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Part IV
TSX PSY supply modules

Subject of this Part

This part describes TSX PSY **...** supply modules and their implementation.

What Is in This Part?

This part contains the following chapters:

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Chapter 34
TSX PSY… supply modules: introduction

Aim of this Chapter

The aim of this Chapter is to introduce the TSX PSY... supply modules .

What Is in This Chapter?

This chapter contains the following topics:

Topic	Page
General introduction	256
Supply modules: description	258
Catalog of TSX PSY... supply modules	260

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**.

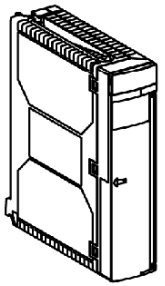
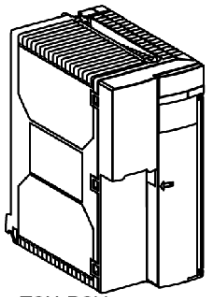
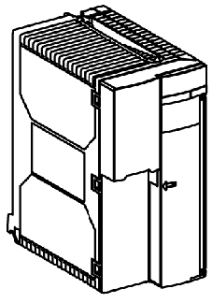
Auxiliary functions of supply modules

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).

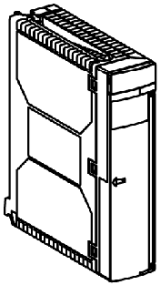
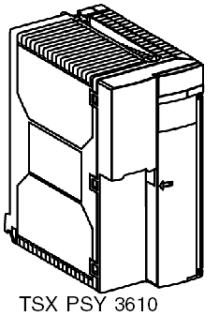
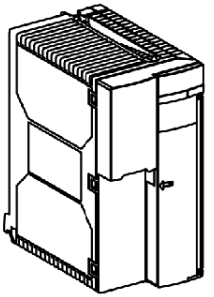
Supply modules for an alternating current network

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

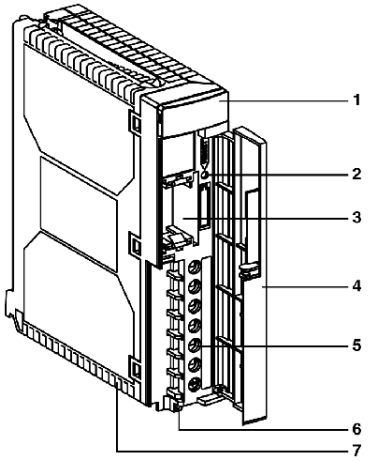
At a Glance

The supply models take the form of:

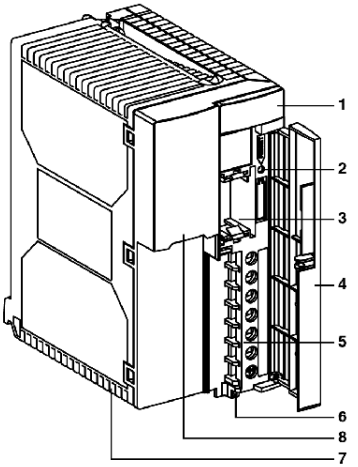
- standard format modules, for TSX PSY 2600 and TSX PSY 1610 modules,
- double format modules for TSX PSY 5500/3610/5520/8500 modules.

Illustration

These illustrations label the different components of a standard supply module and a double format supply module:



Standard format



Double format

Description

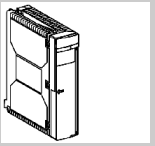
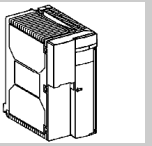
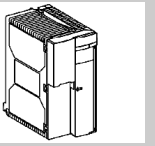
This table describes the components of a supply module:

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.

Catalog of TSX PSY... supply modules

Catalog of Supply Modules for AC Networks

The following table describes the main (maximum) characteristics of TSX PSY **...** 2600/5500/8500 supply modules.

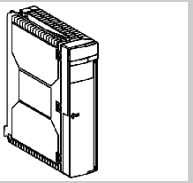
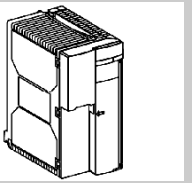
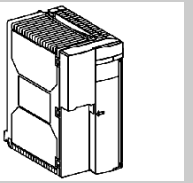
Product references	TSX PSY 2600	TSX PSY 5500	TSX PSY 8500
			
Input characteristics			
Nominal voltages	100...240 VCA	100...120 VCA / 200...240 VCA	100...120 VCA / 200...240 VCA
Thresholds	85...264 VCA	85...140 VCA / 190...264 VCA	85...140 VCA / 190...264 VCA
Frequency limit	47...63Hz	47...63Hz	47...63Hz
Accepted length of micro-power outages	less than or equal to 10 ms	less than or equal to 10 ms	less than or equal to 10 ms
Apparent power	50 VA	150 V AC	150 V AC
Nominal input current	0.5A to 100V 0.3A to 240V	1.7A to 100V 0.5A to 240V	1.7A to 100V 0.5A to 240V
Output characteristics			
Total power	26W	50W	80W
Output voltages	5V, 24 VR (1) 24 VS (2)	5V, 24 VR (1) 24 VS (2)	5V, 24 VS (2)
5V rated current	5A	7A	15A
24 VR rated current	0.6A	0.8A	not supplied
24 VS rated current	0.5A	0.8A	1.6A
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)		
Compliance with Standards	IEC 1131-2		

(1) 24V voltage used to supply the relays installed on the "relay outputs" modules.

(2) 24V voltage used to supply sensors.

Catalog of Supply Modules for DC Networks

The following table describes the main (maximum) characteristics of TSX PSY ... 1610/3610/5520 supply modules.

Product references	TSX PSY 1610	TSX PSY 3610	TSX PSY 5520
			
Input characteristics			
Nominal voltages	Non-isolated 24 VDC	Non-isolated 24 VDC	Isolated 24...48 VDC
Threshold values	19.2 to 30 VDC	19.2 to 30 VDC	19.2 to 60VDC
Accepted length of micro-power outages	less than or equal to 1 ms	less than or equal to 1 ms	less than or equal to 1 ms
Nominal input current	≤ 1.5A	≤ 2.7A	≤ 3A/24V 1.5A/48V
Output characteristics			
Total power	26W	50W	80W
Output voltages	5V, 24 VR (1)	5V, 24 VR (1)	5V, 24 VR (1)
5V rated current	5A	7A	7A
24 rated current	0.6A	0.8A	0.8A
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)		
Compliance with Standards	IEC 1131-2		

(1) 24V voltage used to supply the relays installed on the "relay outputs" modules.

Chapter 35
TSX PSY … supply modules: installation

Aim of this Chapter

This Chapter deals with the installation of TSX PSY ... power supply modules.

What Is in This Chapter?

This chapter contains the following topics:

Topic	Page
Installation/mounting TSX PSY supply modules	264
Rules for connecting TSX PSY supply modules	265
Connecting alternating current power supply modules	267
Connecting direct current power supply modules from a floating 24 or 48 VDC direct current network	269
Connecting DC power supply modules from an AC network	271
Sensor and pre-actuator power supply servo control	275
Definition of protection devices at the start of a line	278

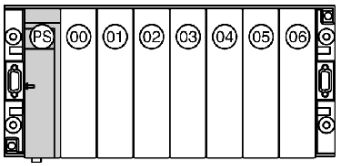
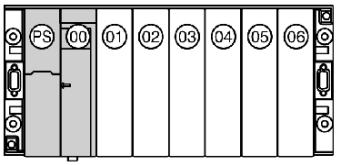
Installation/mounting TSX PSY supply modules

Mounting

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, page 98*).

Installation

This table describes the principle for 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 24 VR 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

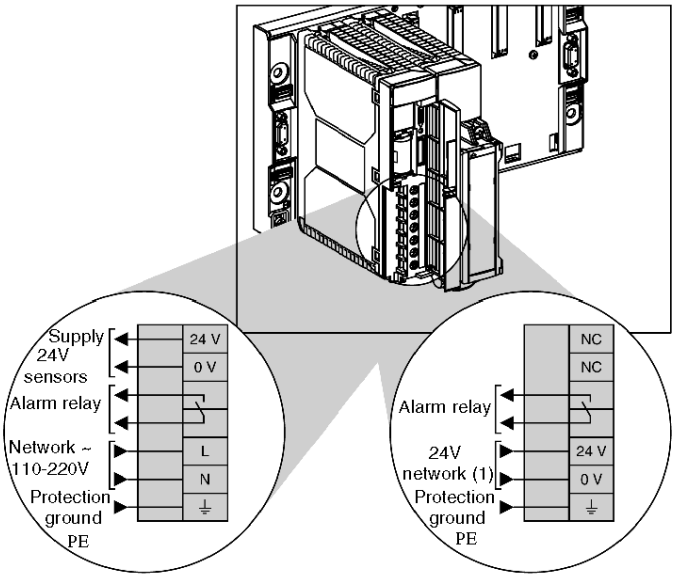
The TSX PSY ••• power supply modules on each rack are equipped with a non-removable terminal block, provided with a cover, which is used to connect the power supply, the alarm relay, the protection ground and, for alternating current supplies, the supply of the 24 VDC sensors.

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.

⚠ DANGER

ELECTRICK SHOCK - IMPROPER POWER SUPPLY VOLTAGE

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 will result in death or serious injury.

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

The 0 V and physical ground are linked internally in the PLCs, in the network cabling accessories, and in some control consoles.

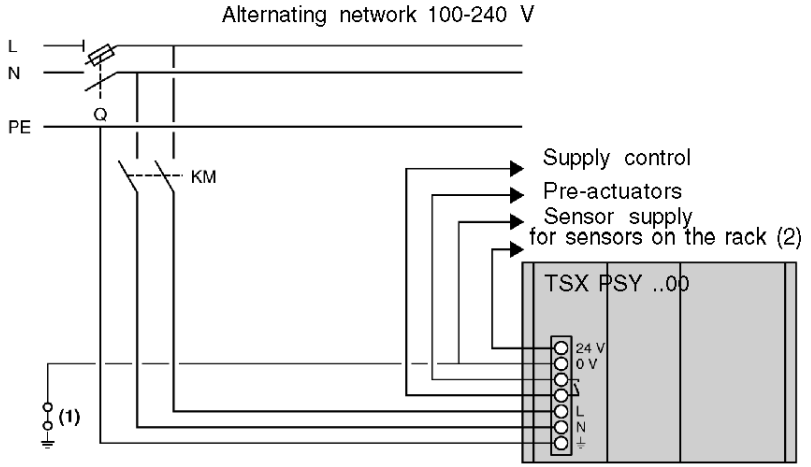
For applications which use a "floating" installation, measures need to be taken with connections. These depend on the method used for installation. In these cases, it is mandatory to use insulated direct current power supplies.

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

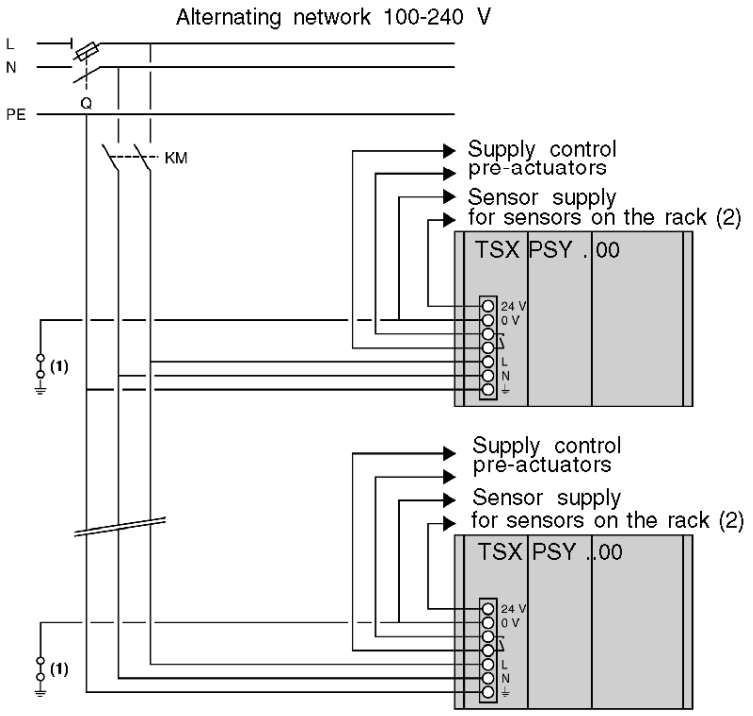
(2) available current:

- 0.6 A with a TSX PSY 2600 *(see page 303)* power supply module,
- 0.8 A with a TSX PSY 5500 *(see page 305)* power supply module,
- 1.6 A with a TSX PSY 8500 *(see page 307)* 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:

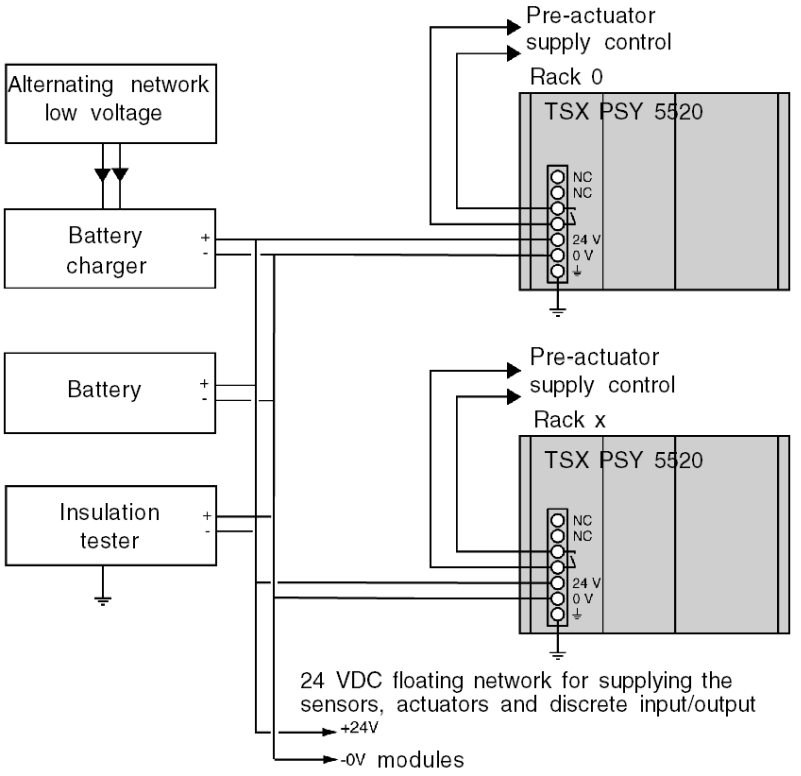
- 0.6 A with a TSX PSY 2600 *(see page 303)* power supply module,
- 0.8 A with a TSX PSY 5500 *(see page 305)* power supply module,
- 1.6 A with a TSX PSY 8500 *(see page 307)* power supply module,

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:



⚠ DANGER

ELECTRIC SHOCK - GROUNDING FOR FLOATING MOUNTING OR MARINEAPPLICATIONS

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.

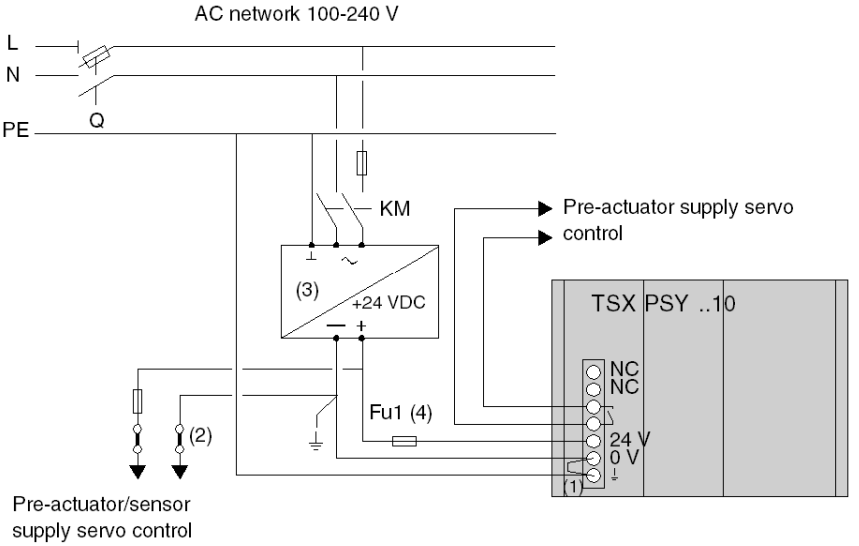
Failure to follow these instructions will result in death or serious injury.

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 DC power supply modules from an AC network

Non-insulated power supply modules TSX PSY 1610/3610

Connecting a single-rack PLC station with a ground-referenced network:



Q: general isolator,

KM: line contactor or circuit-breaker,

(1) : external shunt provided with the power supply module,

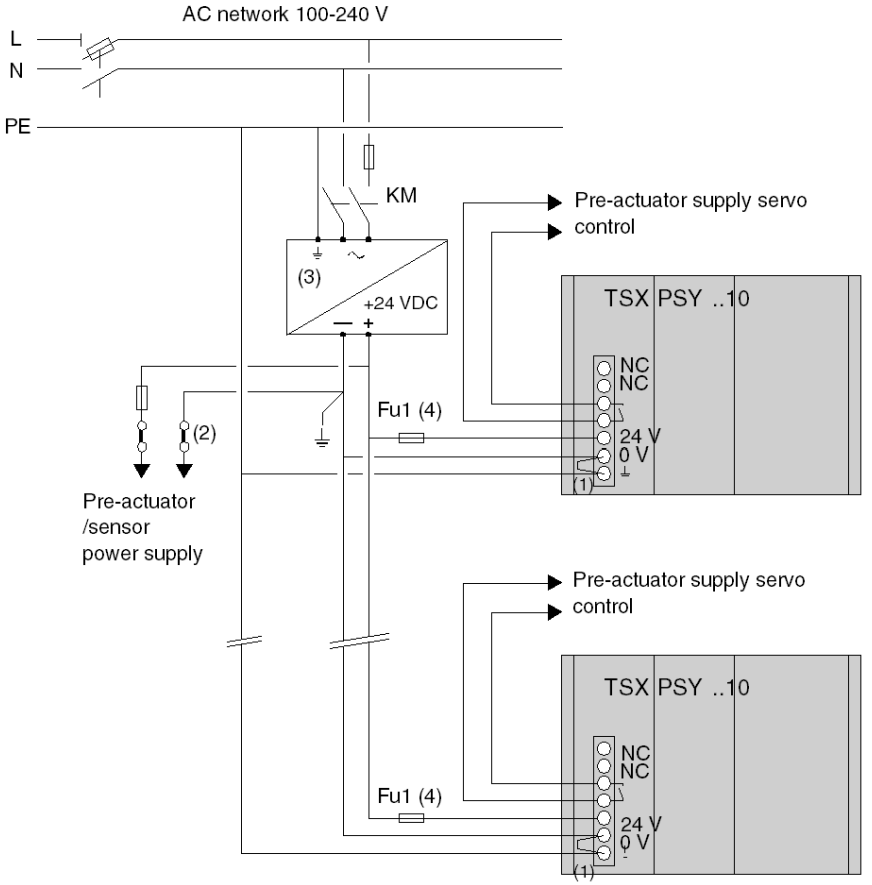
(2) : insulating connector bar for finding grounding faults. In this case, it is necessary to switch off the supply in order to disconnect the network from the ground,

(3) : optional use of a process power supply module *(see page 315)*,

(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 isolator,

KM: line contactor or circuit-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,

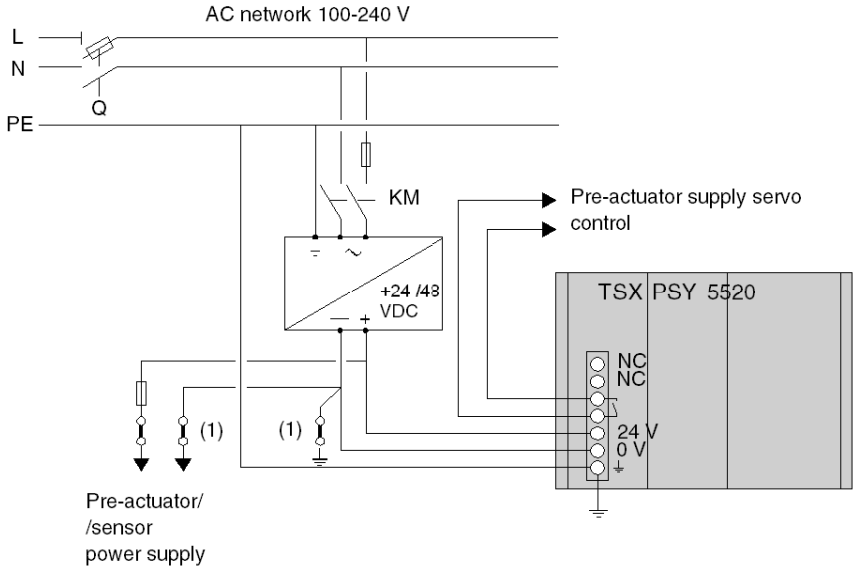
(4) : protective fuse, (4 A, with time-delay) only necessary with the TSX PSY 3610 power supply module.

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 isolator,

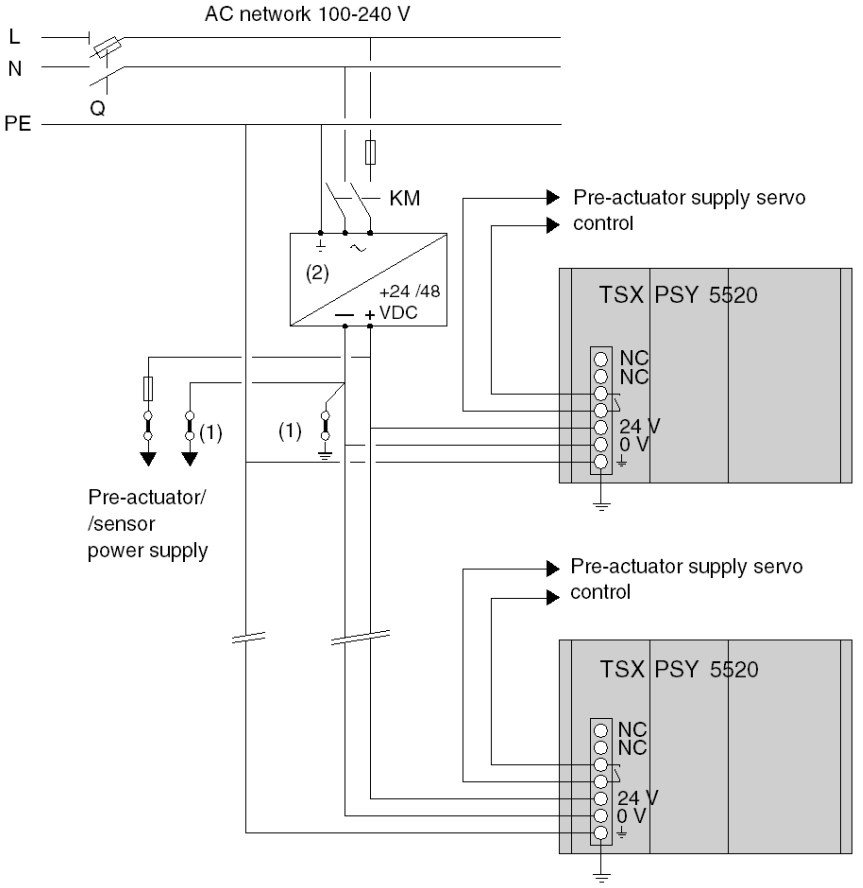
KM: line contactor or circuit-breaker,

(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 isolator,

KM: line contactor or circuit-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 *(see page 271)*).
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.

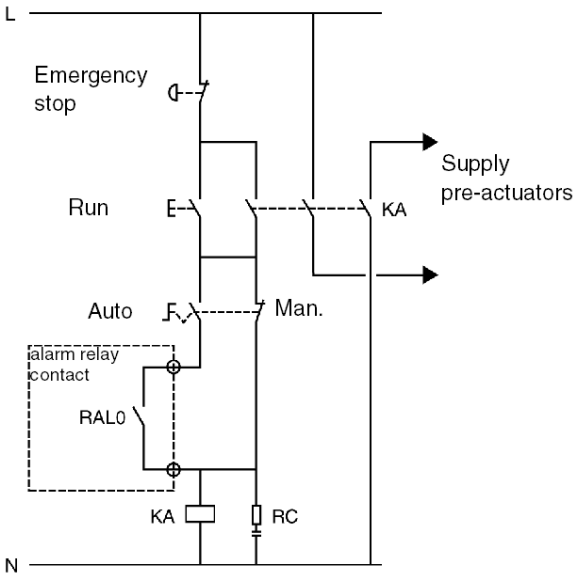
Safety standards

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.

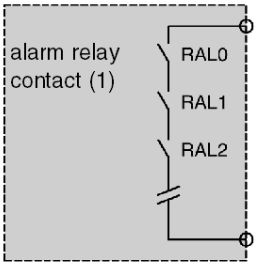
The MANU/AUTO switch makes it possible to force outputs from a terminal, when the PLC is in STOP mode.

Example 1

PLC station supplied by alternating current:



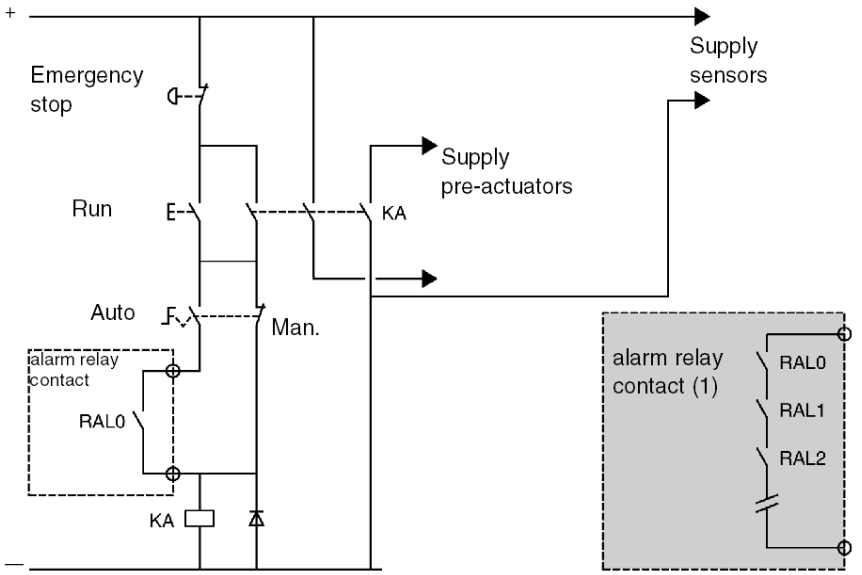
KA: contact controlled by alarm relay from supply module in AUTO run mode.



(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

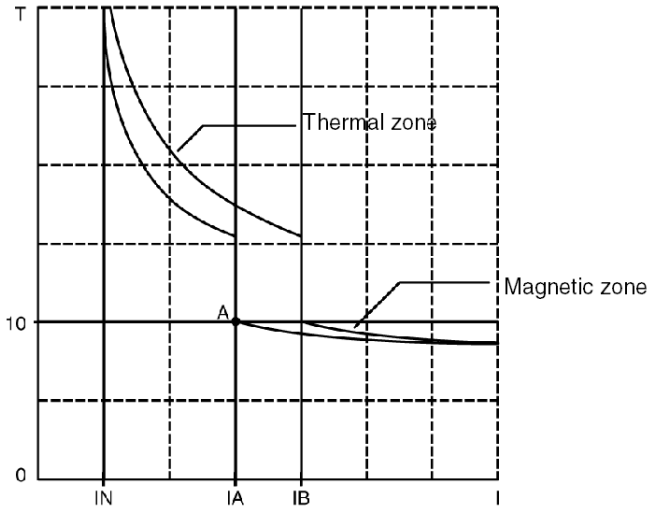
To select the amperage of the circuit breaker, the following three characteristics, which are given for each supply module, must be taken into account:

- 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, must 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.

The characteristics of **I rms**, signal **I**, **It** and **I^2t** for each power supply module are:

TSX module		PSY 2600	PSY 5500	PSY 8500	PSY 1610	PSY 3610	PSY 5520
I rms	at 24VDC	-	-	-	1.5 A	2.7 A	3A
	at 48VDC	-	-	-	-	-	1.5 A
	at 100VAC	0.5 A	1.7 A	1.4 A	-	-	-
	at 24VAC	0.3 A	0.5 A	0.5 A	-	-	-
I signal(1)	at 24VDC	-	-	-	100 A	150 A	15 A
	at 48VDC	-	-	-	-	-	15 A
	at 100VAC	37 A	38 A	30 A	-	-	-
	at 24VAC	75 A	38 A	60 A	-	-	-
It	at 24VDC	-	-	-	0.1 As	0.3 As	0.25 As
	at 48VDC	-	-	-	-	-	15 As
	at 100VAC	0.034 As	0.11 As	0.15 As	-	-	-
	at 24VAC	0.067 As	0.11 As	0.15 As	-	-	-
I^2t	at 24VDC	-	-	-	6 A^2s	26 A^2s	2.2 A^2s
	at 48VDC	-	-	-	-	-	1.8 A^2s
	at 100VAC	0.63 A^2s	4 A^2s	15 A^2s	-	-	-
	at 24VAC	2.6 A^2s	2 A^2s	8 A^2s	-	-	-

(1) Values at initial power-up and at 25°C.

Chapter 36
TSX PSY … supply modules: diagnostics

Aim of this Chapter

This Chapter deals with the diagnostics of TSX PSY **...** supply modules .

What Is in This Chapter?

This chapter contains the following topics:

Topic	Page
Display on TSX PSY supply modules	282
Back-up battery on TSX PSY ... power supply modules	283
Power supply failure to rack other than rack 0	284
What happens after pressing the RESET button on a power supply module	285

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 *(see page 189)*.

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

UNEXPECTED EQUIPMENT OPERATION

Do not set the TSX PSY 2600/5500/8500 module 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

Power supply failure 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 failure period

If the failure period is less than 10 ms for alternating current power supplies or less than 1 ms direct current power supplies, the failure 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.

Chapter 37
TSX PSY … supply modules : auxiliary functions

Aim of this Chapter

This Chapter deals with the auxiliary functions of TSX PSY … supply modules .

What Is in This Chapter?

This chapter contains the following topics:

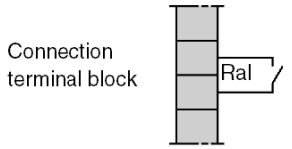
Topic	Page
Alarm relay on TSX PSY supply modules	288
Characteristics of the alarm relay contact	290

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.

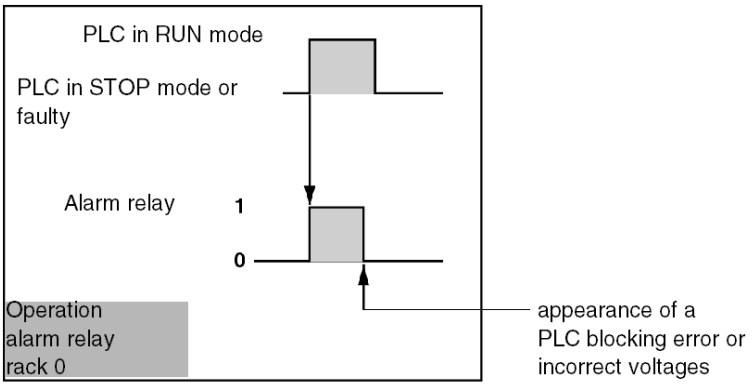
Illustration:



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
UNEXPECTED EQUIPMENT BEHAVIOR Do not use the supply module alarm relay when the Atrium processor is integrated into a PC (because it is not operating in this configuration). **Failure to follow these instructions can result in injury or equipment damage.**

⚠ CAUTION
UNEXPECTED APPLICATION BEHAVIOR. In step by step mode or when using breakpoint,ensure that the behavior of the alarm relay does not influence the outputs state. Set bit %S9 to 1 in order to force the outputs to fallback mode. **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 X Bus 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/TSX H57 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 (8) 2 x 10^6 operations

(3) 0.3 x 9^6 operations (9) 3 x 10^6 operations

(4) 0.5 x 10^6 operations (10) 5 x 10^6 operations

(5) 0.7 x 10^6 operations (11) 10 x 10^6 operations

(6) 1 x 10^6 operations

Chapter 38
TSX PSY power supply modules: breakdown of power consumption and power

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 Is in This Chapter?

This chapter contains the following topics:

Topic	Page
Breakdown of power consumption for selection of the power supply module	294
Power consumption breakdown	296
Power consumption breakdown	297
Power consumption breakdown	298
Power Consumption Breakdown	299
Power consumption breakdown	300
Breakdown of power	301

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

UNEXPECTED EQUIPMENT BEHAVIOR

When selecting the power supply module, ensure that the available power on each output (5 VDC, 24 VR and 24 VDC), and the total available power, are superior to the consumption needs computed through the breakdown of power method.

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

Power consumption breakdown

Table 1

This table shows the typical power consumption of each module and can be used to calculate the power consumption per rack and on each output depending on the modules installed:

Module type	**Product references**	**Consumption in mA** (typical value) (1)		
		At 5VDC	**At 24 VR**	**At 24VS (2)**
Processor + PCMCIA memory card	TSX P57 0244/104/204	850		
	TSX P57 154/254	930		
	TSX P57 1634/2634	1650		
	TSX P57 304	1100		
	TSX P57 354	1180		
	TSX P57 3634	1900		
	TSX P57 454	1680		
	TSX P57 4634	1880		
	TSX P57 554	1680		
	TSX P57 5634	1880		
	TSX P57 6634	1880		
	TSX H57 24M	1880		
	TSX H57 44M	1880		
Discrete inputs	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

(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.

Power consumption breakdown

Table 2

This table shows the typical power consumption of each module and can be used to calculate the consumption per rack and on each output depending on the modules installed:

Module type	**Product references**	**Consumption in mA** (typical value) (1)		
		At 5VDC	**At 24 VR**	**At 24VC (2)**
Discrete 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 DEY 08T22	55		
	TSX DEY 08T31	55		
	TSX DEY 16R5	80	135	
	TSX DEY 16S4	220		
	TSX DEY 16S5	220		
	TSX DEY 16T2	80		
	TSX DEY 16T3	80		
	TSX DSY 32T2K	140		
	TSX DSY 64T2K	155		
Discrete Inputs/Outputs	TSX DMY 28FK	300		75
	TSX DMY 28RFK	300		75
Emergency stop backup	TSX PAY 262	150		
	TSX PAY 282	150		
Remote X-Bus	TSX REY 200	500		

(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.

Power consumption breakdown

Table 3

This table shows the typical power consumption of each module and can be used to calculate the power consumption per rack and on each output depending on the modules installed:

Module type	**Product references**	**Consumption in mA** (typical value) (1)		
		At 5VDC	**At 24 VR**	**At 24VS (2)**
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 41	1500		30
	TSX CAY 42	1500		30
	TSX CAY 33	1500		30
Step by step control	TSX CFY 11	510		50
	TSX CFY 21	650		100
Weighing	TSX ISPY 100 (3)	150	145	

(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 power on the internal 24VR should not be taken into account when selecting the rack power supply.

Power Consumption Breakdown

Table 4

This table shows the typical power consumption of each module and can be used to calculate the power consumption per rack and on each output depending on the modules installed:

Module type	**Product references**	**Consumption in mA** (typical value) (1)		
		At 5VDC	**At 24 VR**	**At 24VS (2)**
Communication	TSX ETY 110 (3) (4)	800		
		1200		
	TSX ETY 120 (3) (4)	800		
		1200		
	TSX ETY 210 (3) (4)	800		
		1200		
	TSX IBY 100	500		
	TSX PBY 100	400		
	TSX SAY 100	110		
	TSX SCY 21601	350		
	TSX SCP 111	140		
	TSX SCP 112	120		
	TSX SCP 114	150		
	TSX FPP 10	330		
	TSX FPP 20	330		
	TSX JNP 112	120		
	TSX JNP 114	150		
	TSX MBP 100	220		
	TSX MDM 10	195		

(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).

Power consumption breakdown

Table 5

This table shows the typical power consumption of each module and can be used to calculate the power consumption per rack and on each output depending on the modules installed:

Module type	**Product references**	**Consumption in mA** (typical value) (1)		
		At 5VDC	**At 24 VR**	**At 24VS (2)**
Other (devices without their own power supply which can be connected to the terminal port)	TSX P ACC01	150		
	T FTX 117	310		

(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.

Breakdown of power

General

The breakdown of power for a rack will be established according to the breakdown of power consumption carried out from the tables defined in the breakdown of power consumption *(see page 294)*.

Power calculation table for a rack:

Rack number:			
1	Power required at 5V DC output:	(1)...x10^{-3}Ax5V	=.....W
2	Power required at 24 VR output:	(1)...x10^{-3}Ax5V	=.....W
3	Power required at 24 VS output:	(1)...x10^{-3}Ax5V	=.....W
4	Total power required:		=.....W

(1) This operand corresponds to the sum of the currents consumed by each rack module on the 5V DC output

(2) This operand corresponds to the sum of the currents consumed by each rack module on the 24 VR output

(3) This operand corresponds to the sum of the currents consumed by each rack module on the 24 VS output

⚠ WARNING

UNEXPECTED EQUIPMENT BEHAVIOR

When selecting the power supply module, ensure that the available power on each output (5 VDC, 24 VR and 24 VDC), and the total available power, are superior to the consumption needs computed through the breakdown of power method.

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

Reminder of the power available (on each total output)

Table of supply module power ratings:

	On 5V DC output	On 24 VR output	On 24 VS output	Total
TSX PSY 1610	15 W	15 W	-	30 W
TSX PSY 2600	25 W	15 W	12 W	26 W
TSX PSY 3610	35 W	19 W	-	50 W
TSX PSY 5520	35 W	19 W	-	50 W
TSX PSY 5500	35 W	19 W	19 W	50 W
TSX PSY 8500	75 W	-	38 W	77/85/100W (1)

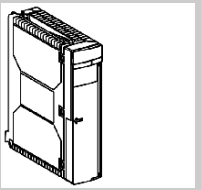
(1) 77 W at 60°C, 85 W at 55°C, 100 W at 55°C if the rack is fitted with a ventilation module.

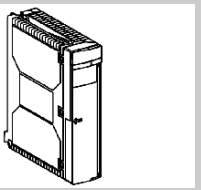
Chapter 39
TSX PSY 2600 power supply module

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	≥ 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.

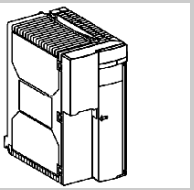
(2) 24V direct current output for supplying relays of "relay output" modules.

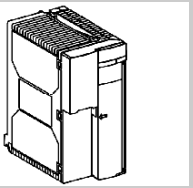
Chapter 40
TSX PSY 5500 power supply module

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.

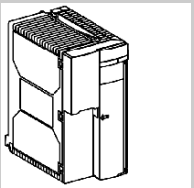
(2) 24V direct current output for supplying relays of "relay output" modules.

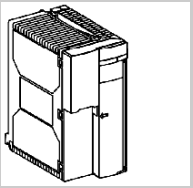
Chapter 41
TSX PSY 8500 power supply module

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

(1) These values should be taken into account when starting up several devices at the same time, or for dimensioning the protection systems.

(2) 77W at 60°C, 85W at 55°C, 100W at 55°C, if the rack is fitted with ventilation modules.

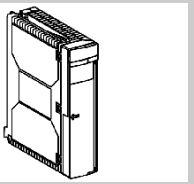
(3) 24V direct current output for supplying relays of "relay output" modules.

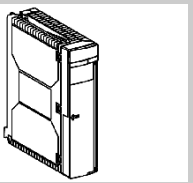
Chapter 42
TSX PSY 1610 power supply module

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 34 V for 1 hour in every 24 hours)		19.2 to 30 Vdc
	Nominal input current: Irms at 24 Vdc		≤1.5 A
	Initial power-up at 25°C (2)	I signal	≤ 100A at 24 Vdc
		I^2t on locking	6 A^2s
		It on locking	0.1 As
	Accepted length of micro-power outages		≤1 ms
	Integrated input protection	via 5x20 time delay fuse, 3.5 A	

Reference	TSX PSY 1610		
			
Secondary	Total output (typical)		30 W
	5VDC output	Nominal voltage:	5 V
		Nominal current	3 A
		Power (typical)	15 W
	24VR output (24VDC relay) (3)	Nominal voltage:	U network – 0.6 V
		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			10 W
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 21.6... 26.4 V.

(2) These values should be taken into account when starting up several devices at the same time, and for dimensioning the protection systems.

(3) 24 Vdc output for supplying relays of "relay output" modules.

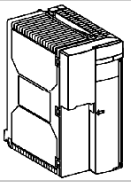
(4) The 24 VR output voltage, which cannot be accessed by the user, is protected by a fuse which is located under the module (5x20, 4 A, Medium type).

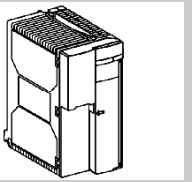
Chapter 43
TSX PSY 3610 power supply module

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.

Reference			
			
Primary	Nominal voltage		24 Vdc
	Voltage limits (including ripple) (1) (possible up to 34 V for 1hour in every 24 hours)		19.2 to 30 Vdc
	Nominal input current: Irms at 24 VDC		≤2.7 A
	Initial power-up at 25°C (2)	I signal	≤ 150 A at 24 Vdc
		I^2t on locking	26 A^2s
		It on locking	0.3 As
	Accepted length of micro-power outages		≤1 ms
	Integrated input protection	no	

Reference			
			
Secondary	Total output (typical)		50 W
	5VDC output	Nominal voltage:	5.1 V
		Nominal current	7 A
		Power (typical)	35 W
	24 VR output (24 V relay) (3)	Nominal voltage:	U network – 0.6 V
		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			15 W
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 21.6...26.4 V.

(2) These values should be taken into account when starting up several devices at the same time, and for dimensioning the protection systems.

(3) 24 V direct current output for supplying relays of "relay output" modules.

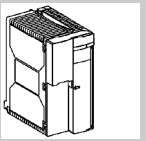
(4) The 24 VR output voltage, which cannot be accessed by the user, is protected by a fuse which is located under the module (5x20, 4 A, Medium type).

Chapter 44
TSX PSY 5520 power supply module

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 60 Vdc
	Nominal input current: Irms		≤ 3 A at 24 Vdc ≤ 1.5 A at 48 Vdc
	Initial power-up at 25°C (1)	I signal	≤ 15 A at 24 Vdc ≤ 15 A at 48 Vdc
		I^2t on locking	2.2 A^2s at 24 Vdc 1.8 A^2s at 48 Vdc
		It on locking	0.25 As at 24 Vdc 0.15 As at 48 Vdc
	Accepted length of micro-power outages		≤1 ms
	Built-in protection of + input	by internal, non-accessible fuse module	
Secondary	Total output (typical)		50 W
	5VDC output	Nominal voltage:	5.1 V
		Nominal current	7 A
		Power (typical)	35 W
	24 VR output (24 Vdc 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

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