagram shows the screw terminal block:



Alternating current supply
TSX PSY 2600/5500/8500

Direct current supply
TSX PSY 1610/3610/5520

(1) 24...48VAC for the TSX PSY 5520 supply module.

⚠ CAUTION
IMPROPER VOLTAGE SELECTION
For the power supply modules TSX PSY 5500/8500, position the voltage selector according to the voltage power used (110 or 220 VAC).
Failure to follow these instructions can result in injury or equipment damage.

Provide a protection device and switchgear upstream of the PLC station.

When selecting protection devices, the user should take into account the signaling currents which are defined in the characteristics tables for each supply module.

Note: As direct current supply modules TSX PSY 1610/2610/5520 have a strong signaling current, it is not advisable to use them on direct current networks which protect flood-back current limits.
When a power supply module is connected to a direct current network, it is mandatory to limit the length of the supply cable in order to help preventing transmission loss.

- TSX PSY 1610 supply module:
  - length limited to 30 meters (60 meters there and back) with copper wires and a 2.5 mm^2 (12 AWG) cross-section,
  - length limited to 20 meters (40 meters there and back) with copper wires and a 1.5 mm^2 (14 AWG) cross-section.
- TSX PSY 3610 and TSX PSY 5520 supply modules:
  - length limited to 15 meters (30 meters there and back) with copper wires and a 2.5 mm^2 (12 AWG) cross-section,
  - length limited to 10 meters (20 meters there and back) with copper wires and a 1.5 mm^2 (14 AWG) cross-section.

⚠ WARNING

DIRECT CURRENT POWER SUPPLY GROUNDING CONSIDERATIONS

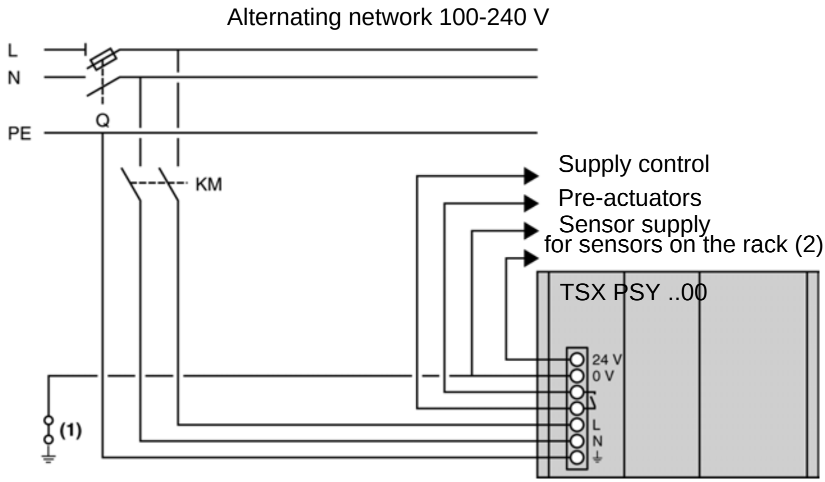
The 0 V and physical ground are linked internally in the PLCs, in the network cabling accessories, and in some control consoles.
For applications which use a "floating" installation, measures need to be taken with connections. These depend on the method used for installation. In these cases, it is mandatory to use insulated direct current power supplies.
Please contact us when you are defining the electrical installation.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Connecting alternating current power supply modules

Connecting a single-rack PLC station

Illustration:



Q: general section switch,

KM: circuit contactor-breaker,

(1) insulating connector bar for finding grounding faults

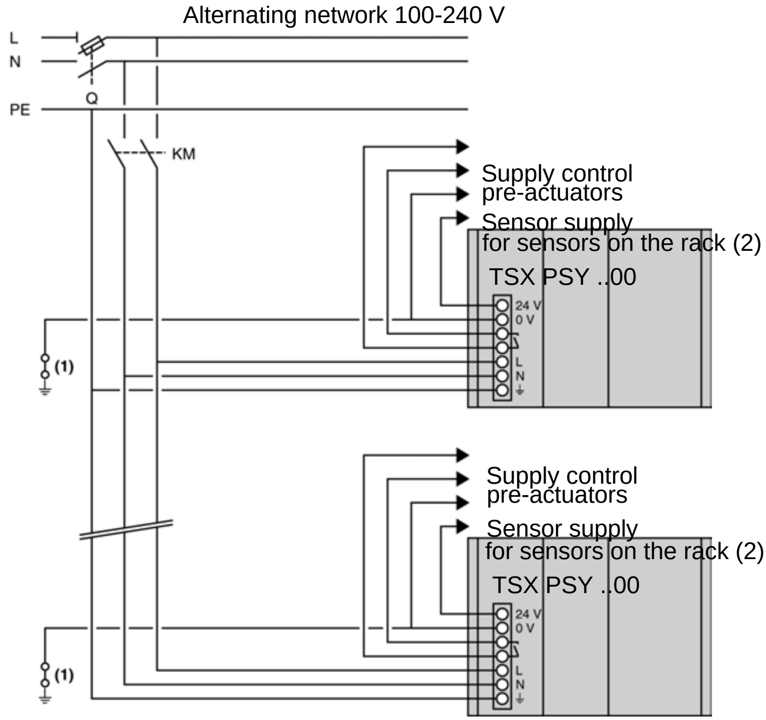
(2) available current:

- 0.6 A with a TSX PSY 2600 (see *TSX PSY 2600 power supply module, p. 391*) power supply module,
- 0.8 A with a TSX PSY 5500 (see *TSX PSY 5500 power supply module, p. 393*) power supply module,
- 1.6 A with a TSX PSY 8500 (see *TSX PSY 8500 power supply module, p. 395*) power supply module,

Note: Protective fuses: alternating current power supply modules TSX PSY 2600/5500/8500 are fitted during manufacture with a protective fuse. This fuse, in series with the **L** input, is located inside the module and cannot be accessed.

Connecting a PLC station made up of several racks

Illustration:



Note: If there are several PLC stations supplied by the same network, the principles of connection are identical.

Q: general section switch,

KM: circuit contactor-breaker,

(1) insulating connector bar for finding grounding faults

(2) available current:

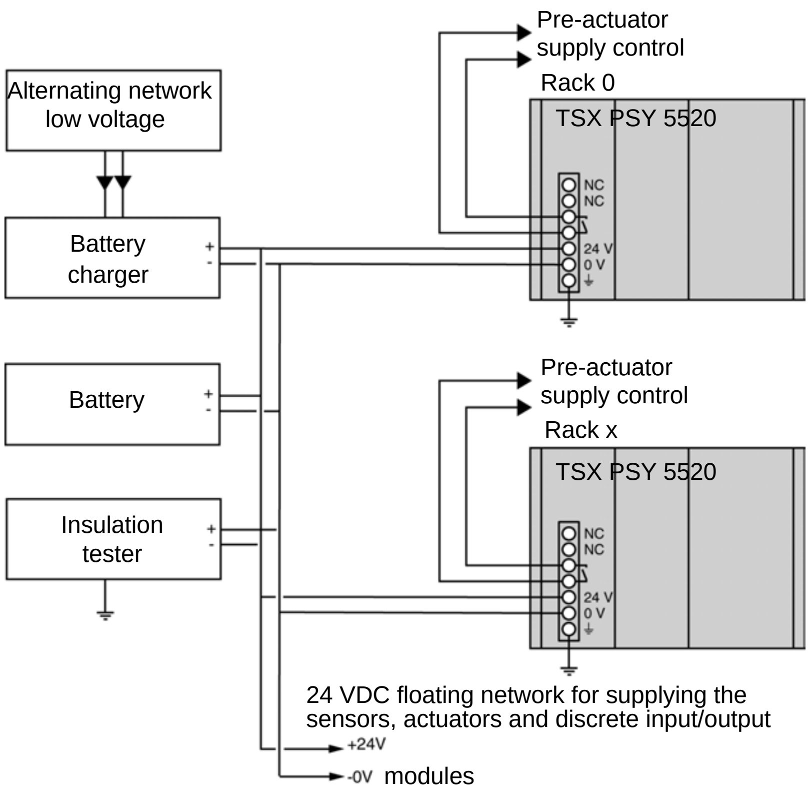
- 0.6 A with a TSX PSY 2600 (see *TSX PSY 2600 power supply module, p. 391*) power supply module,
- 0.8 A with a TSX PSY 5500 (see *TSX PSY 5500 power supply module, p. 393*) power supply module,
- 1.6 A with a TSX PSY 8500 (see *TSX PSY 8500 power supply module, p. 395*) power supply module,

Note: Protective fuses: alternating current power supply modules TSX PSY 2600/5500/8500 are fitted during manufacture with a protective fuse. This fuse, in series with the **L** input, is located inside the module and cannot be accessed.

Connecting direct current power supply modules from a floating 24 or 48 VDC direct current network

Illustration

Diagram showing the principle:



⚠ WARNING

GROUNDING CONSIDERATIONS FOR FLOATING MOUNTING OR MARINE APPLICATIONS

In the case of floating mounting (not linked to ground) used for specific applications and in particular in **Marine Applications**, an insulated **TSX PSY 5520 (24/48 VDC)** supply module must be selected.

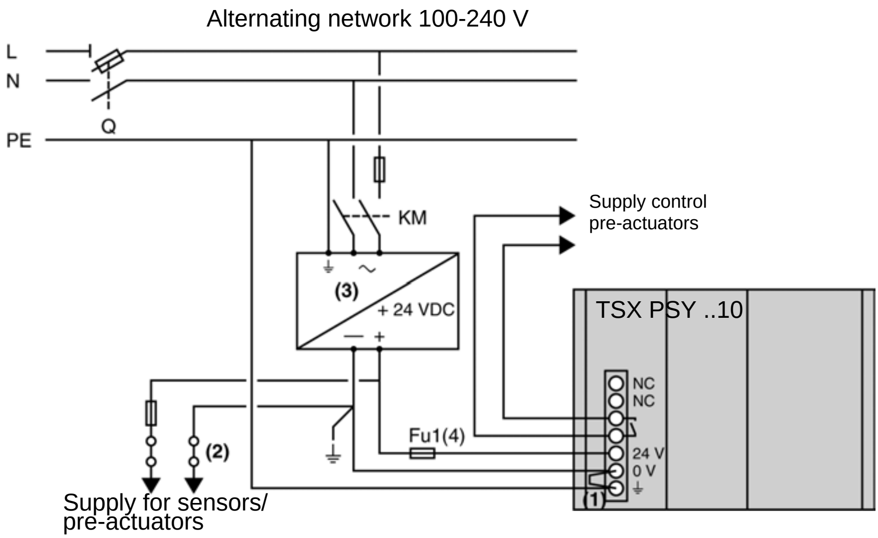
Failure to follow these instructions can result in death, serious injury, or equipment damage.

Note: A device can continually measure the level of insulation of the 24 VDC (or 48 VDC) in relation to the ground, and can give an alert when the level of insulation is abnormally low.
The input/output modules in the Premium range are insulated.

Connecting direct current power supply modules from an alternating current network

Non-insulated power supply modules TSX PSY 1610/3610

Connecting a single-rack PLC station with a ground-referenced network:



Q: General section switch,

KM: Circuit contactor-breaker,

(1): External shunt provided with the power supply module,

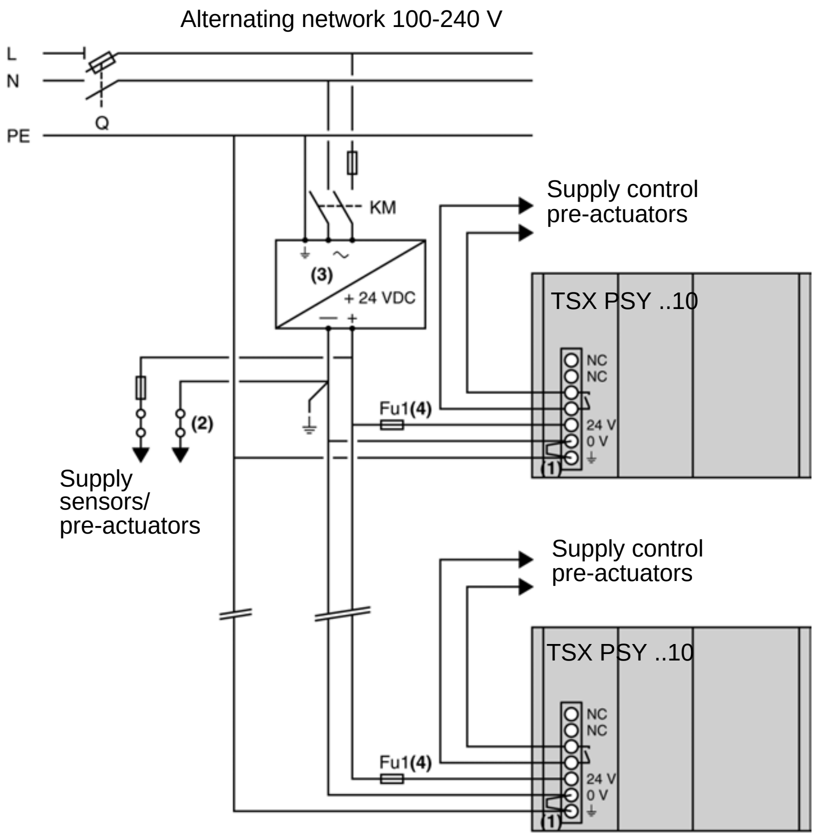
(2): Insulating connector bar for finding grounding faults. In this case, it is necessary to switch off the supply in order to disconnect the network from the ground,

(3): Optional use of a process power supply module (see *Process and AS-i supply, p. 403*),

(4): Protective fuse, (4 A, with time-delay) only necessary with the TSX PSY 3610 power supply module.

The TSX PSY 1610 power supply module is fitted during manufacture with a protective fuse located under the module and in series on the 24V input (3.5 A, 5x20 time-delay fuse).

Connecting a multi-rack PLC station with a ground-referenced network:



Q: General section switch,

KM: Circuit contactor-breaker,

(1): External shunt provided with the power supply module,

(2): Insulating connector bar for finding grounding faults. In this case, it is necessary to switch off the supply in order to disconnect the network from the ground,

(3): Optional use of a process power supply module,

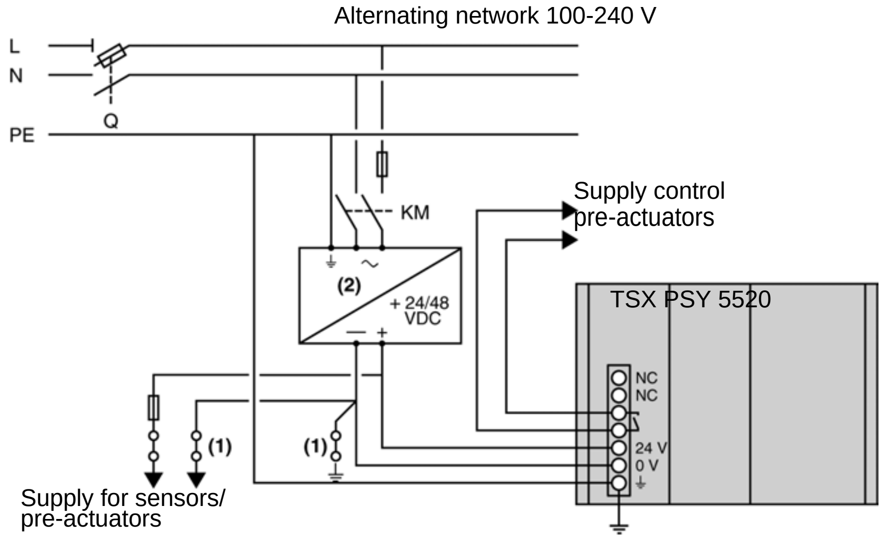
(4): Protective fuse, (4 A, with time-delay) only necessary with the TSX PSY 3610 power supply module.

The TSX PSY 1610 power supply module is fitted during manufacture with a protective fuse located under the module and in series on the 24V input (3.5 A, 5x20 time-delay fuse).

Note: If there are several PLC stations supplied by the same network, the principles of connection are identical.

TSX PSY 5520 isolated power supply module

Connecting a single-rack PLC station with a ground-referenced network:



Q: General section switch,

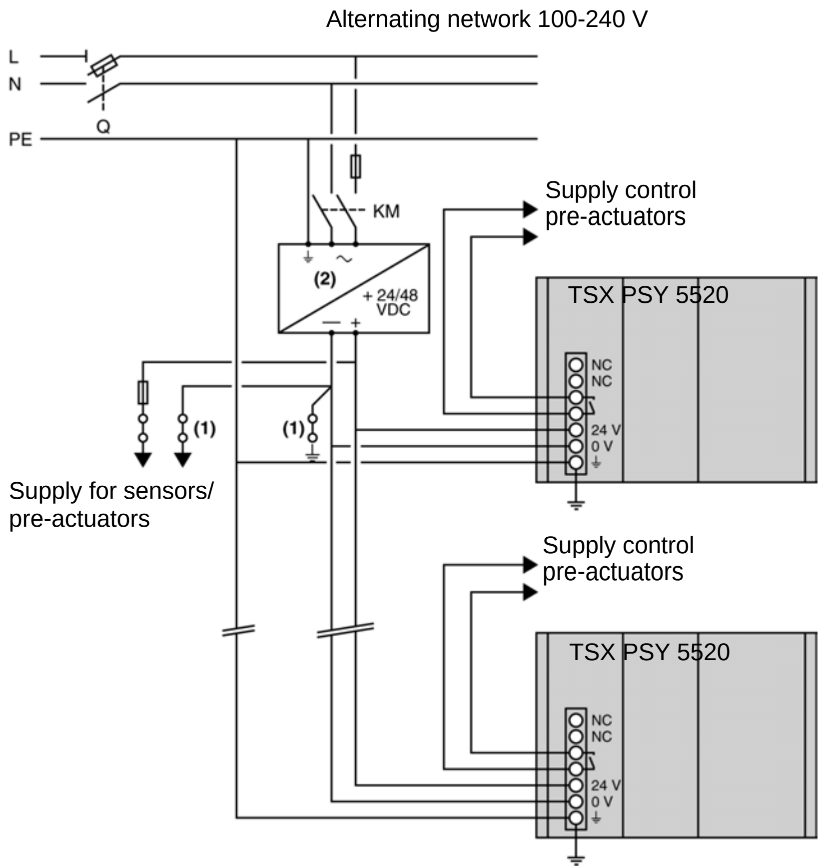
KM: Circuit contactor-breaker,

(1): Insulating connector bar for finding grounding faults,

(2): Optional use of a process power supply.

Note: Protective fuse: the TSX PSY 5520 power supply modules are fitted during manufacture with a protective fuse. This fuse, in series with the 24/48V input, is located inside the module and cannot be accessed.

Connecting a multi-rack PLC station with a ground-referenced network:



Q: General section switch,

KM: Circuit contactor-breaker,

(1): Insulating connector bar for finding grounding faults,

(2): Optional use of a process power supply.

Note: Protective fuse: the TSX PSY 5520 power supply modules are fitted during manufacture with a protective fuse. This fuse, in series with the 24/48V input, is located inside the module and cannot be accessed.

Note: If there are several PLC stations supplied by the same network, the principles of connection are identical.

Sensor and pre-actuator power supply servo control

How to set up servo control

It is recommended that servo control of the different power supplies is set up in the following sequence:

Step	Action
1	Switch on the power supply to the PLC and the inputs (sensors), using the contactor KM (see diagram ("Connecting DC power supply modules from an AC network", Premium and Atrium using Unity Pro, Processors, racks and power supply modules, Implementation Manual)).
2	If the PLC is in RUN mode and running on AUTO, switch on the output power supply (pre-actuators), using the contactor KA. This is controlled by the alarm relay contact in each power supply.

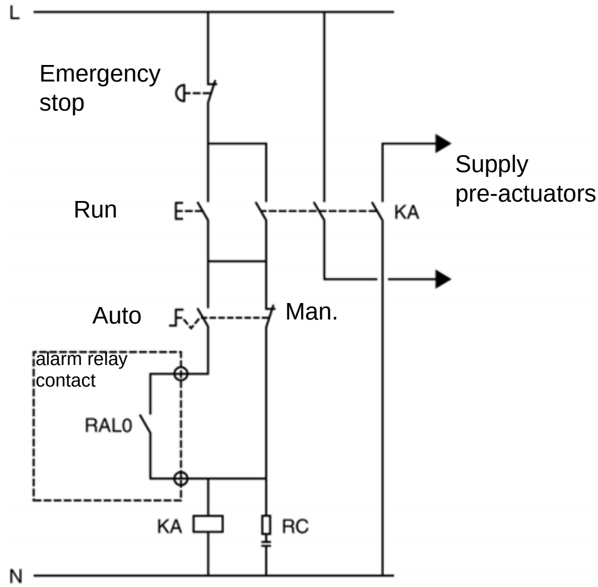
Safety standards

Before restarting the installation following a stop (caused by a power outage or an emergency stop), safety standards require authorization to be given by the operator.

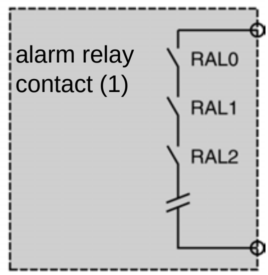
The MANU/AUTO switch makes it possible to force outputs from a terminal, when the PLC is in STOP mode.

Example 1

PLC station supplied by alternating current:

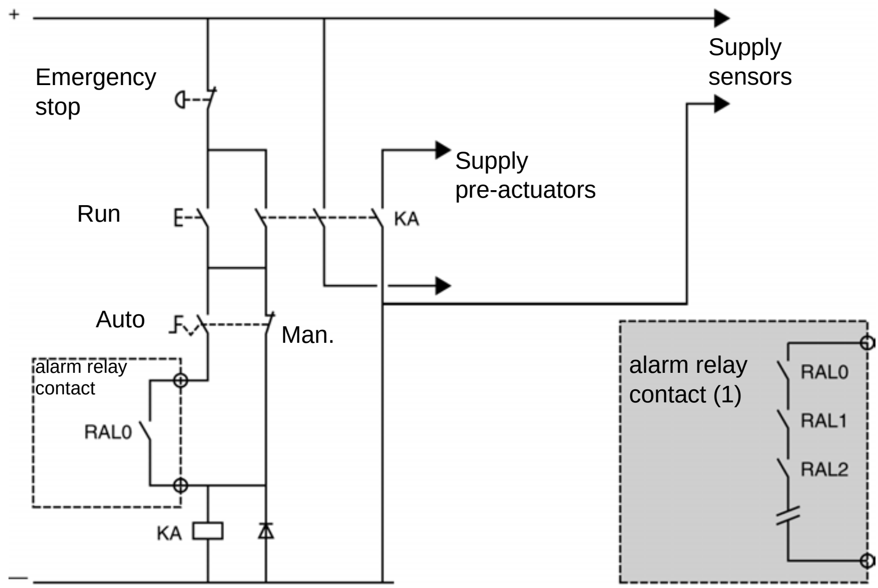


KA: contact controlled by alarm relay from supply module in AUTO run mode.



(1) When the PLC station is composed of several racks: set all the "alarm relay" contacts in series (RAL0, RAL1, RAL2, etc.).

Example 2 **PLC station supplied by direct current:**



KA: contact controlled by alarm relay from supply module in AUTO run mode.

(1) When the PLC station is composed of several racks: set all the "alarm relay" contacts in series (RAL0, RAL1, RAL2, etc.).

Definition of protection devices at the start of a line

Introduction

You are advised to mount a protection device, such as circuit breaker or fuse, at the start of the line on the supply network.

The following information can be used to define the minimum amperage rating of the circuit breaker or fuse for a given power supply module.

Selecting a line circuit breaker

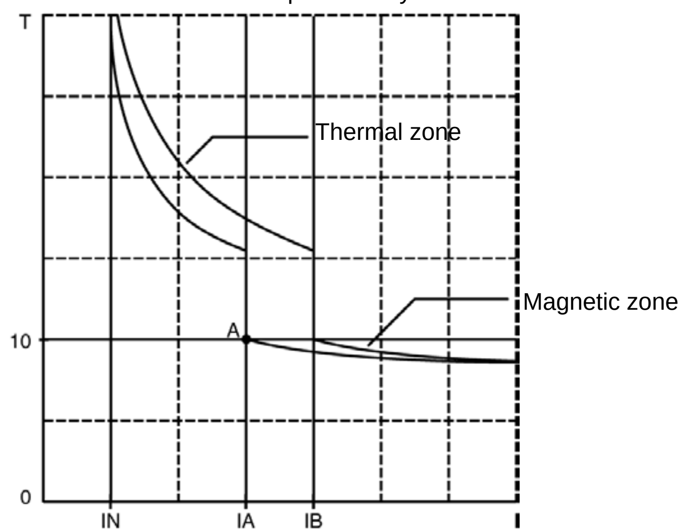
To select the amperage of the circuit breaker, the following three characteristics, which are given for each supply module, should be taken into account.

- the nominal input current: **I rms**,
- signaling current: **I**,
- the **It**.

The minimum amperage for the circuit breaker should be selected as follows:

- amperage of circuit breaker **IN > the supply I** rms,
- max. circuit breaker I > the supply signal **I**,
- circuit breaker It at point A on the curve > the supply**It**.

Illustration: characteristics provided by the circuit breaker manufacturer.



Selecting the line fuse

When selecting the amperage rating of the line fuse, the two following characteristics, which are given for each power supply, should be taken into account:

- the nominal input current: **I rms**,
- I^2t.

The minimum amperage rating for the fuse is selected as follows:

- fuse caliber **IN > 3 x the supply I rms**,
- I^2t of the fuse > 3 x I^2t of the power supply.

Reminder of the characteristics of **I rms**, signal **I**, **It** and **I^2t** for each power supply module

TSX module		**PSY 2600**	**PSY 5500**	**PSY 8500**	**PSY 1610**	**PSY 3610**	**PSY 5520**
I rms	at 24VDC	-	-	-	1.5A	2.7A	3A
	at 48VDC	-	-	-	-	-	1.5A
	at 100VAC	0.5A	1.7A	1.4A	-	-	-
	at 24VAC	0.3A	0.5A	0.5A	-	-	-
I signal(1)	at 24VDC	-	-	-	100A	150A	15A
	at 48VDC	-	-	-	-	-	15A
	at 100VAC	37A	38A	30A	-	-	-
	at 24VAC	75A	38A	60A	-	-	-
It	at 24VDC	-	-	-	0.2As	0.5As	7As
	at 48VDC	-	-	-	-	-	6As
	at 100VAC	0.034As	0.11As	0.15As	-	-	-
	at 24VAC	0.067As	0.11As	0.15As	-	-	-
I^2t	at 24VDC	-	-	-	$12.5A^2s$	$20A^2s$	$50A^2s$
	at 48VDC	-	-	-	-	-	$55A^2s$
	at 100VAC	$0.63A^2s$	$4A^2s$	$15A^2s$	-	-	-
	at 24VAC	$2.6A^2s$	$2A^2s$	$8A^2s$	-	-	-

(1) Values at initial power-up and at 25°C.

TSX PSY … supply modules: diagnostics

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At a Glance

Aim of this Chapter

This Chapter deals with the diagnostics of TSX PSY **…** supply modules .

What's in this Chapter?

This chapter contains the following topics:

Display on TSX PSY supply modules

Introduction

Each supply module has a display panel containing:

- three LEDs (OK, BAT, 24V) for the alternating current supply modules TSX PSY 2600/5500/8500,
- two LEDs (OK, BAT) for the direct current supply modules TSX PSY 1610/3610/5520.

Description

The following table describes the various LEDs and their functions:

Display LED	Description
OK LED (green)	• on when operating normally, • off when the output voltage is below the thresholds.
BAT LED (red)	• off when operating normally, • on if battery is missing, flat, the wrong way round or the wrong type.
24V LED (green)	• on when operating, • off if the sensor 24V voltage delivered by the supply is no longer present.
RESET push-button	Pressing this button activates a sequence of service signals identical to: • a power outage, when pressed, • powering up, when released. The application takes these actions (pressing and releasing) to mean a warm restart ("FAST Task Cycle Time", Premium and Atrium using Unity Pro, Processors, racks and power supply modules, Implementation Manual).

Sensor supply

The alternating current supply modules TSX PSY 2600/5500/8500 have a built-in power supply which delivers a voltage of 24VDC for supplying the sensors.

This sensor power supply can be accessed via the module's screw connection terminal block.

CAUTION

Parallelization

This supply module cannot be set in parallel with an external supply module.

Failure to follow these instructions can result in injury or equipment damage.

Note: The "24 VDC sensor supply module" output for the TSX PSY 8500 module is a VLSV-(very low safety voltage) type This ensures the user's safety.

Back-up battery on TSX PSY ... power supply modules

At a Glance

Each power supply module has a slot for the installation of a battery which supplies the internal **RAM** memory of the processors in order to save the data when the PLC is switched off.

This battery is delivered in the same packaging as the power supply module. When inserting it, you must respect the polarities.

Note: If a Atrium processor which can be integrated into a PC is being used, the back-up battery is built into the processor and its characteristics are the same as those described below.

Data on the back-up battery

Battery characteristics: thyonile lithium chloride battery, 3.6V/0.8 Ah, 1/2AA size.

Spare part product reference: TSX PLP 01.

Period for which data is stored: the data storage time depends on two factors:

- the percentage of time for which the PLC is switched off and as a result the battery is being used,
- the ambient temperature when the PLC is switched off.

Table of the ambient temperatures when switched off:

Ambient temperature when inoperative		≤ **30°C**	**40°C**	**50°C**	**60°C**
Backup time	**PLC off for 12 hours per day**	5 years	3 years	2 years	1 year
	PLC off for 1 hour per day	5 years	5 years	4.5 years	4 years

Monitoring the battery status: when the power is on, it monitors the status of the battery. If the battery is less than nominal, the user is informed visually by the **BAT** (red) LED which lights up. If this happens, the battery must be changed immediately. The %S68 system bit gives the status of the backup battery (0 = battery OK).

Changing the battery: the battery can be changed when the power supply module is on, or immediately after switching it off. In the latter case, the time for intervention is limited.

The backup time depends on the ambient temperature. Assuming that the processor was switched on previously, the typical backup time varies in the following way.

Ambient temperature when switching off	20°C	30°C	40°C	50°C
Backup time	2h	45mn	20mn	8mn

Loss of power to rack other than rack 0

General

All the channels on this rack are seen as in error by the processor, but the other racks are not affected. The values of the inputs in error are no longer updated in the application memory and are reset to zero in a discrete input module, unless they have been forced, when they are maintained at the forcing value.

Limit of outage period

If the outage period is less than 10 ms for alternating current power supplies or less than 1 ms direct current power supplies, the outage is not detected by the program, which will run as normal.

What happens after pressing the RESET button on a power supply module

General

The power supply module of each rack has a RESET button on its front panel, which when pressed triggers an initialization sequence of the modules on the rack it is supplying.

When this action takes place in a power supply module in the rack supporting the TSX P57/TSX H57 processor (rack 0), it causes a warm restart.

Special case with the PCI 57 processor

In this case, the processor is not physically present on the rack at address 0, so pressing the RESET button on the rack power supply module does not cause the application to warm restart, nevertheless the modules present on the rack are reinitialized.

TSX PSY … supply modules : auxiliary functions

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At a Glance

Aim of this Chapter

This Chapter deals with the auxiliary functions of TSX PSY **…** supply modules .

What's in this Chapter?

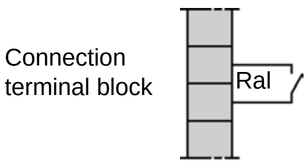
This chapter contains the following topics:

Alarm relay on TSX PSY supply modules

Introduction

The alarm relay located in each supply module has a potential free contact, which can be accessed on the module's screw connection terminal block.

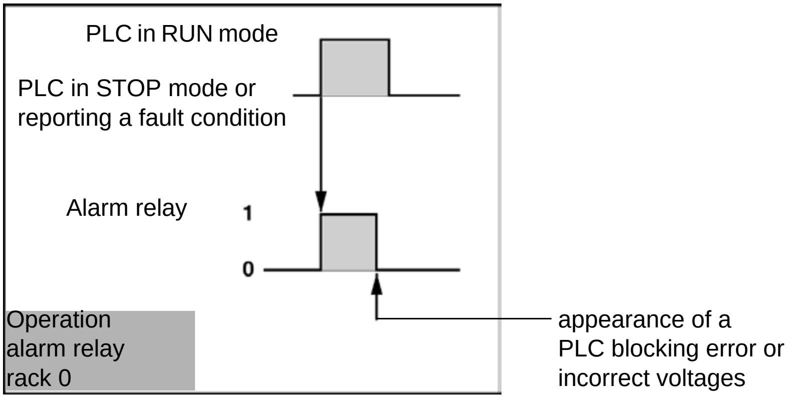
Illustration:



Alarm relay of the module situated on the rack supporting the processor (rack 0)

When operating normally, with the PLC in **RUN** mode, the alarm relay is activated and its contact is closed (state 1). Whenever the application is stopped, even partially, when a "blocking" error appears, when there are incorrect output voltages or power disappears, the relay falls back and its associated contact opens (state 0).

Illustration:



CAUTION

SUPPLY MODULE ALARM NOT FUNCTIONAL WITH PCX 57 PROCESSOR

When a PCX 57 processor, which can be integrated into a PC, is being used, the supply module alarm relay is not managed and is therefore always open.

Failure to follow these instructions can result in injury or equipment damage.

If this function is absolutely imperative for the proper operation of the installation, the alarm relay of the power supply module can be replaced by the use of an alarm relay output on the bus X or the FIPIO bus. In order to achieve this, this output should be:

- a relay output,
- configured with fallback to 0 (default configuration),
- initialized at state 1 when the application program starts executing.

When configured in this way, the relay output will behave in the same way as the alarm relay controlled by a TSX P57 processor.

Alarm relay for modules on the other racks (1 to 7)

Once the module has been switched on and if the output voltages are correct, the alarm relay is activated and the contact is closed (state 1).

If the power disappears, or if the output voltages are incorrect, the relay falls back (state 0).

These modes of operation allow these contacts to be used in fail-safe external circuits, as, for example, the automatic control of pre-actuator supplies, or the transmission of information.

Characteristics of the alarm relay contact

Characteristics Relay alarm contact.

Voltage limit when in use	Alternating current				19..0.264 V	
	Direct current (possible up to 34V for 1hr in every 24hrs)				10...30 V	
Thermal current	3 A					
Alternating current load	**Resistive load AC 12**	Voltage	~24V	~48V	~110V	~220V
		Power	50VAC (5)	50VAC (6) 110VAC (4)	110VAC (6) 220VAC (4)	220VAC (6)
	Inductive AC14 and AC15	Voltage	~24V	~48V	~110V	~220V
		Power	24VAC (4)	10VAC (10) 24VAC (8)	10VAC (11) 50VAC (7) 110VAC (2)	10VAC (11) 50VAC (9) 110VAC (6) 220VAC (1)
Direct current load	**Resistive DC12**	Voltage	24V (direct)			
		Power	24 W (6) 40 W (3)			
	Inductive load DC13 (L/R=60ms)	Voltage	24V (direct)			
		Power	10 W (8) 24 W (6)			
	Minimum switchable load		1mA/5V			
Response time	Activation	< 10 ms				
	Deactivation	< 10 ms				
Type of contact	Normally open					
Built-in protection	Against overloading and short circuits		None, a fast-blow fuse must be fitted			
	Against inductive over-voltage in ~		None, compulsory installation – in parallel to the terminals of each pre-actuator - of a RC circuit or MOV (ZNO) peak limiter, appropriate to the voltage in use			
	Against direct current inductive over-voltage		None, a discharge diode must be fitted to the terminals of each pre-actuator.			
Insulation (test voltage)	Contact/ground	2000 V rms-50/60Hz-1mn (on modules TSX PSY 2600/5500/1610/3610/5520)				
		3000 V rms-50/60Hz-1mn (on module TSX PSY 8500)				
	Resistance of insulation	> 10 MΩ under 500 VDC				

(1) 0.1 x 7^6 operations

(7) 1.5 x 10^6 operations

(2) 0.15 x 8^6 operations

(3) 0.3 x 9^6 operations

(4) 0.5 x 10^6 operations

(5) 0.7 x 10^6 operations

(6) 1 x 10^6 operations

(8) 2 x 10^6 operations

(9) 3 x 10^6 operations

(10) 5 x 10^6 operations

(11) 10 x 10^6 operations

TSX PSY power supply modules: breakdown of power consumption and power

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At a Glance

Aim of this Chapter

The aim of this Chapter is to provide a breakdown of power consumption and power for the selection of the power supply module.

What's in this Chapter?

This chapter contains the following topics:

Breakdown of power consumption for selection of the power supply module

General points

The power needed to supply a rack depends on the type of modules installed on it. It is therefore necessary to perform a consumption report in order to define the supply module to be mounted on the rack (standard or double format module).

Reminder of the outputs available with each power supply module

Summary table:

	Standard format		**Double format**			
	TSX PSY 1610	TSX PSY 2600	TSX PSY 3610	TSX PSY 5520	TSX PSY 5500	TSX PSY 8500
Total output (all outputs included)(1) **(4b)**	30 W (30 W)	26W (30 W)	50 W (55) W	50 W (55 W)	50 W (55 W)	77W at 60°C 85W at 55°C, 100W with a TSX FAN
Power available on 5 VDC output (1 b)	15 W	25 W	35 W	35 W	35 W	75 W
Power available on 24 VR output (2 b)	15 W	15 W	19 W	19 W	19 W	not supplied
Power available on 24VDC output (sensors supply on the front panel terminal block) **(3 b)**	not supplied	12 W	not supplied	not supplied	19 W	38 W

(1) The values in brackets correspond to the maximum values which can be supported for 1 minute every 10 minutes. These values should not be taken into account when calculating the breakdown of power consumption.

⚠ WARNING

POWER CONSUMPTION LIMITS

When the power consumption needs are established, the total power consumed on each output (5 VDC, 24 VR and 24 VS) must not exceed the total output of the module.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Note: The TSX PSY 8500 supply module does not have a 24 VR output for supplying some modules at 24VDC. Therefore, the following provisions and preparations must be made for all racks which have this type of power supply:

- the relay output modules TSX DSY 08R **.** / 16R**.** and the weighing module TSX ISP Y 100 cannot be installed on these racks,
- the TSX ASY 800 analog output modules should be configured using an external power supply (maximum of 3 modules per rack).

Breakdown of power

Table of power breakdown:

Rack number:			
1	Power required at 5VDC output:	.........x10^{-3}Ax5V	=...............W
2	Power required at 24VR output:	.........x10^{-3}Ax24V	=...............W
3	Power required at 24VS output:	.........x10^{-3}Ax24V	=...............W
4	Total power required:		=...............W

WARNING

CALCULATED POWER CONSUMPTION VS. CAPACITY

The calculated power consumption from above must not exceed the power of the supply modules in the table below.

- power required on each output – available power on each output: 1-1a, 2-2a, 3-3a.
- sum of the power required on each output – total power available: 4-4a.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Processor consumption breakdown

Table 1

This table shows the typical consumption of each module and can be used to calculate the consumption per rack and on each output depending on the modules installed:

Rack number:								
Module type	**Product references**	**No.**	**Consumption in mA** (typical value) (1)					
			At 5VDC		**At 24VR**		**At 24VS (2)**	
			Module	Total	Module	Total	Module	Total
Processor + PCMCIA memory card	TSX P57 103		440					
	TSX P57 153		530					
	TSX P57 203		750					
	TSX P57 2623		1110					
	TSX P57 253/353LA		820					
	TSX P57 2823		1180					
	TSX P57 303/303A		1000					
	TSX P57 3623/3623A		1360					
	TSX P57 353/353A		1060					
	TSX P57 453/453A		1080					
	TSX P57 4823/4823A		1440					
Total								

(1) Module consumption is given for 100% of inputs or outputs in state 1.

(2) If using a 24V (direct) external sensor supply, the consumption on this output should not be taken into account when selecting the power supply for the rack.

Note: If the CPU is intended to replace an ATRIUM module in your PLC configuration, make sure that the surplus electrical consumption on the rack which is caused by this modification does not lead to the replacement of your power supply module by a more powerful module.

I/O module consumption breakdown

Table 2

This table shows the typical consumption of each module and can be used to calculate the consumption per rack and on each output depending on the modules installed:

Rack number:								
Module type	**Product references**	**No.**	**Consumption in mA** (typical value) (1)					
			At 5VDC		**At 24VR**		**At 24VS (2)**	
			Module	Total	Module	Total	Module	Total
Carried forward								
Discrete input	TSX DEY 08D2		55				80	
	TSX DEY 16A2		80					
	TSX DEY 16A3		80					
	TSX DEY 16A4		80					
	TSX DEY 16A5		80					
	TSX DEY 16D2		80				135	
	TSX DEY 16D3		80				135	
	TSX DEY 16FK		250				75	
	TSX DEY 32D2K		135				160	
	TSX DEY 32D3K		140				275	
	TSX DEY 64D2K		155				315	
TOR outputs	TSX DSY 08R4D		55		80			
	TSX DSY 08R5		55		70			
	TSX DSY 08R5A		55		80			
	TSX DSY 08S5		125					
	TSX DSY 08T2		55					
	TSX DSY 08T22		55					
	TSX DSY 08T31		55					
	TSX DSY 16R5		80		135			
	TSX DSY 16S4		220					
	TSX DSY 16S5		220					
	TSX DSY 16T2		80					
	TSX DSY 16T3		80					
	TSX DSY 32T2K		140					
	TSX DSY 64T2K		155					

Rack number:								
Discrete Inputs/ Outputs	TSX DMY 28FK		300				75	
	TSX DMY 28RFK		300				75	
Total								

(1) Module consumption is given for 100% of inputs or outputs in state 1.

(2) If using a 24V (direct) external sensor supply, the consumption on this output should not be taken into account when selecting the power supply for the rack.

Consumption breakdown of analog/counting/movement control modules

Table 3

This table shows the typical consumption of each module and can be used to calculate the consumption per rack and on each output depending on the modules installed:

Rack number:								
Module type	**Product references**	**No.**	**Consumption in mA** (typical value) (1)					
			At 5VDC		**At 24VR**		**At 24VS (2)**	
			Module	Total	Module	Total	Module	Total
Carried forward								
Analog	TSX AEY 414		660					
	TSX AEY 420		500					
	TSX AEY 800		270					
	TSX AEY 810		475					
	TSX AEY 1600		270					
	TSX AEY 1614		300					
	TSX AEY 410		990					
	TSX AEY 800 (3)		200		300			
Counting	TSX CTY 2A		280				30	
	TSX CTY 2C		850				15	
	TSX CTY 4A		330				36	
Axis control	TSX CAY 21		1100				15	
	TSX CAY 22		1100				15	
	TSX CAY 33		1500				30	
	TSX CAY 41		1500				30	
	TSX CAY 42		1500				30	
	TSX CSY 84		1800					
Step by step control	TSX CFY 11		510				50	
	TSX CFY 21		650				100	
Grand total								

(1) Module consumption is given for 100% of inputs or outputs in state 1.

(2) If using a 24V (direct) external sensor supply, the consumption on this output should not be taken into account when selecting the power supply for the rack.

(3) If using a 24VR (direct) external power supply, the consumption of 300mA on the internal 24VR should not be taken into account when selecting the rack power supply.

Consumption breakdown of communication modules

Table 4

This table shows the typical consumption of each module and can be used to calculate the consumption per rack and on each output depending on the modules installed:

Rack number:								
Module type	**Product references**	**No.**	**Consumption in mA** (typical value) (1)					
			At 5VDC		**At 24VR**		**At 24VS (2)**	
			Module	Total	Module	Total	Module	Total
Carried forward								
Communication	TSX ETY 110 (3)		800					
	(4)		1200					
	TSX ETY 120 (3)		800					
	(4)		1200					
	TSX ETY 210 (3)		800					
	(4)		1200					
	TSX ETY 4102/5102		360					
	TSX IBY 100		500					
	TSX PBY 100		400					
	TSX SAY 100		110					
	TSX SAY 1000		100					
	TSX SCY 21601		350					
	TSX SCP 111		140					
	TSX SCP 112		120					
	TSX SCP 114		150					
	TSX FPP 10		330					
	TSX FPP 200		330					
	TSX JNP 112		120					
	TSX JNP 114		150					
	TSX MBP 100		220					
	TSX MDM 10		195					
Grand total								

(1) Module consumption is given for 100% of inputs or outputs in state 1,

(2) if using a 24V (direct) external sensor power supply, the consumption on this output should not be taken into account when selecting the power supply for the rack,

(3) without remote power feed (RJ45),

(4) with remote power feed (AUI).

Consumption breakdown (other modules)

Table 5

This table shows the typical consumption of each module and can be used to calculate the consumption per rack and on each output depending on the modules installed:

Rack number:								
Module type	**Product references**	**No.**	**Consumption in mA** (typical value) (1)					
			At 5VDC		**At 24VR**		**At 24VS (2)**	
			Module	Total	Module	Total	Module	Total
Carried forward								
Weighing	TSX ISPY 100/101		150		145			
Emergency stop backup	TSX PAY 262		150					
	TSX PAY 282		150					
Remote bus X	TSX REY 200		500					
Other (devices without their own power supply which can be connected to the terminal port)	TSX P ACC01		150					
	T FTX 117 (adjust)		310					
Grand total								

(1) Module consumption is given for 100% of inputs or outputs in state 1,

(2) If using a 24V (direct) external sensor power supply, the consumption on this output should not be taken into account when selecting the power supply for the rack.

TSX PSY 2600 power supply module

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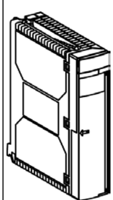
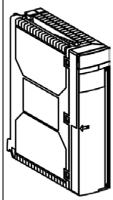
Characteristics of the TSX PSY 2600 power supply module

Characteristics

The TSX PSY 2600 module is a single format alternating current power supply module.

Reference	**TSX PSY 2600**		
			
Primary	Nominal voltage (V) ~		100...240
	Voltage limits (V) ~		85...264
	Nominal and limit frequencies		50-60/47-63Hz
	Apparent power		50 VA
	Nominal current consumption: Irms		≤ 0.5A to 100V ≤ 0.3A to 240V
	Initial power-up at 25°C (1)	I signal	≤ 37A to 100V ≤ 75A to 240V
		I^2t on locking	$0.63A^2s$ to 100V $2.6A^2s$ to 240V
		It on locking	0.034 As at 100V 0.067 As at 240V
	Accepted length of micro-power outages		≤10ms
	Integrated phase protection	via internal, non-accessible fuse	

Reference	**TSX PSY 2600**		
			
Secondary	Total output		26W
	5VDC output	Nominal voltage:	5.1V
		Nominal current	5A
		Power (typical)	25W
	24VR output (24V relay) (2)	Nominal voltage:	24VDC
		Nominal current	0.6A
		Power (typical)	15W
	24VS output (24V sensor)	Nominal voltage:	24VDC
		Nominal current	0.5A
		Power (typical)	12W
	Protection of output from	overloading/short circuits/over-voltages	
Power dissipation			10W
Auxiliary functions			
Alarm relay	yes (1 contact closed, free from potential on terminal block)		
Display	yes, via LED on front panel		
Back-up battery	yes (status monitored via LED on front panel of module)		
Conformity to the norms	IEC 1131-2		
Insulation	Dielectric resistance (50/60Hz-1mn)	Primary/secondary	2000 Vrms
		Primary/ground	2000 Vrms
		24VDC output/ground	-
	Resistance of insulation	Primary/secondary	$\geq$ 100 MΩ
		Primary/ground	$\geq$ 100 MΩ

(1) These values should be taken into account when starting up several devices at the same time, or for dimensioning the protection systems.

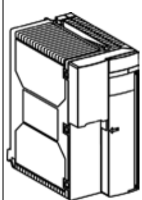
(2) 24V direct current output for supplying relays of "relay output" modules.

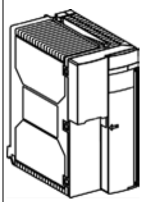
45 TSX PSY 5500 power supply module

Characteristics of the TSX PSY 5500 power supply module

Characteristics

The TSX PSY 5500 module is a double format alternating current power supply module.

Reference			
			
Primary	Nominal voltage (V) ~		100..120/ 200..240
	Voltage limits (V) ~		85..140/190..264
	Nominal and limit frequencies		50-60/47-63Hz
	Apparent power		150 VA
	Nominal current consumption: Irms		≤ 1.7A to 100V ≤ 0.5A to 240V
	Initial power-up at 25°C (1)	I signal	≤ 38A to 100V ≤ 38A to 240V
		I^2t on locking	$4A^2s$ to 100V $2A^2s$ to 240V
		It on locking	0.11 As at 100V 0.11 As at 240V
	Accepted length of micro-power outages		≤10ms
	Integrated phase protection	via internal, non-accessible fuse	

Reference			
			
Secondary	Total output		50W
	5VDC output	Nominal voltage:	5.1V
		Nominal current	7A
		Power (typical)	35W
	24VR output (24V relay) (2)	Nominal voltage:	24VCC
		Nominal current	0.8A
		Power (typical)	19W
	24VS output (24V sensor)	Nominal voltage:	24VCC
		Nominal current	0.8A
		Power (typical)	19W
	Protection of output from	overloading/short circuits/over-voltages	
Power dissipation			20W
Auxiliary functions			
Alarm relay	yes (1 contact closed, free from potential on terminal block)		
Display	yes, via LED on front panel		
Back-up battery	yes (status monitored via LED on front panel of module)		
Conformity to the norms	IEC 1131-2		
Insulation	Dielectric resistance (50/60Hz-1mn)	Primary/secondary	2000 Vrms
		Primary/ground	2000 Vrms
		24VDC output/ground	-
	Resistance of insulation	Primary/secondary	≥ 100 MΩ
		Primary/ground	≥ 100 MΩ

(1) These values should be taken into account when starting up several devices at the same time, or for dimensioning the protection systems.

(2) 24V direct current output for supplying relays of "relay output" modules.

TSX PSY 8500 power supply module

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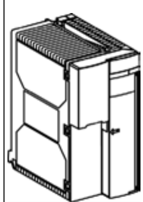
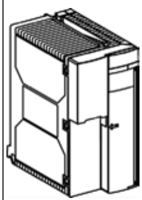
Characteristics of the TSX PSY 8500 power supply module

Characteristics

The TSX PSY 8500 module is a double format alternating current power supply module.

Reference			
			
Primary	Nominal voltage (V) ~		100..120/ 200..240
	Voltage limits (V) ~		85..140/170..264
	Nominal and limit frequencies		50-60/47-63Hz
	Apparent power		150 VA
	Nominal current consumption: Irms		≤ 1.4A to 100V ≤ 0.5A to 240V
	Initial power-up at 25°C (1)	I signal	≤ 30A to 100V ≤ 60A to 240V
		I^2t on locking	$15A^2s$ to 100V $8A^2s$ to 240V
		It on locking	0.15 As at 100V 0.15 As at 240V
	Accepted length of micro-power outages		≤10ms
	Integrated phase protection	via internal, non-accessible fuse	

Reference			
			
Secondary	Total output		77/85/100W (2)
	5VDC output	Nominal voltage:	5.1V
		Nominal current	15A
		Power (typical)	75W
	24VR output (24V relay) (3)	Nominal voltage:	not supplied
		Nominal current	not supplied
		Power (typical)	not supplied
	24VS output (24V sensor)	Nominal voltage:	24VDC
		Nominal current	1.6A
		Power (typical)	38W
	Protection of output from	overloading/short circuits/over-voltages	
Power dissipation			20W
Auxiliary functions			
Alarm relay	yes (1 contact closed, free from potential on terminal block)		
Display	yes, via LED on front panel		
Back-up battery	yes (status monitored via LED on front panel of module)		
Conformity to the norms	IEC 1131-2		
Insulation	Dielectric resistance (50/60Hz-1mn)	Primary/secondary	3000 Vrms
		Primary/ground	3000 Vrms
		24VDC output/ground	500 Vrms
	Resistance of insulation	Primary/secondary	≥ 100 MΩ
		Primary/ground	≥ 100 MΩ

(3) 24V direct current output for supplying relays of "relay output" modules.

TSX PSY 1610 power supply module

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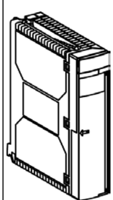
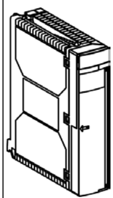
Characteristics of the TSX PSY 1610 power supply module

Characteristics

The TSX PSY 1610 module is a single format non-isolated direct current power supply module.

Reference	**TSX PSY 1610**		
			
Primary	Nominal voltage (not isolated)		24 VDC
	Voltage limits (including ripple) (1) (possible up to 34V for 1hr in every 24hrs)		19.2 to 30 VDC
	Nominal input current: Irms at 24VDC		≤1.5 A
	Initial power-up at 25°C (2)	I signal	≤ 100A at 24V DC
		I^2t on locking	12.5 A^2s
		It on locking	0.2 As
	Accepted length of micro-power outages		≤1ms
	Integrated input protection	via 5x20 time delay fuse, 3.5A	

Reference	**TSX PSY 1610**		
			
Secondary	Total output (typical)		30 W
	5VDC output	Nominal voltage:	5V
		Nominal current	3A
		Power (typical)	15W
	24VR output (24VDC relay) (3)	Nominal voltage:	U network – 0.6V
		Nominal current	0.6 A
		Power (typical)	15 W
	Built-in output protection against (4)	Overloading	yes
		Short circuits	yes
		Over-voltage	yes
Power dissipation			10W
Auxiliary functions			
Alarm relay	yes (1 contact closed, free from potential on terminal block)		
Display	yes, via LED on front panel		
Back-up battery	yes (status monitored via LED on front panel of module)		
Conformity to the norms			IEC1131-2

(1) With the supply of "relay output" modules, the limit range is reduced to 21.6V26.4V.

(2) These values should be taken into account when starting up several devices at the same time, and for dimensioning the protection systems.

(3) 24V direct current output for supplying relays of "relay output" modules.

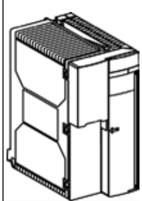
(4) The 24VR output voltage, which cannot be accessed by the user, is protected by a fuse which is located under the module (5x20, 4A, Medium type).

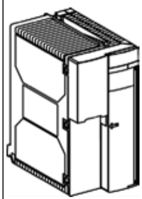
48 TSX PSY 3610 power supply module

Characteristics of the TSX PSY 3610 power supply module

Characteristics

The TSX PSY 3610 module is a double format non-insulated direct current supply module.

<table>
<tr><td>Reference</td><td colspan="3"></td></tr>
<tr><td></td><td colspan="3"></td></tr>
<tr><td rowspan="7">Primary</td><td colspan="2">Nominal voltage</td><td>24 VDC</td></tr>
<tr><td colspan="2">Voltage limits (including ripple) (1) (possible up to 34V for 1hr in every 24hrs)</td><td>19.2 to 30 VDC</td></tr>
<tr><td colspan="2">Nominal input current: Irms at 24VDC</td><td>≤2.7 A</td></tr>
<tr><td rowspan="3">Initial power-up at 25°C (2)</td><td>I
signal</td><td>≤ 150A at 24V DC</td></tr>
<tr><td>I^2t
on locking</td><td>20 A^2s</td></tr>
<tr><td>It
on locking</td><td>0.5 As</td></tr>
<tr><td colspan="2">Accepted length of micro-power outages</td><td>≤1ms</td></tr>
<tr><td></td><td>Integrated input protection</td><td colspan="2">no</td></tr>
</table>

Reference			
			
Secondary	Total output (typical)		50 W
	5VDC output	Nominal voltage:	5.1V
		Nominal current	7A
		Power (typical)	35W
	24VR output (24V relay) (3)	Nominal voltage:	U network – 0.6V
		Nominal current	0.8 A
		Power (typical)	19 W
	Built-in output protection against (4)	Overloading	yes
		Short circuits	yes
		Over-voltage	yes
Power dissipation			15W
Auxiliary functions			
Alarm relay	yes (1 contact closed, free from potential on terminal block)		
Display	yes, via LED on front panel		
Back-up battery	yes (status monitored via LED on front panel of module)		
Conformity to the norms			IEC1131-2

(1) With the supply of "relay output" modules, the limit range is reduced to 21.6V26.4V.

(2) These values should be taken into account when starting up several devices at the same time, and for dimensioning the protection systems.

(3) 24V direct current output for supplying relays of "relay output" modules.

(4) The 24VR output voltage, which cannot be accessed by the user, is protected by a fuse which is located under the module (5x20, 4A, Medium type).

TSX PSY 5520 power supply module

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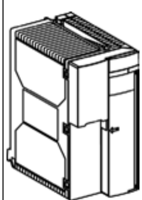
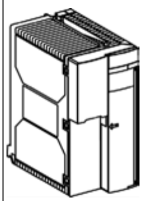
Characteristics of the TSX PSY 5520 power supply module

Characteristics

The TSX PSY 5520 module is a double format insulated direct current power supply module.

Reference			
			
Primary	Nominal voltage		24..0.48 VDC
	Voltage limits (including ripple)		19.2 to 60VDC
	Nominal input current: Irms		≤ 3 A at 24V DC ≤ 1.5A at 48V DC
	Initial power-up at 25°C (1)	I signal	≤ 15A at 24V DC ≤ 15 A at 48V DC
		I^2t on locking	50 A^2s at 24VDC 55 A^2s at 48VDC
		It on locking	7 As at 24VDC 6 As at 48VDC
	Accepted length of micro-power outages		≤1ms
	Built-in protection of + input	by internal, non-accessible fuse module	

Reference			
			
Secondary	Total output (typical)		50 W
	5VDC output	Nominal voltage:	5.1V
		Nominal current	7A
		Power (typical)	35W
	24VR output (24VDC relay) (2)	Nominal voltage:	24 V
		Nominal current	0.8 A
		Power (typical)	19 W
	Built-in output protection against	Overloading	yes
		Short circuits	yes
		Over-voltage	yes
Power dissipation			20W
Auxiliary functions			
Alarm relay	yes (1 contact closed, free from potential on terminal block)		
Display	yes, via LED on front panel		
Back-up battery	yes (status monitored via LED on front panel of module)		
Conformity to the norms			IEC1131-2
Insulation	Dielectric resistance	primary/secondary primary/ground	2000 Vrms-50/ 60Hz-1mn 2000 Vrms-50/ 60Hz-1mn
	Resistance of insulation	primary/secondary primary/ground	≥ 10 MΩ ≥ 10 MΩ

(1) These values should be taken into account when starting up several devices at the same time, and for dimensioning the protection systems.

(2) 24VDC output for supplying the relays of the "relay output" modules.

Process and AS-i supply

VI

At a Glance

Aim of this Part

This Part describes Process and AS-i supply and their installation.

What's in this Part?

This part contains the following chapters:

Process and AS-i supply: introduction

50

At a Glance

Aim of this Chapter

This Chapter introduces Process and AS-i supply.

What's in this Chapter?

This chapter contains the following topics:

General introduction to Process and AS-i power supply modules

General

A wide range of power supply units and modules is offered to meet your needs in the best possible way:

- TBX SUP 10 and TSX SUP 1..1 process power supply units and modules, designed to supply 24 VDC to a PLC system periphery, and driven by PLCs (TSX Micro and Premium). This periphery being composed of sensors, pre-actuators, encoders, operator dialog terminals, regulators, LEDs, push-buttons, pneumatic actuators, etc. . This 24 V power supply can be delivered using a 100/240 V, 50/60 Hz AC network.
  The power supply modules TBX SUP 10 and TSX SUP 1011 can also be connected to a 125 VDC network.
- The AS-i power supply units and modules TSX SUP A02 and A05 designed to supply 30 VDC to the components connected to an AS-i field bus. This power supply is distributed over the same wires as those used for data exchange.

The attachment mode for these products has been specially designed to respond to the specific mounting distances and specifications of TSX Micro and TSX Premium PLCs, and TBX products.

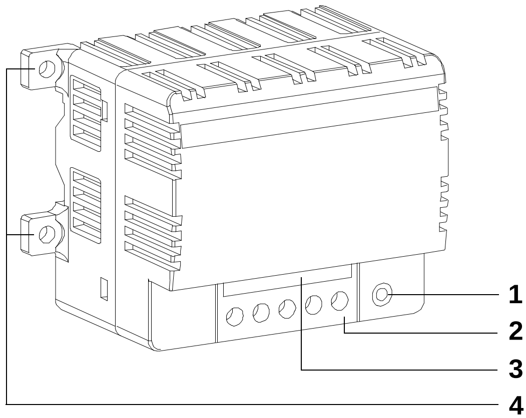
All the products are mounted:

- on a Telequick AM1-PA mounting plate,
- on a central DIN rail AM1-DP200/DE200, except for the high-power power supply blocks TSX SUP 1101 and TSX SUP A05.

Physical description of TBX SUP 10 supply block

Illustration

Diagram and numbers:



Number table

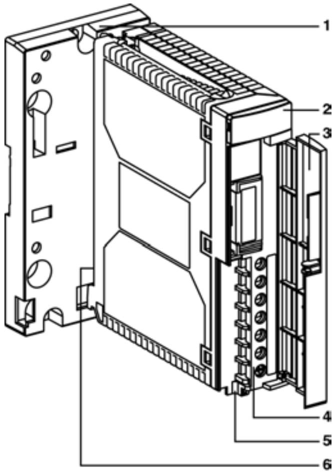
The following table shows the numbers and their corresponding descriptions from the diagram above:

Numbers	Description
1	LED showing power-up of module.
2	Screw terminal block for supply voltage wiring.
3	Identification label for the wire terminals.
4	Wings for fixing the module.

Physical description of the TSX SUP 1011 supply module

Illustration

Diagram and numbers:



Number table

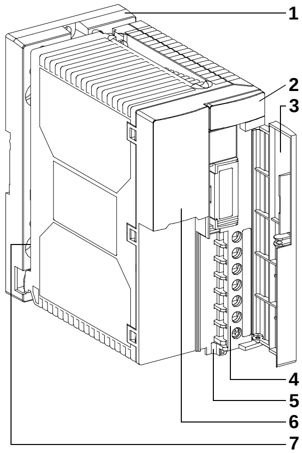
The following table shows the numbers and their corresponding descriptions from the diagram above:

Numbers	Description
1	Support board for fixing the supply module directly onto the AM1-DE200 / DP200 DIN mounting track or the AM1-PA Telequick perforated board.
2	Display block with: ● a 24 V LED (green): lit if the established internal and output voltages are correct, ● a LSH LED (orange) "power optimization mode": lit if the power supply is running in parallelization mode with power optimization.
3	Flap for protecting the terminal block.
4	Screw terminal block for connection: ● to the AC/DC supply network, ● to 24 VDC output.
5	Hole for the cable-tightening clip to go through.
6	"NOR/LSH" switch placed at the back of the module to control the power optimization system. ● NOR position: normal operation without power optimization (default position), ● LSH position: operation with power optimization with supply running in parallel. **Note:** Access to the switch requires the module to be removed from the support board.

Physical description of TSX 1021/1051 supply modules

Illustration

Diagram and numbers:



Number table

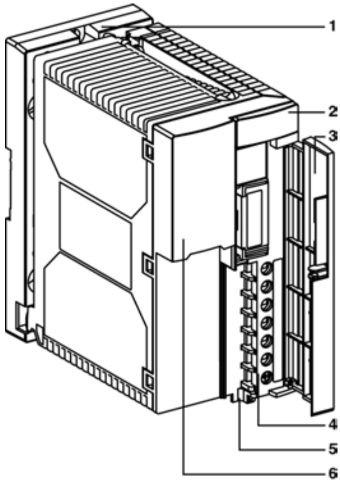
The following table shows the numbers and their corresponding descriptions from the diagram above:

Numbers	Description
1	Support board for fixing the supply module directly onto the AM1-DE200 / DP200 DIN mounting track or the AM1-PA Telequick perforated board.
2	Display block with: ● a 24 V LED (green): lit if the internal and output voltages are correct, ● a LSH LED (orange) only on TSX SUP 1021 "power optimization mode": lit if the power supply is running in parallelization mode with power optimization.
3	Flap for protecting the terminal block.
4	Screw terminal block for connection: ● to the AC/DC supply network, ● to 24 VDC output.
5	Hole for the cable-tightening clip to go through.
6	110/220 V voltage selector. On delivery, the selector is set at 220.
7	"NOR/LSH" switch placed at the back of the module to control the power optimization system. This switch is only present on the TSX SUP 1021 module. ● NOR position: normal operation without power optimization (default position), ● LSH position: operation with power optimization with supply running in parallel. **Note:** Access to the switch requires the module to be removed from the support board.

Physical description of the TSX SUP A02 supply module

Illustration

Diagram and numbers:



Number table

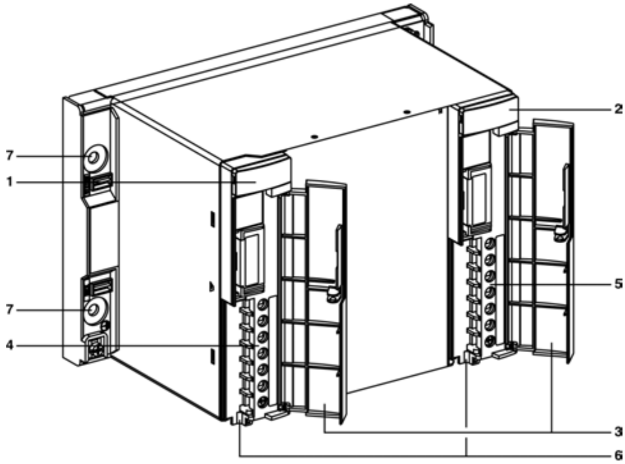
The following table shows the numbers and their corresponding descriptions from the diagram above:

Numbers	Description
1	Support board for mounting the supply module directly onto the AM1-DE200 / DP200 DIN mounting rail or the AM1-PA Telequick board.
2	Display block with: • an AS-i LED (green): lit if the internal and output voltages are correct,
3	Flap for protecting the terminal block.
4	Screw terminal block for connection: • to an alternating supply network, • from AS-i 30 VDC output.
5	Hole for the cable-tightening clip to go through.
6	110/220 V voltage selector. On delivery, the selector is set at 220.

Description of TSX SUP 1101/A05 supply blocks

Illustration

Diagram and numbers:



Number table

The following table shows the numbers and their corresponding descriptions from the diagram above:

Numbers	Description
1	Display block with an ON LED (orange): lit if power supply is running.
2	Display block with: ● a 24 V LED (green): lit if 24 VDC output voltage is present and correct, ● an AS-i LED (green): lit if the AS-i 30 VDC output voltage is present and correct. This LED is only present on the TSX SUP A05.
3	Flap for protecting terminal blocks.
4	Screw terminal block for connection to alternating supply network.
5	Screw terminal block for connecting AS-i 24 VDC and 30 VDC output voltage to TSX SUP A05.
6	Holes for the cable-tightening clip to go through.
7	Four mounting holes for M6 screws.

Physical description of the support board

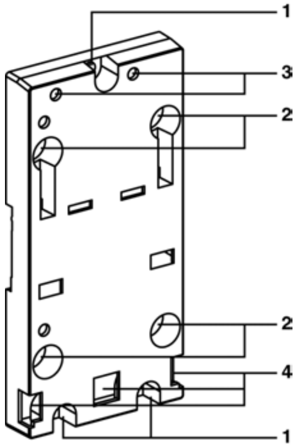
Introduction

Each TSX SUP 10.1 and TSX SUP A02 supply module is delivered mounted on a support board. This is used to fix the supply module: the DIN AM1-DE200 or AM1-DP200 profile, or to a Telequick AM1-PA perforated mounting plate.

Each support board can take: either a TSX SUP 1021, TSX SUP 1051 or TSX SUP A02 module, or one or two TSX SUP 1011 modules.

Illustration

Diagram and numbers:



Information Table

The following table shows the numbers and their corresponding descriptions from the diagram above:

Number	Description
1	Three 5.5 mm diameter holes for mounting the board onto a panel or an AM1-PA perforated board with a mounting distance of 140 mm (mounting distance for TSX 37 PLCs).
2	Four 6.5 mm diameter holes for mounting the board onto a panel or an AM1-PA perforated board with a mounting distance of 88.9 mm (mounting distance for TSX 57 PLCs).
3	Two M4 holes for mounting TSX SUP 1011/1021/1051/A02 supply module(s).
4	Windows designed to ink pins situated at the bottom and at the back of the module.

Note:
• each of these supply modules can also be mounted on a TSX RKY••• rack in place of another module, except in position PS. This must only be used by a TSX PSY••• supply module for supplying rack modules.
• the following operations require the module to be removed from the support board:
- positioning the "NOR/LSH" switch onto "LSH",
- mounting the board onto a panel or AM1-PA perforated board,
- mounting the module onto a TSX RKY••• rack.

Process supply: auxiliary functions

Parallelization mode with power optimization

The aim of parallelization is to use **two modules with the same product reference** in order to provide an output current which is greater than the maximum allowed by a single supply. The total current is the sum of the currents provided by all the supplies put together.

Power optimization is a system within the supply which is designed to distribute currents equally between parallel supplies. The resulting advantage is that the life of products is significantly extended, linked with distributed power consumption.

Dedicated supply features:

TSX SUP 1011/1021 supply	Power optimization mode is obtained by positioning the NOR/LSH switch at the rear of the modules onto LSH. To access the switch, the support board must be removed. When the orange LED (LSH) is lit, the mode is in operation. The current provided by two parallel supplies is limited to: ● 2A with 2 TSX SUP 1011 suppliers, ● 4A with 2 TSX SUP 1021 suppliers. Using this mode means output voltage can vary slightly: 24V + or - 5% instead 24 V + or - 3% in normal mode. When sharing loads, the power imbalance can reach a maximum of 25%. A specific connection (see *Connection of TSX SUP 1011/1021 power supplies, p. 432*) is required for these types of modules.
TSX SUP 1051/1101 supply	Power optimization mode does not require a switch on these supply modules. A specific connection must be made for the TSX SUP 1051 (see *Connection of TSX SUP 1051 power supplies, p. 434*) module and the TSX SUP 1101 (see *Connection of TSX SUP 1101 power supplies, p. 436*) module. The maximum current provided by two parallel supplies is limited to: ● 10A with 2 TSX SUP 1051 suppliers, ● 20A with 2 TSX SUP 1101 suppliers. Using this mode will lead to no loss of output voltage: When sharing loads, the power imbalance can reach a maximum of 15%.

Redundancy on TSX SUP 1011/ 1021 power supplies

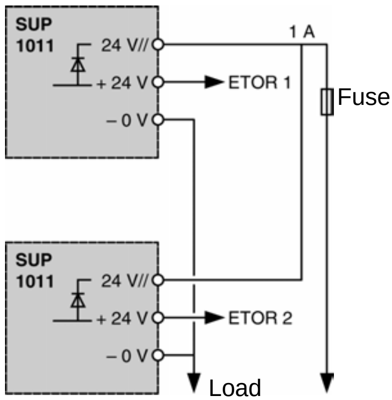
Principle:

To provide the currents required for the application, even in the event of loss of one of the power supplies.

To do this, the two suppliers are run in parallel by setting up the necessary connections (see *Connection of TSX SUP 1011/1021 power supplies, p. 432*).

The suppliers are configured in power optimization mode.

Example: provide 1A with redundancy from 2 TSX SUP 1011 suppliers.



Discrete inputs 1 and 2 on the PLC indicate the loss of one or other of the power supplies.

Note: TSX SUP 1051 and 1101 suppliers are not equipped with a serial diode, which is required for the redundancy function.

AS-i supply module: dedicated features

General

The simultaneous transmission of information and power down the same cable means that data transmission needs to be filtered in relation to supply.

This is why AS-i supply module has a built-in decoupling filter which supports the maximum direct current provided by the power supply. A standardized impedance is introduced into the power supply in relation to the frequency of information transmission.

Process and AS-i suppliers: installation

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At a Glance

Aim of this Chapter

This Chapter deals with the installation of Process and AS-i supply modules.

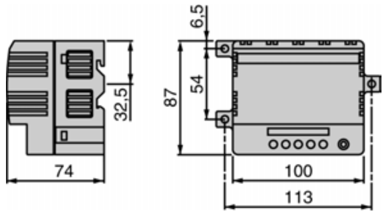
What's in this Chapter?

This chapter contains the following topics:

TBX SUP 10 dimensions/mounting/connections

Dimensions/ mounting

Illustration:

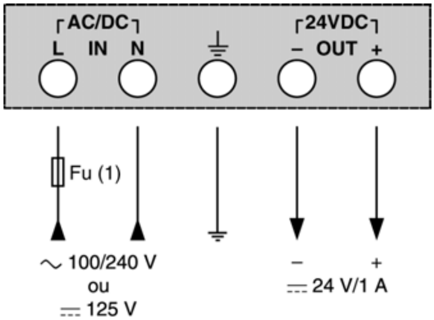


The TBX SUP 10 supply block must be mounted in an upright position to allow for the best possible natural air convection within the block.

It can be mounted on a panel, an AM1-PA Telequick perforated board or AM1-DE200 / DP200 mounting rail.

Connections

Illustration:



(1) External protection fuse on phase: 1A time delay 250V if single supply block.

Note: Primary: if the module is supplied with a 100/240V alternating current, the phase and the neutral wire must be taken into account when wiring. On the other hand, if the module is supplied with a 125 V direct current, polarities do not need to be taken into account.
Secondary: the terminal, with 0V potential, must be connected to the ground as soon as the supply module starts to provide output.

⚠ DANGER

HAZARDOUS VOLTAGE

The module ground terminal must be connected to the protective ground with a green/yellow wire.

Failure to follow these instructions will result in death or serious injury.

Dimensions/mounting Process and AS-i supply modules

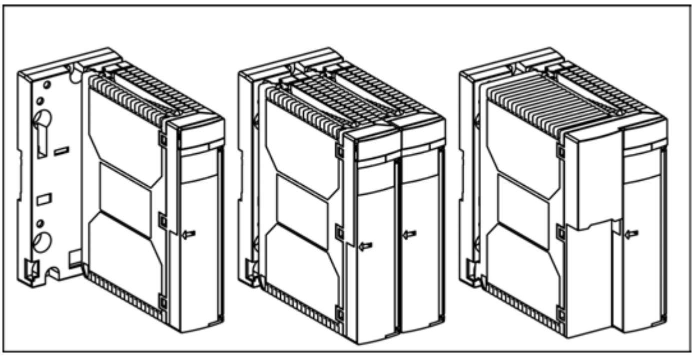
At a Glance

Each power supply module is delivered with a support which allows it to be mounted directly on a DIN (AM1-D••••) mounting rail or TELEQUICK (AM1-PA) mounting plate.

The support is able to receive:

- 1 or 2 TSX SUP 1011 power supply modules,
- 1 TSX SUP 1021/1051/A02 power supply module.

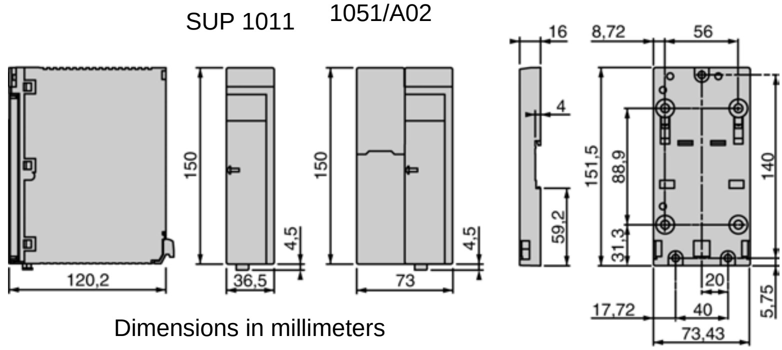
> **Note:** When using the TELEQUICK mounting plate, it is necessary to remove the module.



1 module TSX SUP 1011	2 modules TSX SUP 1011	1 module TSX SUP 1021/ 1051/A02

Dimensions

The illustration below shows the dimensions of the modules and support and the overall dimensions for each type of mounting system.



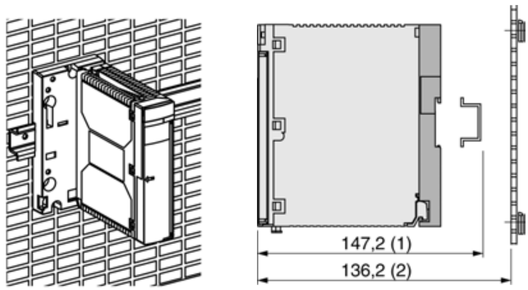
Dimensions in millimeters

TSX SUP 1011/1021/1051/A02 power supply modules can be mounted in different ways:

Mounting on an AM1-DE200 or AM1-DP200 mounting rail or on an AM1-PA board

Each supply module is delivered fixed to a support which can be mounted in this way.

Mounting on an AM1-D mounting rail

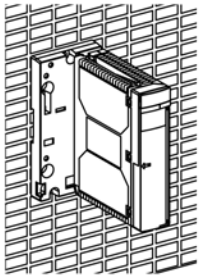


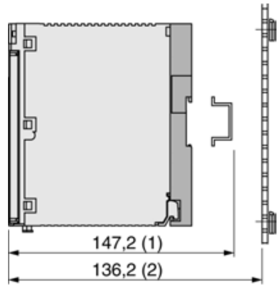
(1) 147.2mm (AM1-DE200)
139.7mm (AM1-DP200)

Carry out the following steps:

Step	Action
1	Remove the module from its support.
2	Mount the support, using 3 M6x25 screws, onto the AM1-D••• mounting rails equipped with AF1-CF56 1/4 turn sliding nuts.
3	Mount the module on its support.

Mounting on an AM1-PA board





(2) 136.7 mm (AM1-PA)

Carry out the following steps:

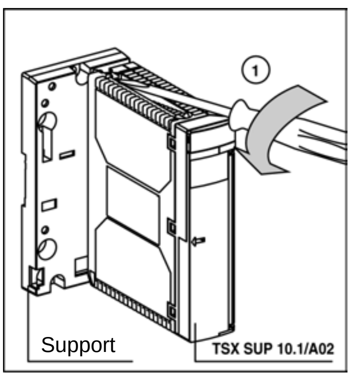
Step	Action
1	Remove the module from its support.
2	Mount the support onto the AM1-PA board.
3	Mount the module on its support.

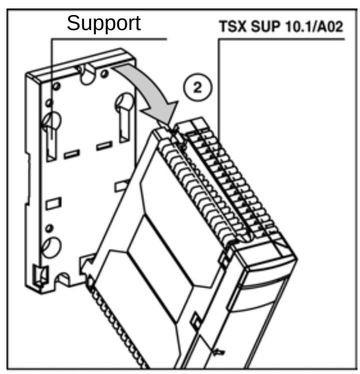
Removing the module

Carry out the following steps:

Step	Action
1	Loosen the screw on the upper part of the module in order to separate it from the support.
2	Rotate the module in order to free the lower pins from the support.

Illustration:





Mounting on an AM1-ED••• mounting rail

Carry out the following steps:

Step	Action
1	Remove the module from its support.
2	Mount the support, using 3 M6x25 screws, onto the AM1-ED••• mounting rails equipped with AF1-CF56 1/4 turn sliding nuts.
3	Mount the module on its support.

Mounting on a TSX RKY••• rack

TSX SUP 1011/1021/1051/A02 power supply modules can be mounted in any position on the TSX RKY•• rack, except for the PS position reserved for the power supply module of the rack. In this case, the support is not used and must be removed.

The support delivered with the supply module is not used and must be removed; the module is in this case mounted in the same way as the other modules (e.g.: processor (see *How to mount processor modules, p. 161*).

Note: The power supply module of the TSX PSY••• rack must be in the PS position in order to supply power to the modules in the rack.

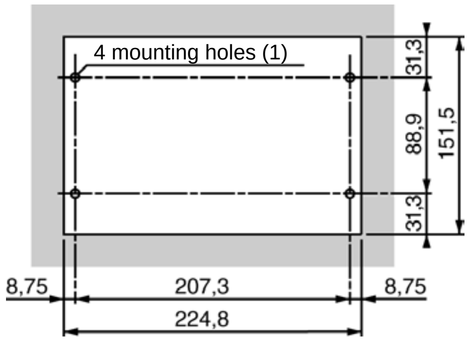
TSX SUP 1101/A05 supply block dimensions/mounting

Introduction

TSX SUP 1101 and TSX SUP A05 supply blocks can be mounted on a panel, an AM1-PA board, or DIN rail.

Mounting on a panel

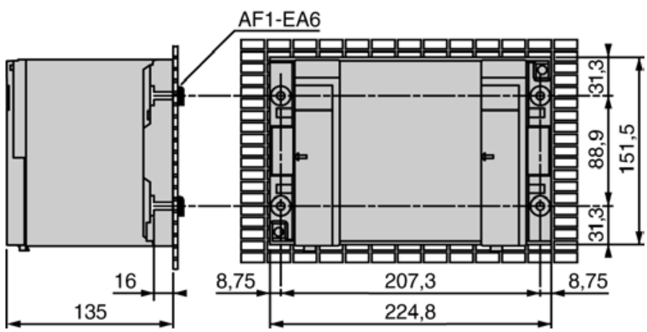
Screw-hole layout (dimensions in millimeters):



(1) The diameter of the mounting holes must be sufficient to take M6 screws.

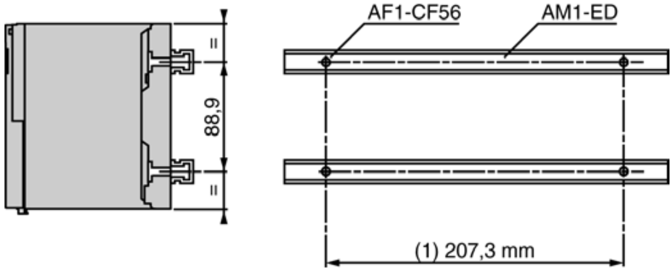
Mounting on an AM1-PA Telequick mounting grid

Fix the supply block with 4 M6 x 25 screws + washers and AF1-EA6 clips nuts (dimensions in millimeters):



Mounting on 35 mm wide DIN mounting rail

Fix the supply block using 4 M6 x 25 screws + washers and AF1-CF6 $^{1}/_{4}$ turn sliding nuts (dimensions in millimeters):



Summary of mounting methods

Summary table of mounting methods

The following table lists a summary of the different methods available for mounting Process and AS-i supply modules:

Supply module product reference	TBX SUP 10	TSX SUP 1011	TSX SUP 1021	TSX SUP 1051	TSX SUP 1101	TSX SUP A02	TSX SUP A05
AM1-PA Telequick board	X	X	X	X	X	X	X
AM1-DE200/DP200 central DIN rail	X	X	X	X		X	
AM1-ED DIN rail with 88.9 mm spacing (TSX 57 PLC)		X	X	X	X	X	X
TSX 57 rack TSX RKY••		X	X	X		X	

Process supply modules: connections

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At a Glance

Aim of this Chapter

This Chapter deals with the connection of Process supply modules.

What's in this Chapter?

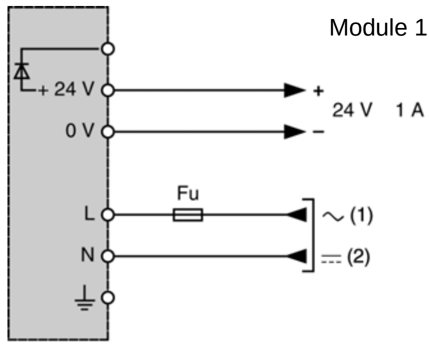
This chapter contains the following topics:

Connection of TSX SUP 1011/1021 power supplies

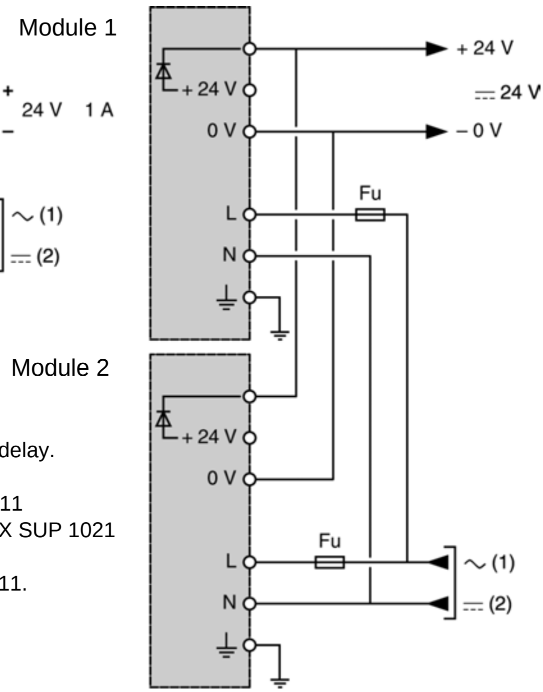
Illustration

Connection diagram:

Normal connection



Parallelization



Fu=External fuse
on phase (Fu): 250 V 4 A time delay.

(1) 100...240 VAC on TSX SUP 1011
100...120/200..240 VAC on TSX SUP 1021

(2) 125 VDC, only on TSX SUP 1011.

Connection rules

Primary:if the module is supplied with a 100/240 VAC power supply, it is necessary to observe wiring requirements for the phase and neutral when connecting the module. However, if the module is powered by a 125 VDC supply, it is not necessary to respect the polarities.

- an operating voltage ≥ 600 VAC with a cross-section of 1.5 mm^2 (14 AWG) for connection to the mains,

⚠ DANGER

HAZARDOUS VOLTAGE

The ground terminal of the module must be connected to the protective earth using a green/yellow wire.

Failure to follow these instructions will result in death or serious injury.

The power supply terminal is protected by a flap which allows access to the wiring terminals. The wires come vertically out of the power supply at its base. These wires can be kept in place with a cable-clip.

Secondary: to comply with isolation requirements (EN 60950) for a 24 V SELV isolated voltage, the following wiring is used:

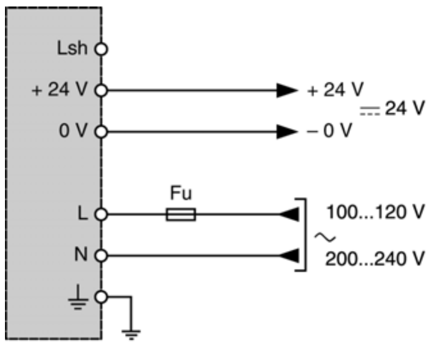
- an operating voltage ≥ 300 VAC with a cross-section of 2.5 mm^2 (12 AWG) for the 24 V outputs and the ground.

Connection of TSX SUP 1051 power supplies

Illustration

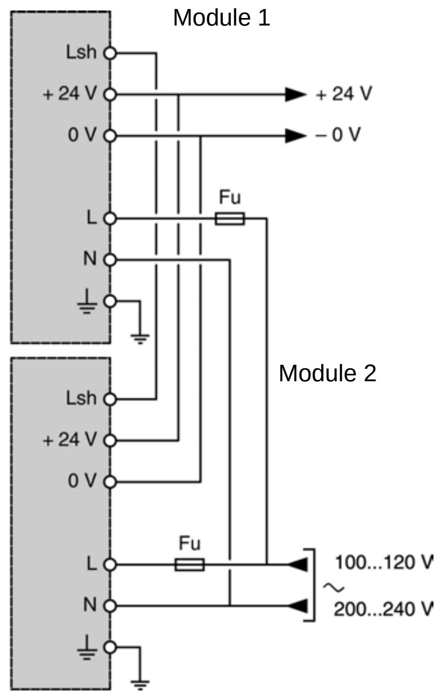
Connection diagram:

Normal connection



Fu=External safety fuse on phase (Fu): 250 V 4 A time delay

Parallelization



Connection rules

Primary: observe the rules concerning phase and neutral when wiring.

- an operating voltage ≥ 600 VAC with a cross-section of 1.5 mm^2 (14 AWG) for connection to the mains,

⚠ DANGER

HAZARDOUS VOLTAGE

The ground terminal of the module must be connected to the protective earth using a green/yellow wire.

Failure to follow these instructions will result in death or serious injury.

The power supply terminal is protected by a flap which allows access to the wiring terminals. The wires come vertically out of the power supply at its base. These wires can be kept in place with a cable-clip.

Secondary: to comply with isolation requirements (EN 60950) for a 24 V SELV isolated voltage, the following wiring is used:

- an operating voltage ≥ 300 VAC with a cross-section of 2.5 mm^2 (12 AWG) for the 24 V outputs and the ground.

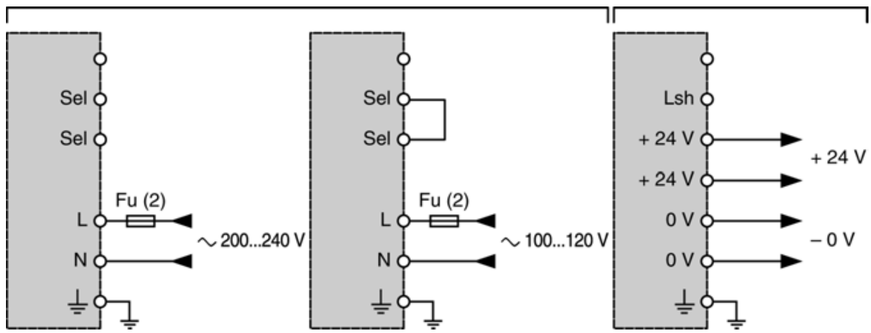
Connection of TSX SUP 1101 power supplies

Illustration 1

Normal connection diagram:

input terminal

output terminal



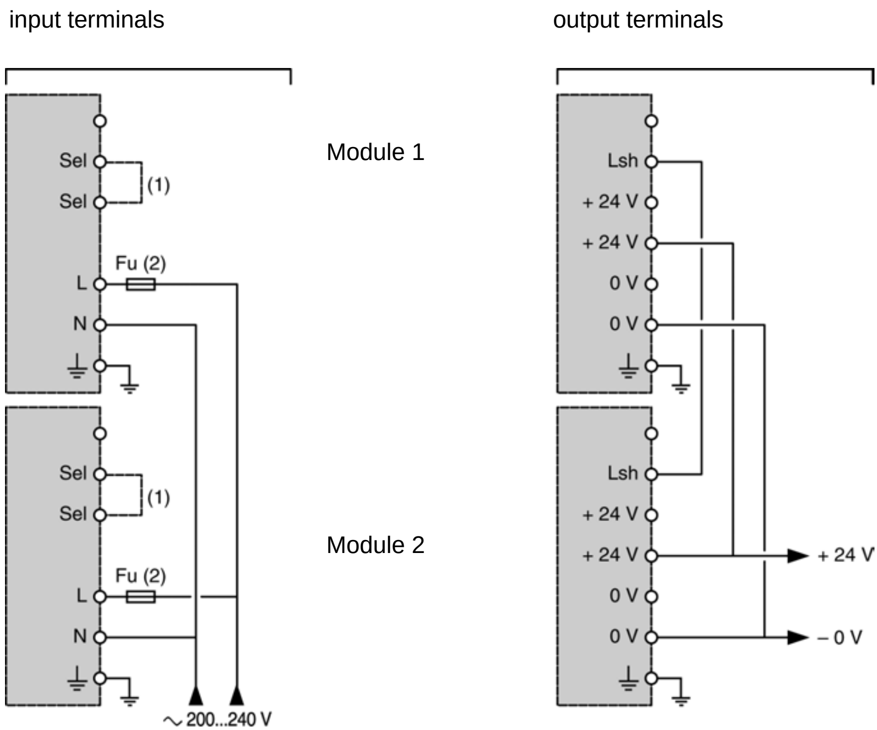
AC network connection 200..240 V

AC network connection 100..120 V

24 VDC output connection.

Illustration 2

Parallel connection diagram (parallelization):



(1) Connection for a 100...120 VAC power supply.

(2) External fuse on phase (Fu): 250 V 6.3 A time delay.

Connection rules

Primary: Observe the rules concerning phase and neutral when wiring.

- an operating voltage ≥ 600 VAC with a cross-section of 1.5 mm^2 (14 AWG) or 2.5 mm^2 (12 AWG) for connection to the mains,

⚠ DANGER

HAZARDOUS VOLTAGE

The ground terminal of the module must be connected to the protective earth using a green/yellow wire.

Failure to follow these instructions will result in death or serious injury.

The power supply terminal is protected by a flap which allows access to the wiring terminals. The wires come vertically out of the power supply at its base. These wires can be kept in place with a cable-clip.

Secondary: To comply with isolation requirements (EN 60950) for a 24 V SELV isolated voltage, the following wiring is used:

- an operating voltage ≥ 300 VAC with a cross-section of 2.5 mm^2 (12 AWG) for the 24 V outputs and the ground.
- Wire the two 24 V terminals in parallel, or distribute the load over the two 24 V outputs when the total current to be supplied is greater than 5 A.

Connecting AS-i supply modules

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At a Glance

Aim of this Chapter

This Chapter deals with the connection of AS-i supply modules.

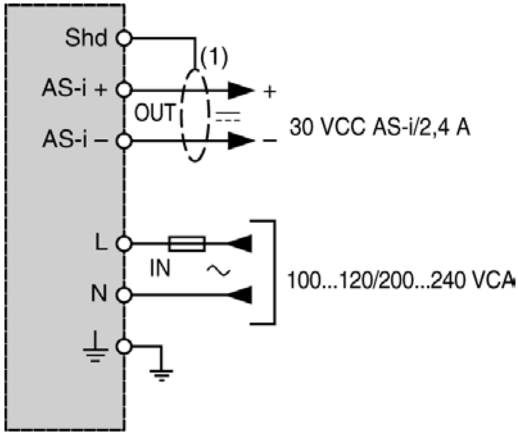
What's in this Chapter?

This chapter contains the following topics:

Connection of TSX SUP A02 power supply modules

Illustration

Connection diagram:

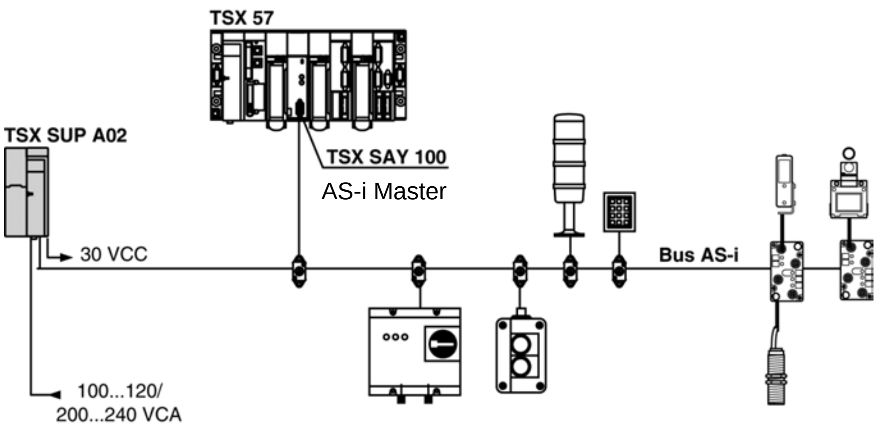


(1) Shielded AS-i cable screen if environment is disturbed.

Fu=External fuse on phase (Fu): 250 V 4 A time delay.

Connection synoptic

The TSX SUP A02 power supply module is designed to supply the AS-i bus, and the connected slaves (30 VDC/2.4 A).



Connection rules

Primary: observe the rules concerning phase and neutral when wiring.

⚠ DANGER

HAZARDOUS VOLTAGE

The ground terminal of the module must be connected to the protective earth using a green/yellow wire.

Failure to follow these instructions will result in death or serious injury.

The power supply terminal is protected by a flap which allows access to the wiring terminals. The wires come vertically out of the power supply at its base. These wires can be kept in place with a cable-clip.

To comply with isolation requirements (EN 60950) for a 24 V SELV isolated voltage, the following wiring is used:

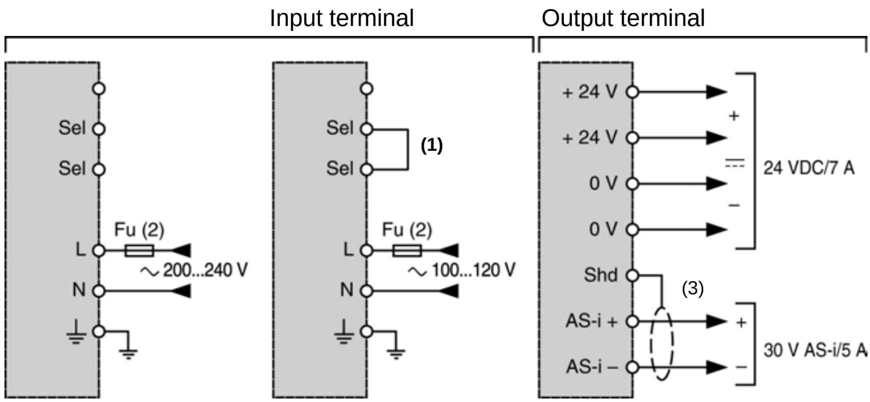
- an operating voltage ≥ 600 VAC with a cross-section of 1.5 mm^2 (14 AWG) for connection to the mains,
- an operating voltage ≥ 300 VAC with a cross-section of 2.5 mm^2 (12 AWG) for the 24 V outputs and the ground.

It is necessary to use a shielded cable for the AS-i bus only in cases where the installation is subject to very high levels of disturbance in terms of EMC (Electro Magnetic Compatibility).

Connecting TSX SUP A05 supply modules

Illustration

Connection diagram:



Connection to alternating network 200...240 V

Connection to an alternating network 100...120 V

Direct output connection 24 V and 30 V AS-i

(1) Connection if supply is from 100...120 V alternating current network.

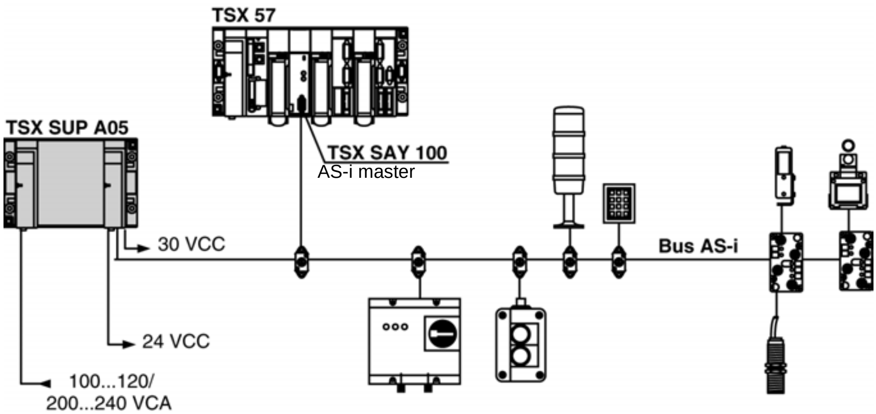
(2) External protection fuse on phase (Fu): 6.3 A time delay 250 V.

(3) Shielded AS-i cable screen in case of disrupted surroundings.

Connection overview

The TSX SUP A05 supply module is designed to supply the AS-i bus, including the slaves which are connected to it (30 V/5 A output). It also has an auxiliary supply (24 VDC/7 A) for sensors/actuators which consume large amounts of current. For this, a black AS-i ribbon cable is used.

Principle diagram:



Rules of connection

Primary: observe the rules concerning phase and neutral when wiring.

- an operating voltage ≥ 600 VAC with a cross-section of 1.5 mm^2 (14 AWG) or 2.5 mm^2 (12 AWG) for connection to the mains,

⚠ DANGER

HAZARDOUS VOLTAGE

The module ground terminal must be connected to the protective ground with a green/yellow wire.

Failure to follow these instructions will result in death or serious injury.

The "AC power supply network" and "24 V and 30 VDC output" AS-i terminals are protected by a flap allowing access to the wiring terminals. The wires come vertically out of the power supply at its base. These wires can be kept in place with a cable-clip.

Secondary: to comply with isolation requirements (EN 60950) for a 24 V SELV isolated voltage, the following wiring is used:

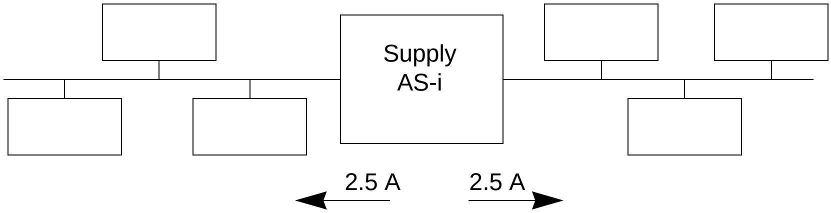
- an operating voltage ≥ 300 VAC with a cross-section of 2.5 mm^2 (12 AWG) for the 24 V outputs and the ground,
- connect the two 24 V terminals in parallel, or distribute the load over the two 24 V outputs when the total current to be provided is greater than 5 A.

Using a shielded cable for the AS-i bus is only necessary if the installation is overly disrupted in terms of EMC (Electro Magnetic Compatibility).

Given the large current that this supply module provides, its position on the bus is very important.

If the supply module is placed at one of the ends of the bus, it will provide a nominal current (e.g. 5 A) for the whole bus. The voltage drop at the end of the bus is therefore proportional to the 5 A.

If it is positioned in the middle of the bus, the voltage drop at the ends is proportional to only 2.5 A, assuming that the consumption for both sections of the bus is the same.



If there is no slave which consumes large amounts of power, it would be better to place the supply module in the middle of the installation. Conversely, if the installation has one or several large power consumers, it would be wise to place the supply module close to them.

Note: Where there are large power consumer actuators (contactor, solenoid coils etc.) the TSX SUP A05 supply module can provide the auxiliary 24 VDC, insulated from the AS-i line.

General precautions

Introduction

While installing the yellow AS-i cable, it is essential to place it in a cable track which is separate from the power cables. It is also advisable to place it flat and not twisted. This will help make the two AS-i cable wires as symmetrical as possible.

Installing the AS-i cable on a surface connected to the electric potential of the machine (for example, the housing) complies with the requirements of the EMC (Electro Magnetic Compatibility) directive.

The end of the cable, or the ends in the case of a bus with a star-formation , must be protected either:

- by connecting it (them) to a T-derivation,
- by not allowing them to come out of their last connection point.

Important

It is important to distribute power effectively on the AS-i bus, so that each device on the bus is supplied with sufficient voltage to enable it to operate properly. To do this, certain rules must be followed.

Rule 1

Select the capacity of the supply module adapted to the total consumption of the AS-i segment. Available capacities are 2.4 A (TSX SUP A02) and 5 A (TSX SUP A05).

A capacity of 2.4 A is generally sufficient based on an average consumption of 65mA per slave for a segment made up of a maximum of 31 slaves.

Rule 2

To minimize the effect of voltage drops and reduce the cost of the cable, you must determine the best position of the supply module on the bus, as well as the minimum size of cable appropriate for distributing power.

The voltage drop between the master and the last slave on the bus must not exceed 3 V. For that purpose, the table below gives the essential points for selecting the cross-sectional measurement of the AS-i cable.

Table of characteristics:

Cross-section measurement of AS-i cable	**0.75 mm^2 (28 AWG)**	**1.5 mm^2 (14 AWG)**	**2.5 mm^2 (12 AWG)**
Linear resistance	52 milli Ohms/meter	27 milli Ohms/meter	16 milli Ohms/meter
Voltage drop for 1 A over 100 meters (328 feet)	5.2 V	2.7 V	1.6 V

The cable which can be used for most applications is the cable with a cross-section of 1.5 mm^2 (14 AWG). This is the standard AS-i bus model (the cable is offered in the SCHNEIDER catalog).

Smaller cables can be used when sensors consume very little power.

Note: The maximum length of all the segments making up the AS-i bus without a relay is 100 meters (328 feet). The lengths of cables which link a slave to a passive distribution box must be taken into account.

Process and AS-i supply module characteristics

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At a Glance

Aim of this Chapter

This Chapter presents the different electrical characteristics of Process and AS-i supply modules in a table.

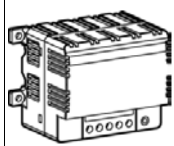
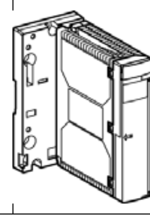
What's in this Chapter?

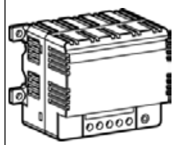
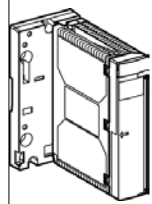
This chapter contains the following topics:

Electrical characteristics of process supply modules: TBX SUP 10 and TSX SUP 1011

Table of Characteristics

The following table describes the electrical characteristics of supply modules: TBX SUP 10 and TSX SUP 1011:

Process supply			**TBX SUP 10 24V/1A**	**TSX SUP 1011 24V/1A**
				
Primary				
Nominal input voltage		V	alternating 100240 direct 125	alternating 100240 direct 125
Input limit voltage		V	alternating 90264 direct 88156	alternating 85264 direct 105156
Network frequency		Hz	47...63	47...63/360...440
Nominal input current (U=100V)		On	0.4	0.4
Maximum call current (1)	to 100 V	On	3	37
	to 240 V	On	30	75
Maximum It on trigger (1)	to 100 V	As	0.03	0.034
	to 240 V	As	0.07	0.067
Maximum I^2t on trigger (1)	to 100 V	A^2s	2	0.63
	to 240 V	A^2s	2	2.6
Power factor			0.6	0.6
Harmonic (3)			10% (Phi=0°and 180°)	10% (Phi=0°and 180°)
Full load efficiency		%	>75	>75
Secondary				
Output (2)		W	24	26(30)
Nominal output current (2)		On	1	1.1

Process supply			**TBX SUP 10 24V/1A**	**TSX SUP 1011 24V/ 1A**
				
Output voltage/ accuracy at 25°C		V	24+/-5%	24+/-3%
Residual ripple (peak to peak)		mV	240	150
Maximum HF noise (peak to peak)		mV	240	240
Accepted length of micro-power outages (3)		ms	≤10 in AC ≤1 in DC	≤10 in AC ≤1 in DC
Protection against	Short circuits and overloads		continuous automatic reset	fallback to 0 and automatic reset after fault has disappeared
	Over-voltages	V	cuts off at U>36	cuts off at U>36
Parallelization			no	yes with power optimization
Serialization			no	yes
Power dissipation			8	18

(1) Values on initial power-up at 25°C. These elements are to be taken into account on start-up for the dimensioning of protection devices.

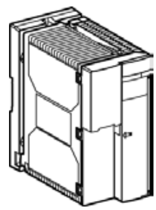
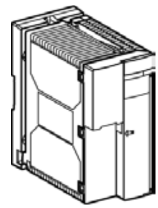
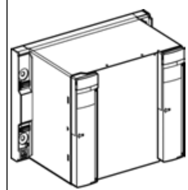
(2) Output power and current for an ambient temperature of 60°C. Input value in ( ) = output in a ventilated cabinet or within a temperature range of 0+40°C.

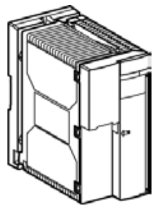
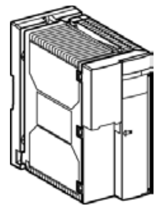
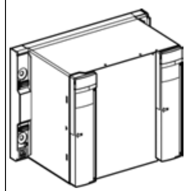
(3) A nominal voltage for a repetition period of 1Hz.

Electrical characteristics of process supply modules: TSX SUP 1021/1051/1101

Table of Characteristics

The following table describes the electrical characteristics of supply modules: TSX SUP 1021/1051/1101:

Process supply			**TSX SUP 1021 24V/2A**	**TSX SUP 1051 24V/5A**	**TSX SUP 1101 24V/10A**
					
Primary					
Nominal input voltage		V	alternating 100..0.120/200..0.240		
Input limit voltage		V	alternating 85...132/170...264		
Network frequency		Hz	47...63/360...440		
Nominal input current (U=100V)		On	0.8	2.4	5
Maximum call current (1)	to 100 V	On	<30	51	75
	to 240 V	On	<30	51	51
Maximum It on trigger (1)	to 100 V	As	0.06	0.17	0.17
	to 240 V	As	0.03	0.17	0.17
Maximum I^2t on trigger (1)	to 100 V	A^2s	4	8.6	8.5
	to 240 V	A^2s	4	8.6	8.5
Power factor			0.6	0.52	0.5
Harmonic 3			10% (φ=0° and 180°)		
Full load efficiency		%	>75	>80	
Secondary					
Output (2)		W	53(60)	120	240
Nominal output current (2)		On	2.2	5	10
Output voltage (0°C-60°c) V			24+/-3%		24+/-1%
Residual ripple (peak to peak)		mV	150	200	
Maximum HF noise (peak to peak) mV		mV	240		
Accepted length of micro-power outages (3)		ms	<=10		
Start-up time on resisting load		s	<1		

Process supply			**TSX SUP 1021 24V/2A**	**TSX SUP 1051 24V/5A**	**TSX SUP 1101 24V/10A**
					
Protection against	Short circuits and overloads		fallback to 0 and automatic reset after fault has disappeared	current limit	
	Over-voltages	V	cuts off at U>36	cuts off at U>32	
Parallelization			yes with power optimization		
Serialization			yes		
Power dissipation			18	30	60

(1) Values on initial power-up at 25°C. These elements are to be taken into account on start-up for the dimensioning of protection devices.

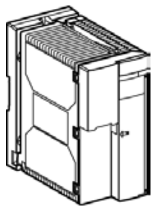
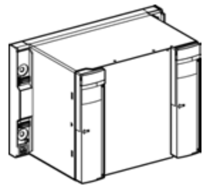
(2) Output power and current for an ambient temperature of 60°C. Input value in ( ) = output in a ventilated cabinet or within a temperature range of 0+40°C.

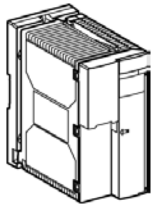
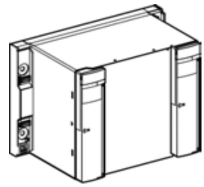
(3) A nominal voltage for a repetition period of 1Hz.

Electrical characteristics of AS-i supply modules: TSX SUP A02/A05

Table of Characteristics

The following table describes the electrical characteristics of supply modules: TSX SUP A02/A05:

References			**TSX SUP A02** **30V AS-i / 2.4A**	**TSX SUP A05 24V/7 AS-i & 30V AS-i/5A**
				
Primary				
Nominal input voltage		V	alternating 100..0.120/ 200..0.240	alternating 100..0.120/200..0.240
Input limit voltage		V	alternating 85...132/ 170...264	alternating 85...132/170...264
Network frequency		Hz	47...63/360...440	47...63/360...440
Nominal input current (U=100V)		On	1.3	5
Maximum call current (1)	to 100 V	On	30	50
	to 240 V	On	30	50
Maximum It on trigger (1)	to 100 V	As	0.06	0.17
	to 240 V	As	0.03	0.17
Maximum I^2t on trigger (1)	to 100 V	A^2s	4	8.5
	to 240 V	A^2s	4	8.5
Power factor			0.6	0.51
Harmonic 3			10% (Phi=0°and 180°)	10% (Phi=0°and 180°)
Full load efficiency		%	>75	>80
Secondary				
Output		W	72(84) (2)	230 (3)
Peak nominal current	30 V AS-i output	On	2.4(2.8) (2)	5 (3)(4)
	24 V output	On	-	7 (3)(4)

References			**TSX SUP A02 30V AS-i / 2.4A**	**TSX SUP A05 24V/7 AS-i & 30V AS-i/5A**	
					
Output voltage Global variation (-10°C to +60°C)		V V	30(AS-i) 29.5 to 31.6	24 +/-3%	30(AS-i) 29.5 to 31.6
Ripple (from 10 to 500 kHz) Ripple (from 0 to 10 kHz)		mV mV	50 300	200 240	50 300
Start-up time on resisting load		s	<2 (where C=15000 micro Farads	<2 (where C= 15000 micro Farads)	
Length of micro power outages (5)		ms	≤10		
Protection against	Short circuits and overloads		fallback to 0 and automatic reset after fault has disappeared	current limit on each output	
	Over-voltages	V	cuts off at U>36	cuts off at U>36	
Power dissipation		W	24	60	

(1) Values on initial power-up at 25°C. These elements are to be taken into account on start-up for the dimensioning of protection devices.

(2) Output and output current for an ambient temperature of 60°C. Input value () = surge output.

(3) Output and output current for a maximum ambient temperature of 55°C, if product index II = 01 (60°C if product index II > 01).

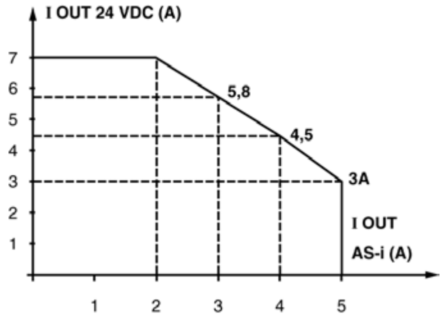
(4) distribution of current for each output (see *Chart of available currents on 30 V AS-i and 24 V output from the TSX SUP A05 supply block., p. 456*).

(5) Acceptable period at nominal voltage for a repetition period of 1 Hz.

Chart of available currents on 30 V AS-i and 24 V output from the TSX SUP A05 supply block.

The maximum power which can be delivered by the supply block is 230 W. If consumption is 5 A on the 30 V AS-i, possible flow on 24 V output is no greater than 3 A (see chart below).

Chart:



Physical environmental characteristics

Table of characteristics

The following table describes the electrical characteristics of Process and AS-i supply modules:

Process and AS-i supply blocks/ modules		**TBX SUP 10**	**TSX SUP 1011/1021** **TSX SUP 1051/1101** **TSX SUP A02/A05**
Connection to screw terminals maximum capacity per terminal	 mm^2	1 terminal per output 1 x 2.5 (12 AWG)	1011/1021/1051/A02: 1 output terminal 1101 : 2 terminals/output A05: 2 terminals/output (24 VDC) 1 terminal/output (30 VDC AS-i) 2 x 1.5 (14 AWG) with adapter or 1 x 2.5 (12 AWG)
Temperature: Storage Operating	 °C °C	-25 to +70 +5 to +55	-25 to +70 0 to +60 (TSX SUP 1011/1021/ 1051/1101 -10 to +60 (TSX SUP A02/A05) (1)
Relative humidity	%	5-95	
Cooling	%	By natural convection	
Reference standard		-	Very Low Voltage Safety (EN 60950 and IEC 1131-2)
Dielectric strength: Primary/secondary Primary/ground Secondary/ground	 V eff V eff V eff	50/60 Hz-1 mm 1500 1500 500	 3500 2200 500
Insulation resistance Primary/secondary Primary/ground	 MΩ MΩ	 ≥ 100 ≥ 100	
Leakage current		I≤=3.5 mA (EN 60950)	
Electrostatic uploading immunity		6 kV per contact/8 KV in the air (complies with IEC 1000-4-2)	
Fast electric surge		2 kV (serial mode and common mode on input and output)	
Electromagnetic field influence		10 V/m (80 MHz to 1 GHz)	
Rejected electromagnetic disturbances		(comply with FCC 15-A et EN 55022 class A Test conditions: nominal U and I, resisting load, cable: 1 meter horizontally, 0.8 meters vertically	

Process and AS-i supply blocks/ modules		**TBX SUP 10**	**TSX SUP 1011/1021** **TSX SUP 1051/1101** **TSX SUP A02/A05**
Shock wave		Input: 4 kV MC, 2 kV MS Outputs: 2 kV MF, 0.5 kV MS (complies with IEC 1000-4-5)	
Vibration (2)		1 mm 3 Hz to 13.2 Hz 1g 57 Hz to 150 Hz (2g TSX SUP A02/A05) (complies with IEC 68-2-6, FC test)	
Degree of protection		IP 20.5	IP 20.5, terminal IP 21.5
MTBF at 40°C	H	100 000	
Length of life at 50°C	H	30 000 (at nominal voltage and 80 % of nominal power)	

(1) -10°C +55°C for TSX SUP A05 supply module with product index II=01.

-10°C +60°C for TSX SUP A05 supply module with product index II > 01.

(2) complies with IEC 68-2-6, FC test with module or block mounted on a board or panel.

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