

Section	Page
1 Presentation	1/1
1.1 General	1/1
1.2 24 VDC process power supplies	1/2
1.2-1 Catalog	1/2
1.2-2 Auxiliary functions	1/4
1.3 AS-i power supplies	1/6
1.3-1 Catalog	1/6
1.4 Physical description	1/7
1.4-1 TBX SUP 10 power supply unit	1/7
1.4-2 TSX SUP 1011/ 1021/ 1051/ A02 power supply modules	1/7
1.4-3 TSX SUP 1101 and TSX SUP A05 power supply unit	1/10
1.4-4 Support plate	1/11
2 Installation / Connections	2/1
2.1 TBX SUP 10 dimensions/mounting/connections	2/1
2.2 Dimensions/mounting of process and AS-i power supplies	2/2
2.2-1 TSX SUP 1011 / 1021 / 1051 / A02 power supply	2/2
2.2-2 TSX SUP 1101 / A05 power supplies	2/5
2.2-3 Summary of mounting options	2/6
2.3 Connections for 24 VDC process power supplies	2/7
2.3-1 TSX SUP 1011/1021 power supplies	2/7
2.3-2 TSX SUP 1051 power supply	2/8
2.3-3 TSX SUP 1101 power supply	2/9

Section	Page
2.4 Connections for AS-i power supplies	2/11
2.4-1 TSX SUP A02 power supply	2/11
2.4-2 TSX SUP A05 power supply	2/13
2.4-3 General recommendations	2/15
3 Characteristics	3/1
3.1 Electrical characteristics	3/1
3.1-1 Process power supplies : TBX SUP 10 and TSX SUP 1011	3/1
3.1-2 Process power supplies : TSX SUP 1021/1051/1101	3/2
3.1-3 AS-i power supplies : TSX SUP A02 /A05	3/3
3.2 Physical and environmental characteristics	3/5

1.1 General

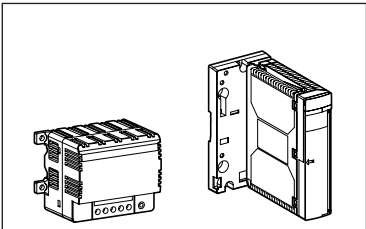
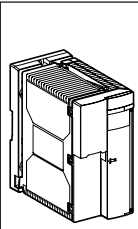
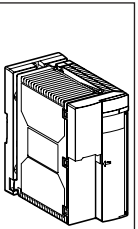
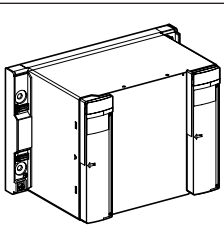
A wide range of power supply units and modules are available providing the user with the best possible solution for his requirements :

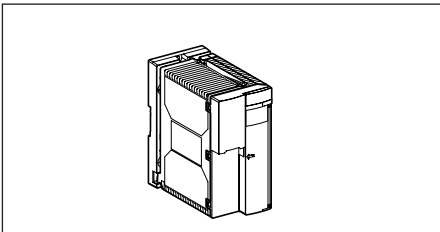
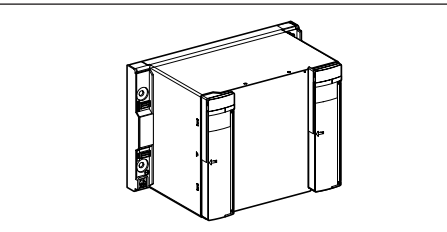
- TBX SUP 10 and TSX SUP 1..1 process power supply units and modules supply 24 VDC to the peripherals of an application controlled by PLCs (TSX Micro and Premium). These peripherals include sensors, preactuators, encoders, operator terminals, loop controllers, indicator lamps, pushbuttons, pneumatic cylinders, etc. The 24 V supply can be provided by a 100/240 V, 50/60 Hz AC supply. TBX SUP 10 and TSX SUP 1011 power supply modules can also be connected to 125 VDC supply.
- AS-i TSX SUP A02 and A05 process power supply units and modules supply components connected on an AS-i fieldbus with 30 VDC. This power supply is distributed via the same conductors as those used for data exchanges.

The mounting arrangements for these products have been specially designed to meet the specific distance and mounting requirements for TSX Micro and Premium PLCs and TBX products.

All the products can be mounted :

- on a Telequick AM1-PA mounting plate,
- on an AM1-DP200 / DE200 central DIN rail, with the exception of TSX SUP 1101 and TSX SUP A05 high power supply units.

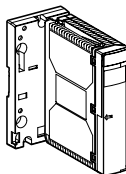
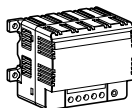
Process power supply				
Supply voltage 100...240VAC or 125VDC		Supply voltage 100...120/200...240 VAC		
				
24VDC / 1A		24VDC / 1A	24VDC / 2A	24VDC / 5A
				24VDC / 10A

AS-i bus power supplies	
Supply voltage 100...120 or 200...240 VAC	
	
AS-i 30 VDC / 2.4 A	AS-i 30 VDC / 5 A & 24 VDC

1-2 24 VDC process power supplies

1.2-1 Catalog

Selection table

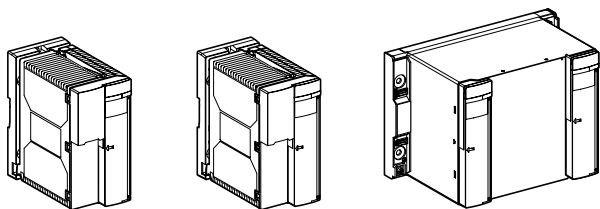


Input characteristics		
Nominal voltage	100...240 VAC or 125 VDC	
Limit values	90...264VAC or 88...156 VDC	85...264VAC or 105...150 VDC
Limit frequency	47...63 Hz	47...63 Hz or 360...440 Hz
Nominal input current	0.4A	0.4 A
Output characteristics		
Useful power	24 W	26 W
⎓ output voltage	24 VDC	
Nominal current	1 A	1.1 A
Auxiliary functions		
SELV (1)	No	Yes
Paralleling (2)	No	Yes, with power optimization (3)
Redundancy (4)	No	Yes
References		
	TSX SUP 10	TSX SUP 1011

- (1) Construction characteristics conforming to standards IEC 950, IEC 1131-2, ensuring the safety of the user at the 24 V output, in terms of isolation between primary and secondary, maximum overvoltage on the output wiring and protection via the grounding circuit.
- (2) Option of paralleling 2 power supply outputs of the same type, to provide an output current greater than the maximum authorized by a single supply.
- (3) For 2 modules providing a total current of 100 %, each module supplies 50 % of the total. This improves the lifetime of the products.
- (4) Option of paralleling 2 power supply outputs of the same type, to provide an output current less than the maximum authorized by a single supply but ensuring availability of the output voltage even if one of the two modules becomes faulty.

Catalog (continued)

Selection table (continued)



E

Input characteristics	Nominal voltage			100...120 VAC or 200...240 VAC		
	Limit values			85...132VAC or 170..264 VAC		
	Limit frequency			47...63 Hz or 360...440 Hz		
	Nominal input current		0.8 A	2.4 A	5 A	
Output characteristics	Useful power		53 W	120 W	240 W	
	⎓ output voltage			24VDC		
	Nominal current		2.2 A	5 A	10 A	
	Auxiliary functions					
SELV (1)		Yes				
Paralleling (2)		Yes, with power optimization (3)				
Redundancy (4)		Yes	No			
References		TSX SUP 1021	TSX SUP 1051	TSX SUP 1101		

- (1) Construction characteristics conforming to standards IEC 950, IEC 1131-2, ensuring the safety of the user at the 24 V output, in terms of isolation between primary and secondary, maximum overvoltage on the output wiring and protection via the grounding circuit.
- (2) Option of paralleling 2 power supply outputs of the same type, to provide an output current greater than the maximum authorized by a single supply.
- (3) For 2 modules providing a total current of 100 %, each module supplies 50 % of the total. This improves the lifetime of the products.
- (4) Option of paralleling 2 power supply outputs of the same type, to provide an output current less than the maximum authorized by a single supply but ensuring availability of the output voltage even if one of the two modules becomes faulty.

1.2-2 Auxiliary functions

• Parallel operation with power optimization mode

The aim of paralleling is to use **two modules with the same reference** to provide an output current greater than the maximum authorized by a single power supply. The total current is the sum of the currents supplied by all the power supplies.

Power optimization is an internal power supply system used to distribute currents equally between power supplies connected in parallel. The benefit obtained is a significant increase in the service life due to the distribution of power consumed.

- On TSX SUP 1011 / 1021 power supplies

Power optimization mode is obtained by setting the NOR/LSH switch located at the rear of the modules to the LSH position. The support must be dismantled in order to reach this switch. When the orange (LSH) indicator lamp is on, the mode is operational. (See section 2.3-1 for required connections).

The current supplied with two power supplies connected in parallel is limited to :

- 2 A with 2 TSX SUP 1011 power supply modules,
- 4 A with 2 TSX SUP 1021 power supply modules.

Using this mode reduces the precision of the output voltage: $24\% \pm 5\%$ instead of $24\text{ V} \pm 3\%$ in normal mode.

The phase imbalance of the powers on load sharing can be a maximum of 25%.

- On TSX SUP 1051 / 1101 power supplies

Power optimization mode does not require a switch on these power supplies. The connections specified in the following sections must be made :

- 2.3-2 for the TSX SUP 1051 power supply module,
- 2.3-3 for the TSX SUP 1101 power supply unit,

The maximum current supplied with two power supplies connected in parallel is limited to :

- 10 A with 2 TSX SUP 1051 power supply modules,
- 20 A with 2 TSX SUP 1101 power supply units.

Using this mode does not affect the precision of the output voltage.

The phase imbalance of the powers on load sharing can be a maximum of 15%.

- **Redundancy / safety on TSX SUP 1101 / 1021 power supplies**

Principle :

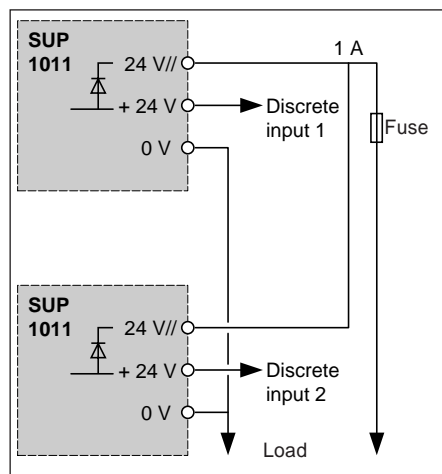
To ensure availability of the currents required for the application, even if one of the power supplies becomes faulty.

In this case the two power supplies are connected in parallel, using the connections specified in section 2.3-1.

The power supplies are configured in power optimization mode.

Example : supply 1A with redundancy from the 2 TSX SUP 1011 power supplies.

Discrete inputs 1 and 2 of the PLC indicate the failure of one or other of the power supplies.



Note :

TSX SUP 1051 and 1101 power supplies are not fitted with the diode in series, required for the redundancy function.

E

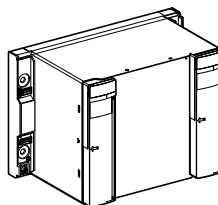
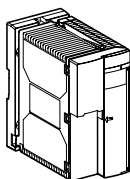
1-3 AS-i power supplies

Special features :

As data and power are transmitted simultaneously on the same cable, data transmission must be filtered in relation to the power supply. For this reason the AS-i power supply integrates a decoupling filter which supports the maximum direct current provided by the power supply. The power supply gives a standardized impedance in relation to data transmission frequencies.

1.3-1 Catalog

Selection table



Input characteristics Nominal voltage	100...120 VAC or 200...240 VAC		
	Limit values		
	85...132 VAC or 170...264 VAC		
	Limit frequency		
Nominal input current	47...63 Hz or 360...440 Hz		
Output characteristics Useful power	1.3 A	5 A	
--- output voltages	72 W	230 W	
Nominal current	AS-i 30 VDC	AS-i 30 VDC	24 VDC
	2.4 A	5 A (1)	7 A (1)
Auxiliary functions SELV safety (2)			
	Yes		
Paralleling	No		
Redundancy			
	No		
References	TSX SUP A02		TSX SUP A05

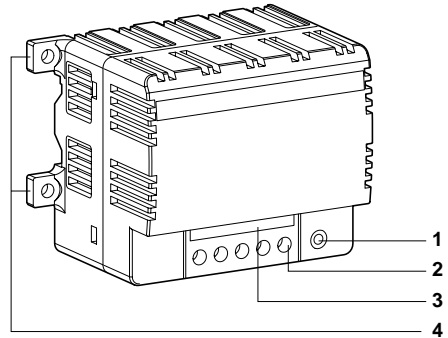
(1) Maximum current for each output, the sum of the powers is limited to 230 W

(2) Construction characteristics conforming to standards IEC 950, IEC 1131-2, ensuring the safety of the user at the 24 V output, in terms of isolation between primary and secondary, maximum overvoltage on the output wiring and protection via the grounding circuit.

1.4 Physical description

1.4-1 TBX SUP 10 power supply unit

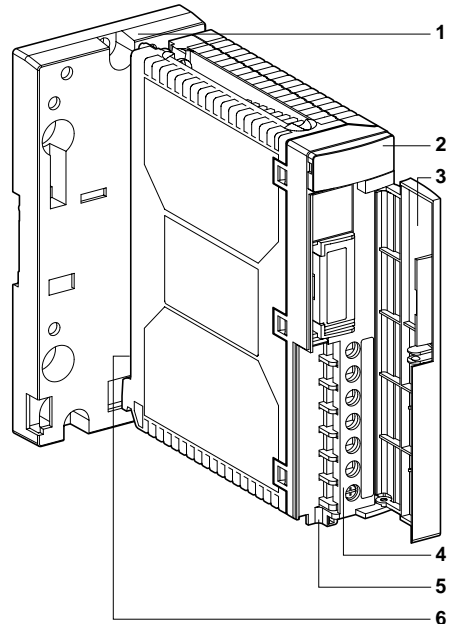
- 1 Lamp indicating module power-up.
- 2 Screw terminal block for wiring the power supply voltages.
- 3 Identification label for the wiring terminals.
- 4 Module mounting lugs.



1.4-2 TSX SUP 1011/ 1021/ 1051/ A02 power supply modules

• TSX SUP 1011 module

- 1 Support plate for mounting the supply module directly on an AM1-DE200/ DP200 rail or an AM1-PA Telequick pre-slotted plate.
- 2 Display block comprising :
 - A 24V indicator lamp (green) : lit if the internal and output voltages are established and correct.
 - An LSH indicator lamp (orange) "power optimization mode" : lit if the supply is operating in parallel mode with power optimization.
- 3 Cover to protect the terminal block
- 4 Screw terminal block for connection to the :
 - AC or DC supply,
 - 24VDC output.
- 5 Slots for cable clamp.
- 6 "NOR / LSH" switch on the rear of the module to control the power optimization device.
 - NOR position : normal operation without power optimization (default position),
 - LSH position : operation with power optimization with power supplies in parallel.



• TSX SUP 1021 / 1051 modules

1 Support plate for mounting the supply module directly on an AM1-DE200/DP200 rail or an AM1-PA Telequick pre-slotted plate.

2 Display block comprising :

- A 24V indicator lamp (green) : lit if the internal and output voltages are correct.
- An LSH "power optimization mode" indicator lamp (orange), only on TSX SUP 1021 : lit if the supply is operating in parallel mode with power optimization.

3 Cover to protect the terminal block

4 Screw terminal block for connection to the :

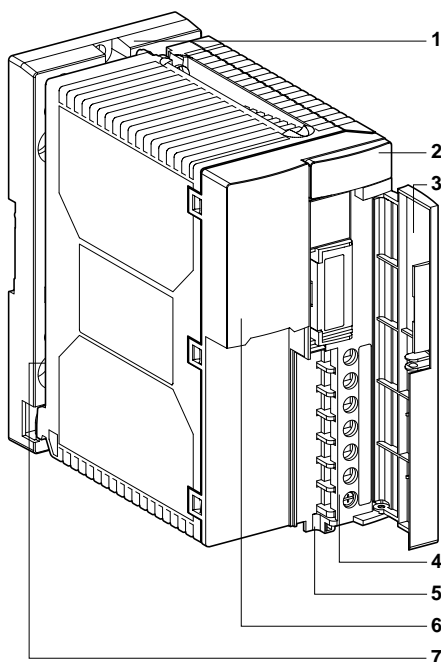
- AC or DC supply,
- 24VDC output.

5 Slots for cable clamp.

6 110/220 V voltage selector. On delivery, the selector is set to 220.

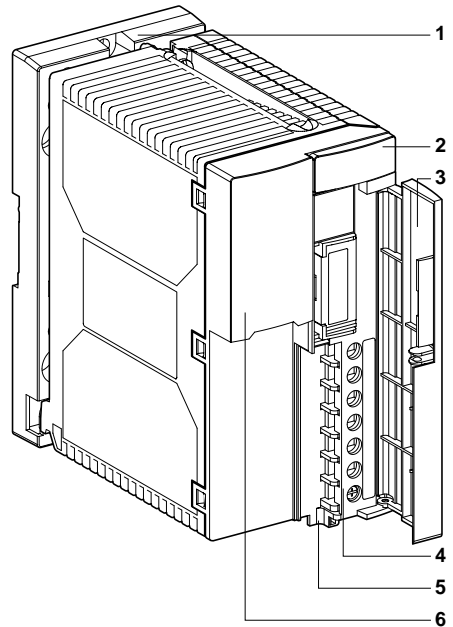
7 "NOR / LSH" switch on the rear of the module to control the power optimization device. This switch is only present on the TSX SUP 1021 module

- NOR position : normal operation without power optimization (default position),
- LSH position : operation with power optimization with power supplies in parallel.



- **TSX SUP A02 module**

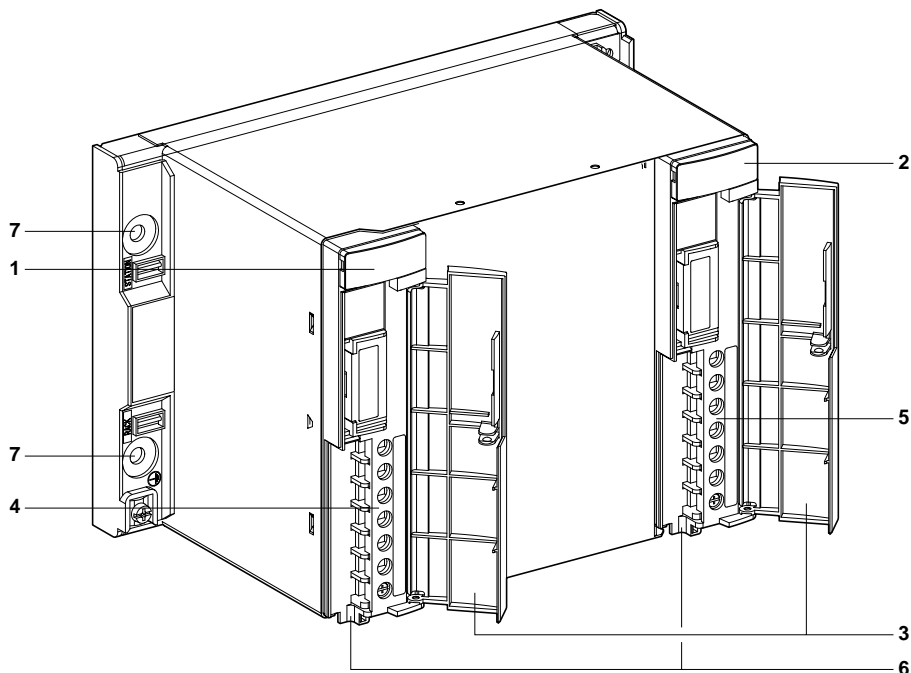
- 1 Support plate for mounting the supply module directly on an AM1-DE200/ DP200 rail or an AM1-PA Telequick pre-slotted plate.
- 2 Display block comprising :
 - An AS-i indicator lamp (green) : lit if the internal and output voltages are correct.
- 3 Cover to protect the terminal block
- 4 Screw terminal block for connection to the :
 - AC supply
 - AS-i 30 VDC output.
- 5 Slot for cable clamp.
- 6 110/220 V voltage selector. On delivery, the selector is set to 220.



E

1.4-3 TSX SUP 1101 and TSX SUP A05 power supply unit

E



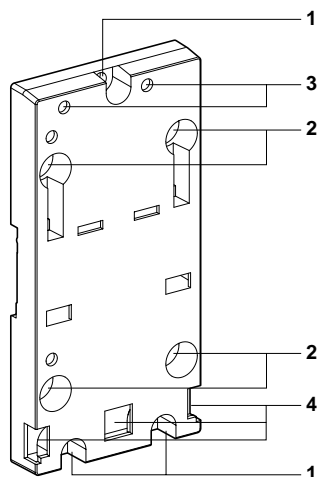
- 1 Display block comprising an ON indicator lamp (orange) : lit if the power supply is on.
- 2 Display block comprising :
 - a 24V indicator lamp (green) : lit if the 24 VDC output voltage is present and correct,
 - an AS-i indicator lamp (green : lit if the AS-i 30 VDC output voltage is present and correct. Indicator lamp present only on the TSX SUP A05 unit.
- 3 Cover to protect the terminal blocks
- 4 Screw terminal block for connection to the AC supply
- 5 Screw terminal block for connection of the 24 VDC and AS-i 30 VDC output voltage to TSX SUP A05
- 6 Slots for cable clamp
- 7 Four fixing holes for M6 screws.

1.4-4 Support plate

Each TSX SUP 10.1 and TSX SUP A02 power supply module comes with a support plate for fixing the power supply : either on an AM1-DE200 or AM1-DP200 rail, or an AM1-PA Telequick pre-slotted plate.

Each support plate can take : one TSX SUP 1021, TSX SUP 1051 or TSX SUP A02 module, or one or two TSX SUP 1011 modules.

- 1 Three Ø 5.5 holes for mounting the support plate on a panel or AM1-PA pre-slotted plate at 140 mm centers (fixing center for TSX 37 PLCs).
- 2 Four Ø 6.5 holes for mounting the support plate on a panel or AM1-PA pre-slotted plate at 88.9 mm centers (fixing center for TSX 57 PLCs).
- 3 Two M4 holes for fixing one or more TSX SUP 1011/1021/1051/A02 power supply modules.
- 4 Slots for anchoring pins located at the bottom and rear of the module.

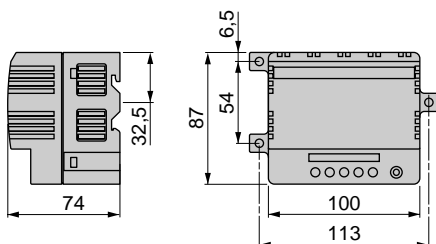


Notes :

- Each of these power supply modules can also be mounted on a TSX RKY ... rack replacing another module, with the exception of position PS, which must be used by a TSX PSY ... power supply module supplying power to the rack modules.
- The following operations require the module to be removed from the support plate :
 - setting the "NOR/LSH" switch to LSH,
 - mounting the plate on a panel or a pre-slotted AM1-PA plate,
 - mounting the module on a TSX RKY ... rack.

2.1 TBX SUP 10 dimensions/mounting/connections

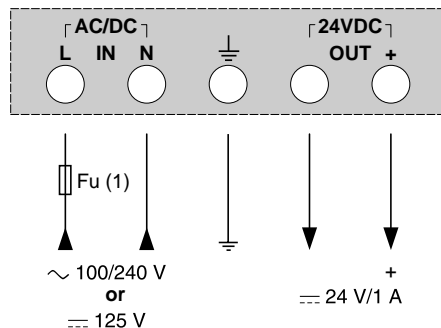
• Dimensions / mounting



The TBX SUP 10 power supply unit should be mounted vertically to ensure optimal air flow within the unit.

It can be mounted on a panel, on an AM1-PA Telequick pre-slotted plate or AM1-DE200 / DP200 rail.

• Connections



Note

Primary : if the module is supplied with 100/240 V~, the phase and the neutral must be respected when wiring. Conversely, if the module is supplied with 125 V ---, it is not necessary to respect the polarities.

Secondary : the - 0 V terminal must be connected to the ground at the output of the power supply module.

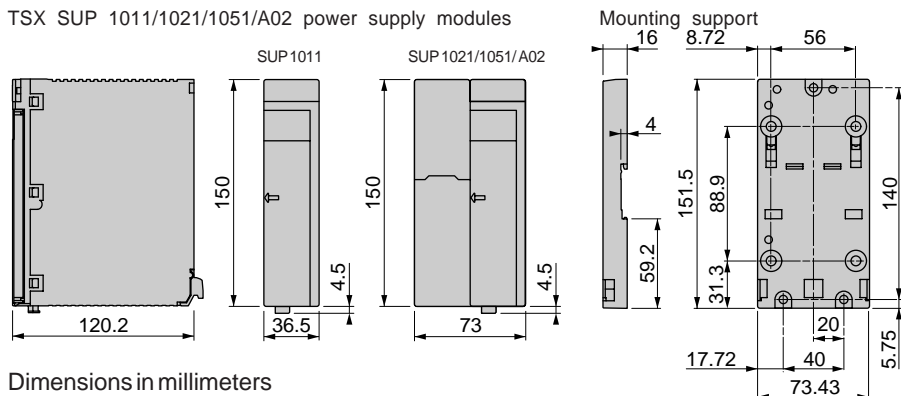
⚠ To ensure the safety of personnel, connect the ground terminal of the module to the protective ground with a green/yellow wire.

(1) External protection fuse on phase : 1A time-delayed 250 V for a single power supply.

2.2 Dimensions/mounting of process and AS-i power supplies

2.2-1 TSX SUP 1011 / 1021 / 1051 / A02 power supply

TSX SUP 1011/1021/1051/A02 power supply modules

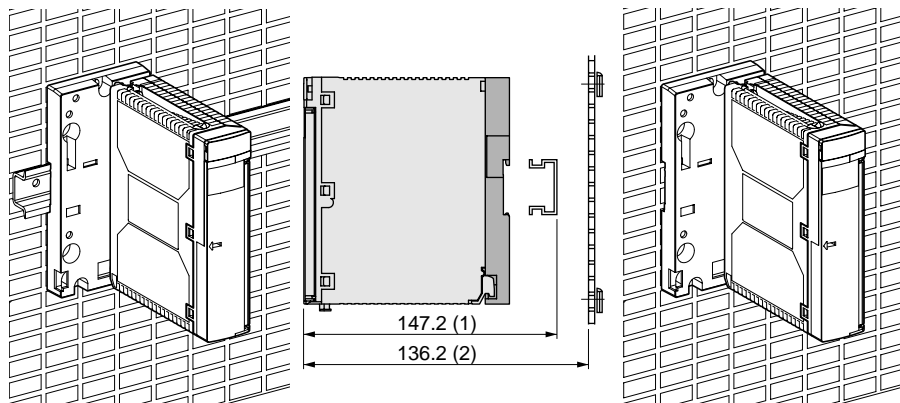


Dimensions in millimeters

TSX SUP 1011/1021/1051/A02 power supply modules can be mounted in the following ways :

Mounting on AM1-DE200 or AM1-DP200 rail or AM1-PA plate

Each power supply module comes mounted on a support for this type of mounting.



(1) 147.2 mm (AM1-DE200)
139.7 mm (AM1-DP200)

(2) 136.7 mm (AM1-PA)

Mounting on an AM1-D... rail

- 1 Check that the module is mounted on the support
- 2 Mount the module + support on the rail

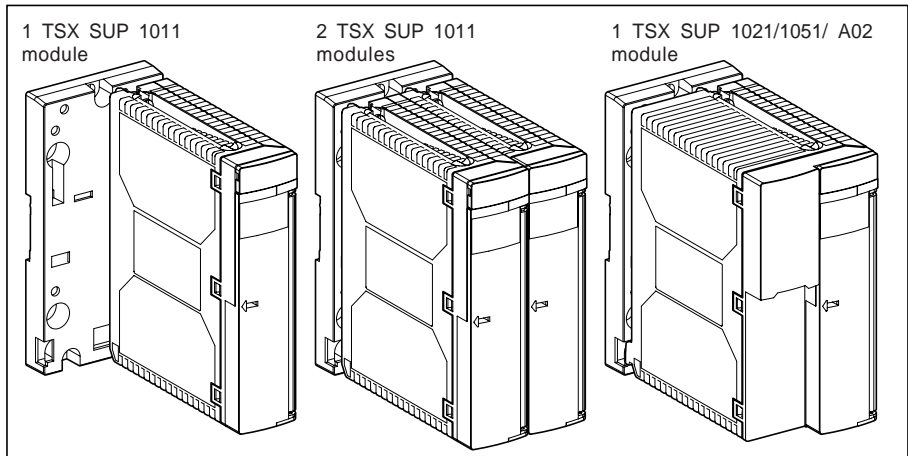
Mounting on an AM1-PA plate

- 1 Dismantle the module from the support
- 2 Mount the support on the AM1-PA plate
- 3 Mount the module on the support

Mounting the module on the support

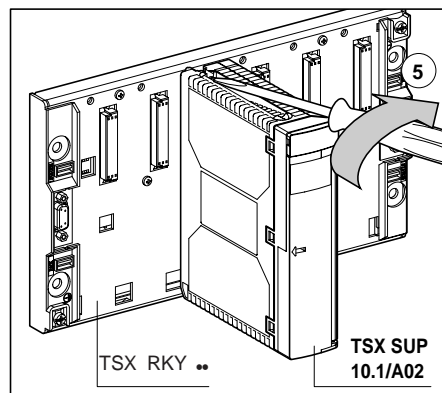
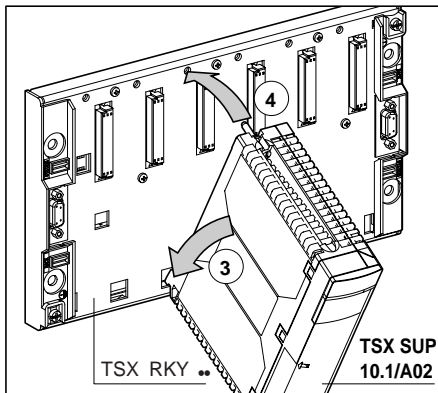
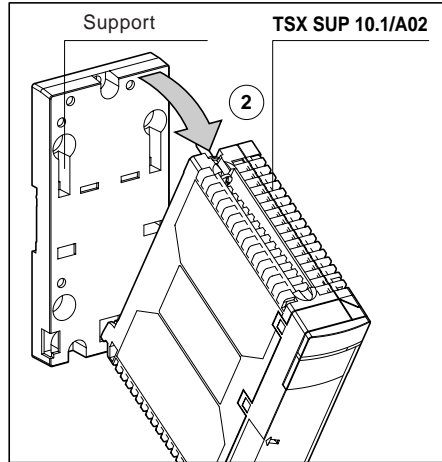
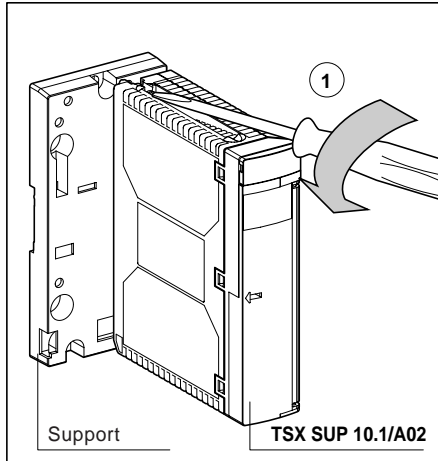
Each power supply module has an integral support for mounting it directly on a DIN rail. The support can take 1 or 2 TSX SUP 1011 power supply modules or 1 TSX SUP 1021/ 1051/A02 power supply module.

- 1** Fix the module pins in the slots on the lower part of the support.
- 2** Tilt the module until it touches the support.
- 3** Tighten the screw on the upper part of the module to secure it to the support.



Mounting on TSX RKY .. rack

TSX SUP 1011/1021/1051/A02 power supply modules can be mounted in any of the positions on a TSX RKY.. rack with the exception of position PS which is reserved for the rack power supply module. If this is the case, the support is not used and must be removed.



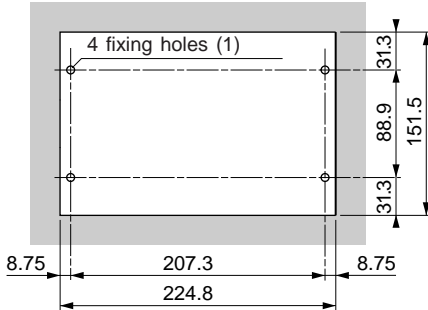
Note:

The TSX PSY... rack power supply module must be in position PS in order to supply power to the rack modules.

2.2-2 TSX SUP 1101 / A05 power supplies

TSX SUP 1101 and TSX SUP A05 power supply units can be mounted on a panel, an AM1 - PA plate or a DIN rail.

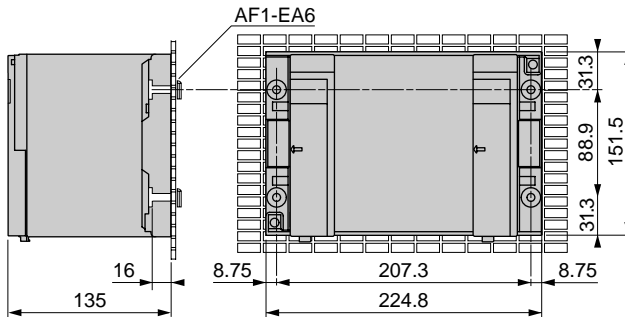
- **Mounting on a panel : drilling plan** (dimensions in millimeters)



(1) The diameter of the fixing holes must be large enough to take M6 screws.

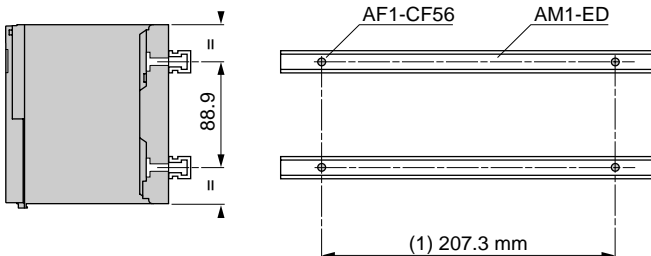
- **Mounting on a Telequick AM1-PA pre-slotted plate** (dimensions in millimeters)

Fix the power supply unit using four M6x25 screws + washers and AF1-EA6 clip nuts



- **Mounting on a DIN rail, width 35 mm** (dimensions in millimeters)

Fix the power supply unit using four M6x25 screws + washers and AF1-CF56 1/4 turn sliding nuts



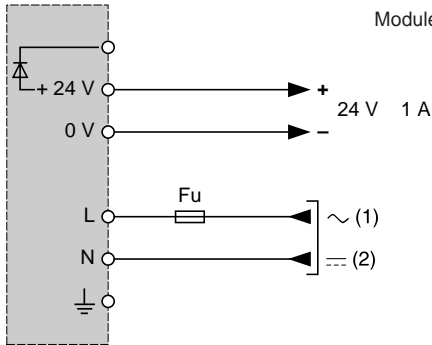
2.2-3 Summary of mounting options

Power supply references	TBX SUP 10	TSX SUP 1011	TSX SUP 1021	TSX SUP 1051	TSX SUP 1101	TSX SUP A02	TSX SUP A05
Telequick AM1-PA plate	•	•	•	•	•	•	•
AM1-DE200/DP200 central DIN rail	•	•	•	•		•	
AM1-ED DIN rail 140 mm center (TSX 37 PLC)		•	•	•		•	
AM1-ED DIN rail 88.9 mm center (TSX 57 PLC)		•	•	•	•	•	•
TSX RKY●● TSX 57 rack		•	•	•		•	

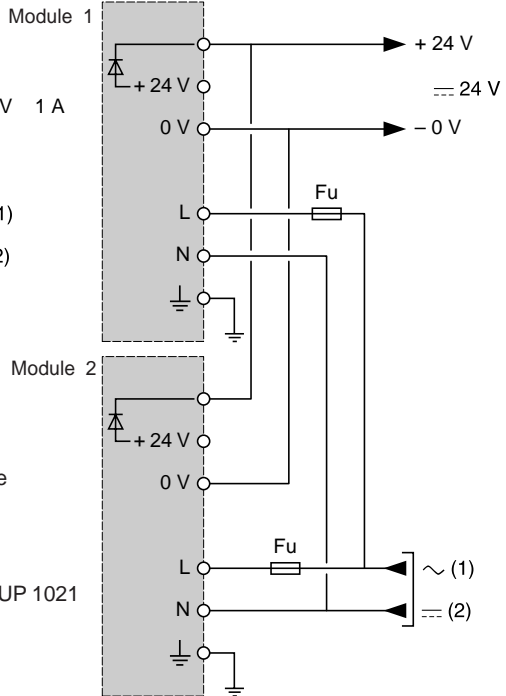
2.3 Connections for 24 VDC process power supplies

2.3-1 TSX SUP 1011/1021 power supplies

Normal connection



Paralleling



Fu = External protection fuse on phase
(Fu) : 4A time-delayed 250 V.

- (1) 100...240VAC on TSX SUP 1011
100...120 / 200...240VAC on TSX SUP 1021
- (2) 125 VDC, only on TSX SUP 1011

Connection rules

Primary : if the module is supplied with 100/240 V~, it is necessary to respect the phase and the neutral when wiring. Conversely, if the module is supplied with 125 V---, it is not necessary to respect the polarities.

⚠ To ensure the safety of personnel, connect the ground terminal of the module to the protective ground with a green/yellow wire.

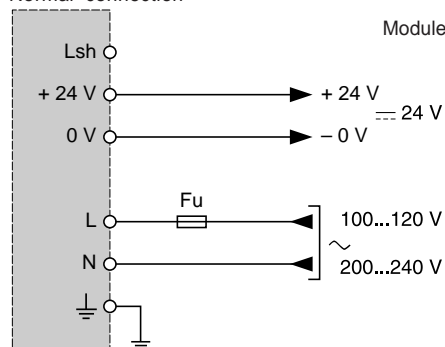
The power supply terminal block is protected by a cover which allows access to the wiring terminals. Wires exit vertically downwards. The wires can be held by a cable clamp.

In order to ensure 24 V SELV isolation, use wires with :

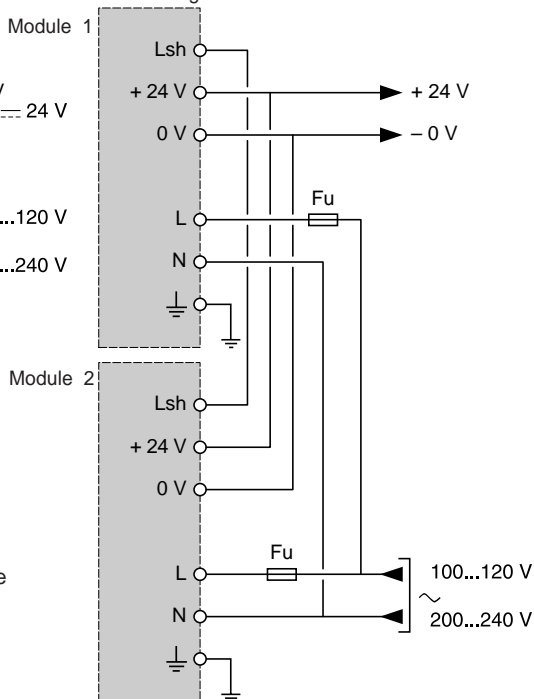
- An operating voltage ≥ 600 VAC and a cross-section of 1.5 mm² for connecting to the AC supply,
- An operating voltage ≥ 300 VAC and a cross-section of 2.5 mm² for 24 V outputs and the ground.

2.3-2 TSX SUP 1051 power supply

Normal connection



Paralleling



Fu = External protection fuse on phase
(Fu) : 4A time-delayed 250 V.

Connection rules

Primary : respect the phase and the neutral when wiring.

⚠ To ensure the safety of personnel, connect the ground terminal of the module to the protective ground with a green/yellow wire.

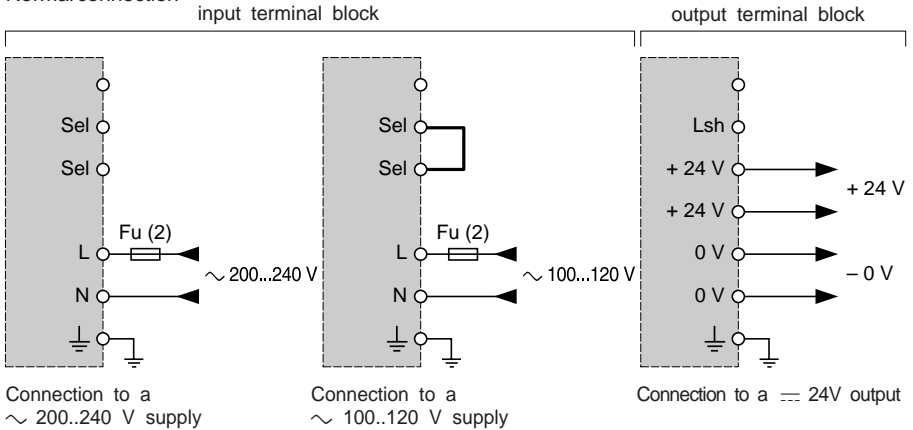
The power supply terminal block is protected by a cover which allows access to the wiring terminals. Wires exit vertically downwards. The wires can be held by a cable clamp.

In order to ensure 24 V SELV isolation, use wires with :

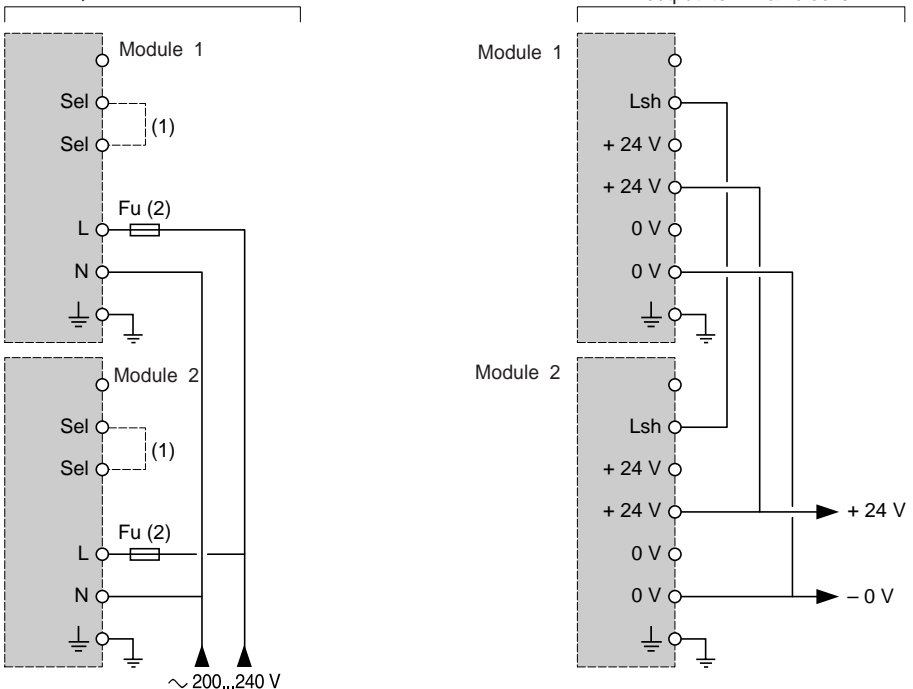
- An operating voltage ≥ 600 VAC and a cross-section of 1.5 mm^2 for connecting to the AC supply,
- An operating voltage ≥ 300 VAC and a cross-section of 2.5 mm^2 for 24 V outputs and the ground.

2.3-3 TSX SUP 1101 power supply

Normal connection



Paralleling
input terminal blocks



- (1) Connection to be performed if the power supply is provided by $\sim 100...120$ V
- (2) External protection fuse on phase (Fu) : 6.3A time-delayed 250 V.

Connection rules

Primary : respect the phase and the neutral when wiring.



To ensure the safety of personnel, connect the ground terminal of the module to the protective ground with a green/yellow wire.

The power supply terminal block is protected by a cover which allows access to the wiring terminals. Wires exit vertically downwards. The wires can be held by a cable clamp.

E

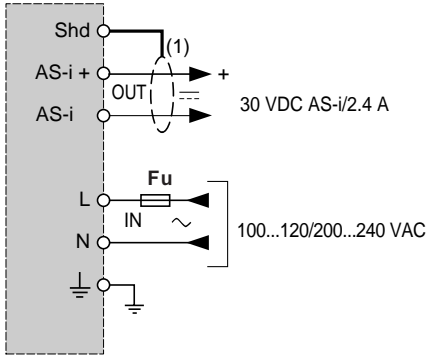
Secondary :

In order to ensure 24 V SELV isolation, use wires with :

- An operating voltage ≥ 300 VAC and a cross-section of 1.5 mm^2 or 2.5 mm^2 for connecting to the AC supply,
- An operating voltage ≥ 300 VAC and a cross-section of 2.5 mm^2 for 24 V outputs and the ground.
- Wire the two 24V terminals in parallel or share the load on the two 24V outputs if the total current supplied is greater than 5A.

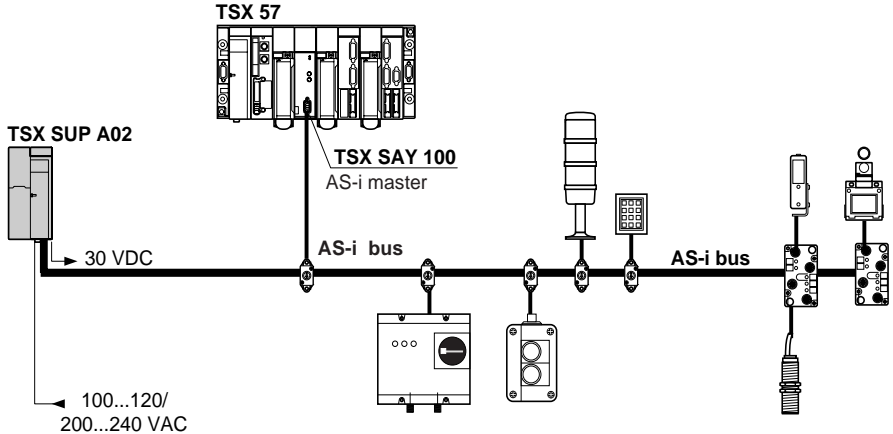
2.4 Connections for AS-i power supplies

2.4-1 TSX SUP A02 power supply



Connection diagram

The TSX SUP A02 power supply module is used to supply power to the AS-i bus and the slaves connected to it (30 VDC/2.4A output).



Connection rules

Primary : respect the phase and the neutral when wiring.



To ensure the safety of personnel, connect the ground terminal of the module to the protective ground with a green/yellow wire.

The power supply terminal block is protected by a cover which allows access to the wiring terminals. Wires exit vertically downwards. The wires can be held by a cable clamp.

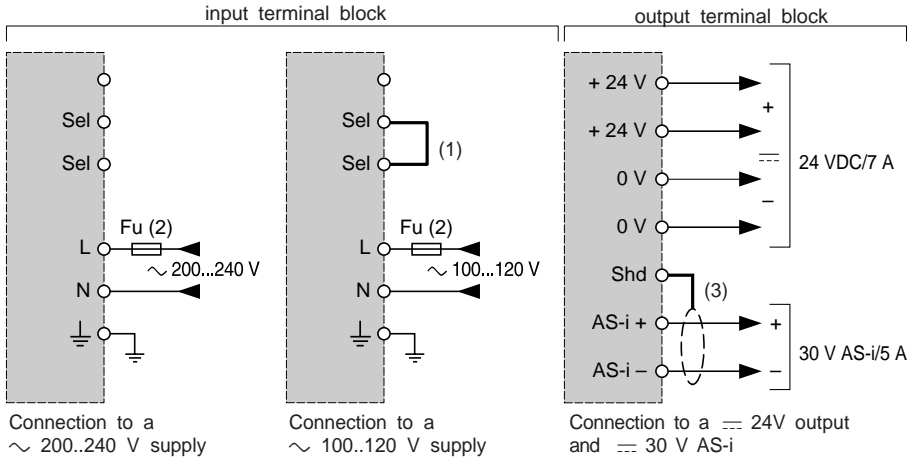
E

In order to ensure 24 V SELV isolation, use wires with :

- An operating voltage ≥ 600 VAC and a cross-section of 1.5 mm^2 for connecting to the AC supply,
- An operating voltage ≥ 300 VAC and a cross-section of 2.5 mm^2 for 24 V outputs and the ground.

A shielded cable is only required for the AS-i bus if the installation is subject to high EMC (Electromagnetic Compatibility) interference.

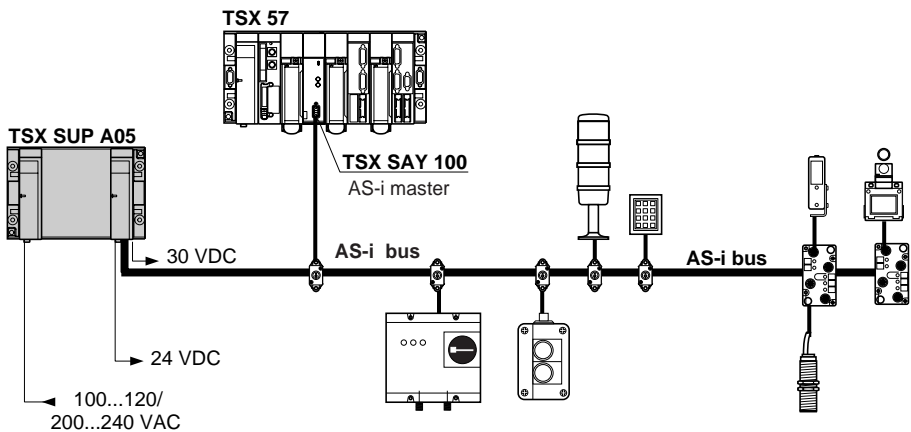
2.4-2 TSX SUP A05 power supply



- (1) Connection to be performed if the power supply is provided by $\sim 100..120$ V
- (2) External protection fuse on phase (Fu) : 6.3A time-delayed 250 V.
- (3) Shielded AS-i cable screen for atmospheres subject to interference

Connection diagram

The TSX SUP A05 power supply unit is used to supply power to the AS-i bus and the slaves connected to it (30 V/5A output). It also has an auxiliary power supply (24 VDC/7A) for sensors/actuators which are high current consumers; a black AS-i ribbon cable is used for this purpose.



Connection rules

Primary : respect the phase and the neutral when wiring.

⚠ To ensure the safety of personnel, connect the ground terminal of the module to the protective ground with a green/yellow wire.

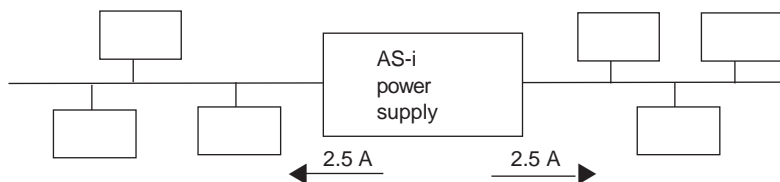
The "∼ power supply" and "— 24V and AS-i 30 VDC output voltage" terminal blocks are protected by a cover which allows access to the wiring terminals. Wires exit vertically downwards. The wires can be held by a cable clamp.

In order to ensure 24 V SELV isolation, use wires with :

- An operating voltage ≥ 300 VAC and a cross-section of 1.5 mm^2 or 2.5 mm^2 for connecting to the AC supply,
- An operating voltage ≥ 300 VAC and a cross-section of 2.5 mm^2 for 24V outputs and the ground.
- Wire the two 24V terminals in parallel or share the load on the two 24V outputs if the total current supplied is greater than 5A.

A shielded cable is only required for the AS-i bus if the installation is subject to high EMC (Electromagnetic Compatibility) interference.

As this power supply can supply a very large current, its positioning on the bus is very important. If the power supply is positioned at one end of the bus, it provides its nominal current (for example 5A) for the whole bus, and the voltage drop at the end of the bus is thus proportional to this 5A. If it is positioned halfway along the bus, the voltage drop at the end of the bus is only proportional to 2.5A, if consumption on each of the sections of the bus is equal.



If none of the slaves use a large amount of energy, it is preferable to position the power supply in the center of the installation. Conversely, if the installation has one or more slaves which use a large amount of energy, it is advisable to position the power supply near to these slaves.

Note : If actuators which use a large amount of energy are present (contactors, solenoid valve coils, etc), the TSX SUP A05 power supply can provide the auxiliary 24 VDC, isolated from the AS-i line.

2.4-3 General recommendations

When the AS-i yellow cable is installed, it must be placed in a cable ducting which is separate from the power cable ducting. It is also advisable to lay it flat and not to twist it in order to optimize the symmetry between the two wires of the AS-i cable. The installation of the AS-i cable in a plan connected to the electrical potential of the machine (for example the frame), meets the requirements of the EMC (Electromagnetic Compatibility) directive.

The end of the cable, or ends for a star connection, must be protected by :

- connecting them to a tap link tee,
- not allowing them to exit the last connection point.

Important

The energy on the AS-i bus must be properly distributed so that each product on the bus is supplied with sufficient voltage to ensure correct operation. To do this, the following rules must be respected :

- Rule 1

Select the power supply rating suitable for the total consumption of the AS-i segment. The ratings available are 2.4 A (TSX SUP A02) and 5 A (TSX SUP A05). A rating of 2.4 A is usually sufficient for an average consumption of 65 mA per slave for a segment comprising a maximum of 31 slaves.

- Rule 2

To minimize voltage drops and reduce the cost of the cable, it is necessary to determine the optimum position for the power supply on the bus, as well as the minimum cross-section suitable for distributing the power.

The voltage drop should not exceed 3V between the master and the last slave on the bus. To this end, the table below gives the information required to select the cross-section of the AS-i cable.

AS-i cable cross-section	0.75 mm ²	1.5 mm ²	2.5 mm ²
Linear resistance	52 mΩ / meter	27 mΩ / meter	16 mΩ / meter
Voltage drop for 1 A on 100 meters	5.2 V	2.7 V	1.6 V

The 1.5 mm² cable is suitable for the majority of applications, this is the AS-i bus standard model (cable offered in the SCHNEIDER catalog). Cables with a smaller cross-section may be used if the sensors use very little energy.

Note :

The maximum length without a repeater for all the segments of the AS-i bus is 100 meters. The length of cable connecting a slave to a passive splitter block must be taken into account.

3.1 Electrical characteristics

3.1-1 Process power supplies : TBX SUP 10 and TSX SUP 1011

Process power supplies		TBX SUP 10 24 V / 1A	TSX SUP 1011 24V / 1A
Primary			
Nominal input voltage	V	~ 100... 240 --- 125	~ 100... 240 --- 125
Input limit voltage	V	~ 90...264 --- 88...156	~ 85...264 --- 105...150
Line frequency	Hz	47... 63	47...63/360...440
Nominal input current (U = 100V)	A	0.4	0.4
Max inrush current	at 100 V A	3	37
(1) at 240 V	A	30	75
It max	at 100 V As	0.03	0.034
on activation (1) at 240 V	As	0.07	0.067
I ² t max	at 100 V A ² s	2	0.63
on activation (1) at 240 V	A ² s	2	2.6
Power factor		0.6	0.6
Harmonic 3		10% ($\varphi = 0^\circ$ and 180°)	10% ($\varphi = 0^\circ$ and 180°)
Full load efficiency	%	> 75	> 75
Secondary			
Useful power (2)	W	24	26 (30)
Nominal output current (2)	A	1	1.1
Output voltage / specified at 25°C	V	24 ± 5 %	24 ± 3 %
Residual ripple (peak to peak)	mV	240	150
Max HF noise (peak to peak)	mV	240	240
Permitted duration of AC supply micro-break (3)	ms	≤ 10 in ~ ≤ 1 in ---	≤ 10 in ~ ≤ 1 in ---
Protection against short-circuits and overloads		continuous - automatic reactivation	fallback to 0 and automatic re-activation when error disappears
Overvoltages	V	peak limiting U > 36	peak limiting U > 36
Paralleling		no	yes with power optimization
Serial connection		no	yes
Dissipated power	W	8	9

(1) Values on initial activation, at 25°C. These elements should be taken into account when starting up for sizing protection devices.

(2) Useful power and output current at an ambient temperature of 60°C. Value between () = useful power in a ventilated enclosure or within a temperature range of 0...+40°C.

(3) Nominal voltage for a repetition frequency of 1 Hz.

3.1-2 Process power supplies : TSX SUP 1021/1051/1101

Process power supplies		TSX SUP 1021 24 V / 2A	TSX SUP 1051 24 V / 5A	TSX SUP 1101 24 V / 10A
Primary				
Nominal input voltage	V	~ 100...120/200...240		
Input limit voltage	V	~ 85...132/170...264		
Line frequency	Hz	47...63 / 360...440		
Nominal input current (U=100V)	A	0.8	2.4	5
Max inrush current (1)	at 100 V	A	< 30	51
	at 240 V	A	< 30	51
It max on activation (1)	at 100 V	As	0.06	0.17
	at 240 V	As	0.03	0.17
I²t max on activation (1)	at 100 V	A²s	4	8.6
	at 240 V	A²s	4	8.6
Power factor		0.6	0.52	0.5
Harmonic 3		10% (φ = 0° and 180°)		
Full load efficiency	%	> 75	> 80	
Secondary				
Useful power (2)	W	53(60)	120	240
Nominal output current (2) A	2.2	5	10	
Output voltage (0°C - 60°C)	V	24 ± 3 %		24 ± 1 %
Residual ripple (peak to peak)	mV	150	200	
Max HF noise (peak to peak)	mV	240		
Permitted duration of AC supply micro-break (3)	ms	≤ 10		
Start time on resistive load s	< 1			
Protection Short-circuits against and overloads		fallback to 0 and automatic reactivation when error disappears	current limit	
Internal overvoltages	V	peak limiting U > 36	peak limiting U > 32	
Paralleling		yes, with power optimization		
Serial connection		yes		
Dissipated power	W	18	30	60

(1) Values on initial activation, at 25°C. These elements should be taken into account when starting up for sizing protection devices.

(2) Useful power and output current at an ambient temperature of 60°C. Value between () = useful power in a ventilated enclosure or within a temperature range of 0...+40°C.

(3) Permitted duration at nominal voltage for a repetition frequency of 1 Hz.

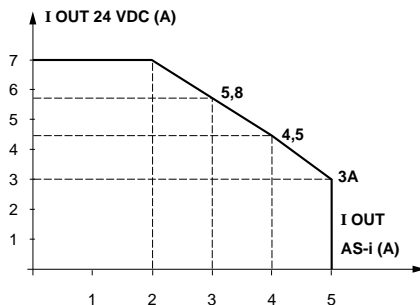
3.1-3 AS-i power supplies : TSX SUP A02 /A05

AS-i power supplies		TSX SUP A02 30V AS-i / 2.4A	TSX SUP A05 24V / 7A & 30V AS-i/5A
Primary			
Nominal input voltage	V	~ 100...120/200...240	~ 100...120/200...240
Input limit voltage	V	~ 85...132/170...264	~ 85...132/170...264
Line frequency	Hz	47...63/360...440	47...63/360...440
Nominal input current (U = 100V)	A	1.3	5
Max inrush current	at 100 V	30	50
(1)	at 240 V	30	50
It max	at 100 V	As	0.17
on activation (1)	at 240 V	As	0.17
I ² t max	at 100 V	A ² s	8.5
on activation (1)	at 240 V	A ² s	8.5
Power factor		0.6	0.51
Harmonic 3		10% ($\varphi = 0^\circ$ and 180°)	10% ($\varphi = 0^\circ$ and 180°)
Full load efficiency	%	> 75	> 80
Secondary			
Useful peak power	W	72 (84) (2)	230 (3)
Nominal peak AS-i 30 V output	A	2.4 (2.8) (2)	5 (3) (4)
current 24V output	A	—	7 (3) (4)
Output voltage	V	30 (AS-i)	24 30 (AS-i)
Global variation (-10°C to + 60°C)	V	29.5 to 31.6	±3% 29.5 to 31.6
Ripple (from 10 to 500 kHz)	mV	50	200 50
Ripple (from 0 to 10 kHz)	mV	300	240 300
Start time on resistive load	s	< 2 (with C = 15000 µF)	< 2 (with C = 15000 µF)
Permitted duration of AC supply micro-break (5)	ms	≤ 10	≤ 10
Protection against Short-circuits and overloads		fallback to 0 and automatic reactivation when error disappears	current limit on each output
Overvoltages	V	peak limiting U > 36	peak limiting U > 36
Dissipated power	W	24	60

- (1) Values on initial activation, at 25°C. These elements should be taken into account when starting up for sizing protection devices.
- (2) Useful power and output current at an ambient temperature of 60°C. Value between () = transitory useful power.
- (3) Useful power and output current for a maximum ambient temperature of 55°C, if product index II = 01. (60°C if product index II > 01).
- (4) See the distribution diagram for current on each output on the next page.
- (5) Permitted duration at nominal voltage for a repetition frequency of 1 Hz.

Diagram of currents available on AS-i 30 V and 24V outputs of the TSX SUP A05 power supply unit

The maximum power delivered by the power supply is 230 W. If the consumption is 5 A on the AS-i 30 V, the possible flow on the 24 V output is then only 3 A (see diagram opposite).



3.2 Physical and environmental characteristics

Process and AS-i power supply modules / units		TBX SUP 10	TSX SUP 1011 / 1021 TSX SUP 1051 / 1101 TSX SUP A02/A05
Connection to screw terminals		1 terminal per output	1011/1021/1051/A02: 1 terminal/output 1101: 2 terminals/output A05: 2 terminals/output (24 VDC) 1 terminal/output (AS-i 30 VDC) 2x1.5 with cable end or 1 x 2.5
Max. capacity/terminal	mm ²	1 x 2.5	
Temperatures : Storage Operation	° 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	
User safety		—	SELV (EN 60950 and IEC1131-2)
Dielectric strength : Primary / secondary Primary / ground Secondary / Ground	V rms V rms V rms	50/60Hz- 1min 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 discharge immunity		6 kV per contact / 8 kV in the air (conforms to IEC 1000-4-2)	
Fast electrical transients		2 kV (serial mode and common mode on input and output)	
Electromagnetic field influence		10 V/m (80 MHz to 1 GHz)	
Electromagnetic interference rejection		(conforms to FCC 15-A and EN 55022 class A) Test conditions : U and I nominal, resistive load, cables: 1 meter horizontal, 0.8 meter vertical	
Shock wave		Input : 4 kV MC, 2 kV MS Outputs : 2 kV MF, 0.5 kV MS (conforms to IEC 1000-4-5)	
Vibrations (2)		1 mm 3 Hz to 13.2 Hz 1 g 57 Hz to 150 Hz (2g TSX SUP A02/A05) (conforms to IEC 68-2-6, FC test)	
Degree of protection		IP 20.5	IP 20.5, terminal block IP 21.5
MTBF at 40°C	H	100 000	
Service life at 50°C	H	30 000 (at nominal voltage and at 80% of the nominal power)	

- (1) -10°C to +55°C for the TSX SUP A05 power supply unit with product index II = 01
-10°C to +60°C for the TSX SUP A05 power supply unit with product index II > 01
(2) conforms to IEC 68-2-6, FC test with module or unit mounted on plate or panel