

Modicon Micro PLCs

TSX 3705/3708/3710/3720

Implementation Manual Volume 1

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Document Set

At a Glance

This manual comprises three volumes.

- Volume 1,
 - Processors,
 - Implementation/Diagnostics/Maintenance,
 - Integrated analog,
 - Integrated upcounting,
 - Integrated communication.
 - Volume 2,
 - Discrete input/output modules,
 - Remote adaptor modules for discrete input/outputs,
 - Process and AS-i supplies.
 - Volume 3.
 - Analog input/output modules,
 - Counting module,
 - Communication by PCMCIA card.
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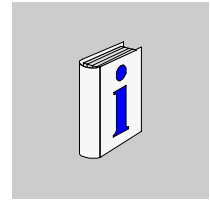
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About the Book



At a Glance

Document Scope	This manual describes implementation of Micro PLCs.
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General introduction to a PLC station



At a Glance

Aim of this Part This part aims to provide a general description of a PLC station and its different components.

What's in this Part? This part contains the following chapters:

Chapter	Chapter Name	Page
1	General introduction to Micro PLCs	21
2	General introduction to the components of a PLC station	25
3	General introduction to communication	37

General introduction to Micro PLCs

1

At a Glance

Aim of this Chapter

The aim of this chapter is to describe the Micro PLCs.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Micro PLCs	22
Modular TSX 37-21 and TSX 37-22 PLCs	24

Micro PLCs

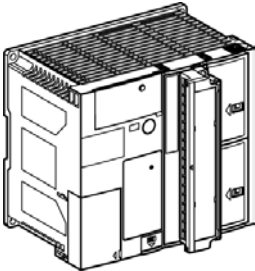
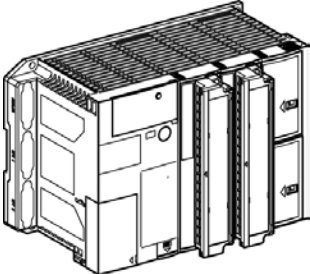
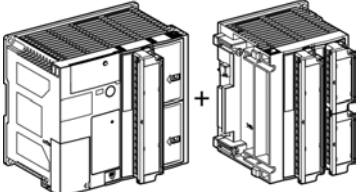
Introduction

The range of Micro PLCs comprises several PLC types, so as to best meet your needs.

- The TSX 37-05, TSX 37-08 and TSX 37-10 PLCs, at the same time modules that are compact and capable of integrating one or two discrete input/output modules into the database, according to the type,
- the TSX 37-21 and TSX 37-22 modular PLCs.

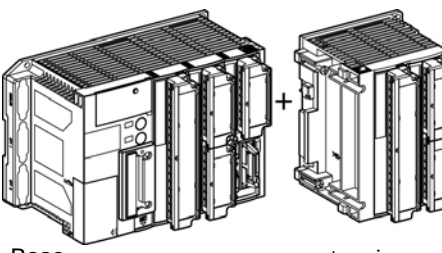
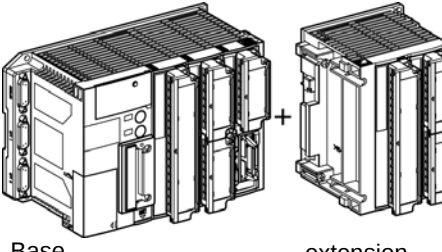
TSX 37-05
TSX37-08
TSX 37-10

The table below presents the TSX 37-05, TSX 37-08 and TSX 37-10 PLCs.

Type	Illustration
the TSX 37-05 PLC, incorporates a 28 input/output (16I +12O)module in its database. This is located in the first slot and has two available half slots which enable either a standard format module, or two half-format modules, to be received. Its maximum input/output capacity is 92 discrete I/O, with installation in the available slot of a 64 discrete I/ O module connected by an HE10 connector.	
the TSX 37-08 PLC, incorporates two 28 input/output (16I +12O)modules in its database. These are located in the first two slots and have two available half slots which enable either a standard format module, or two half-format modules, to be received. Its maximum input/output capacity is 120 I/O with installation in the available slot of a discrete 64 I/O module (connected by an HE10 connector).	
the TSX 37-10 PLCs, offer five database configurations. They differ in their supply voltage and the discrete module type installed in the first slot. These PLCs can receive a mini extension rack, which allows the number of local inputs/outputs to be extended to 192 I/O. These PLCs are equipped with a real-time clock.	 Base extension

TSX 37-21
TSX37-22

The table below presents the TSX 37-21 and TSX 37-22 PLCs.

Type The TSX 37-21 PLC is available in 2 configurations which differ according to the power supply type. These PLCs do not integrate discrete input/output modules in the database. They possess a maximum capacity of 256 I/O when a mini extension rack is added. They are equipped with a real-time clock, enabling the application memory volume to be extended and can receive a communication module.	Illustration  Base extension
the modular TSX 37-22 PLCs are identical in every way to TSX 37-21 PLCs, with further rapid counting and analog input/output functions built in.	 Base extension

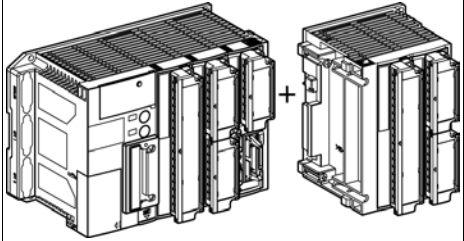
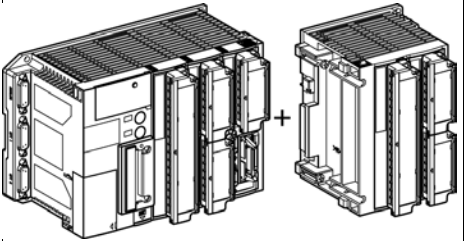
Modular TSX 37-21 and TSX 37-22 PLCs

Introduction

The TSX Micro PLC range has just been added to the range of compact and modular TSX Micro PLCs

At a Glance

Modular TSX 37-21 and TSX 37-22 PLCs.

Type	Illustration
the PLCs TSX 37-21 , incorporate a real-time clock, which enables the application memory volume to be extended and a communication module to be received. They do not incorporate discrete input/output modules in the database, but they can receive a mini extension rack, which enables the number of inputs/outputs to be extended to 256 I/O. TSX 37-21 PLCs has two different configuration versions to meet the requirements of alternating and direct supplies.	 The illustration shows a 'Base' unit on the left and an 'extension' unit on the right, separated by a plus sign. Both units are shown from a three-quarter perspective, highlighting their modular design and terminal blocks.
the modular TSX 37-22 PLCs are identical in every way to TSX 37-21 PLCs, with further rapid counting and analog input/output functions built in.	 The illustration shows a 'Base' unit on the left and an 'extension' unit on the right, separated by a plus sign. Both units are shown from a three-quarter perspective, highlighting their modular design and terminal blocks.

General introduction to the components of a PLC station



At a Glance

Aim of this Chapter

This chapter aims to describe the main constituent elements of a TSX 37 PLC.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
General information about discrete inputs/outputs	26
Local discrete inputs/outputs in the rack	27
Remote discrete inputs/outputs	28
Discrete safety inputs/outputs	30
Local analog inputs/outputs	31
Remote analog inputs/outputs	33
Counting channel	34
Forced PLC ventilation	36

General information about discrete inputs/outputs

At a Glance

All discrete modules (see Micro Installation Manual, Volume 2) can be installed in all the available positions in TSX 37 PLCs. In order to best meet your requirements, two module sizes are on offer for the discrete inputs/outputs:

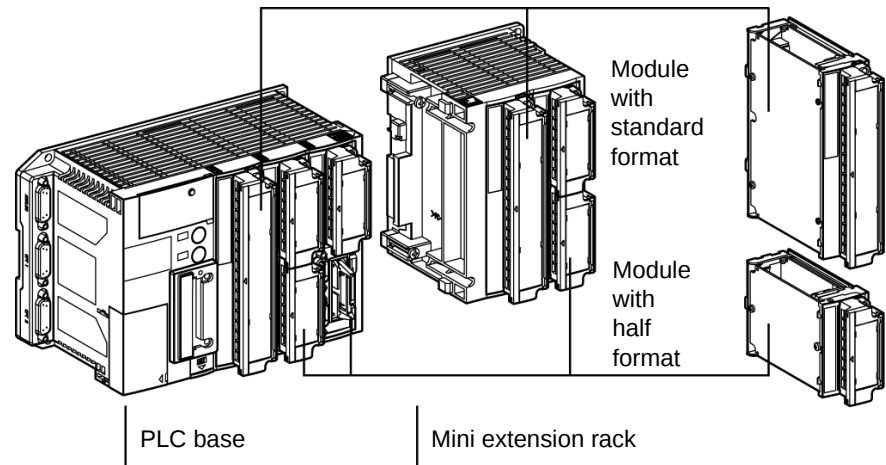
- the standard size which takes up a slot (2 position),
- the half-size which takes up a single position.

All the other modules (analog, counting, etc.) are half-size modules.

A mini extension rack, which can be directly connected to the PLC database, enables the number of available slots to be extended and therefore the number of modules, which can be used, to be increased.

Illustration

Micro and discrete modules:



Local discrete inputs/outputs in the rack

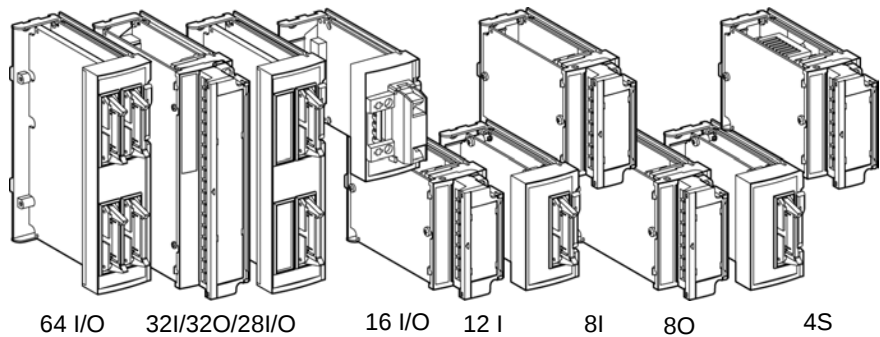
General points

The discrete input/output modules differ in:

- their format (standard and half-format),
- their modularity (from 4S to 64I/O),
- their channel types
 - direct current or alternative current inputs,
 - static or relay outputs,
- their connector (HE10 screw terminal connector(s)).

Illustration

The illustration below presents the different types of local discrete input/output modules in the rack.



Remote discrete inputs/outputs

Introduction

The Micro range enables you to use remote discrete inputs/outputs (see Implementation manual Micro Volume 2)

For this, two modules are proposed:

- an offset module TSX STZ 10,
- a bus master module AS-i TSX SAZ 10 (only on TSX 37-10 and TSX 37-21/22).

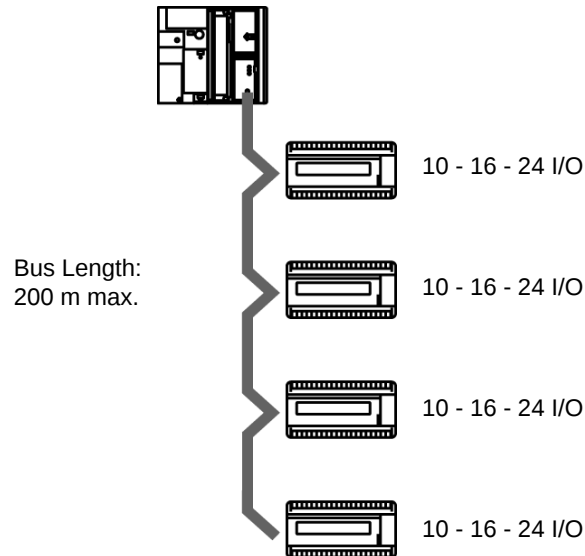
Note: This choice is exclusive: it is not possible to use both modules simultaneously.

Using a TSX STZ 10 offset module

The TSX STZ 10 offset module enables the inputs/outputs of 4 TSX 07-PLCs to be used remotely (up to 200m), and to thus increase the number of inputs/outputs in the configuration.

Illustration

The schema below illustrates the connection between the TSX STZ 10 offset module and TSX 07 PLCs

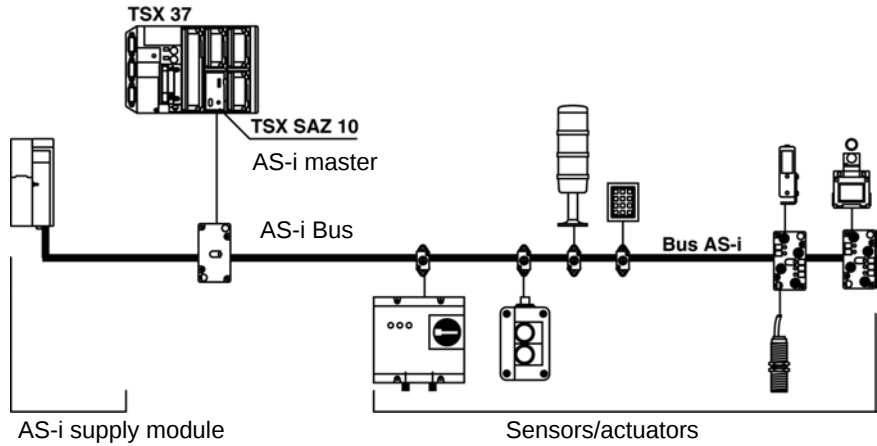


Using an AS-i TSX SAZ 10 bus master module

Using an AS-i interface module enables 124 input bits and 124 output bits distributed along 31 slave devices to be managed, with a limit of 4 input bits and 4 output bits per device. The maximum length of the bus without a relay is limited to 100 meters.

Illustration

The schema below illustrates an example of an AS-i bus



Discrete safety inputs/outputs

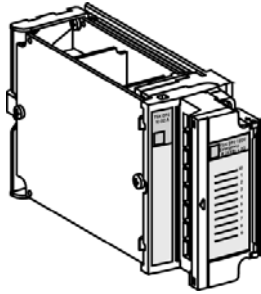
General

The TSX DPZ 10D2A safety module carries out a PREVENTA cabled safety function in a half-size module and the complete diagnostics of the safety string.

It offers an emergency stop monitoring or position interrupting function, adapted to the safety demands according to the EN 954-1, EN 418 and EN 60204-1 standards.

Illustration

safety module:



Local analog inputs/outputs

Introduction

The analog inputs/outputs from the TSX 37 range differ in their modularity, their performance and signal ranges offered (high voltage level, thermoelectric couple, heat probe, etc).

(For further details see Micro implementation manual Volume 2).

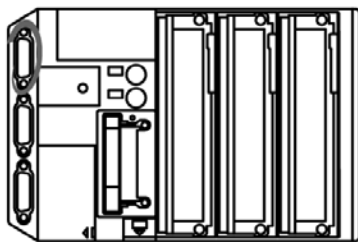
Analog inputs/ outputs built in to TSX 37-22 PLCs

TSX 37-22 PLCs offer 8 inputs and 0-10 V 8 bit-output, and a 10V voltage reference output, which means that a large number of automatic cases can be answered economically.

These inputs may be associated to the TSX ACZ 03 adjustment and adaptation module, which allows:

- manual adjustment of application values across 4 sliders,
- conversion to 4-20 mA current from 0-10V signals,
- adaptation of analog inputs to 24V discrete inputs (IEC type 1).

Illustration:

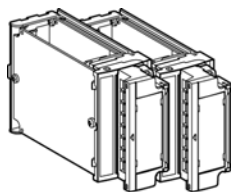


8 I 0-10V and 1 O 0-10V, 8 bits.

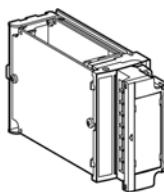
Analog input/ output module

Analog input/output modules, which can be installed in all TSX 37-05/08/10/21/22 PLCs offer a high level of performance. They differ in modularity (from 2 to 8 channels) and the input or output type (high voltage level, high current level, thermoelectric couple-inputs, heat probe-inputs, etc.). The connection is always made by a screw terminal block.

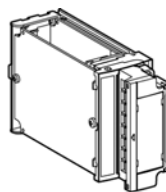
Illustration:



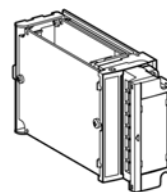
8 I
0-10 v +/- 10V
or
0-20 mA 4-20 mA
12 bits



4 I
differentials
multigrams
(+/- 10V, 4-20 mA
Thermocouple, Pt
100,...)
16 bits



4 O
+/- 10V
16 bits+sign



2 O
+/- 10 V
0-20 mA
4-20 mA
11 bits + sign

Remote analog inputs/outputs

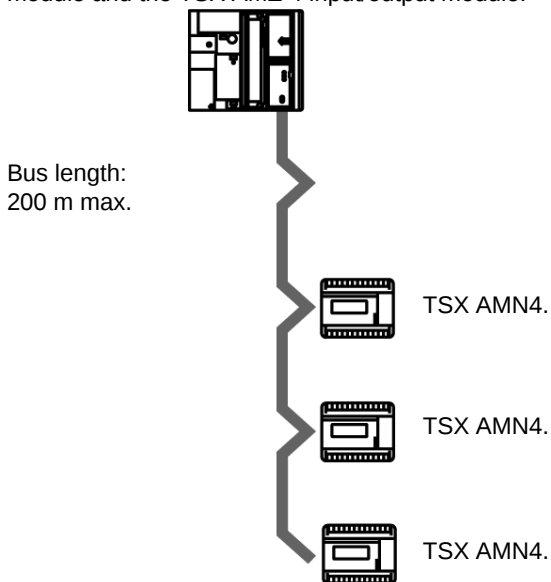
General points

The TSX STZ 10 I/O offset module enables the remote use (up to a distance of 200m) of up to 3 TSX AMZ 4• analog input/output modules from the TSX 07 PLC range (see Implementation manual Micro Volume 2).

Note: Using an input/output offset module for PLCs excludes the use of an AS-i master module.

Illustration

The schema below illustrates the connection between the TSX STZ 10 offset module and the TSX AMZ 4 input/output module.



Counting channel

Introduction

TSX 37 PLCs offer 3 possibilities for counting:

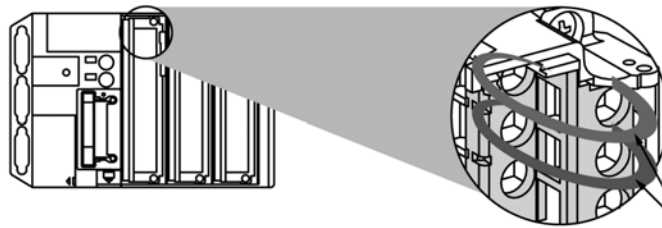
- via the first four discrete inputs of the first module,
- by using the counting channels which are built in to TSX 37-22 PLCs,
- via counting modules, which can be installed in the available positions (TSX CTZ 1A/2A, TSX CTZ 2AA).

Upcounting on discrete inputs

The first 4 inputs of the discrete module, located in the first slot of the PLC, make it possible to have 2 up/down counting channels at 500Hz. (See (Counting built into bases).

Illustration

The illustration below shows the 4 inputs of the discrete module configurable in counting channels.



2 counting channels
to 500 Hz:
up counter,
down counter,
up/down counter.

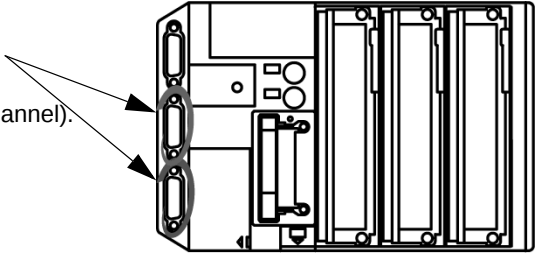
Integrated upcounting

Built-in counting in TSX 37-22 PLCs makes it possible to have 2 10KHz counting channels, as well as all the signals necessary for implementing these functions (reset to zero, set to pre-selection, top-turn, etc.).

Illustration

The illustration below locates the 2 integrated counting channels.

2 x 10 KHz counting channels:
up counter,
down counter,
up/down counter (on the first channel).

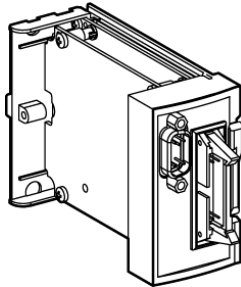


Counting modules

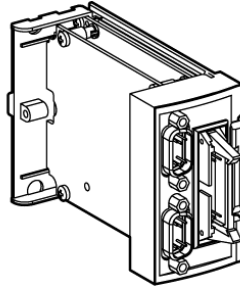
The up and down counting modules differ in the number of channels offered, the 40KHz or 500KHz counting frequency and the type and number of logical signals complementary to up/down counting functions.

Illustration

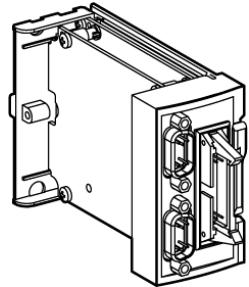
The illustration below shows the different counting modules.



1 x 40 KHz
counting channel
up counter,
down counter,
up/down counter.



2 x 40 KHz
counting channels
up counter,
down counter,
up/down counter.



2 x 500 KHz
counting channels
up counter,
down counter,
up/down counter.

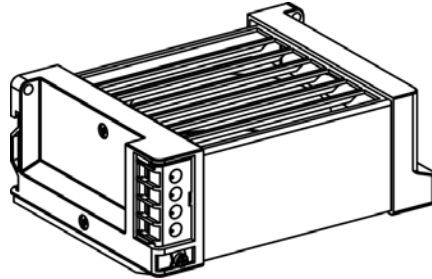
Forced PLC ventilation

Introduction

Depending on the PLC-type (TSX 37-05/08/10 or TSX 37-21/22 with or without mini extension rack), one or two ventilation modules can be installed above each PLC to assist the cooling of the different modules by forced convection.

Illustration

The illustration below shows the ventilation module TSX FAN •••.



Usage conditions

These ventilation blocks should be used in the following cases:

- **Ambient temperature between 25°C and 70°C:** forced ventilation increases the life span of the various Micro PLC components (MTBF increased by 25%).
- **Ambient temperature between 60°C and 70°C:** the ambient temperature is limited to 60°C without ventilation, forced ventilation lowers the temperature inside the modules by more than 10°C (and removes the hot points) which brings the modules' internal temperature down to the equivalent of the ambient temperature of 60°C.

In these conditions, the product life span is increased by more than 50%.

Three types of ventilation module are offered:

- Ventilation module with 110V AC supply,
- ventilation module with 220V AC power supply,
- ventilation module with 24V DC supply,

Note: Using forced ventilation makes it necessary to take fitting precautions when analog modules of type TSX AEZ 414 are used in the PLC configuration (see (Cabling and installation recommendations for thermocouples)).

General introduction to communication



At a Glance

Aim of this Chapter This chapter aims to provide a general description of communication with Micro PLCs.

What's in this Chapter? This chapter contains the following topics:

Topic	Page
Communication	38
UNI-TELWAY link	39
Character mode link by terminal port	40
Modbus Connection	41
FIPWAY link	42
FIPIO link	43
Modem link	44
Modbus Plus Link	45

Communication

General

TSX 37 PLCs offer a series of economic multidrop links via the terminal port of all the PLCs and an additional permanent connection for the operator dialog on TSX 37-21/22 PLCs.

These connections enable the connection of (one single protocol at a time):

- a programming terminal and/or an operator dialog device (UNITELWAY master mode),
- the PLC to an UNI-TELWAY multidrop link (UNI-TELWAY master or slave mode),
- the PLC to the Modbus bus,
- a printer or a terminal in character mode,
- a modem.

A TSX P ACC 01 enables the PLC to be connected to a UNI-TELWAY link, when the distance between the devices is greater than 10 meters. If desired, it makes it possible to duplicate the terminal port in order to simultaneously connect a console and an operator dialog device on a TSX 37 05/08/10 PLC.

TSX 37-21 and TSX 37-22 PLCs are also fitted with a slot which makes it possible to receive a communication module in PCMCIA format (full-duplex or half-duplex, UNI-TELWAY, JBUS/MODBUS, FIPWAY, FIPIO Agent, Modbus+, modem asynchronous series of links).

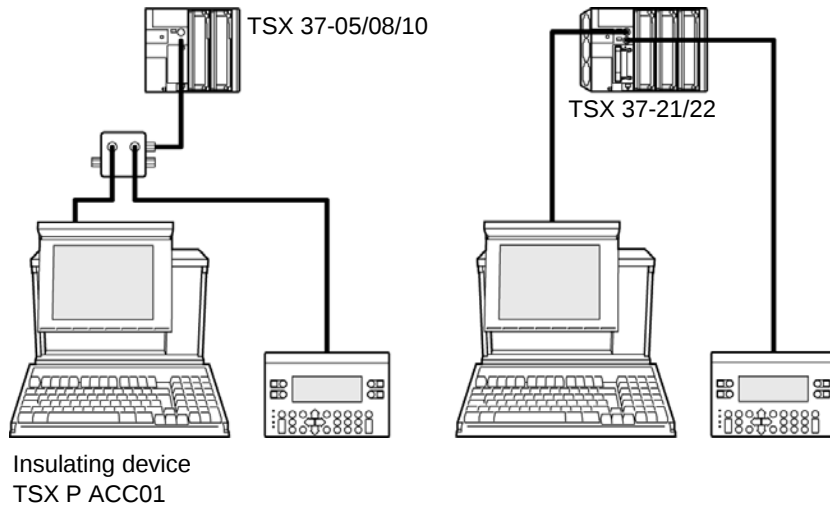
UNI-TELWAY link

General

Communicating via UNI-TELWAY allows the exchange of data between all the devices which are connected on the bus. The UNI-TELWAY standard is a UNI-TE protocol which creates a hierarchical structure (one master and several slaves). The master device is the bus manager.

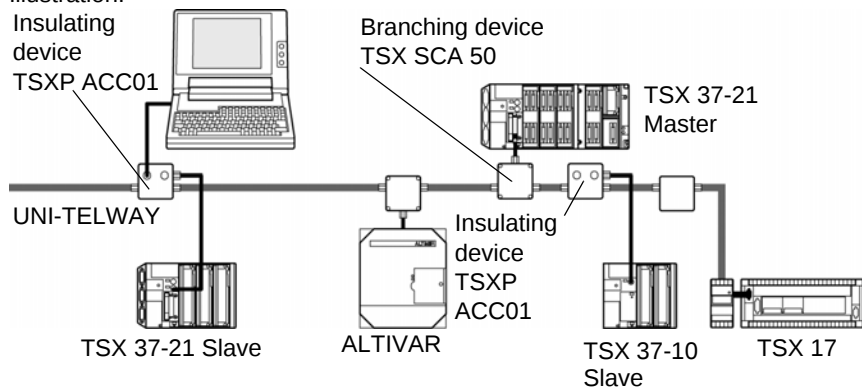
UNI-TELWAY master link by terminal port

Illustration:



UNI-TELWAY slave link by terminal port and master by PCMCIA module

Illustration:



Character mode link by terminal port

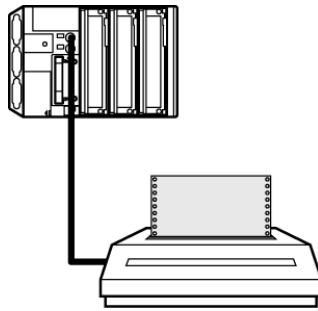
General

Communication via character mode enables dialog and communication functions to be carried out between the PLCs and their environment.

- common peripherals: printers, keyboard-screen, workshop terminal,
- specialized peripherals: bar code readers,
- link to a checking or production management calculator,
- data transmission between heterogeneous devices (numerical commands, variable speed controllers, etc),
- link to an external modem.

Illustration

character mode link to a printer:



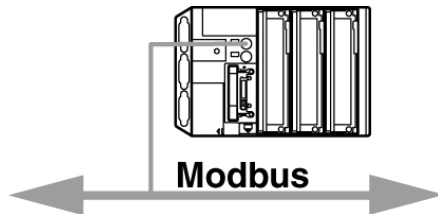
Modbus Connection

General points

Communicating via Modbus allows data exchange between the master and all the slave devices which are connected on the bus. The Modbus protocol is a protocol which creates a hierarchical structure (one master and several slaves).

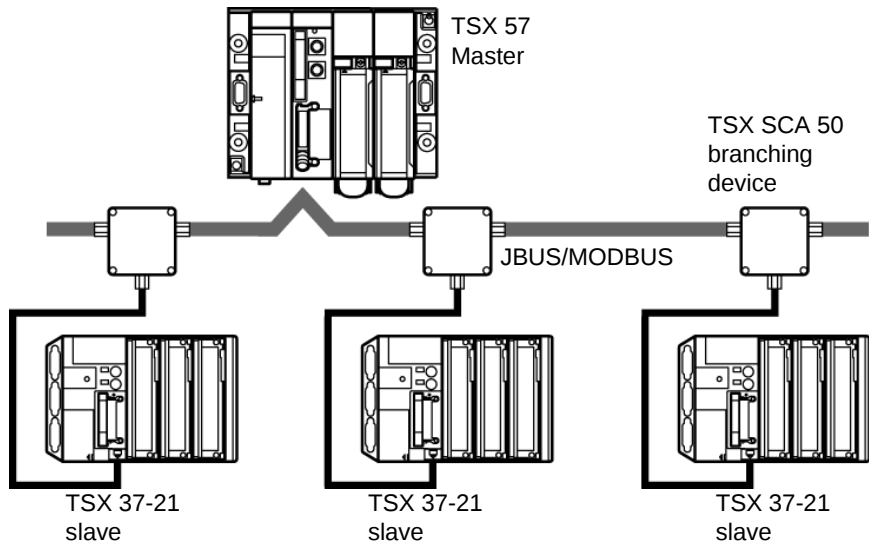
Illustration

connection to Modbus bus via terminal port:
TSX 37-05/08/10/21/22



JBUS/MODBUS link via communication module

Illustration:



FIPWAY link

General points

To decentralize peripheral devices, intelligence and ultra-remote services, Schneider Automation offers the FIPWAY industrial local network.

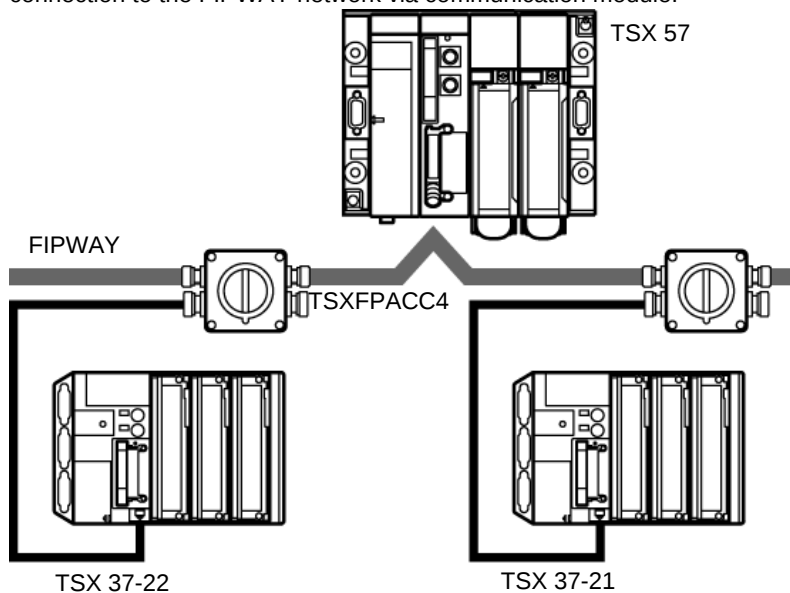
The FIPWAY network conforms entirely to the FIP standard with access by a bus arbitrator.

A FIPWAY communication channel comprises three elementary functions:

- The inter-station message handling function which guarantees the routing of messages,
- the telegram sending/receiving function,
- the common words (%NW) or shared table production/consumption function.

Illustration

connection to the FIPWAY network via communication module:



FIPIO link

General

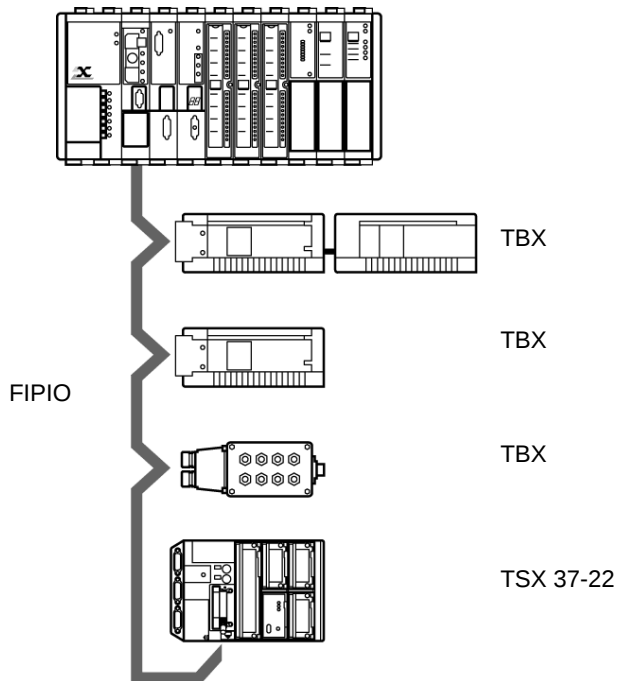
Communicating via FIPIO is part of the WORLDVIP global offer from Schneider Automation.

FIPIO is a field bus, which allows the decentralization of the inputs/outputs of a PLC station and its industrial peripheral devices nearest to the operational part.

The FIPIO protocol depends on the producer/consumer exchanges (example: common words) and the bus is managed by a bus arbitrator.

Illustration

FIPIO link by communication module:
TSX series 7



Modem link

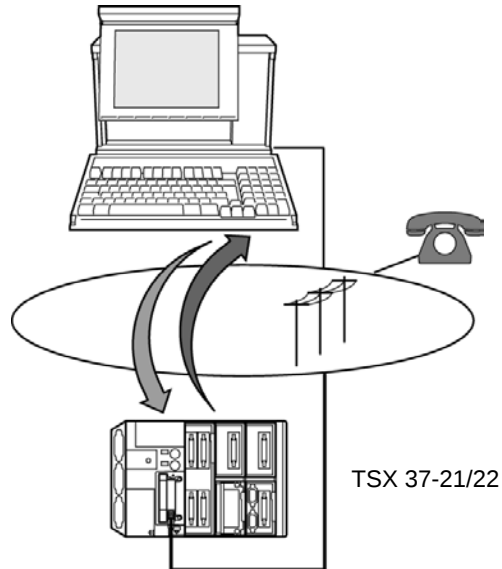
General

A large number of applications are affected by modem communications.

Communicating via the TSX MDM 10 modem makes it possible to access stations, which have been offset by the switched public telephone network in order to carry out checks, diagnostics, or remote controls.

Illustration

connecting to the telephone network with a PCMCIA card modem:



Modbus Plus Link

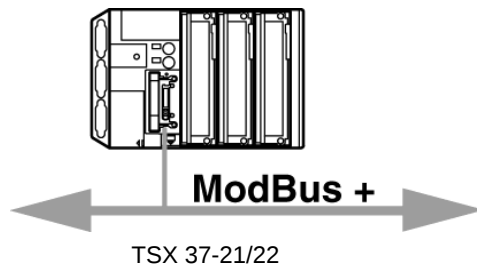
General

Communicating by Modbus Plus allows the exchange of data between all the devices connected on the network.

The Modbus Plus protocol is based on the principle of a Logical Token passing bus. Each station on the same network is identified by an address between 1 and 64 and has access to the network after receiving a token. Duplicated addresses are not valid.

Illustration

Illustration:



TSX 37 PLC



At a Glance

Aim of this Part This part is about the TSX 37-05, TSX 37-08, TSX 37-10 and TSX 37- 21/22 PLCs.

What's in this Part? This part contains the following chapters:

Chapter	Chapter Name	Page
4	TSX 37-05 PLC	49
5	TSX 37-08PLC	55
6	TSX 37-10PLC	61
7	TSX 37-21 and TSX 37-22 PLCs	67
8	TSX 37 PLC supplies	75
9	Memories on TSX 37	79
10	TSX 37 PLC performance	87
11	Commissioning standards and conditions	89

TSX 37-05 PLC

4

At a Glance

Aim of this Chapter

This chapter is about the TSX 37-05 PLC, its physical description and its technical characteristics.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Introduction to the TSX 37 05 PLC base	50
TSX 37-05: physical description	52
Characteristics of the TSX 37-05	53
Display panel on TSX 37-05	54

Introduction to the TSX 37 05 PLC base

General points

A TSX 37-05 PLC base groups under one product reference:

- a rack comprising the supply to the base (100-240V AC), the processor, the dedicated memory, the watchdog in FLASH EPROM and two half-slots for the modules,
- a discrete module of 28 standard size inputs/outputs in the first slot in the rack.

Catalog data

data table:

Reference Number	Supply	Built-in input/output module	
TSX 3705 028DR1	100240V AC	TSX DMZ 28DR: 16 24V DC inputs, 12 relay outputs	
Discrete inputs/outputs	Maximum number of discrete I/Os	in the base (1)	92
		remote (TSX 07)	0
		remote on the AS-i bus	0
	Maximum number of modules (2)	28 discrete inputs/outputs	2
		32 discrete inputs/outputs	1
		64 discrete inputs/outputs (high density)	1
		input/output mismatch (for TSX 07 I/O or AS-i bus)	0
Analog	Number of analog input/output modules (2)		2
	No. of analog inputs		16
	No. of analog outputs		8
Counting	No. of 500Hz counting channels on discrete inputs		2
	No. of counting modules (2)		2
	No. of 40kHz or 500kHz counting channels		4

(1) with 1 64 input/output module with HE10 connectors,

(2) taking into account the available slots, the number of modules cannot be cumulated.

RS 485 terminal port

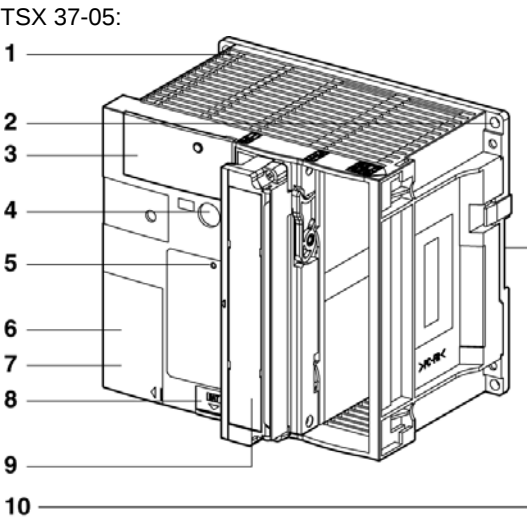
With an 8-point mini-DIN size RS 485 terminal port, it is possible to:

- connect an FTX type terminal or a compatible PC, a printer,
- and to connect the PLC to the UNI-TELWAY or Modbus busses. For this, it proposes, by default, the UNI-TELWAY 96 Baud master communication mode and, by configuration:
 - the UNI-TELWAY slave mode or,
 - ASCII character mode or,
 - the Modbus protocol.

Note: The terminal and PLC can both be connected to the UNI-TELWAY bus using the TSX P ACC 01 insulating device. This should be used when the distance between the UNI-TELWAY connection equipment is greater than 10 meters (see (TSX unit P ACC 01)).

TSX 37-05: physical description

Illustration



Number table

function description of the numbers:

Number	Description
1	2 slot rack comprising the supply, the processor and its memory.
2	Fixing hole for the PLC.
3	Centralized display panel.
4	Terminal port (TER).
5	RESET button.
6	Access door to the supply terminals.
7	Stack change information label.
8	Access door to the optional stack and data protection switch for the operating system.
9	A 28 I/O module whose basic position is in the first slot.
10	Mounting device on DIN mounting rail.

Note: For an IP20 protection index, place the protection covers in the empty slots. These covers, which are not supplied, should be ordered in batches of 10, quoting the reference TSX RKA 01.

Characteristics of the TSX 37-05

Table of characteristics

Technical characteristics:

PLCs		TSX 37-05
Functions	No. of local discrete inputs/outputs	92
	No. of remote discrete inputs/outputs (TSX 07 and AS-i)	0
	No. of integrated UNI-TELWAY connections	1
	Communication modules	0
	Real-time clock	No
	Integrated analog	No
	Integrated upcounting -500Hz (on discrete input) -10kHz	Yes No
Memory	Savable internal RAM - program (100% Boolean) - data - constant	9 Kwords 2/1.6 Kinst. (1) 1 Kwords (2) 128 words (2)
	Integrated Flash Eprom	10 Kwords (3)
Memory extension	-	No
Execution time by Kinst.(5)	RAM (100% Boolean)	0.3ms
System overhead		1.9 ms
Application structure	Master task	1
	Fast task	1
	Processing on events	1 to 8
Pre-defined function blocks	Timers	64 (4)
	Counters	32

(1) The first value corresponds to a program in List. The 2nd value corresponds to a program in Ladder language.

(2) Size by default; can be extended at the expense of the application program size.

(3) 9 Kwords available for the backup application + 1 Kword for the %MW backup.

(4) A maximum of 16 timers with a 10ms time base.

(5) Inoperative overhead and I/O management.

Display panel on TSX 37-05

General points

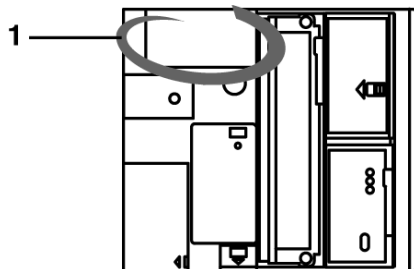
The display block **1** centralizes all the information needed for diagnostics and for maintenance of the PLC and its modules. For this, it provides the following:

- 8 LED status displays giving PLC function information (RUN, TER, I/O, ERR and BAT LEDs) and the current display mode (R, I/O, WRD and DIAG LEDs),
- from a block of 96 LED displays making it possible to display:
 - **local inputs/outputs in display mode** (BASE LED on): the state of all discrete inputs and outputs of the PLC,
 - **in diagnostic mode** (DIAG LEDs on):
 - "module" errors (all LEDs associated with the module flash slowly),
 - or
 - "channel" errors (LED display associated with the channel),
 - **in object display mode** (WRD LED on): the contents of a maximum of 16 %MWi, %SWi, or %KWi words (these words are displayed in binary or hexadecimal), the state of a group of 64 %Mi, %Si or %Xi bits,
- a push button which enables the information sequence to be viewed and to change the display mode.

Note: For further information concerning the display block, please refer to the *Display panel*, p. 501

Illustration

display panel:



At a Glance

Aim of this Chapter

This chapter is about the TSX 37-08 PLC, its physical description and its technical characteristics.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Introduction to the TSX 37 -08 PLC base	56
TSX 37-08: physical description	58
Characteristics of the TSX 37-08	59
Display panel on TSX 37-08	60

Introduction to the TSX 37 -08 PLC base

Introduction to the TSX 37 08 PLC base

A TSX 37-08 PLC base groups under one product reference:

- a rack comprising the supply to the base (100-240V AC), the processor, the dedicated memory, the watchdog in FLASH EPROM and two half-slots for the modules,
- 2 standard size discrete 28 input/output modules in the first two rack slots.

Catalog data

data table:

Reference Number	Supply	Integrated input/output modules	
TSX 3708 056DR1	100240V AC	TSX DMZ 28DR: 16 24V DC inputs, 12 relay outputs	
Discrete inputs/ outputs	Maximum number of discrete I/Os	in the base (1)	120
		remote (TSX 07)	0
		remote on the AS-i bus	0
	Maximum number of modules (2)	28 discrete inputs/outputs	3
		32 discrete inputs/outputs	1
		64 discrete inputs/outputs	1
		64 discrete inputs/outputs (high density)	0
		input/output mismatch (for TSX 07 I/O or AS-i bus)	0
Analog	Number of analog input/output modules (2)		2
	No. of analog inputs		16
	No. of analog outputs		8
Counting	No. of 500Hz counting channels on discrete inputs		2
	No. of counting modules (2)		2
	No. of 40kHz or 500kHz counting channels		4

(1) with 1 64 input/output module with HE10 connectors,

(2) taking into account the available slots, the number of modules cannot be cumulated.

RS 485 terminal port

With an 8-point mini-DIN size RS 485 terminal port, it is possible to:

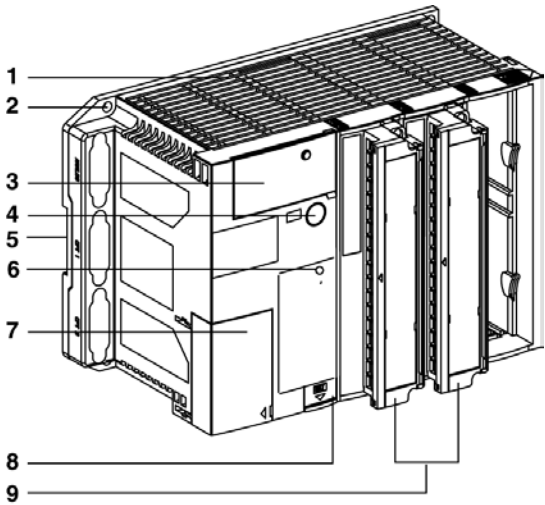
- connect an FTX type terminal or a compatible PC, a printer,
- and to connect the PLC to the UNI-TELWAY or Modbus busses. For this, it proposes, by default, the UNI-TELWAY 96 Baud master communication mode and, by configuration:
 - the UNI-TELWAY slave mode or,
 - ASCII character mode or,
 - the Modbus protocol.

Note: The terminal and PLC can both be connected to the UNI-TELWAY bus using the TSX P ACC 01 insulating device. This should be used when the distance between the UNI-TELWAY connection equipment is greater than 10 meters (see (TSX unit P ACC 01)).

TSX 37-08: physical description

Illustration

TSX 3708:



Address table

description for each address:

Address	Description
1	3 slot rack containing the supply, the processor and its base memory.
2	PLC fixing hole.
3	Centralized display block.
4	Terminal port (TER).
5	Mounting device on DIN mounting rail.
6	RESET button.
7	Access door to the supply terminals.
8	Access door to the optional battery and to the operating system data protection switch.
9	Two 28 I/O modules, positioned as standard in the first two slots.

Note: For an IP20 protection rating, place protection covers in the empty slots. These covers, which are not supplied, should be ordered separately in lots of 10, quoting the reference TSX RKA 01.

Characteristics of the TSX 37-08

Table of characteristics

Technical characteristics:

PLCs		TSX 37-08
Functions	No. of local discrete inputs/outputs	120
	No. of remote discrete inputs/outputs (TSX 07 and AS-i)	0
	No. of integrated UNI-TELWAY connections	1
	Communication modules	0
	Real-time clock	No
	Integrated analog	No
	Integrated upcounting -500Hz (on discrete input) -10kHz	Yes No
Memory	Savable internal RAM program (100% Boolean) data constant	9 Kwords 2/1.6 Kinst. (1) 1 Kword (2) 128 words (2)
	Integrated Flash Eprom	10 Kwords (3)
Memory extension	-	No
Execution time by Kinst.(5)	RAM (100% Boolean)	0.3ms
System overhead		1.9 ms
Application structure	Master task	1
	Fast task	1
	Processing on events	1 to 8
Pre-defined function blocks	Timers	64 (4)
	Counters	32

(1) The first value corresponds to a program in List. The 2nd value corresponds to a program in Ladder language.

(2) Size by default; can be extended at the expense of the application program size.

(3) 9 Kwords available for the backup application + 1 Kword for the %MW backup.

(4) A maximum of 16 timers, with a 10ms time base.

(5) Inoperative overhead and I/O management.

Display panel on TSX 37-08

General points

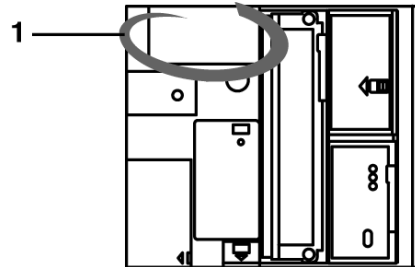
The display block **1** centralizes all the information needed for diagnostics and for maintenance of the PLC and its modules. For this, it provides the following:

- 8 LED status displays giving PLC operating information (RUN, TER, I/O, ERR and BAT LEDs) and the current display mode (R, I/O, WRD and DIAG LEDs),
- from a block of 96 LED displays making it possible to display:
 - **local inputs/outputs in display mode** (BASE LED on): the state of all discrete inputs and outputs of the PLC,
 - **in diagnostic mode** (DIAG LEDs on):
 - "module" errors (all LEDs associated with the module flash slowly),
 - "channel" errors (LED display associated with the channel),
 - **in object display mode** (WRD LED on): the contents of a maximum of 16 %MWi, %SWi, or %KWi words (these words are displayed in binary or hexadecimal), the state of a group of 64 %Mi, %Si or %Xi bits,
- a push button which enables the information sequence to be viewed and to change the display mode.

Note: For further information concerning the display block, please refer to the *Display panel*, p. 501

Illustration

display panel:



TSX 37-10PLC

6

At a Glance

Aim of this Chapter

This chapter is about the TSX 37-10 PLC, its physical description and its technical characteristics.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Introduction to the TSX 37 -10 PLC base	62
TSX 37-10: description	64
Characteristics of the TSX 37-10	65
TSX 37-10 display block	66

Introduction to the TSX 37 -10 PLC base

General points

A TSX 37-10 PLC base groups under one product reference:

- a rack comprising the supply to the base (24 VDC or 100-240 VAC), the processor, the dedicated memory, the backup memory in FLASH EPROM and two slots for the modules,
- a discrete module of 28 or 64 standard size inputs/outputs in the first slot in the rack.

Table of the different types of TSX 37 10 base:

Base	Supply	Built-in input/output module
TSX3710028AR1	100240V AC	TSXDMZ28AR: 16 115V AC inputs, 12 relay outputs
TSX3710028DR1	100240V AC	TSX DMZ 28DR: 16 24V DC inputs, 12 relay outputs
TSX3710128DR1	24V DC	TSX DMZ 28DR: 16 24V DC inputs, 12 relay outputs
TSX3710128DT1	24V DC	TSXDMZ28DT: 16 24V DC inputs, 12 static outputs
TSX3710128DTK1	24V DC	TSXDMZ28DTK: 16 24V DC inputs, 12 static outputs
TSX3710164DTK1	24V DC	TSX DMZ 64 DTK: 32 24V DC inputs, 32 static outputs

Using the TSX RKY 02 mini extension rack means 2 extra slots can be added to the PLC. The package allows the use of 3 slots which can each be equipped with a standard format module or two half-format modules.

Catalog data

The following table gives the **maximum** configurations of the TSX 37 10 PLCs:

Discrete inputs/ outputs	Maximum number of discrete I/Os	in the base	128
		in the base and extension	192
		in the base + extension + remote (I/O TSX 07)	268
		in the base + extension + remote (AS-i bus)	408
		remote (4 TSX 07)	96
		remote on the AS-i bus (124I + 124O)	248
	Maximum number of modules	28 or 32 discrete inputs/outputs	4
		64 discrete inputs/outputs (high density)	2
		input/output mismatch (for TSX 07 I/O or AS-i bus)	1
Analog	Number of analog input/output modules		2
	No. of analog inputs		16
	No. of analog outputs		8
Counting	No. of 500Hz counting channels on discrete inputs		2
	No. of counting modules (in the PLC)(*)		2
	No. of 40kHz or 500kHz counting channels		4

(*) The counting modules are only to be installed in the basic PLC model.

A TSX 37-10 configuration can receive 2 analog modules and 2 counting modules.

RS 485 terminal port

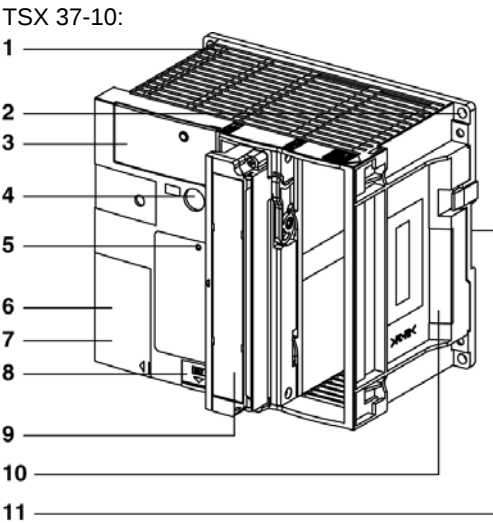
With an 8-point mini-DIN size RS 485 terminal port, it is possible to:

- connect an FTX type terminal or a compatible PC, a printer,
- and to connect the PLC to the UNI-TELWAY or Modbus busses. For this, it proposes, by default, the UNI-TELWAY 96 Baud master communication mode and, by configuration (see (Communication incorporated in the bases):
 - the UNI-TELWAY slave mode or,
 - ASCII character mode or,
 - the Modbus protocol.

Note: The terminal and PLC can both be connected to the UNI-TELWAY bus using the TSX P ACC 01 insulating device. This should be used when the distance between the UNI-TELWAY connection equipment is greater than 10 meters (see (TSX unit P ACC 01)).

TSX 37-10: description

Illustration



Number table

function description of the numbers:

Number	Description
1	2 slot rack comprising the supply, the processor and its memory.
2	Fixing hole for the PLC.
3	Centralized display panel.
4	Terminal port (TER).
5	RESET button.
6	Access door to the supply terminals.
7	Stack change information label.
8	Access door to the optional stack and data protection switch for the operating system.
9	A 28 or 64 I/O module whose basic position is in the first slot.
10	Access cover to the connection connector of the mini extension rack.
11	Mounting device on DIN mounting rail.

Note: For an IP20 protection index, place the protection covers in the empty slots. These covers, which are not supplied, should be ordered separately in batches, quoting the reference TSX RKA 01.

Characteristics of the TSX 37-10

Table of characteristics

Technical characteristics:

PLCs		TSX 37-10
Functions	No. of discrete input/output TSX 07 local + remote local + remote on the AS-i bus	268 408
	No. of connections Built-in UNI-TELWAY	1
	Communication modules	0
	Real-time clock	Yes
	Integrated analog	No
	Integrated upcounting On discrete inputs (-500 Hz) -10 kHz	Yes No
Internal memory	Savable internal RAM program (100% Boolean) (1) data (in internal RAM) constant	14 Kwords 4.7/2.7 Kinst. 1 Kword (2) 128 words (2)
	Built-in Flash Eprom	16 Kwords (3)
Memory extension	PCMCIA card	No
Execution time by Kinst.(5)	RAM (100% Boolean) PCMCIA (100% Boolean)	0.3ms -
System overhead		1.9 ms
Application structure	Master task	1
	Fast task	1
	Task on events	1 to 8
Pre-defined function blocks	Timers	64 (4)
	Counters	32

(1) The first value corresponds to a program in List. The 2nd value corresponds to a program in Ladder language.

(2) Size by default; can be extended at the expense of the application program size.

(3) 15 Kwords available for the backup application + 1 Kword for the %MW backup.

(4) A maximum of 16 timers, with a 10ms time base.

(5) Inoperative overhead and I/O management.

TSX 37-10 display block

General points

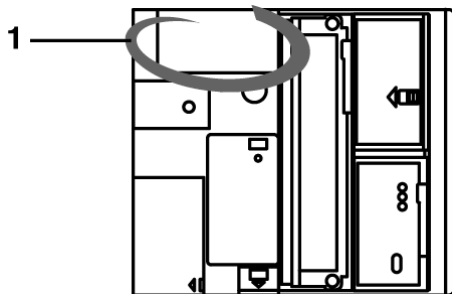
The display block **1** centralizes all the information needed for diagnostics and for maintenance of the PLC and its modules. For this, it provides the following:

- 8 status LEDs giving PLC operating information (the RUN, TER, I/O, ERR and BAT LEDs) and current display mode (the R I/O, WRD and DIAG LEDs),
- from a block of 96 LED displays making it possible to display:
 - **local inputs/outputs in display mode** (BASE or EXT LED on) : the status of all discrete PLC inputs and outputs and the mini extension rack,
 - **remote inputs/outputs in display mode** (R I/O LED lit) : the discrete input/output status of each slave present on the AS-i bus,
 - **in diagnostic mode** (DIAG LEDs on):
 - "module" errors (all LEDs associated with the module flash slowly),
 - or
 - "channel" errors (LED display associated with the channel),
 for remote inputs/outputs on the AS-i bus : the state of each slave (slaves with error flashing),
 - **in object display mode** (WRD LED on): the contents of a maximum of 16 %MWi, %SWi or %KWi words (displayed in binary or hexadecimal mode), the status of a group of 64 %Mi, %Si or %Xi bits, the status of the TSX 07 module input and output bits used as discrete remote inputs/outputs,
- a push button which enables the information sequence to be viewed and to change the display mode.

Note: For further information concerning the display block, please refer to the *Display panel*, p. 501

Illustration

display panel:



TSX 37-21 and TSX 37-22 PLCs

7

At a Glance

Aim of this Chapter

This chapter is about the TSX 37-21 and TSX 37-22 PLCs, their physical description and their technical characteristics.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Introduction to the TSX 37-21 and TSX 37-22 PLC bases	68
TSX 37-21 and TSX 37-22: description	71
Characteristics of the TSX 37-21 and the TSX 37-22	73
TSX 37-21 and TSX 37-22 display panel	74

Introduction to the TSX 37-21 and TSX 37-22 PLC bases

General points

The TSX 37-21 and TSX 37-22 PLC bases consist of a rack containing the 24V DC supply (TSX 37-21 101 and TSX 37-22 101) or 100-240V AC supply (TSX 37-21 and TSX 37-22 001), the processor, the dedicated memory, the backup memory and 3 module slots.

Using the TSX RKZ 02 mini extension rack means 2 extra slots can be added to the PLC. The group makes 5 slots are available which can each be equipped with a standard size module or two half-size modules, except for the first slot which can only receive standard size modules.

A memory extension card and a communication module can be received using two PCMCIA size slots.

Analog and built-in counting functions can also be accessed using 3 connectors provided by the TSX 37-22 PLC.

Catalog data

The following table gives the **maximum** configurations for the TSX 37-21 and TSX 37-22 PLCs (maximum number of modules and inputs/outputs):

PLC	TSX		37-21	37-22
I/O	Maximum number of discrete I/Os	in the base	192	192
		in the base+extension	256	256
		in the base+extension+remotes (TSX 07)	332	332
		in the base+extension+remotes (AS-i bus)	472	472
		remote (4 TSX 07)	96	96
		remote on the AS-i bus (124I+124O)	248	248
	Maximum number of modules	28 or 32 discrete inputs/outputs	5	5
		64 discrete inputs/outputs (high density)	3	3
		input/output mismatch (for TSX 07 I/O or AS-i bus)	1	1
Analog	Maximum number of analog input/output modules		4	4
	Maximum number of analog inputs in the rack		32	32
	Maximum number of analog outputs in the rack		16	16
	Maximum number of built-in analog inputs in the rack		-	8
	Maximum number of built-in analog output		-	1
Counting	Maximum number of 500Hz counting channels on discrete inputs		2	2
	Maximum number of counting modules (in the PLC) (1)		4	4
	Maximum number of 40kHz and/or 500kHz counting channels		7	7
	Maximum number of built-in counting channels (10 kHz)		-	2
Communication	Number of communication modules (2)		1	1

(1) The counting modules can only be installed in the basic PLC model.

A TSX 37-21/22 configuration can receive 4 analog modules and 4 counting modules.

(2) PCMCIA communication card (FIPWAY, FIPIO Agent, Modbus+ Modem).

**RS 485 terminal
port**

Using two RS 485 terminal ports in 8 point mini-DIN size, it is possible to connect:

- TER: an FTX type terminal or compatible PC, or to connect the PLC to the UNI-TELWAY bus or Modbus via the TSX P ACC 01 insulating device,
- AUX: an operator dialog terminal, or a printer.

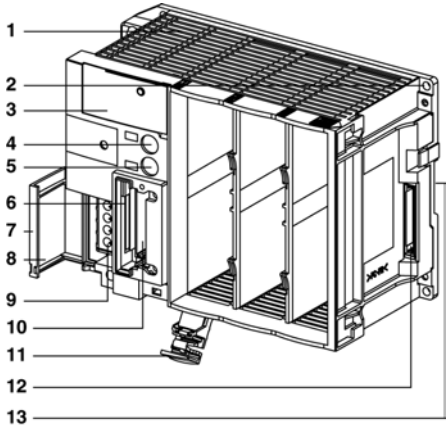
For this, the terminal port and dialog operator port propose by default the UNI-TELWAY master 96 Baud communication mode and, by configuration (see (Communication incorporated in the bases):

- the UNI-TELWAY slave mode or,
 - ASCII character mode or,
 - the Modbus protocol.
-

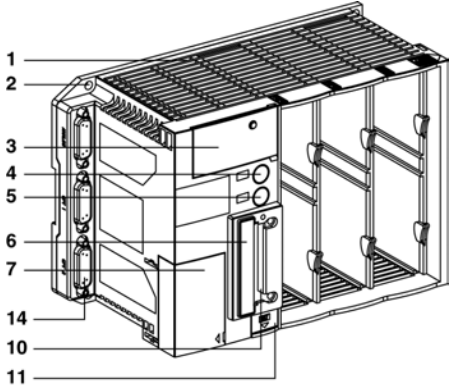
TSX 37-21 and TSX 37-22: description

Illustration

TSX 37-21 and TSX 37-22:



TSX 37-21



TSX 37-22

Address table

Description for each address:

Address	Description
1	3 slot rack containing the supply, the processor and its base memory.
2	PLC fixing hole.
3	Centralized display block.
4	Terminal port TER.
5	AUX operator dialog port.
6	Slot for a memory extension card. If there is no card, this slot is equipped with a cover which must be left in place as removing it will cause: • the PLC to stop, • the terminal port to be inactive.
7	Access door to the supply terminals.
8	Battery change information label.
9	Supply terminals.
10	Slot for a communication module..
11	Access door to the optional battery and to the operating system data protection switch.
12	Mini extension rack connector, fully protected by a removable cover.
13	Mounting device on DIN mounting rail.
14	Connectors for built-in analog and counting functions.

Note: For an IP20 protection rating, place protection covers in the empty slots. These covers, which are not supplied, should be ordered separately in lots of 10, quoting the reference TSX RKA 01.

Characteristics of the TSX 37-21 and the TSX 37-22

Table of characteristics

Technical characteristics:

PLCs		TSX 37-21	TSX 37-22
Functions	No. of discrete input/output TSX 07 local + remote local + remote on the AS-i bus	332 472	332 472
	No. of connections Built-in UNI-TELWAY	1	1
	Communication modules	1	1
	Real-time clock	Yes	Yes
	Integrated analog	No	Yes
	Integrated upcounting -500 Hz -10 kHz	Yes No	Yes Yes
Internal memory	Savable internal RAM	20 Kwords	
	program (100% Boolean) (1)	7.9/4.5 Kinst.	
	data (in internal RAM)	2 Kwords (2)	
	constant	128 words (2)	128 words (2)
	Built-in Flash Eprom	16 Kwords (3)	
Memory extension	PCMCIA card	32 Kwords	
	PCMCIA card	64 Kwords	
	PCMCIA card	128 Kwords	
Execution time by Kinst.(7)	RAM (100% Boolean)	0.15 ms	0.15 ms
	PCMCIA (100% Boolean)	0.225 ms	0.225 ms
System overhead		1.6 ms	2.3 ms
Application structure	Master task	1	1
	Fast task	1	1
	Task on events	1 to 16	1 to 16
Pre-defined function blocks	Timers	64 (6)	64 (6)
	Counters	32	32

(1) The first value corresponds to a program in List. The 2nd value corresponds to a program in Ladder language.

(2) Size by default; can be extended at the expense of the application program size.

(3) 15 Kwords available for the backup application + 1 Kword for the %MW backup.

(4) Can be extended to 24.5 Kwords.

(5) Can be extended to 32 Kwords.

(6) A maximum of 16 timers, with a 10ms time base.

(7) Inoperative overhead and I/O management.

TSX 37-21 and TSX 37-22 display panel

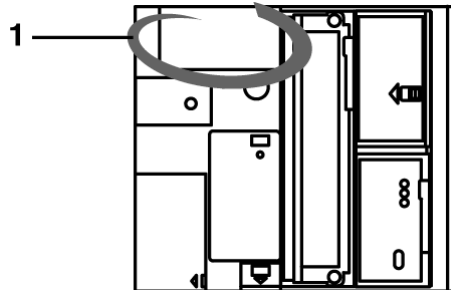
General points

The display block **1** centralizes all the information needed for diagnostics and for maintenance of the PLC and its modules. For this, it provides the following:

- 8 status LEDs giving PLC operating information (the RUN, TER, I/O, ERR and BAT LEDs) and current display mode (the R I/O, WRD and DIAG LEDs),
- from a block of 96 LED displays making it possible to display:
 - **local inputs/outputs in display mode** (BASE or EXT LED on): the status of all discrete PLC inputs and outputs and the mini extension rack,
 - **remote inputs/outputs in display mode** (R I/O LED lit): the discrete input/output status of each slave present on the AS-i bus,
 - **in diagnostic mode** (DIAG LEDs on):
 - "module" errors (all LEDs associated with the module flash slowly),
 - or
 - "channel" errors (LED display associated with the channel),
 for remote inputs/outputs on the AS-i bus: the state of each slave (slaves with error flashing),
 - **in object display mode** (WRD LED on): the contents of a maximum of 16 %MWi, %SWi or %KWi words (displayed in binary or hexadecimal mode), the status of a group of 64 %Mi, %Si or %Xi bits, the status of the TSX 07 module input and output bits used as discrete remote inputs/outputs,
- a push button which enables the information sequence to be viewed and to change the display mode.

Illustration

display panel:



TSX 37 PLC supplies

8

At a Glance

Aim of this Chapter

This chapter is about the TSX 37 PLC base supplies.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Alternating current supplies	76
Direct current supply	77
Additional characteristics	78

Alternating current supplies

Characteristics

table of characteristics:

PLCs	TSX 37-05/08/10/21/22		
Primary	Nominal voltages		100...240 VAC
	Voltage limits		85-264 VAC
	Nominal frequencies		50-60 Hz
	Frequency limits		47-63 Hz
	Current absorbed		0.7 A to 100 V 0.3 A to 240 V
	Call current (2)		< 60 A
Secondary	+5 VDC	Nominal current (1)	2.8 A
		Peak current	3.2 A
	+24 V relay	Nominal current (1)	0.5 A
		Peak current	0.6 A
	+24V sensors (3)	Nominal current (1)	0.4 A
		Peak current	0.6 A
	Total power (4)	Nominal	24 W
		Peak	32 W
Insulation	Dielectric strength:	primary/ secondary	2500 V eff 50/60 Hz

(1) The nominal currents correspond to the consumption of 2/3 of the active inputs/ outputs simultaneously. The supply can nevertheless operate without cutting off peak power equivalent 100% of the active inputs/outputs simultaneously.

(2) This value means that the network should support a call current of 60 A. It should be taken into account when starting several devices simultaneously or for dimensioning protection devices.

(3) For an alternating supply, the 24 V sensor limits the configuration to 100 inputs on the base. Beyond this, an external supply must be used.

(4) The total power is not the sum of the power equivalent to the maximum yield of each of the outputs that it is possible to obtain simultaneously in one configuration. It is calculated for particular configurations, which correspond to optimum usage of the PLC.

Direct current supply

Characteristics

table of characteristics:

PLCs	TSX 37-10/21/22		
Primary	Nominal voltages		24 VDC
	Voltage limits (ripple included)		19-30 VDC 19-34 VDC (3)
	Peak to peak ripple		5% of U_n $f = 90$ Hz to 1 kHz
	Frequency limits		47-63 Hz
	Current absorbed		2 A
	Maximum call current (2)		< 60 A
Secondary	+5 VDC	Nominal current (1)	2.8 A
		Peak current	3.2 A
	Total power (4)	Nominal	16 W
		Peak	18 W
Insulation	Dielectric strength:	primary/ secondary	No insulation; the 0V and PE are internally coupled

(1) The nominal currents correspond to the consumption of 2/3 of the simultaneously active inputs/outputs. The supply can nevertheless operate without cutting off a peak power matching 100% of the simultaneously active inputs/outputs.

(2) This value means that the network should support a call current of 60 A. It should be taken into account when starting several devices simultaneously or for dimensioning of protection devices.

(3) 34 VDC for one hour, for a battery operated device with charger.

(4) The total power is not the sum of the power matching the maximum yield of each of the outputs that it is possible to obtain simultaneously in one configuration. It is calculated for particular configurations, which correspond to optimum usage of the PLC.

Additional characteristics

Supply protection

The supply provided by the TSX 37-05/08, TSX 37-10, TSX 37-21 and TSX 37-22 PLCs are all protected against overloading and short circuits.

A short circuit or overload on the 24 V sensor does not have any effect on the other voltages. The 24 V sensor reappears when the error disappears.

Service signals

During operation, a signal is generated when the PLC supply voltage exceeds the limits (Power Fail).

Programming terminal supply

The +5 VDC voltage, delivered by PLC to the terminal port, does not allow auto-supply of a programming terminal, but a pocket terminal with a very low power consumption (<200 mA).

At a Glance

Aim of this chapter

This chapter describes the memory on TSX 37.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Internal memory	80
PCMCIA memory extension cards on TSX 37-21/22 PLCs	81
Standard and Backup Memory Cards	83
Application + File Type Memory Cards	85

Internal memory

General points

The internal memory store of the TSX 37-05/08/10/21/22 PLCs is composed of two separate stores :

- An internal RAM memory (1), which is used by the application program and which has a capacity of :
 - 9 Kwords for a TSX 37-05/08 PLC
 - 14 Kwords for a TSX 37-10 PLC
 - 20 Kwords for a TSX 37-21/22 PLC.

Furthermore, in the case of a TSX 37-21/22 PLC, the application memory can be extended with a 32 or 64 Kword PCMCIA memory card, of the RAM or FLASH EPROM type.

- A FLASH EPROM memory of:
 - 10 Kwords on the TSX 37-05/08 PLCs,
 - 16 Kwords on the TSX 37-10/21/22 PLCs, which is a backup memory.

This memory is a backup memory:

 - of the application program (only 15 Kwords can be used as a backup for the application program on the TSX 37- 21/22 PLCs),
 - of the %MW internal words with a maximum of 1000 internal words (store reserved for 1 Kword).

(1) The internal RAM memory is backed up by an optional 3.6V battery with an autonomy of 2 years (see *Inserting/changing the battery*, p. 113).

Note: In some cases, (configuration error, application change), it may be useful to totally erase the contents of the internal RAM or FLASH EPROM of the PLC. For this, carry out the PLC power-up keeping the DIAG button pressed during the running of the autotests (a minimum of 10 seconds).

PCMCIA memory extension cards on TSX 37-21/22 PLCs

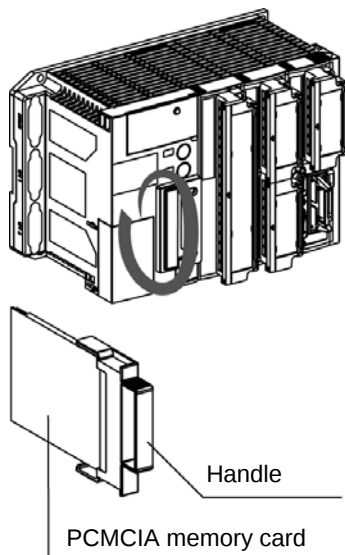
General points

The slot on the front panel of the PLC, which is protected by a cover, is for the insertion of an optional memory card of the PCMCIA type 1 format. This card extends the internal memory of the processor to store the application program and its constants.

Note: The protective cover must be removed before the PCMCIA card can be inserted.

Illustration

PCMCIA card and TSX 37:



Handling PCMCIA memory cards when switched on

A PCMCIA memory card can be inserted or removed when switched on.. So that it is operational, the memory card should be equipped with a handle, the absence of which disables the starting of the processor (processor failed, led ERR lit).

Note: If the program contained in the PCMCIA memory card includes the RUN AUTO option, the processor will automatically restart in RUN after the card is inserted.

Protection of the application

PCMCIA cards are equipped with a lockout system which forbids write access (loading of a new program)

This protection comes in addition to the software protection (see PL7 online help) which forbids read access to the program.

Standard and Backup Memory Cards

Standard Memory Cards

There are various types of standard memory cards:

- **Saved RAM memory extension cards:**
used particularly when generating and debugging an application program. They are used for all application transfer and modification services when online. The memory is saved by a removable battery built into the memory card.
- **FLASH EPROM memory extension card:**
used when the application program debugging has finished. It allows only a global transfer of the application and avoids the problems associated with battery back-ups.
- **BACKUP memory card:**
When previously loaded with the application program, this card can be used to re-load the application program into the processor's internal RAM memory without the need to use a programming terminal.
This card can only be used when the application is in the processor's internal RAM memory and if the entire size (program + constants) is less than 15 Kwords.

	WARNING
	Use of the write protection switch
	It is essential that any modification of the position of the PCMCIA card write protection switch be performed when the controller is powered down. Failure to follow these instructions can result in death, serious injury, or equipment damage.

**Product
References for
Standard and
Backup
Extension
Memory Cards**

Table of References:

References	Type/Capacity	PLC compatibility	
		TSX 37-05 TSX 37-08 TSX 37-10	TSX 37-21 TSX 37-22
TSX MRP P 128K (1) TSX MRP 032P	RAM/32 K16	No	Yes
TSX MRPP 224K (1) TSX MRP 064P	RAM/64 K16	No	Yes
TSX MRP C 448K (1) TSX MRP 0128P	RAM/128 K16	No	Yes
TSX MFP P 128K (1) TSX MFP 032P	Flash Eprom/32 K16	No	Yes
TSX MFP P 224K (1) TSX MFP 064P	Flash Eprom/64 K16	No	Yes
TSX MFP 064 P2 TSX MFP 064P	Flash Eprom/64 K16	No	Yes (2)
TSX MFP P 384K (1) TSX MFP 0128P	Flash Eprom/128 K16	No	Yes
TSX MFP 0128 P2 TSX MFP 0128P	Flash Eprom/128 K16	No	Yes (2)
TSX MFP B 096K (1) TSX MFP BA032P	BACKUP/32 K 16	No	Yes
Legend			
(1) TSX M... ..K new references to replace the old TSX M•P ... type references.			
(2) The application found on the TSX MFP* ****2 card can only be read if the card is in a processor version < 6.2. If the card is in a processor version ≥ 6.2, the card application is available in read and write mode.			

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

Application + File Type Memory Cards

General

In addition to the conventional application storage area, these memory cards also have a file area for archiving the data by program.

Application examples:

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

There are two types of memory card:

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

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

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

**Application + File
Type Memory
Card References**

Reference table:

References	Type/capacity		PLC compatibility	
	Application zone	File zone (RAM type)	TSX 37-05 TSX 37-08 TSX 37-10	TSX 37-21 TSX 37-22
TSX MRP C 448K TSX MRP 232P	RAM/32 K 16	128 K 16	No	Yes
TSX MRP C 384K TSX MRP 264P	RAM/64 K 16	128 K 16	No	Yes
TSX MRP C 768K TSX MRP 2128P	RAM/128 K 16	128 K 16	No	Yes
TSX MCP C 224K TSX MRP 232P	Flash Eprom/32 K 16	128 K 16	No	Yes
TSX MCP C 224K TSX MRP 264P	Flash Eprom/64 K 16	128 K 16	No	Yes
Legend				
TSX M•PC ••K new references to replace the old TSX M•P •• type references.				

Note: Memory capacity: K16=Kwords (16 bit words).

TSX 37 PLC performance

10

Performances

Acquisition time for the discrete inputs (in the base or in the extension)

data table:

Number of inputs	0	16	32	48	60	72	84	96
Acquisition time for inputs without errors (microseconds)	77	176	270	356	448	539	623	708
Acquisition time for an input (microseconds)		11	8.44	7.42	7.47	7.49	7.42	7.36

Update time for the discrete outputs (in the base or in the extension)

data table:

Number of outputs	0	12	24	36	44	52	60	68
Update time for the outputs (microseconds)	42	189	314	454	573	691	825	1031
Update time for one output (microseconds)		15.75	13.08	12.61	13.02	13.29	13.75	15.16

**Event
processing time:
SRT**

This is the time between the occurrence of an event (for example rising edge on an EVT input of the module 1, presetting on a counting channel of the TSX 37-22 base or of a TSX CTZ module, etc.) and the assignment of a discrete output.

SRT = 1.5 ms (SRT = Software Response Time)

Note: Inputs 0 to 3 of module 1 should be configured with a minimum filtering value, so that they can be used in EVT inputs.

Cycle time for an application.

To calculate the overall cycle time of a discrete application, the following must be added:

- the system overhead corresponding to the type of PLC,
- the program execution time for the number of kilo instructions,
- the acquisition time for the discrete inputs,
- the update time for the discrete outputs.

For details of all these times, refer to (Instruction times).

Note: To find out the true current duration of an application, with the help of the debug processor screen, you must subtract from the displayed value a value of 2 ms, corresponding to the time taken by the PLC to process information requested by the console or the network module.
The maximum duration indicated in this screen can have a high value, if a PCMCIA format communication module is present in the PLC.

Commissioning standards and conditions

11

At a Glance

Aim of this Chapter

This chapter is about the Micro PLCs commissioning standards and conditions .

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Standards and certifications	90
Operating conditions and environmental recommendations	91
Protection treatment for TSX 37 Micro PLCs	92

Standards and certifications

General points

The TSX 37 PLCs were designed to comply with the main national and international standards for industrial process control electronic equipment:

- programmable PLCs: specific requirements: functional characteristics, immunity, strength, safety, etc.
IEC 61131-2, CSA 22.2 No.142, UL 508,
 - merchant navy requirements of the major international bodies:
ABS, BV, DNV, GL, LROS, RINA, RRS, CCS, etc.
 - compliance with European Directives:
Low Voltage: 73/23/EEC amendment 93/68/EEC
Electromagnetic Compatibility: 89/336/EEC amendments 92/31/EEC and 93/68/EEC,
 - electric qualities and self-extinguishability of insulating materials:
UL 746C, UL 94, etc.
 - hazardous locations Cl1 Div2 CSA 22.2 No.213:
"THIS EQUIPMENT IS SUITABLE FOR USE IN CLASS I, DIVISION 2, GROUPS A, B, C AND D ON NON-HAZARDOUS LOCATIONS ONLY".
WARNING: "EXPLOSION HAZARD - DO NOT DISCONNECT WHILE CIRCUIT IS LIVE UNLESS AREA IS KNOWN TO BE NON-HAZARDOUS".
-

Operating conditions and environmental recommendations

Description

Temperature, humidity, altitude:

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

Power supply voltages:

Voltages	nominal	24 VDC	100..240 VAC
	limit	19..30 VAC (1)	90..264 VAC
Frequencies	nominal		50/60 Hz
	limit		47/63 Hz

(1) 34 VDC for one hour per 24 hours, for a battery device with charger.

Protection treatment for TSX 37 Micro PLCs

General points

TSX 37 PLCs meet all "TC" treatment requirements (1).

For installations in industrial production workshops or in an atmosphere corresponding to "TH" treatment (2), TSX 37 PLCs must be embedded in IP54 minimal protection envelopes as recommended in standards IEC 60664 and NF C 20 040.

The TSX 37 PLCs themselves display an IP20 protection index (3).

They can therefore be installed without an envelope in restricted access locations not exceeding pollution degree 2 (control rooms containing no dust-producing machines or activities).

(1) "TC" treatment: treatment for all climates.

(2) "TH" treatment: treatment for warm and humid atmospheres.

(3) In the event that position is not occupied by a module, a TSX RKA 01 protection cover needs to be mounted.

Human and material safety

Human and material safety standards (1):

EC	Test Designation	Standards	Levels	
yes	Dielectric strength and Insulation resistance *	IEC61131-2 UL 508 CSA 22-2 No.142 IEC60950	24V supply 100-220V supply < 48V Discrete I/Os > 48V Discrete I/Os R> 10MΩ	1500V RMS 2000V RMS 500V RMS 2000V RMS
yes	Ground continuity	IEC61131-2 UL 508 CSA 22-2 No.142	< 0.1Ω / 30A / 2μV	
yes	Leakage current	CSA 22-2 No.142 IEC60950	Fixed devices < 3.5mA	
yes	Protection via envelopes	IEC61131-2 CSA 22-2 No.142 IEC60950	IP20 with RKA01 covers	
no	Impact Resistance	CSA 22-2 No.142 IEC60950	Drop / 1.3m / 500g Sphere	

(1) the devices must be installed and wired according to the directions in the TSX DG KBLF manual.

**Resistance of the
devices to power
supply L.F.
turbulence**

Standards concerning the resistance of the devices to power supply L.F turbulence
(1):

EC	Test Designation	Standards	Levels	
yes	Voltage and frequency Variation	EN 50082-1	Un +/- 15% / Fn +/- 5% Un +/-20% / Fn +/-10%	30 min x 2 15s x 2
yes	DC voltage variation	EN 50082-1	0.85Un - 1.2Un + 5% ripple maximum	30 + 30 min
yes	Harmonic 3	IEC 61131-2	10% Un 0° / 5min - 180° / 5min	
yes	Momentary Interruptions	IEC 61131-2	AC DC	10ms 1ms
yes	Voltage peaks and troughs	IEC 61131-2	Un-0-Un; Un/60s Un-0-Un; Un/5s Un-0.9Ud; Un/60s	3 cycles separated by 10s 3 cycles separated by 1 to 5s 3 cycles separated by 1 to 5s

(1) the devices must be installed and wired according to the directions in the TSX DG KBLF manual.

**Resistance to
H.F. turbulence**

Standards concerning L.F turbulence (1):

EC	Test Designation	Standards	Levels	
yes	Absorbed oscillatory wave	IEC 61131-2 IEC 61000-4-12	AC/DC Discrete I/O $\geq 24\zeta$	1kV MS 1kV MS
yes	Fast transients (bursts)	EN 50082-1 IEC 61000-4-4	AC/DC supply Discrete I/O $> 48\zeta$ other ports	2kV MF / MC 2kV MC 1kV MC
no	Hybrid shockwave	IEC 61000-4-5	AC/DC supply Discrete AC I/Os Discrete DC I/Os Shielded Cable	2kV MF / 1kV MS 2kV MF / 1kV MS 2kV MF / 0.5kV MS 1kV MC
yes	Electrostatic Discharge	IEC 61131-2 IEC 61000-4-2	6kV contact 8kV air	
yes	Electromagnetic Field	EN 50082-2 IEC 61000-4-3	10V/m from 27MHz to 1GHz Sinusoidal Modulation Amplitude 80% / 1kHz	
yes	Conduit Turbulence	EN 50082-2 IEC 61000-4-6	3V from 0.15MHz to 80MHz Sinusoidal Modulation Amplitude 80% / 1kHz	

(1) the devices must be installed and wired according to the directions in the TSX DG KBLF manual.

**Electromagnetic
emissions**

Standards concerning electromagnetic emissions (1):

EC	Test Designation	Standards	Levels	
yes	Conduction Limits	EN55022/55011 EN50081-2	Class A 150kHz -500kHz 500kHz -30MHz	near-peak 79dB V average 66dB V near-peak 73dB V average 60dB V
yes	Radiation limits	EN55022/55011 EN50081-2	Class A 30MHz - 230MHz 230MHz - 1GHz	d = 10m near-peak 30dB V near-peak 37dB V

(1) the devices must be installed and wired according to the directions in the TSX DG KBLF manual.

Resistance to climatic variation

Standards concerning electromagnetic emissions (1):

EC	Test Designation	Standards	Levels
no	Dry heat	IEC 60068-2-2 Bd	60°C / 16h (E.O) 40°C / 16h (E.F)
no	Cold	IEC 60068-2-1 Ad	5°C / 16h
no	Continuous humid heat	IEC 60068-2-30 Ca	60°C / 93% Hr / 96h (E.O) 40°C / 93% Hr / 96h (E.F)
no	Cyclical humid heat	IEC 60068-2-30 Db	(55°C E.O / 40°C E.F) - 25°C / 93-95% Hr 2 cycles: 12 o' clock - 12h o' clock
no	Cyclical temperature variations	IEC 60068-2-14 Nb	0°C - 60°C / 5 cycles: 6 o'clock-6 o'clock (E.O.) 0°C - 40°C / 5 cycles: 6 o'clock-6 o'clock (E.F)
no	Temperature Rise	IEC 61131-2 UL 508 CSA 22-2 No.142	Ambient temperature: 60°C (70°C with ventilation TSXFANNxxP

(1) the devices must be installed and wired according to the directions in the TSX DG KBLF manual.

Resistance to mechanical constraints

Standards concerning electromagnetic emissions (1):

EC	Test Designation	Standards	Levels
no	Sinusoidal vibrations	IEC 60068-2-6 Fc	3 Hz - 100Hz / 1mm amplitude / 0.7g Endurance: fr / 90min / axis 3 Hz -150Hz / 1mm amplitude / 2g Endurance: 10 cycles (1 octave / min)
no	Half-sinus shocks	IEC 60068-2-27 Ea	15g x 11ms) 3 impacts / direction / axis

(1) the devices must be installed and wired according to the directions in the TSX DG KBLF manual.

Resistance to climatic variation

Standards concerning resistance to climatic variation (1):

EC	Test Designation	Standards	Levels
no	Dry heat whilst inoperative	IEC 60068-2-2 Bb	70°C / 96h
no	Cold whilst inoperative	IEC 60068-2-1 Ab	-25°C / 96h
no	Humid heat whilst inoperative	IEC 60068-2-30 dB	55°C; 25°C / 93%Hr; 95 %Hr 2 cycles: 12 o' clock - 12h o' clock
no	Thermal shocks whilst inoperative	IEC 60068-2-14 Na	-25°C; 25°C 2 cycles: 3 o'clock - 3 o'clock

(1) the devices must be installed and wired according to the directions in the TSX DG KBLF manual.

Resistance to mechanical constraints

Standards concerning resistance to mechanical constraints (1):

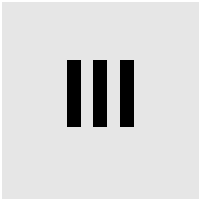
EC	Test Designation	Standards	Levels
no	Flat free drop	IEC 60068-2-32 Ed	10cm / 2 drops
no	Free drop from controlled position	IEC 60068-2-31 Ec	30° or 10cm / 2 drops
no	Random free drop (conditioned material)	IEC 60068-2-32 Option 1	0.5m / 5 drops

(1) the devices must be installed and wired according to the directions in the TSX DG KBLF manual.

Abbreviations used

- **EC**: tests required by EC directives,
- **Un**: nominal voltage,
- **Fn**: nominal frequency,
- **Ud**: detection level under power,
- **MS**: serial mode,
- **MC**: common mode,
- **MF**: wired mode,
- **E.O**: open device,
- **E.F**: closed device,
- **Hr**: relative humidity,
- **f.r**: resonance frequency.

TSX 37 PLC: Mounting



At a Glance

Aim of this Part This part describes the installation and connection of the TSX 37 PLCs.

What's in this Part? This part contains the following chapters:

Chapter	Chapter Name	Page
12	TSX 37 PLC: installation	99
13	TSX 37 PLC: connection	121
14	Ventilation module	139

At a Glance

Aim of this Chapter

This chapter describes the installation of the TSX 37 PLCs, their container and the different modules.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Rules of installation	100
Dimensions	102
PLC mounting/fixing	103
Mounting the base onto a DIN profile (or rail)	104
Mounting the PLC onto a board or panel	105
Procedure for assembling the extension with the base	106
Inserting a module	107
Removing a module	108
Mini extension rack	109
Channel addressing	111
Inserting/changing the battery	113
Mounting/removing the memory card	115
Changing the Battery on the PCMCIA Card	117
Screw tightening torque	119

Rules of installation

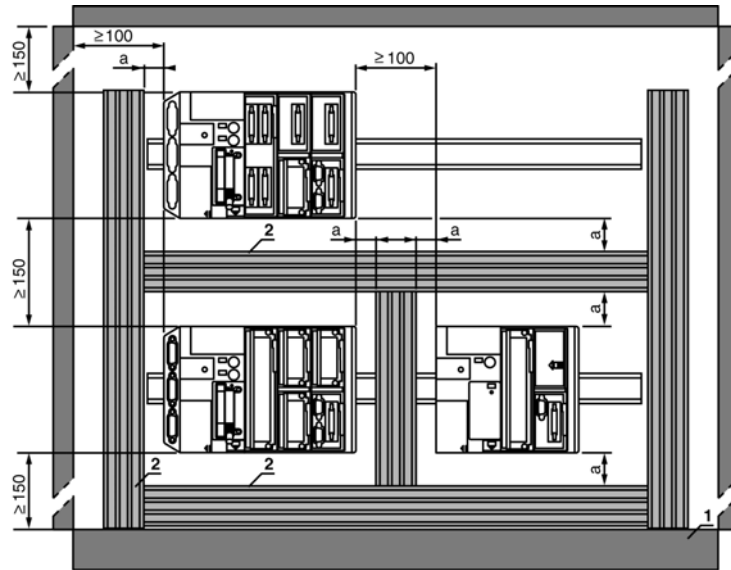
PLC arrangement

Certain rules must be respected for installing containers and inserting modules during the mounting of the TSX 37 PLCs:

- The PLCs should be air-cooled by natural convection. To facilitate their ventilation, they should be installed vertically with the ventilation louvers on the top. **Only the horizontal position is therefore authorized.**
 - If several PLCs are installed in the same rack, it is recommended that the following provisions be respected:
 - leave a space of at least 150 mm between two overlapped PLCs, to allow a passage for the wiring ducts and to facilitate air circulation,
 - it is advised to install heat generating devices (transformers, supply modules, power switches, etc) above the PLCs,
 - leave a space of at least 100mm at each side of a PLC (with or without extension) to allow a passage for the wiring and to facilitate air circulation,
 - if the internal RAM memory is backed up by a battery (optional), it will be necessary to provide sufficient space (≥ 50 mm) between the PLC and the duct, in order to allow the hatch to be opened and access to the battery.
-

Illustration

Principle diagram:

(1) ≥ 50 mm

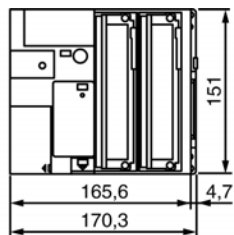
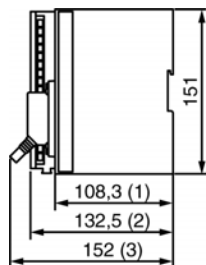
1 Installation or casing.

2 Trough or cable tray.

Note: In the case of the use of ventilation devices, see *Rules for installation of the racks with ventilation modules*, p. 148

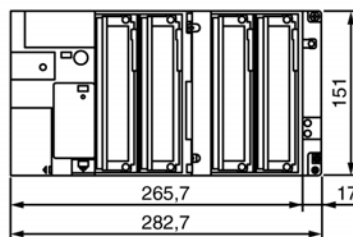
Dimensions

TSX 37-05 / TSX 37-10 PLCs



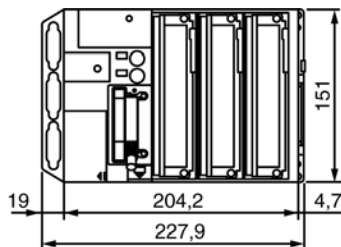
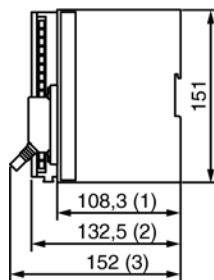
TSX 37-05 and TSX 37-10
without mini extension rack
TSX RKZ02

- (1) PLC empty
- (2) With screw terminal block.
- (3) With HE10 or SubD connectors



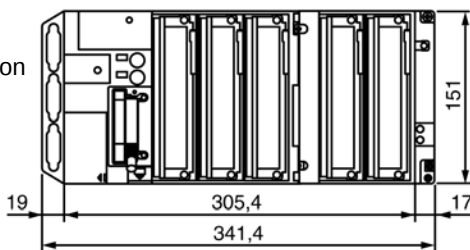
TSX 37-10
with mini rack
extension
TSX RKZ02

TSX 37-08/ TSX 37-21/ TSX 37-22 PLCs



TSX 37-08 and
TSX 37-21/22
without TSX RKZ02
mini-extension rack

TSX 37-21/22 with
TSX RKZ02 mini-extension
rack



- (1) PLC empty.
- (2) With screw terminal block.
- (3) With HE10 or SubD connector.

PLC mounting/fixing

General

The TSX 37 PLCs, with or without mini extension rack can be mounted on a DIN profile, a Telequick board or on a panel:

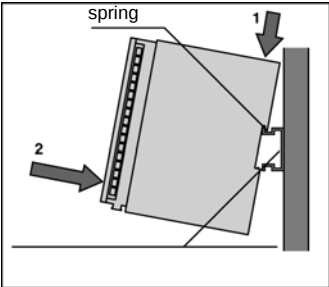
- the process of fixing onto a DIN profile requires no accessories,
- the process of fixing onto a Telequick board or on a panel is performed by 4 screws with a diameter of M4 for the base and 2 screws with a diameter of M4 for the mini extension rack, these 6 screws are not supplied. If mounting is difficult, from a mechanical point of view, it is preferable to fix the PLC onto a board or panel.

The installation rules (see *Rules of installation*, p. 100) are to be respected, whatever the type of mounting.

Mounting the base onto a DIN profile (or rail)

Procedure to be followed

Carry out the following steps:

Step	Description	Illustration
1	Position the PLC on the DIN profile as indicated by the diagram.	 DIN profile 35 mm large:AM1-DE200
2	Push down on the back part of the PLC (1), to compress the springs, then tip it backwards against the profile (2).	
3	Release the PLC in order to lock it.	

Note: This type of fitting does not comply with normal operating conditions in terms of resistance to vibrations (acceleration: 2g).

Dismounting the PLC from the DIN profile (rail)

To dismount the PLC, carry out the steps for the mounting process in reverse, i.e.:

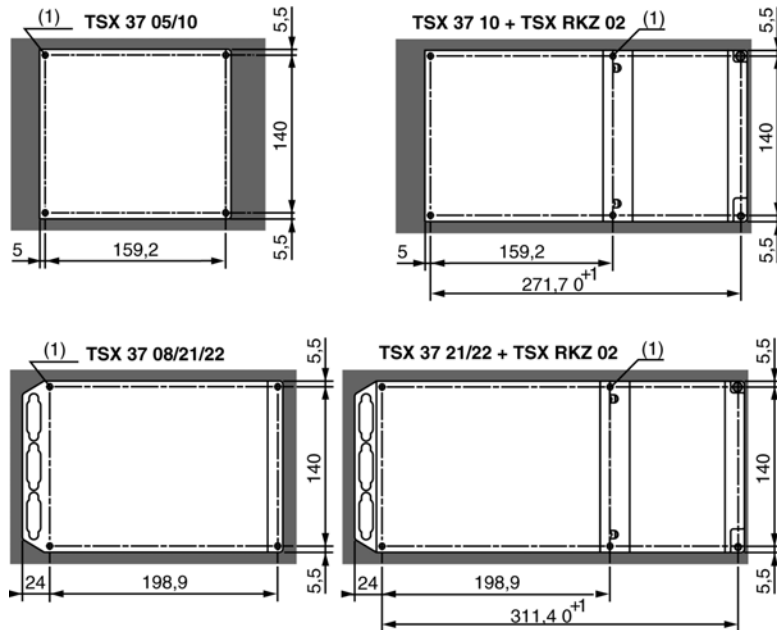
- push down on the back part of the PLC (1), to compress the springs, then tip it up towards the front to disengage it from the DIN profile (2).

Note: In order to guarantee the good working order of PLCs in a strict electromagnetic environment, it is necessary to mount the modules on metal supports which are correctly grounded.

Mounting the PLC onto a board or panel

Mounting distance

Illustration (side in millimeters):

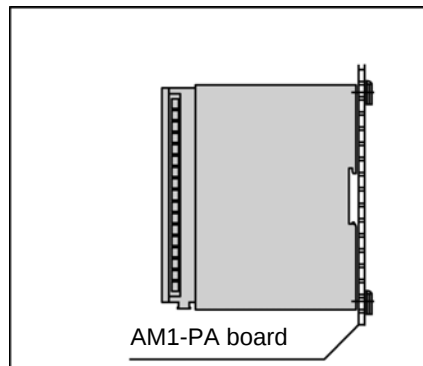


(1) The diameter of the fixing holes must be sufficient to take M4 screws.

Procedure for mounting the PLC onto a Telequick board

Fix the base with 4 screws with a diameter of 4, mounted in the fixing holes located in the elbows of the PLC (4 screws with M4x16AF1-VA416 captive washers and 4 M4 AF1-EA4 clip nuts).

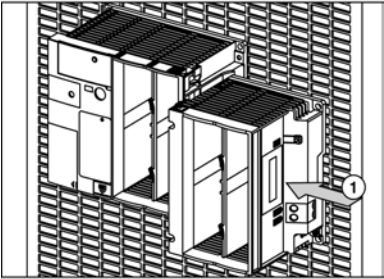
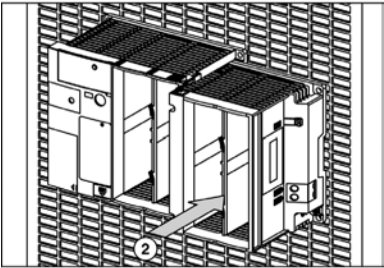
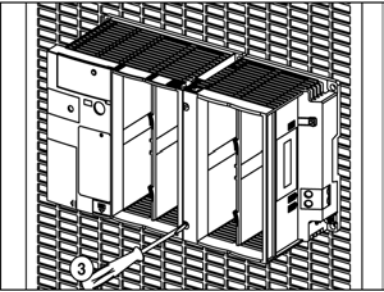
Illustration:



Procedure for assembling the extension with the base

Procedure

Carry out the following steps:

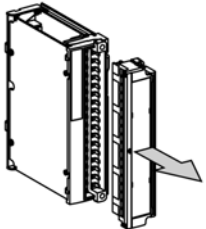
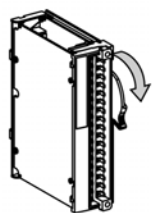
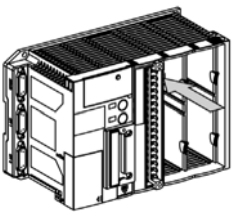
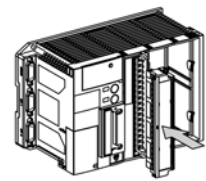
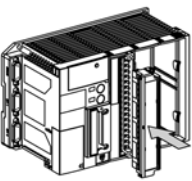
Step	Action	Illustration
1	Remove the access cover to the connection connector of the mini extension rack.	
2	Pin the mini extension rack against the PLC base, with an offset to the front of approx. 1 cm, then slide it to the back, in order to check the mechanical coupling and the connection of the 2 elements.	
3	Screw on the 2 mini extension rack captive screws, to fix to the base.	
4	If the PLC is mounted onto a board or panel and to improve vibration resistance, it is possible to fix the mini extension rack onto the board, in addition to operation (3). In order to do this, use 2 screws with a diameter of 4, mounted in the oblong fixing holes of the mini extension rack (2 screws with M4x16 AF1-VA416 captive washers and 2 M4 AF1-EA4 clip nuts).	

If the PLC is mounted on the DIN profile, the mini extension rack is not fixed to it, but is fixed to the base (with additional support from a lateral spring).

Inserting a module

Procedure to be followed

Carry out the following steps:

Step	Action	Illustration
1	If the module is equipped with a screw terminal block, remove it by successively unscrewing the 2 fixing screws. This operation progressively disconnects the terminal block. You are advised not to totally unscrew one screw and then the other, but alternate between the two.	
2	Set the latch to the "unlocked" position by switching it to the bottom of the module.	
3	Slide the module into its slot; this is helped by runners. Then push the front of the module in order to connect it.	
4	Switch the latch up, which locks the module.	
5	If the module is equipped with a screw terminal block, insert it, alternatively screw the 2 screws, which progressively connects the terminal block to the module.	

Note: In order to maximize individual safety in relation to equipment supplied with 100/120 V or 200/240 V, the life span of the equipment and to avoid disrupting input/output exchanges; mounting a module or terminal block should be performed under the following conditions:

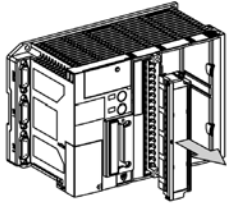
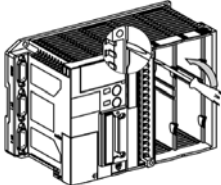
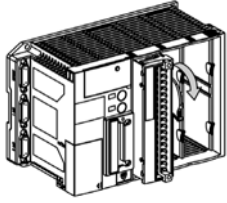
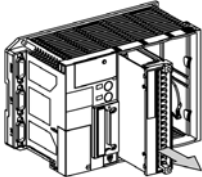
- PLC switched off for the module,
- sensor and pre-actuator voltage cut for the terminal block.

Removing a module

Procedure to be followed

Removing a module is performed following the same sequence as for inserting a module in a rack.

Carry out the following steps:

Step	Action	Illustration
1	If a module has a terminal block, remove it.	
2	Switch the latch down to disconnect the module. To do this, insert the tip of a flat screwdriver into the groove provided and lever towards the bottom to start unlocking the module.	
3	Finish levering the latch by hand, which disconnects the module.	
4	Slide the module out of its slot by pulling it forwards. Switch the latch up and if necessary fix the terminal block back onto the module.	

Note: In order to maximize individual safety in relation to equipment supplied with 100/120 V or 200/240 V, the life span of the equipment and to avoid disrupting input/output exchanges; dismantling a module or terminal block should be performed under the following conditions:

- PLC switched off for the module,
- sensor and pre-actuator voltage cut for the terminal block.

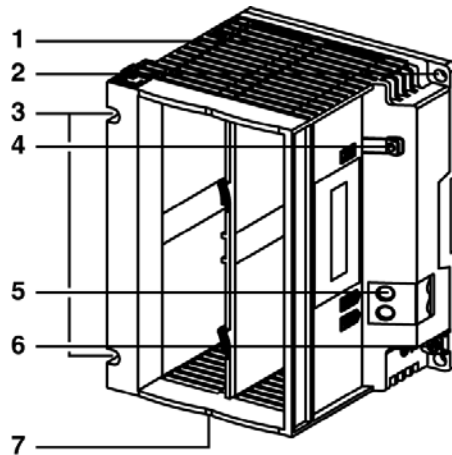
Mini extension rack

At a Glance

The mini extension rack TSX RKZ 02 allows two slots to be added to a TSX 37-10/21/22 PLC base; each of which can receive one module in standard format or two modules in semi-format.

Physical Description

The illustration below shows the mini extension rack.



Information
Table

description for each of the numbers:

Number	Description
1	Extension rack with 2 slots.
2	Fixing hole of the extension rack.
3	Fixing screw of the base extension.
4	LED showing that auxiliary voltage of 24 VDC is being supplied (for relay or analog modules).
5	Supply terminals protected by a removable cover.
6	Ground connection terminals.
7	PLC base connectors (backplane bus and ground continuity).

Note: For an IP20 protection rating, place the protection covers in the empty slots. These covers, which are not supplied, should be ordered separately in lots of 10, quoting the reference TSX RKA 01.

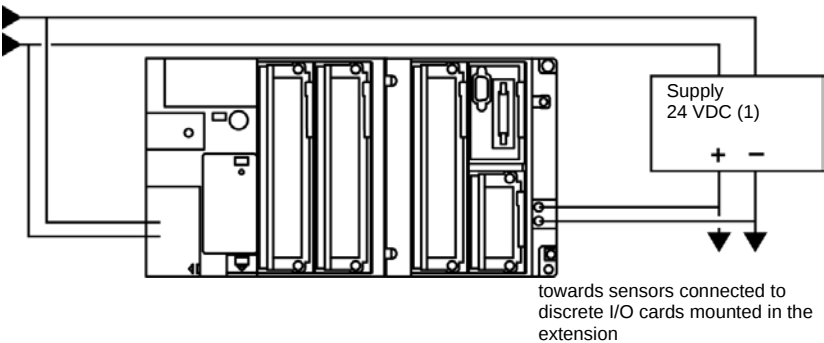
Supply

When the TSX 37-10/21/22 PLC is supplied from an alternating network, the 24 VDC is not supplied to the mini extension rack. In this case, if the relay or analog modules are present in the extension, a 24 VDC auxiliary supply **must** be connected to the supply terminals of the mini extension rack (refer to the paragraph "Supply connections").

The 24 V voltage supplied by the base allows the sensors to be supplied and possibly those in the extension, on the condition that the consumption balance does not exceed 400 mA. If this is not the case, also use a 24 VDC auxiliary supply.

Illustration

supply and extension:
Alternating network



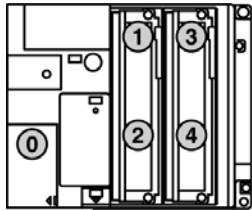
(1) TSX SUP• Supply Process, see *Process and AS-i supply*, p. 545.

Channel addressing

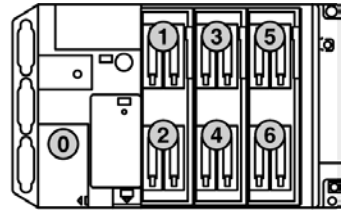
General

Channel addressing is **geographic**; i.e. it depends on the physical position of the module in the PLC or extension.

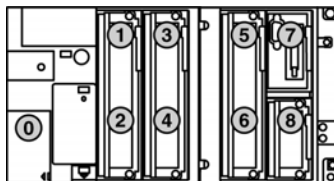
Illustration:



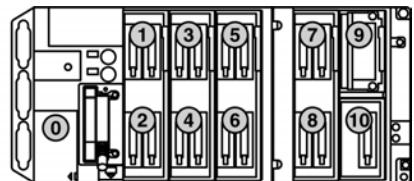
TSX 37-05



TSX 37-08



TSX 37-10 + TSX RKZ 02



TSX 37-21/22 + TSX RKY 02

Addressing principle

With a half size base modularity, full size modules are addressed as two half size modules placed on top of each other. In the remainder of this chapter, the term "position" (of the module) represents either a half size module, or the upper or lower part of a full size module.

Discrete input/output syntax is as follows:

%	I or Q	position	.	channel
Symbol	I = input Q = output	1 to 4 (37 05/10) 1 to 6 (37 08/21/22) 1 to 8 (37 10+RKZ02) 1 to 10 (37 2. + RKZ02)	Period	i

**Channel
addresses for
each type of
module**

address table:

Full size module		64 I/O	32E	32S	28 I/O
Channel Number: i	Odd	0 to 31	0 to 15	0 to 15	0 to 15
	Even position	0 to 31	0 to 15	0 to 15	0 to 11
Channel address	Odd	%lx.0 to %lx.31	%lx.0 to %lx.15	%Qx.0 to %Qx.15	%lx.0 to %lx.15
	Even position	%Q(x+1). 0 à %Q(x+1). 31	%l(x+1).0 to %l(x+1).1 5	%Q(x+1). 0 à %Q(x+1). 15	%Q(x+1). 0 à %Q(x+1). 11

half size table:

Half size modules		16 I/O	12 I	8 O	4 O
Channel Number: i	Odd or even position	i: 0 to 7 Q: 8 to 15	0 to 11	0 to 7	0 to 3
Channel address	Odd or even position	i: %lx.0 to %lx.7 Q: %Qx.8 to %Qx.15	%lx.0 to %lx.11	%Qx.0 to: %Qx.7	%Qx.0 to: %Qx.3

Inserting/changing the battery

Installing the battery

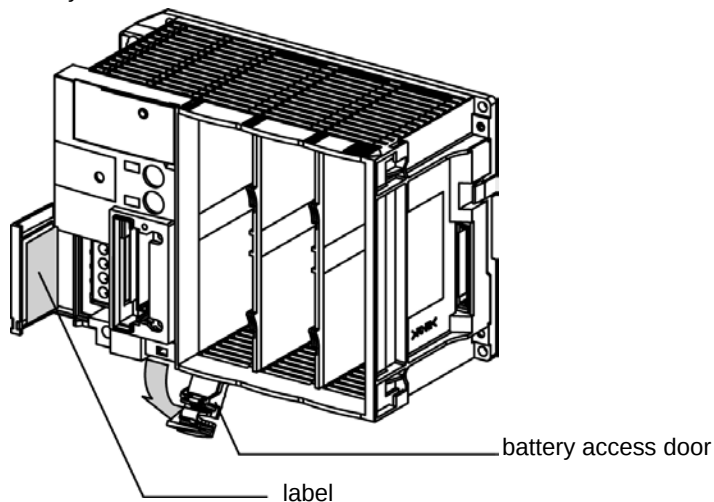
Carry out the following steps:

Steps	Action
1	Unlock the battery access door by pressing on the front panel. This opens the door downwards.
2	Place the battery in its slot, taking care to respect polarities as marked on the module.
3	Push the door back up to close and lock.

Note: This operation can be carried out when the PLC is on or off. If the power supply is cut off when the battery is being changed, the RAM is backed up for a maximum of 30 minutes.

Illustration

battery slot:



Changing the battery

The battery (TSX PLP 01), which backs up the internal RAM should be changed **every 2 years** or when the BAT light lights up (voltage supplied by a < 2.5 V battery).

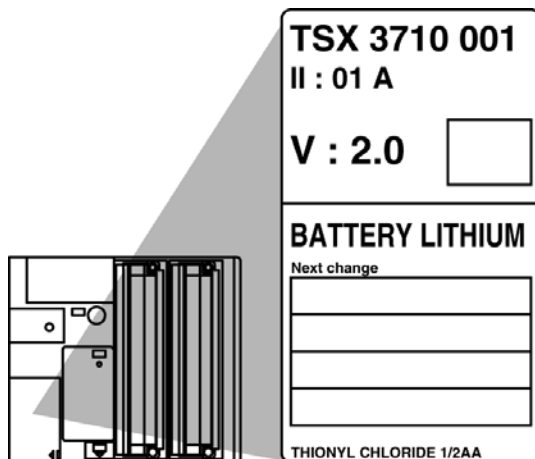
To do this, use the same sequence as for inserting a battery:

Step	Action
1	Push the battery access door to open it downwards.
2	Remove the defective battery from its slot.
3	Put in the new battery, observing the polarities.
4	Push the door back up to close and lock.

Important

To ensure that the battery is changed every 2 years, you are advised to note the date of the next change on the label provided for this purpose and located on the inside of the access door of the supply terminal blocks.

Illustration:



Note: When the battery supply voltage becomes less than 2 V, the internal RAM is no longer backed up (from 30 minutes onwards), when the PLC is switched off.

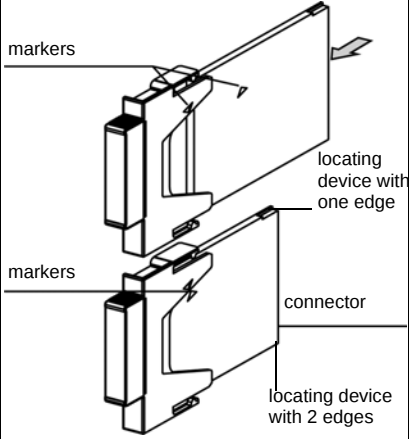
Mounting/removing the memory card

Introduction

The memory card must be equipped with a handle to be inserted into the slot (normally factory-fitted). If this is not the case, mount the handle on the card by following the procedure described below.

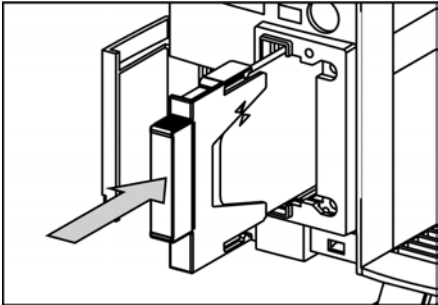
Mounting the handle

Carry out the following steps:

Step	Action	Illustration
1	Position the end of the memory card unequipped with a connector at the entry to the handle. During this operation, align the markings (in the form of a triangle) on the handle and on the card label.	
2	Slide the memory card into the handle until it stops. The card is now firmly attached to the handle.	

Mounting the memory card in the PLC

To insert the PCMCIA card into the PLC, carry out the following steps:

Step	Action	Illustration
1	Remove the protective cover by unlocking it, then pulling it towards the front of the PLC (use a screwdriver).	
2	Place the PCMCIA card fitted with its handle into the opened slot. Slide the assembly in until the card can go no further, then press on the handle to connect the card.	

Note: When inserting the PCMCIA card into its slot, check that the hardware locating devices are correctly positioned:

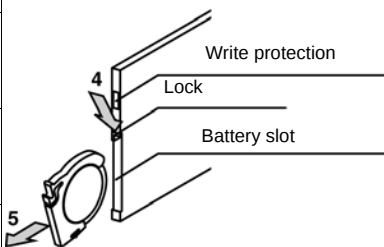
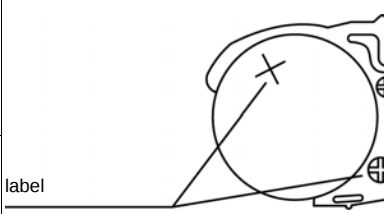
- 1 edge on top,
- 2 edges down (or write protection down)

Changing the Battery on the PCMCIA Card

Procedure

Some PCMCIA cards are equipped with a single battery, with the product reference TSX BATM01, which must be changed. The various memory card references are found in a summary table (Correspondence Table).

To do this, perform the following steps:

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

Battery Life

data table:

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

Note: When in operation, the ERR LED flashes if there is a fault with the PCMCIA card battery.

Screw tightening torque

General

data table:

Technological elements	Maximum tightening torque
Fixing screws of the PLCs, modules and terminal blocks Ground connection screws	0.8 N.m
Discrete module terminal block screws Supply terminal block screws SUB D connector screws Different cable and lead connector screws	0.8 N.m
TSX DMZ 16 DTK/ etc. module casing terminal block screws	0.5 N.m

At a Glance

Aim of this Chapter

This Chapter deals with the connection of TSX 37 PLCs.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Ground connection of the PLC	122
Grounding the modules	123
Supply connections	124
Connection rules	125
Connecting PLCs supplied with alternating current	126
Connecting several PLCs supplied by TBX SUP 10 or TSX SUP supplies....	129
Connecting PLCs supplied with direct current	130
Connecting PLC(s) supplied by a continuous floating network (not grounded)	133
Specific provisions for a continuous floating network	135
Sensor and pre actuator supply control	136

Ground connection of the PLC

General

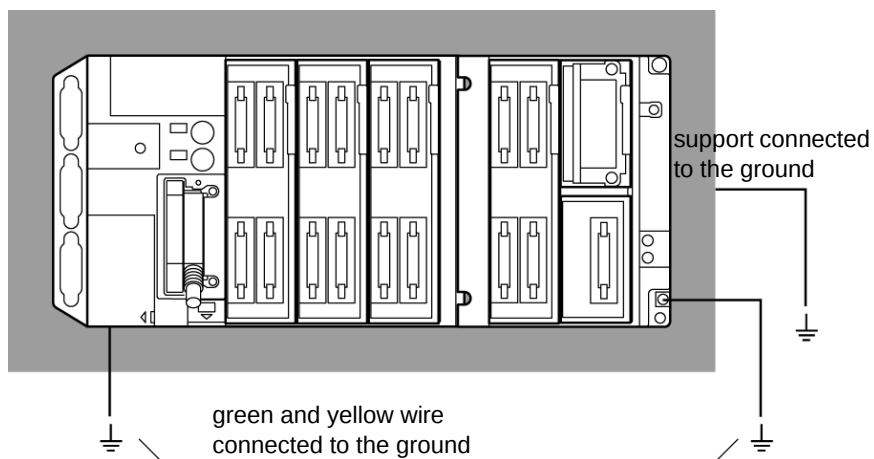
Grounding the TSX 37 bases and mini extension rack is provided by the rear section, which is metallic. This guarantees efficient working order for PLCs in environment norms, on condition however that they be fixed on a correctly grounded metal support. The base and extension should be mounted on the same support or supports, which are correctly coupled together.

To ensure personal safety, **it is always necessary** to ground the base ground connection terminals and the mini extension rack.

For this, use a 2,5 mm² (minimum) green/yellow wire of the shortest length possible.

Illustration

Ground connections:



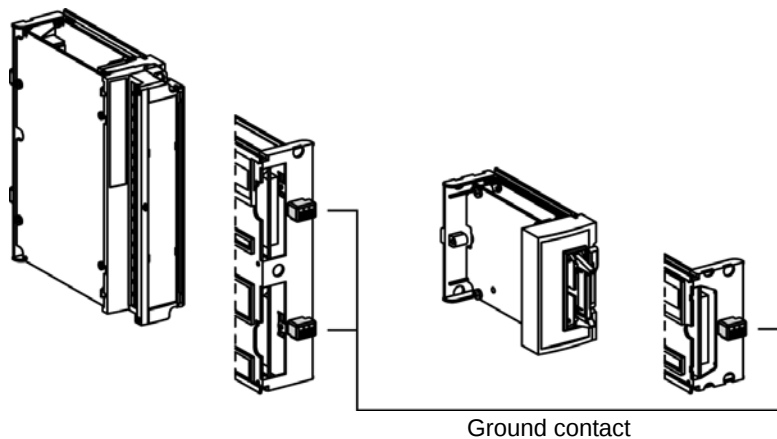
Grounding the modules

General

Grounding the modules is performed with a contact on the back (2 contacts for the modules in standard format), which connects to a metallic finger forming a part of the PLC base or mini extension rack when inserted into a module. **This connection ensures grounding.**

Illustration

Ground connection:



Supply connections

Introduction

The TSX 37 range offers two possibilities for the supply of PLCs:

- alternating current,
 - and direct current.
-

The PLC is supplied with alternating current

- the base delivers the 24 VDC (24 VR) voltage necessary to supply the coils of its integrated relay modules,
- however, the mini extension rack **must** be supplied with 24 VDC in the following cases:
 - analog modules are positioned in the extension,
 - relay modules are positioned in the extension, The 24 VDC supply tolerance must be +/- 10% max. If this voltage disappears or there is a reduction of more than 10%, good working order of the relay modules is no longer ensured. No error indication is given to the application program. If detection of this error is desired, you are advised, for example, to use a dividing bridge inline with an analog input of the base configuration.

Note: When the PLC is supplied with alternating current, it is **strictly forbidden** to use the 24 V sensor voltage, provided by the base, to supply the mini extension rack with 24 VDC (24 VR).

The PLC is supplied with direct current (24 VDC not insulated)

- The base delivers the 24 VDC (24 VR) voltage necessary to supply the coils of the relay/analog modules that are integrated in the base and/or the mini extension rack.
The TSX 37 PLCs and modules can continuously function in a voltage range between 19 and 30 VDC (and up to 34 VDC for 1 hour for a battery operated device with charger).
However, if relay modules are fitted to the PLC (base or extension), the 24 VDC supply should have a maximum tolerance of +/- 10%.

A TSX SUP supply can be used to provide the 24 VDC voltage (refer to wiring diagrams on the following pages).

Connection rules

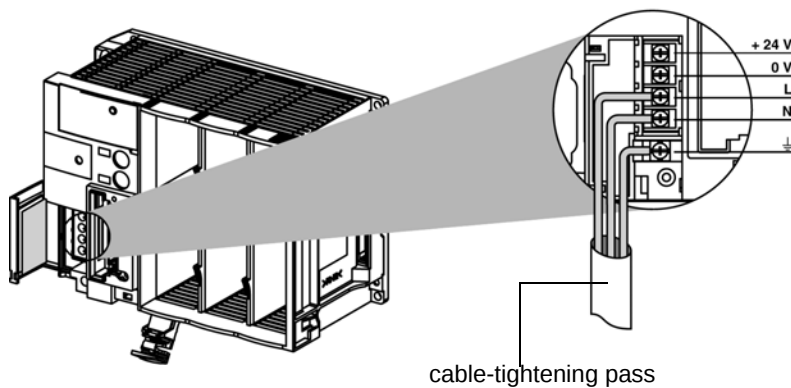
General

The TSX 37 PLC supply terminal block is protected by a door, which allows access to the wiring terminals. Wire output passes vertically to the bottom. Wiring can be maintained in position by a cable tightening clip.

Note: Plan for a device, which protects and cuts the supply upstream of the PLC. When the PLC is supplied by a direct network, the length of the supply cable must be limited to 30 m if the wires have a cross section of 2.5 mm² or 20 m if the wires have a cross section of 1.5 mm², to prevent a loss of line.

Illustration

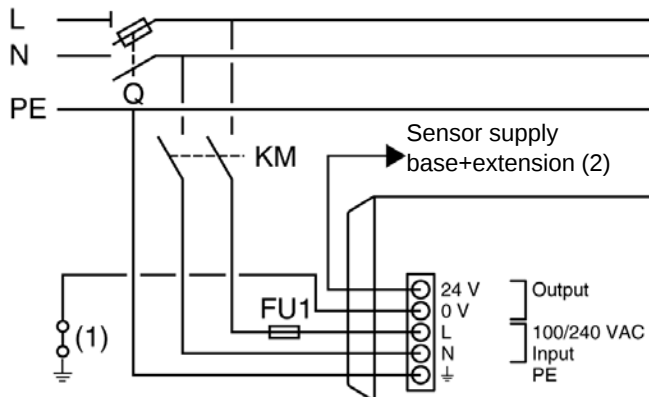
Principle diagram:



Connecting PLCs supplied with alternating current

Connecting a single PLC

Illustration:
Alternating network 100-240 V



Q: general isolator,

KM: line contactor or circuit breaker,

Fu1: 1 A fuse with time delay.

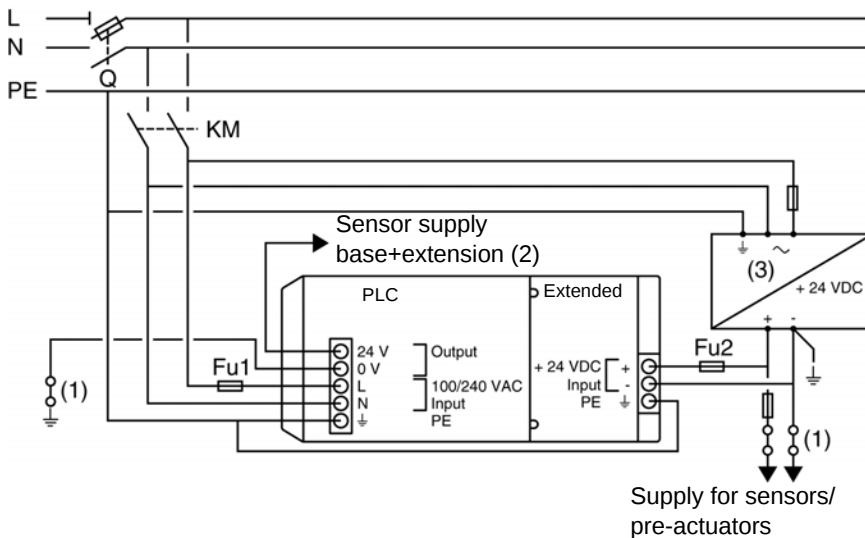
(1) : isolation strip for finding grounding faults,

(2) : do not exceed 400 mA.

Connecting a PLC with an extension

Illustration:

Alternating network 100-240 V



Q: general isolator, KM: line contactor or circuit breaker,

Fu1: 1 A fuse with time delay, Fu2: standard 0.5 A fuse,

(1) : isolation strip for finding grounding faults,

(2) : do not exceed 400 mA,

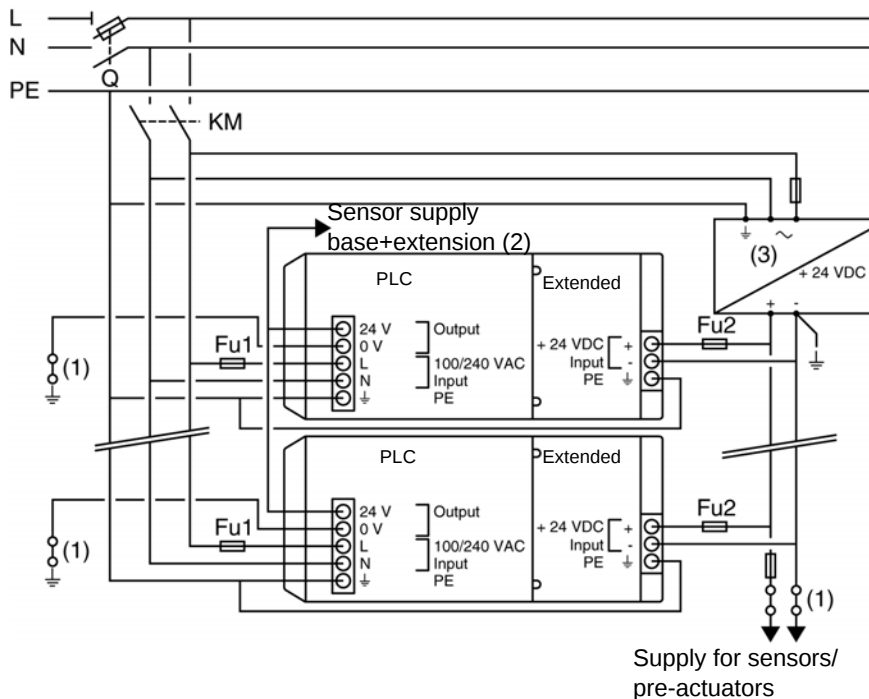
(3) : only if the discrete relay or analog modules are fitted in the extension.

if a TBX SUP 10 or TSX SUP 1011 supply is used, remove Fu2.

Connecting several PLCs

Illustration:

Alternating network 100-240 V



Q: general isolator, KM: line contactor or circuit breaker,

Fu1: 1 A fuse with time delay, Fu2: standard 0.5 A fuse,

(1) : isolation strip for finding grounding faults,

(2) : do not exceed 400 mA,

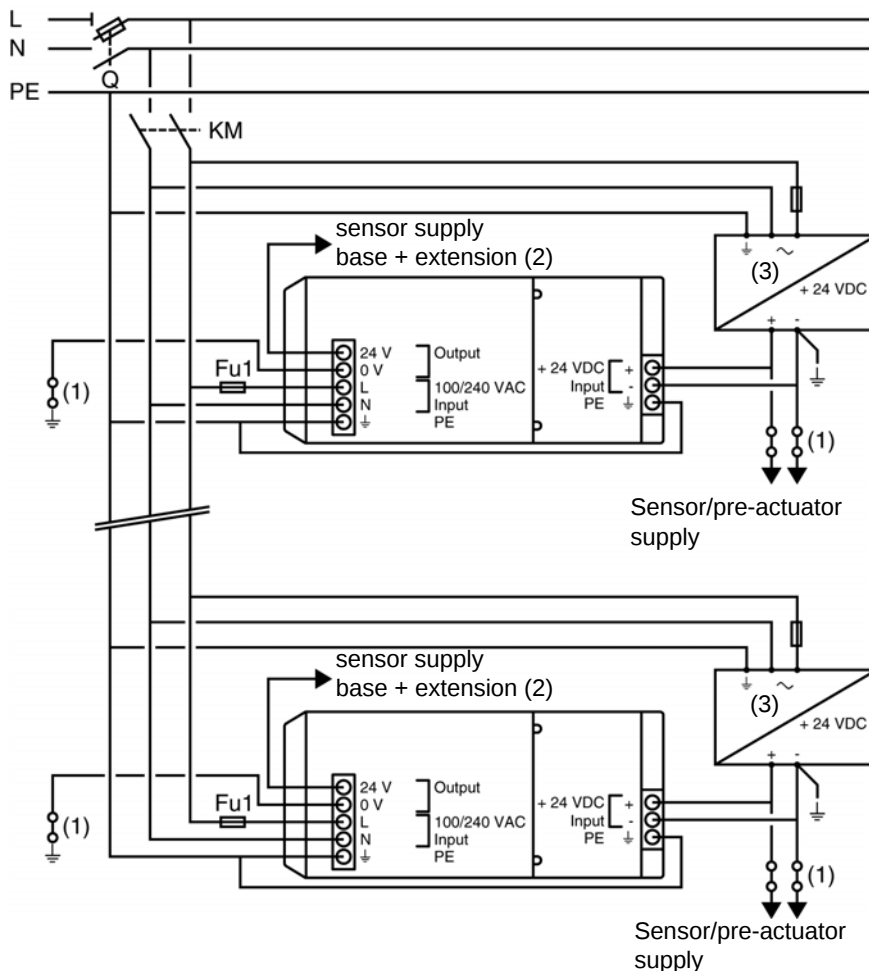
(3) : only if the discrete relay or analog modules are fitted in the extension.

if a TBX SUP 10 or TSX SUP 1011 supply is used, remove Fu2.

Connecting several PLCs supplied by TBX SUP 10 or TSX SUP supplies....

Principle diagram

Illustration:
100-240 V alternating network



Q : general sectionner.

KM : circuit breaker or line switch.

Fu1 : 1 A fuse with time delay.

(1) : isolating blade to search for an grounding error.

(2) : do not exceed 400 mA.

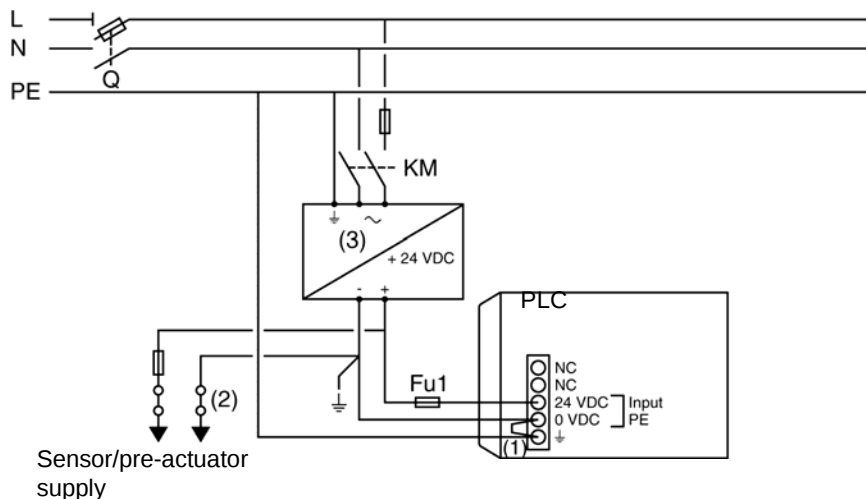
(3) : only if the discrete relay or analog modules are implanted in the extension.

Connecting PLCs supplied with direct current

Connecting a single PLC

Illustration:

Alternating network 100-240 V



Q: general isolator, KM: line contactor or circuit breaker,

Fu1: 4A fuse with time delay,

(1) : external shunt supplied and mounted on the PLC. Should not be removed,

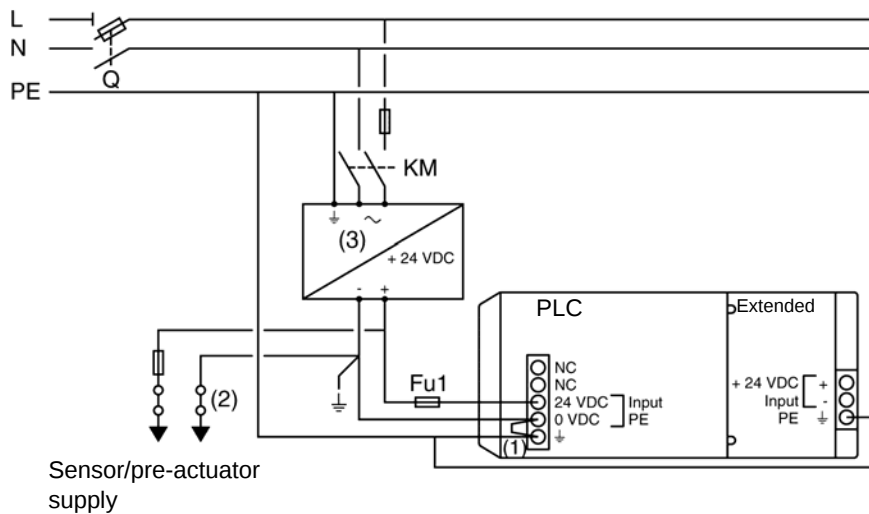
(2) : isolation strip for finding grounding faults. The external shunt must be removed in order to do this, so that the supply terminal block can be disconnected from the grounded PLC.

(3) : using a TSX SUP supply.

Connecting a PLC with an extension

Illustration:

Alternating network 100-240 V



Q: general isolator, KM: line contactor or circuit breaker,

Fu1: 4A fuse with time delay,

(1) : external shunt supplied and mounted on the PLC. Should not be removed,

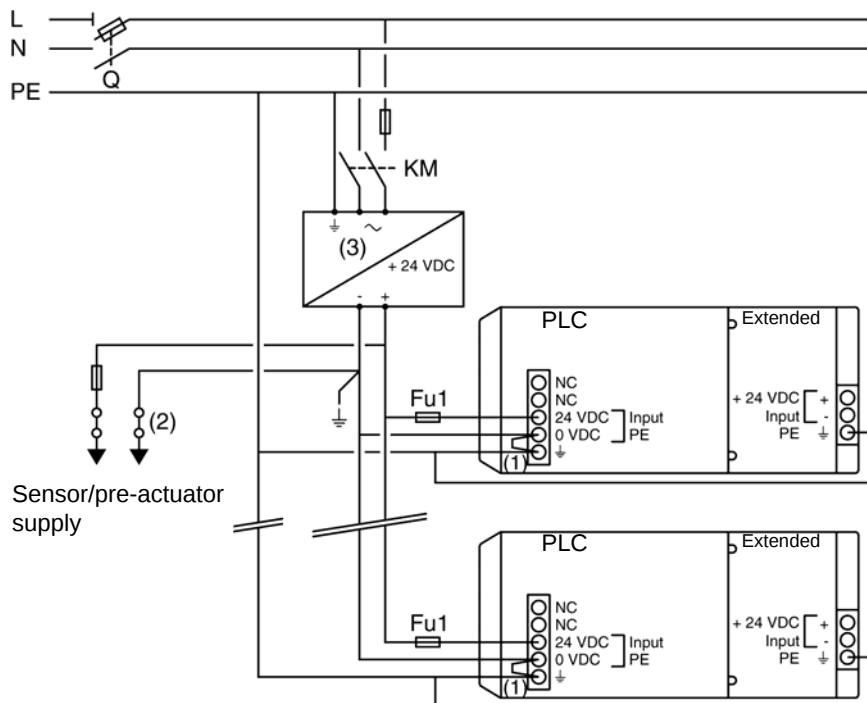
(2) : isolation strip for finding grounding faults. The external shunt must be removed in order to do this, so that the supply terminal block can be disconnected from the grounded PLC.

(3) : using a TSX SUP supply.

Connecting several PLCs

Illustration:

Alternating network 100-240 V



Q: general isolator, KM: line contactor or circuit breaker,

Fu1: 4A fuse with time delay,

(1) : external shunt supplied and mounted on the PLC. Should not be removed,

(2) : isolation strip for finding grounding faults. The external shunt must be removed in order to do this, so that the supply terminal block can be disconnected from the grounded PLC.

(3) : using a TSX SUP supply.

Connecting PLC(s) supplied by a continuous floating network (not grounded)

General

The TSX 37 PLCs with a 24 VDC network supply do not have primary/secondary insulation and the internal 0V is coupled with the mechanical ground connection of the PLC. This results in the 0V of the 24VDC network being coupled with the same mechanical ground connection and the particular provisions to be taken for the specific applications and in particular **Applications in a marine environment**, which use a "floating" mount.

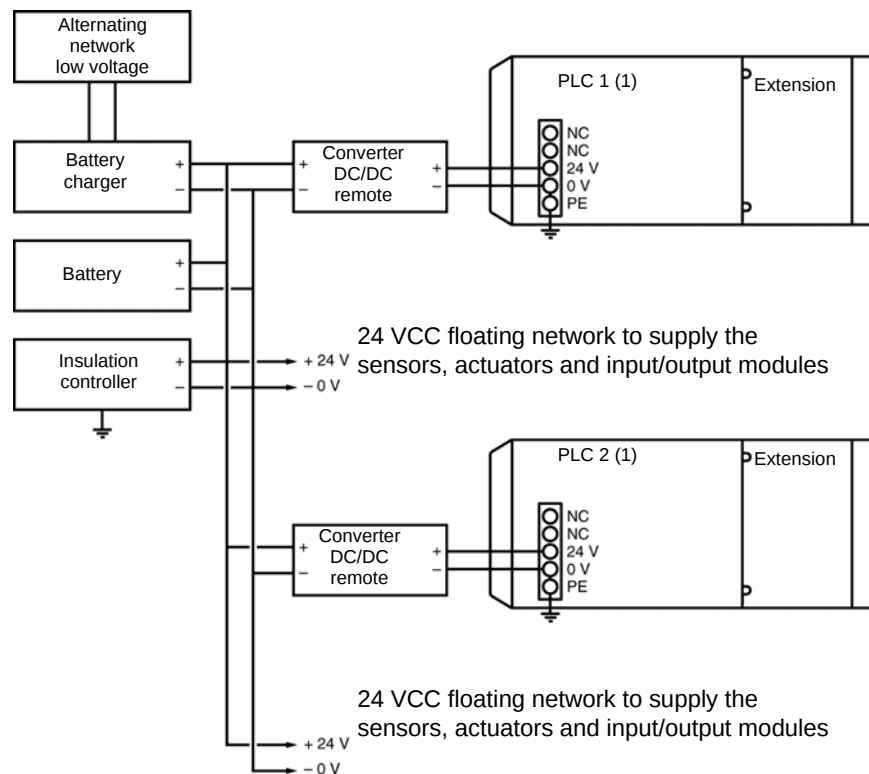
The only correct way of connecting a TSX 37 (1) PLC to this type of "floating" network is to place an insulated continuous converter (24 VDC/24 VDC) near each PLC, and use an insulation controller upstream of the converter(s). With this type of mounting, the first insulation error (i.e. a wire leading one of the floating network polarities to the ground connection) is detected by the insulation controller and does not produce any error affecting the automatic operation.

(1) TSX 37 10 PLC: TSX 3710 128DR1/128DT1/128DTK1/164DTK1

TSX 3721/22 PLC: TSX 3721 1../ TSX 3722 1..

Principle diagram

Illustration:



(1) TSX 37 10 PLC: TSX 3710 128DR1/128DT1/128DTK1/164DTK1

TSX 3721/22 PLC: TSX 3721 1../ TSX 3722 1..

Note: The DC/DC converter should be very close to the PLC 2 and the + 24 VDC polarity wire should be connected in such a way that it cannot accidentally lead to the ground connection.

Specific provisions for a continuous floating network

Discrete inputs/outputs	The Discrete inputs/outputs are insulated, the sensor, actuator and discrete input/output module supply should come directly from the floating 24 VDC network.
Counting inputs, built in to the TSX 37 22 1.. PLC bases.	These inputs are insulated; the supply and that of the input's related sensors should come from the floating 24 VDC network.
Analog inputs/outputs, built in to the TSX 37 22 1.. PLC bases.	These inputs/outputs are not insulated (0V grounded), and should not be used with this type or mounting. In cases where analog inputs/outputs are required, only use analog input/output modules (TSX AEZetc./ASZetc.), which are insulated. The sensor supply related to analog inputs should come from the floating 24 VDC network, with the outputs delivering a voltage and a current insulated from the ground connection.
Module with relay outputs	If the modules with relay outputs are built into the PLC, the DC/DC converter should deliver a voltage of 24 VDC +/- 10%.
PLC with a mini extension rack	If the PLC has a mini extension rack, the mini extension rack is not supplied with 24 VDC.
Communication between PLCs	Communication links between PLCs: No specific provision. • communication via terminal port: insulation is performed by the TSX P ACC01 unit, • communication via PCMCIA card: the PCMCIA communication card ensures insulation.

Sensor and pre actuator supply control

General

It is advised to control the different supplies with the following sequence:

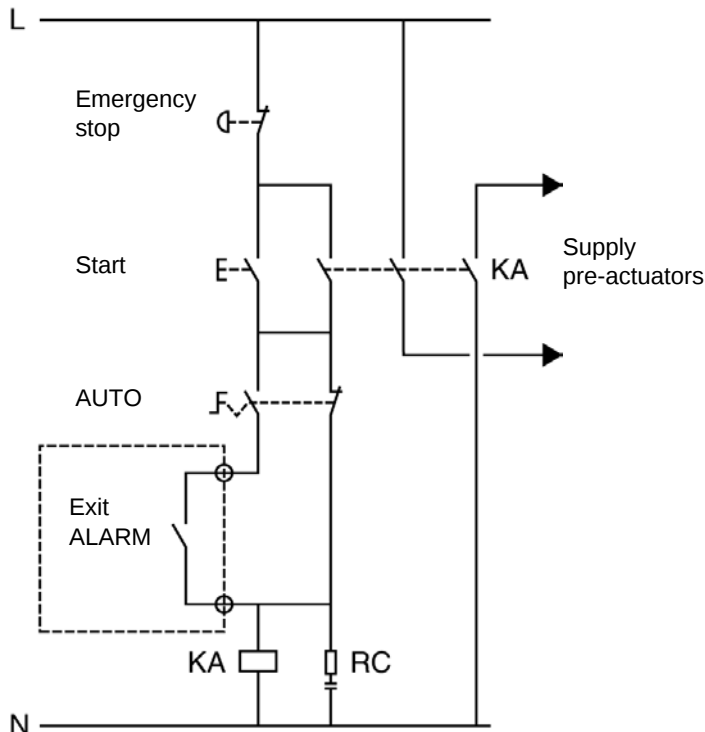
- Power up PLC and inputs (sensors) supply with the KM contactor.
- If the PLC is in RUN and AUTO mode, power up output (pre-actuators) supply with the KA connector. This is performed via the ALARME (%Q2.0) output, which will be relayed (to KA1) if the output is static (continuous supply).

Furthermore, the safety standards require authorization from the operations personnel, before the installation is rebooted following a stop (arising from a power outage or from an emergency stop). The following control diagrams take into account these standards.

The MANU/AUTO switch forces the outputs from a terminal, when the PLC is in STOP mode.

PLC supplied with alternating current

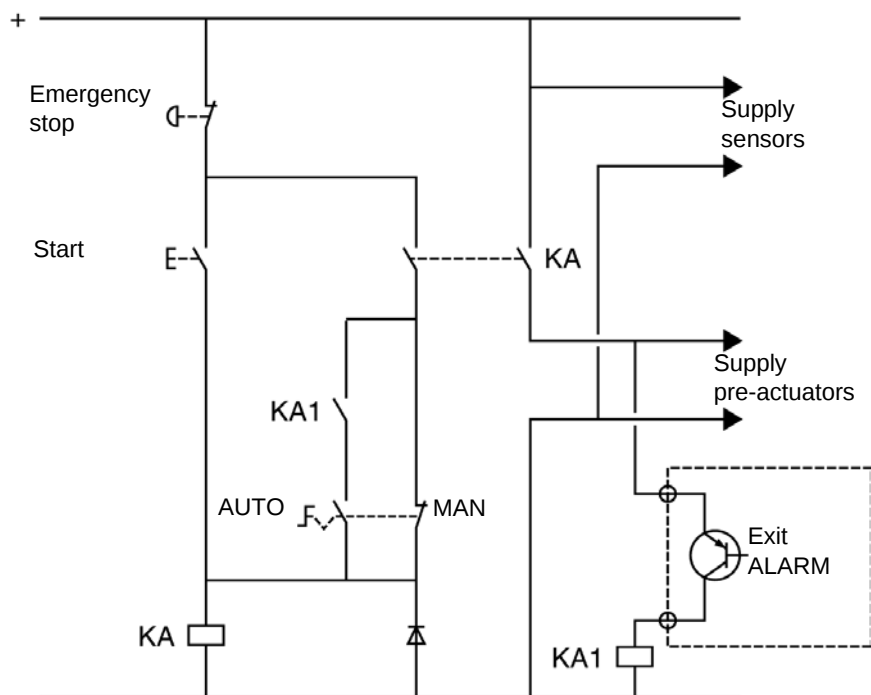
Illustration:



KA : Control contactor controlled by the ALARM (Q2.0) output in AUTO mode.

PLC supplied with direct current

Illustration:



KA : contactor controlled at the ALARM (Q2.0) output by the KA1 relay.

KA1 : relay at the ALARM (Q2.0) output or static (Q2.0) output.

Ventilation module

14

At a Glance

Aim of this Chapter

This chapter describes the ventilation module for the Micro PLC.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Ventilation module: general introduction	140
Ventilation module: physical presentation	142
Ventilation module: catalog	143
Ventilation module: dimensions	144
Ventilation module: mounting	146
Rules for installation of the racks with ventilation modules	148
Ventilation module: connections	149
Ventilation module: characteristics	151

Ventilation module: general introduction

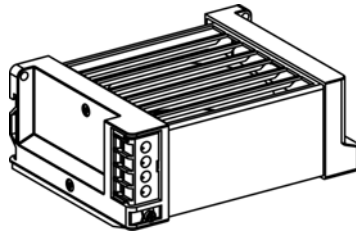
Introduction

The ventilation modules installed above the Micro PLC station racks ensure a forced convection of air, so that the ambient temperature inside the envelope is homogenized, therefore eliminating the various possible hot spots.

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

Illustration

The illustration below shows the ventilation module.



Use of ventilation modules

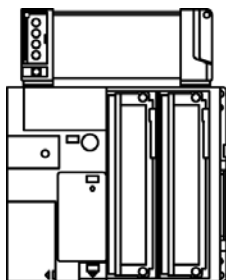
The use of these modules is recommended in the following cases:

- **Ambient temperature between 25°C and 60°C:** the life of various Micro PLC components is extended (extension by 25% of the MTBF).
- **Ambient temperature between 60°C and 70°C:** the ambient temperature being limited to 60°C without ventilation, forced ventilation makes it possible to lower the temperature inside the modules by 10°C, which brings the internal temperature of the modules back to the equivalent of 60°C at ambient temperature.
In these conditions, the product life span is increased by more than 50%.

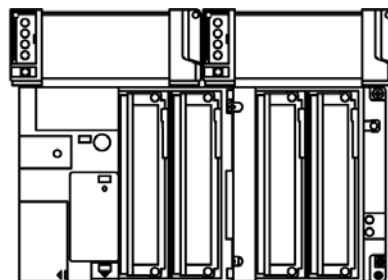
Different module types

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

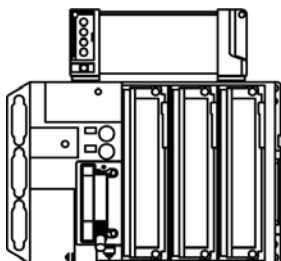
According to the type of PLC, TSX 37-05/08/10 or TSX 37-21/22 with or without TSX RKZ 02 mini extension rack, 1 or 2 ventilation modules must be installed.



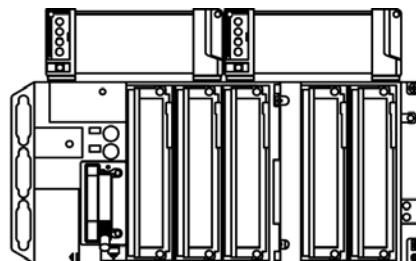
TSX 37-05/10 PLCs only



TSX 37-10 + TSX RKZ 02 PLC



TSX 37-08/21/22 PLCs only

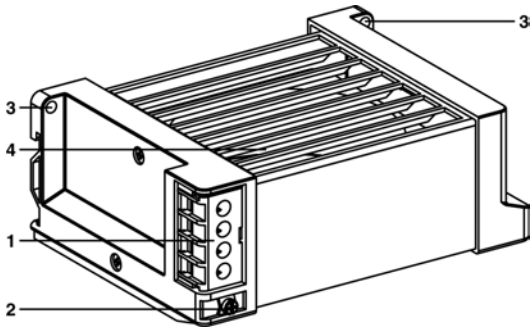


TSX 37-21/22 + TSX RKY 02 PLC

Ventilation module: physical presentation

Illustration

Descriptive diagram:



Number table

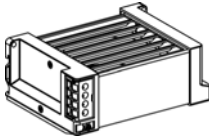
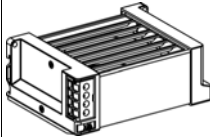
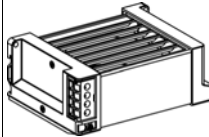
This table gives the function description of the numbers:

Address	Description
1	Connection terminal block: • of the module supply voltage, • of the heat sensor and LED (or inline pre-actuator) supply. Each terminal can receive 1 1.5 mm² wire without a wire end ferrule or 2 1 mm² wires with wire end ferrules.
2	Terminal for connecting a module to the ground connection.
3	Module fixing holes (screw M4 x 12), in the case of mounting on a board or panel.
4	Rotated flap which allows the air to be sent back to the front.

Ventilation module: catalog

Catalog

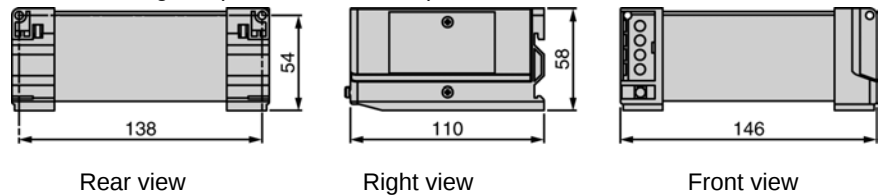
This table shows the different types of ventilation modules:

			
Power supply voltage	24 VDC	110 VAC	220 VAC
Temperature probe	Yes (detection of temperature $\geq 80^{\circ}\text{C}$ $\pm 5^{\circ}\text{C}$), open on alarm		
No. of modules	• 1 module with TSX 37-10 or TSX 37-21/22 PLC only • 2 modules with TSX 37-10 or TSX 37-21/22 PLC + TSX RKZ02		
References	TSX FAN D2 P	TSX FAN A4 P	TSX FAN A5 P

Ventilation module: dimensions

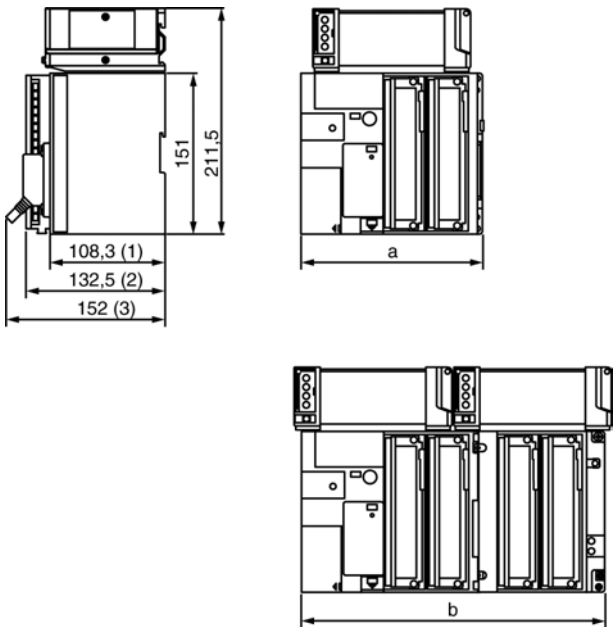
Ventilation module only

Illustration diagram (sides in millimeters):



**Ventilation
module + Micro**

Illustration diagram (sides in millimeters):



- (1) PLC empty,
- (2) with screw terminal block modules,
- (3) with HE10 connector modules,
- (a) Micro PLC dimensions only,
- (b) Micro PLC + TSX RKZ 02 extendable rack.

Table of characteristics:

Dimensions	a	b
TSX 37-05 PLC	170.3 mm	-
TSX 37-08 PLC	227.9 mm	-
TSX 37-10 PLC	170.3 mm	282.7 mm
TSX 37-21/22 PLC	227.9 mm	341.4 mm

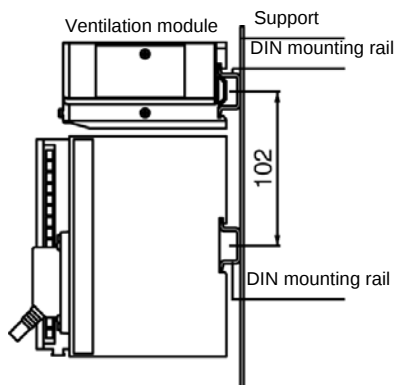
Ventilation module: mounting

General points

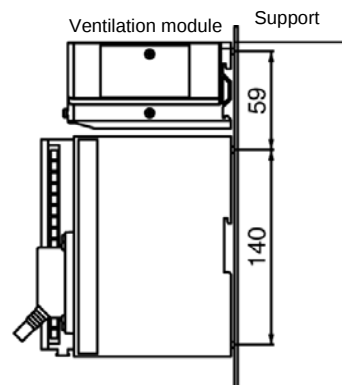
For reasons of mechanical strength, it is imperative to use the same method of fixing for the PLC and the ventilation module. The dimensions indicated are in millimeters.

Diagram:

Mounting onto a DIN mounting rail
(Type AM1-ED)



Mounting onto a board (AMI-PA)
or panel



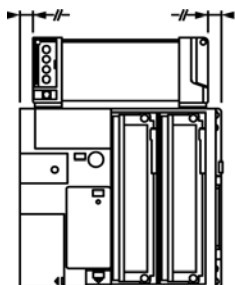
Fixing ventilation module
using 2 M4x12 screws

Note: Using forced ventilation means it is necessary to take fitting precautions when analog modules of type TSX AEZ 414 are used in the PLC configuration (see (Cabling and installation recommendations for thermocouples)).

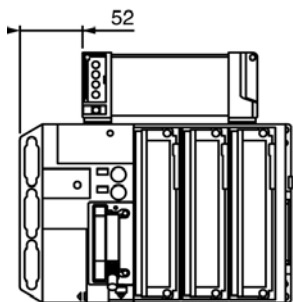
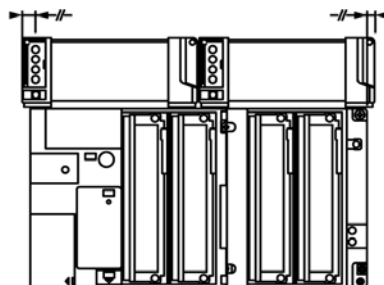
**Mounting
position**

Mounting position of the ventilation modules according to the PLC type:

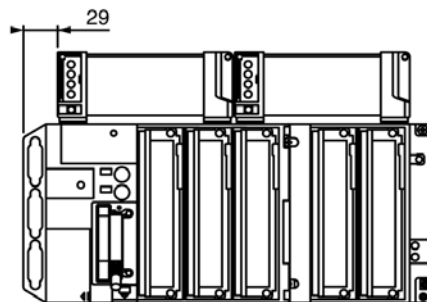
TSX 37-05/10 PLCs only



TSX 37-10 + TSX RKZ 02 PLC



TSX 37-08/21/22 PLCs only

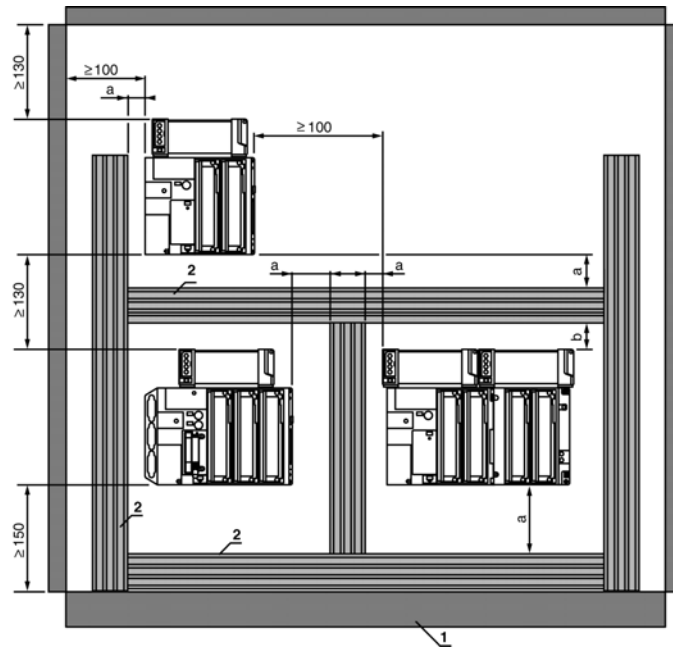


TSX 37-21/22 + TSX RKZ 02 PLC

Rules for installation of the racks with ventilation modules

Principle diagram

Illustration:



$a \geq 50$ mm $b \geq 30$ mm

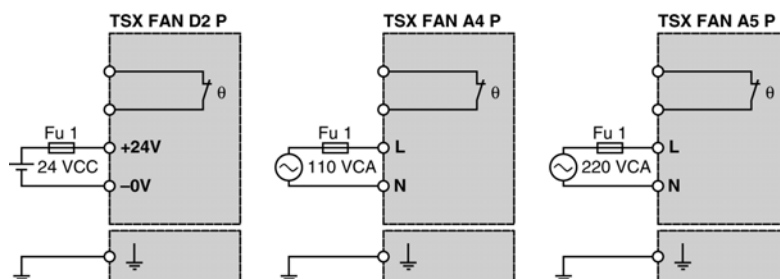
1 Installation or envelope.

2 Duct or wire quadrant.

Ventilation module: connections

Ventilation module supply connection

Illustration:

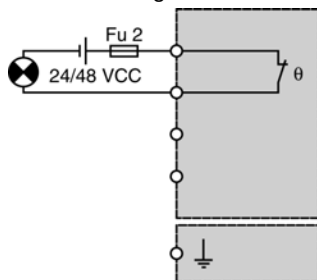


Note: When using several ventilation modules of the same type, use a shared supply for all the ventilation modules.

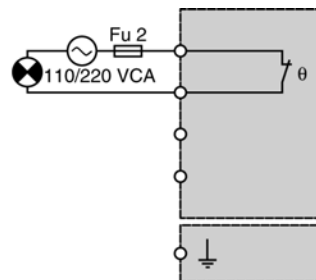
Heat sensor supply connection

The heat sensor can be supplied either with a direct or alternating current and connected on a signaling LED, a PLC input etc.

Illustration diagram:



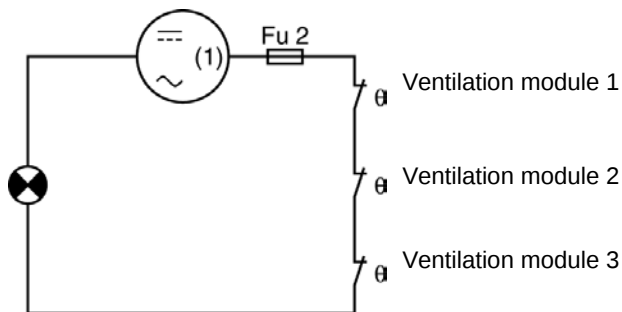
Direct current supply



Alternating current supply

Note: When using several ventilation modules, the sensor contacts will be put in a series.

illustration:



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

Ventilation module: characteristics

Table of characteristics

Table of characteristics of the ventilation modules:

Module type		TSX FAN D2 P	TSX FAN A4P	TSX FAN A5P
Supply voltage	Nominal	24 VDC	110 VAC	220 VAC
	Limit	20...27.6 VDC	90...120 VAC	180...260 VAC
Current absorbed to nominal voltage		180 mA	180 mA	100 mA
Heat sensor	Supply voltage: direct 24/48 VDC or alternating 110/220 VAC			
	Breaking power (on a resistive load)	1 A to 24 VDC / 10 000 maneuvers 1 A to 48 VDC / 30 000 maneuvers 1 A to 110 VAC / 30 000 maneuvers 0.5 A to 220 VAC / 10 000 maneuvers		
	Trigger	Temperature $\geq 75^{\circ}\text{C} \pm 5^{\circ}\text{C}$		
	State	closed if temperature $\leq 75^{\circ}\text{C} \pm 5^{\circ}\text{C}$ open if temperature $\geq 75^{\circ}\text{C} \pm 5^{\circ}\text{C}$		

Discrete input/output modules for Micro



At a Glance

Aim of this Part This part introduces the range of Discrete input/output modules on Micro PLCs.

What's in this Part? This part contains the following chapters:

Chapter	Chapter Name	Page
15	General introduction to Discrete input/output modules	155
16	General implementation rules for Discrete input/output modules	169
17	Handling of Discrete input/output module faults	191
18	The Discrete input/output mixed module TSX DMZ 64DTK	193
19	The Discrete input/output mixed module TSX DMZ 28DTK	203
20	The Discrete input/output mixed module TSX DMZ 28DT	213
21	The Discrete input/output mixed module TSX DMZ 28DR	221
22	The Discrete input/output mixed module TSX DMZ 28AR	231
23	Discrete input module TSX DEZ 32D2	239
24	Discrete output module TSX DSZ 32T2	245
25	Discrete output module TSX DSZ 32R5	251
26	Discrete input module TSX DEZ 12D2K	259
27	Discrete input module TSX DEZ 12D2	265
28	Discrete input module TSX DEZ 08A4	271
29	Discrete input module TSX DEZ 08A5	277
30	Discrete output module TSX DSZ 08T2K	283
31	Discrete output module TSX DSZ 08T2	291
32	Discrete output module TSX DSZ 04T22	297
33	Discrete output module TSX DSZ 08R5	303
34	The Discrete input/output mixed module TSX DMZ 16DTK	309

Chapter	Chapter Name	Page
35	Emergency stop monitoring module	323
36	TELEFAST 2 connection interface links for the Discrete I/O modules	355

General introduction to Discrete input/output modules

15

At a Glance

Aim of this Chapter

This chapter is a general introduction to the Discrete input/output modules.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
General description	156
Physical description	159
Catalog of discrete input modules	161
Catalog of discrete output modules	163
Catalog of discrete input/output mixed modules	165

General description

General

Input modules: they receive signals from the sensors and carry out acquisition functions, adaptation functions, galvanic insulation functions, filtering functions and functions protecting against parasitic signals.

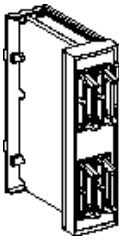
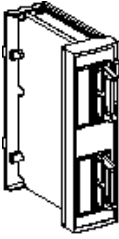
Output modules: they carry out latch functions on the orders given by the processor to enable pre-actuator control through decoupling circuits and amplification circuits.

The range of discrete input and output modules meets the demands with regard to the:

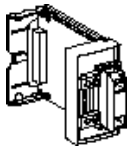
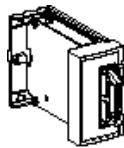
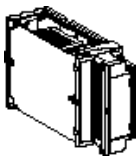
- functional level: direct or alternating inputs/outputs, positive or negative logic,
 - connection via screw terminal blocks or HE10 connectors,
 - Modularity
-

Overview

Full size input/output modules:

Modularity	Illustration	Connector
64 inputs/outputs (32 I + 32 O)		HE10 connectors
28 inputs/outputs (16 I + 12 O)		HE10 connectors
28 inputs/outputs (16 I + 12 O) or 32 inputs or 32 outputs		Screw terminal blocks

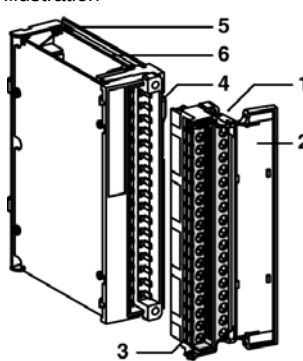
Half-size input/output mixed modules:

Modularity	Illustration	Connector
16 inputs/outputs (8 I + 8 O) (Enables direct connection to installation help systems Tego Dial and Tego Power).		HE10 connectors + tunnel terminal block for connection of power supply
12 inputs or 8 inputs or 8 outputs or 4 outputs		HE10 connectors
12 inputs or 8 inputs or 8 outputs or 4 outputs		Screw terminal blocks

Physical description

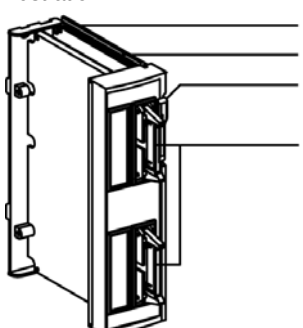
Module with screw terminal block connection

Each module is made up of the following elements:

Illustration 	1. Removable screw terminal block for direct connection of inputs/outputs to sensors and pre-actuators. 2. Access flap to the terminal block screws which also provides a place for the address label. 3. Removable cover allowing access to screws and ensuring both that they cannot be lost and human protection. 4. Lock which enables locking or extraction of the module from its slot (PLC or extension), which is only retrievable when the terminal block is removed. 5. Metallic body ensuring the following functions: • electronic card support, • ground connection for resistance to electromagnetic disturbances, • ground connection electric continuity, • control of the module in its slot. 6. Electronic card(s).
---	--

Module connection by HE10 connector

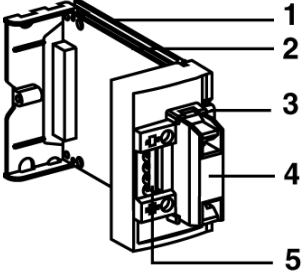
Each module is made up of the following elements:

Illustration 	1. HE10 connectors, protected by a cover. They enable input/output connection with sensors and actuators either directly or through TELEFAST 2 connection bases. 2. Lock enabling locking or extraction of module from its slot (PLC or extension). 3. Metallic body ensuring the following functions: • electronic card support, • ground connection for resistance to electromagnetic disturbances, • ground connection electric continuity, • control of the module in its slot. 4. Electronic card(s)
--	--

Note: The description is identical for half-sized modules with screw terminal block or HE10 connector.

**Module with
casing terminal
block connection**

Each module is made up of the following elements:

Illustration 	1. Metallic body ensuring the following functions: • electronic card support, • ground connection for resistance to electromagnetic disturbances, • ground connection electric continuity, • control of the module in its slot. 2. Electronic card(s). 3. Lock enabling locking or 'extraction of module from its slot (PLC or extension). 4. HE10 connector, protected by a cover. Enables input/output connection with sensors and actuators either directly or 'through' Tego Dial or Tego Power connection bases. 5. Casing terminal block for connection to 24 VDC voltage supplying inputs or outputs.
---	---

Catalog of discrete input modules

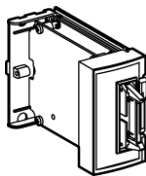
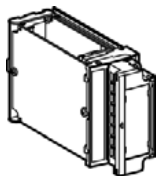
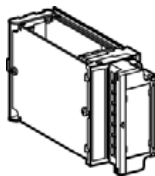
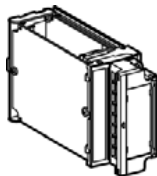
Catalog of full size input modules

The following table describes the main characteristics of full size input and output modules:

	
Modularity	32 inputs
Type/Voltage	24 VDC input
Insulation	Isolated inputs
Compliance with IEC 1131-2	Type 2
Logic	Positive
PD compatibility	All PD (IEC 947-5-2) 2 wire AC/DC PD 3 wire PD DC PNP
Configurable filtering	Built-in (0.1 to 7.5 ms by increments of 0.5 ms)
Connections	Screw terminal blocks
References	TSX DEZ 32D2

Catalog of half size input modules

The following table describes the main characteristics of half size input modules:

				
Modularity	12 inputs		8 inputs	
Type/Voltage	Inputs: 24 VDC		Inputs: 100/120 VAC	Inputs: 200/240 VAC
Insulation	Isolated inputs			
Compliance with IEC 1131-2	Type 2	Type 1 (in positive logic)	Type 2	Type 1
Logic	Positive	Positive or negative		
PD compatibility	All PD: 2 wire AC/DC 3 wire DC PNP	2 wire DC PD (1) All 3 wire PD: PNP (pos. log.) NPN (neg. log.)	2 wire AC/DC PD (1)	2 wire AC PD (1)
	(1) : See <i>Compatibility of sensors with inputs</i> , p. 186			
Configurable filtering	Built-in (0.1 to 7.5 ms by increments of 0.5 ms)		Built-in, 50 or 60 Hz network	
Connections	HE10 connectors	Screw terminal block		
Product references	TSX DEZ 12D2K	TSX DEZ 12D2	TSX DEZ 08A4	TSX DEZ 08A5

Catalog of discrete output modules

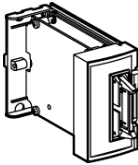
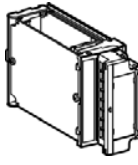
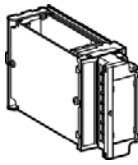
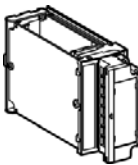
Catalog of full size output modules

The following table describes the main characteristics of full size output modules:

		
Modularity	32 outputs	
Type/Voltage	Static outputs: 24...240 VAC/24 VDC	Relay outputs
Insulation	Isolated outputs	
Current/Power	0.5 A	1 "F" contact per channel I _{th} = 2 A performance according to load (see <i>Characteristics of the TSX DSZ 32R5 module</i> , p. 255)
Compliance with IEC 1131-2	Yes	-
Protection	Outputs protected against overloads and short-circuits by a fast electromagnet demagnetization circuit	Outputs are not protected
Logic	Positive	-
Output parallelization	2 outputs (see (24 VDC static output parallelization))	-
Connections	Screw terminal block	
References	TSX DSZ 32T2	TSX DSZ 32R5

Catalog of half size output modules

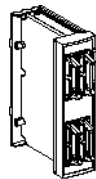
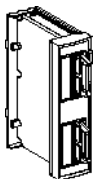
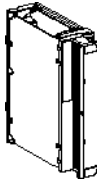
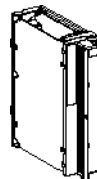
The following table describes the main characteristics of half size output modules:

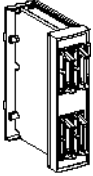
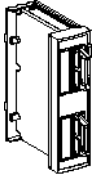
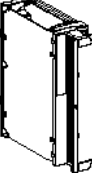
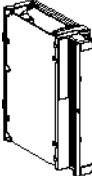
				
Modularity	8 outputs		4 outputs	8 outputs
Type/Voltage	Static outputs 24 VDC			Relay outputs: 24/240 VAC 24 VDC
Insulation	Isolated outputs			
Allowable current/power	0.5 A		2 A	1 "F" contact per channel I _{th} = 3 A Performance according to load (see <i>Characteristics of the TSX DSZ 08R5 module</i> , p. 306)
Compliance IEC 1131-2	Yes			
Protection	Outputs protected against overloads and short-circuits by a fast electromagnet demagnetization circuit			Outputs are not protected
Logic	Positive			-
Output parallelization	2 outputs (see (24 VDC static output parallelization))			-
Connections	HE10 connectors	Screw terminal block		
Product references	TSX DSZ 08T2K	TSX DSZ 08T2	TSX DSZ 04T22	TSX DSZ 08R5

Catalog of discrete input/output mixed modules

Full size mixed input/output

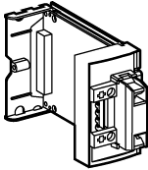
The following table describes the main characteristics of full size input/output mixed modules:

					
Modularity	32 inputs 32 outputs	16 inputs 12 outputs			
Type/Voltage	Inputs: 24 VDC Static outputs: 24 VDC			Inputs: 24 VDC Relay outputs: 24/240 VAC 24 VDC	Inputs: 110 VDC Relay outputs: 24/240 VAC 24 VDC
Inputs:					
Insulation	Isolated inputs				
Compliance IEC 1131-2	Type 1			Type 1, in positive logic	Type 2
Logic	Positive			Positive or negative	Positive
PD compatibility	2 wire DC PD (see <i>Compatibility of sensors with inputs</i> , p. 186) 3 wire DC PD (PNP with positive logic input, NPN with negative logic input)				2 wire AC PD
Configurable filtering	Built-in (0.1 to 7.5 ms by increments of 0.5 ms)				Built-in, 50 or 60 Hz network
Outputs:					
Insulation	Isolated outputs				
Current/Power	0.1 A	0.5 A	1 "F" contact per channel I _{th} = 3 A performance according to load (see characteristics of output modules concerned)		
Compliance IEC 1131-2	Yes				
Protection	Outputs protected against overloads and short-circuits by a fast electromagnet demagnetization circuit			Outputs are not protected	
Logic	Positive			-	
Product reference	TSX DMZ 64DTK	TSX DMZ 28DTK	TSX DMZ 28DT	TSX DMZ 28DR	TSX DMZ 28AR

					
Output parallelization	3 outputs (see (24 VDC static output parallelization))	2 outputs (see (24 VDC static output parallelization))	-		
Connections	HE10 connectors		Screw terminal block		
Product reference	TSX DMZ 64DTK	TSX DMZ 28DTK	TSX DMZ 28DT	TSX DMZ 28DR	TSX DMZ 28AR

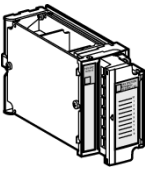
**Half size mixed
input/output**

The following table describes the main characteristics of the half size input/output mixed module:

	
Modularity	8 inputs 8 outputs
Type/Voltage	24 VDC input 24 VDC static output
Inputs:	
Insulation	Isolated inputs
Compliance IEC 1131-2	Type 1
Logic	Positive
PD compatibility	2 wire PD (see <i>Compatibility of sensors with inputs, p. 186</i>) 3 wire DC PD (PNP with positive logic input)
Configurable filtering	Built-in (0.1 to 7.5 ms by increments of 0.5 ms)
Outputs	
Insulation	Isolated outputs
Current/power	0.5 A
Compliance IEC 1131-2	Yes
Protection	Outputs protected against overloads and short-circuits by a fast electromagnet demagnetization circuit
Logic	Positive
Output parallelization	2 outputs (see (24 VDC static output parallelization))
Connections	HE10 connectors and tunnel terminal block for connection of power supply, adapted for connection to Help systems for setting up Tego Dial and Tego Power
Product reference	TSX DMZ 16DTK

Safety module for monitoring the emergency stop

The following table describes the main characteristics of the safety module (see *Emergency stop monitoring module*, p. 323) which monitors the emergency stop:

	
Modularity	8 discrete outputs (emergency stop), 1 discrete input (confirmation) 2 safety relay outputs
Type/Voltage	24 VDC input 24/240 ACV or 24 VDC relay outputs
Compliance with safety standards	EN 60204-1, EN 954-1 Category 3
Inputs:	
Insulation	Isolated inputs
Compliance IEC 1131-2	Type 1
Logic	Positive
Configurable filtering	Built-in (0.1 to 7.5 ms by increments of 0.5 ms)
Outputs:	
Insulation	Isolated outputs
Current/power	1 "F" contact per channel, maximum current = 1.25 A performance characteristics (see <i>Electrical characteristics of the emergency stop monitoring module</i> , p. 349)
Protection	Outputs are not protected
Connection	Screw terminal block
Product reference	TSX DPZ 10D2A

General implementation rules for Discrete input/output modules

16

At a Glance

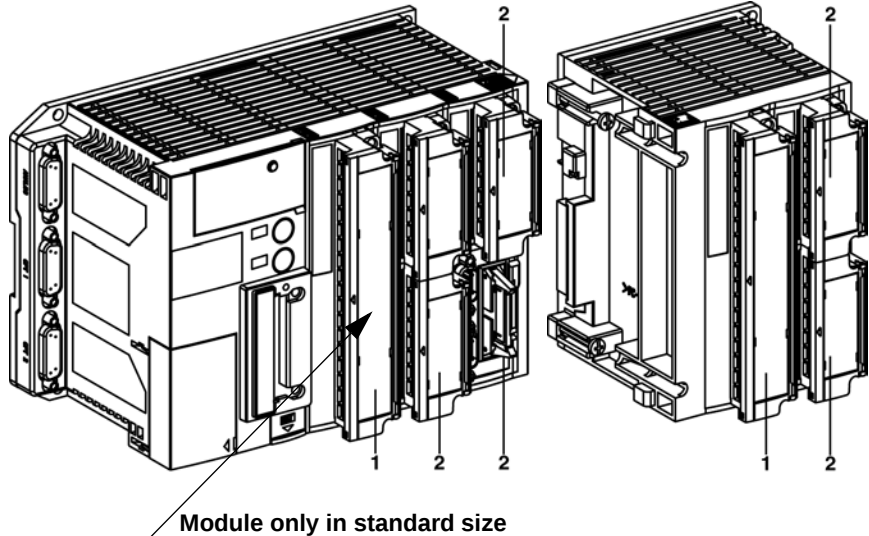
Aim of this Chapter	This chapter introduces the general installation rules for Discrete input/output modules.																				
What's in this Chapter?	This chapter contains the following topics: <table><tr><th>Topic</th><th>Page</th></tr><tr><td>Installation</td><td>170</td></tr><tr><td>Mounting/removing modules</td><td>171</td></tr><tr><td>Labeling a module with a screw terminal block</td><td>174</td></tr><tr><td>Labeling a full size module with an HE10 connector</td><td>176</td></tr><tr><td>Channel addressing</td><td>177</td></tr><tr><td>Precautions of use</td><td>179</td></tr><tr><td>General precautions and rules for wiring</td><td>182</td></tr><tr><td>Compatibility of sensors with inputs</td><td>186</td></tr><tr><td>Compatibility of actuators with outputs</td><td>190</td></tr></table>	Topic	Page	Installation	170	Mounting/removing modules	171	Labeling a module with a screw terminal block	174	Labeling a full size module with an HE10 connector	176	Channel addressing	177	Precautions of use	179	General precautions and rules for wiring	182	Compatibility of sensors with inputs	186	Compatibility of actuators with outputs	190
Topic	Page																				
Installation	170																				
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General precautions and rules for wiring	182																				
Compatibility of sensors with inputs	186																				
Compatibility of actuators with outputs	190																				

Installation

Installing a discrete I/O module

- A standard size module takes up 2 positions and is mounted in an available slot:
 - at the base of a Micro PLC,
 - on a mini extension unit
- A simple size module takes up 1 position and is mounted in an available slot:
 - at the base of a Micro PLC, except for the first slot,
 - on a mini extension unit

Example of installing a discrete inputs/outputs module in a Micro PLC:



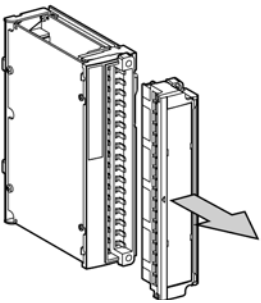
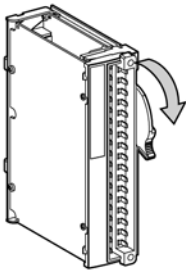
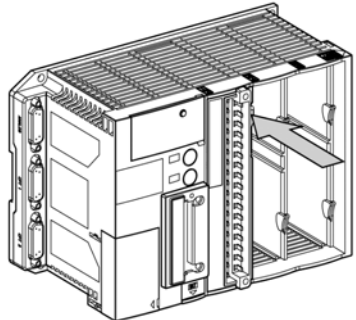
1 : Module in standard size

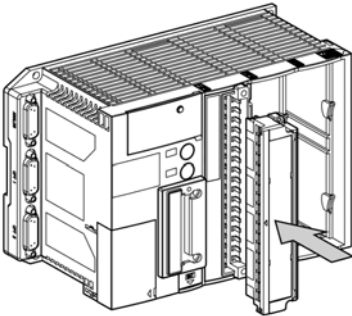
2 : Half size module

Mounting/removing modules

Mounting a module

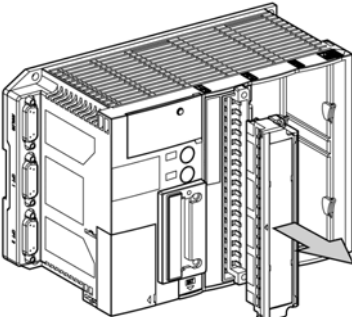
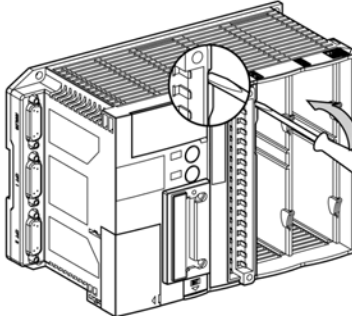
Carry out the following steps:

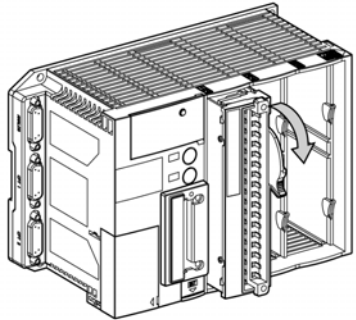
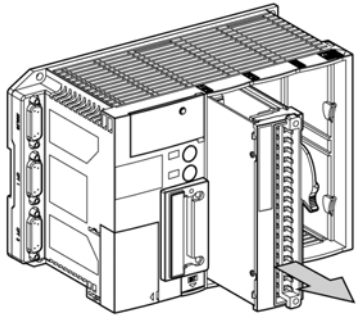
Step	Action	Figure
1	For modules with a screw terminal block, unscrew in succession the two fixing screws (undo each screw alternately a little at a time) so the terminal block becomes disconnected.	Example 
2	Set the latch into "unlocked" position by switching it to the bottom.	Example 
3	Slide the module into its slot (this is helped by runners) and push on its front side to connect it.	Example 
4	Switch the latch to the top.	

Step	Action	Figure
5	For modules with a screw terminal block, screw in succession the two fixing screws. Turn each screw alternately a little at a time to slowly connect the terminal block.	Example 

Removing a module

Carry out the following steps:

Step	Action	Figure
1	If a module has a terminal block, remove it.	Example 
2	Switch the latch to the bottom to disconnect the module by inserting the tip of a flat screwdriver into the groove provided and levering towards the bottom to start unlocking the module.	Example 

Step	Action	Figure
3	Finish levering the latch by hand, and this will disconnect the module.	Example 
4	Slide the module out of its slot by pulling it forwards. Switch the latch to the top and if necessary fix the terminal block back onto the module.	Example 

Labeling a module with a screw terminal block

Module description

A fixed label shows the following:

- the module product reference,
- a box in which to write the module slot number.

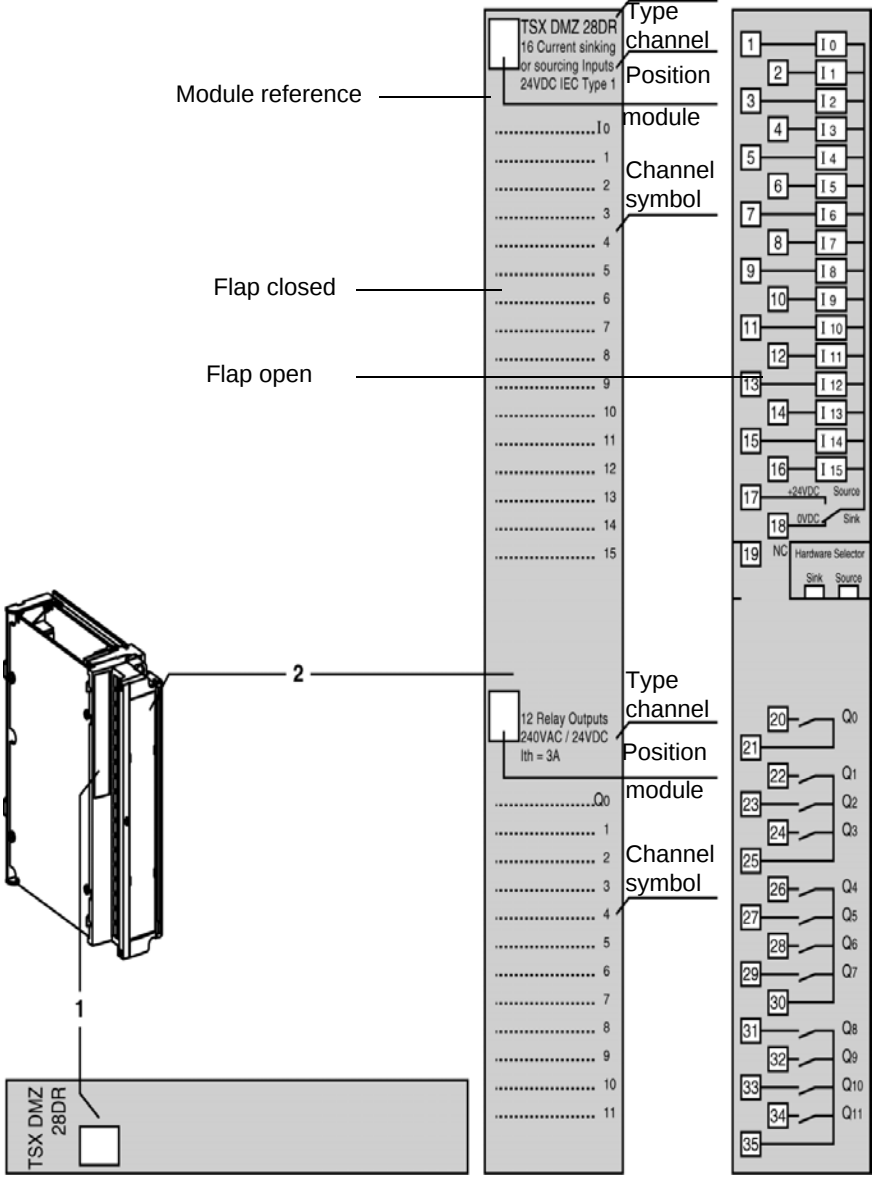
Terminal block description

On the inside of the flap there is a removable label printed on both sides, showing the following:

- external view (closed flap):
 - the module product reference,
 - the nature of the channels,
 - a box in which to write the module position number (address),
 - the designation for each channel (symbol).
- internal view (flap open),
 - the input and output wiring plan with the channel numbers and the connection terminal number.

Illustration

Example:



Labeling a full size module with an HE10 connector

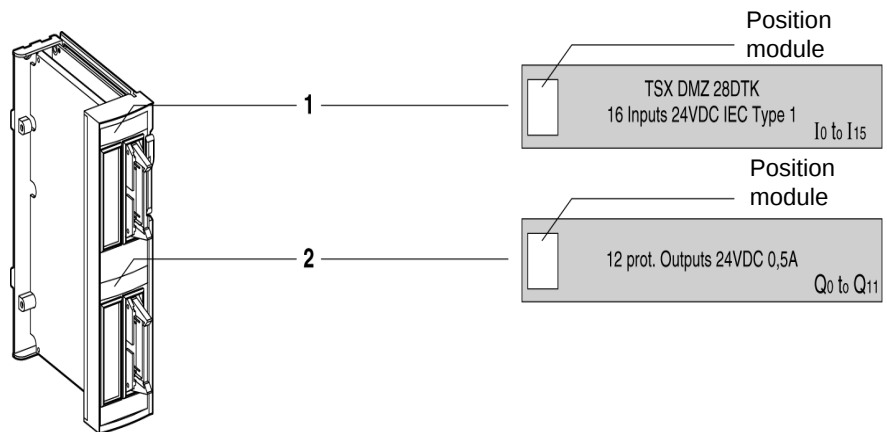
Description

There are two labels:

- the upper position identification label which has:
 - the module product reference,
 - the nature of the channels,
 - a box in which to write the module position number (address).
- the lower position identification label which has:
 - the nature of the channels,
 - a box in which to write the module position number (address).

Illustration

Example:



Note:

Half size modules only have label 1.

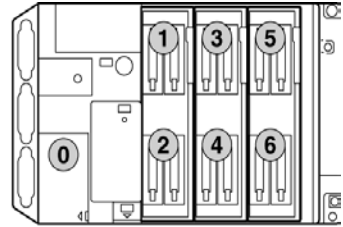
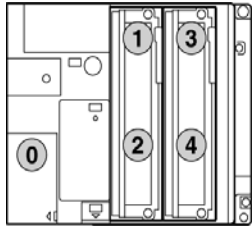
Channel addressing

Principle

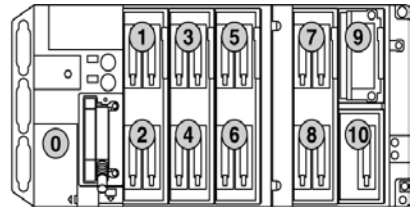
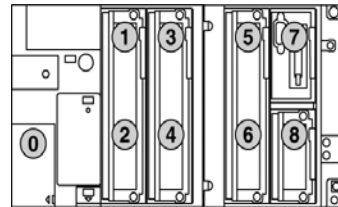
Channel addressing is **geographical** i.e. it depends on the physical position of the module in the base module or in the mini-extension rack.

Example

TSX37-05/10 and TSX37-08/21/22



TSX37-10 + TSX RKZ 02 and TSX37-21/22 + TSX RKZ 02



Rules

With a half size base modularity, full size modules are addressed as two half size modules placed on top of each other. The term **Position** represents either a half size module, or the upper or lower part of a full size module.

Discrete Input/Output syntax is as follows:

%	I or Q	Position	.	Channel
Symbol	I = Input Q = Output	1 to 4 (37 05/10) 1 to 6 (37 08/21/22) 1 to 8 (37 10+RKZ02) 1 to 8 (37 21/22+RKZ02)	Pulse	i

%I1.5 signifies: Module Input 5 placed in position 1.

%Q8.3 signifies: Module Output 3 placed in position 8.

Address of channels**Full size module**

		64 I/O	32 I	32O	28 I/O
Channel Number: i	Odd position	0 to 31	0 to 15	0 to 15	0 to 15
	Even position	0 to 31	0 to 15	0 to 15	0 to 11
Channel Address	Odd position	%lx.0 to %lx.11	%lx.0 to %lx.15	%Qx.0 to %Qx.15	%lx.0 to %lx.15
	Even position	%Q(x+1).0 to %Q(x+1).31	%l(x+1).0 to %l(x+1).15	%Q(x+1).0 to %Q(x+1).15	%Q(x+1).0 to %Q(x+1).31

Half size module

		16 I/O	12 I	8 O	4 O
Channel Number: i	Odd or even position	I:0 to 7	0 to 11	0 to 7	0 to 3
		Q:8 to 15			
Channel Address	Odd or even position	%lx.0 to %lx.7	%lx.0 to %lx.11	%Qx.0 to %Qx.7	%Qx.0 to %Qx.3
		%Qx.8 to %Qx.15			

Note

If there is no I/O module declared in a position during configuration, the PL7 Micro software functions as if a 16 I/16 O half size module was present. PL7 allows access to input bits %lx.0 to %lx.15 and to output bits %Qx.0 to %Qx.15 for each position.

When half size modules are declared, PL7 Micro allows access to input bits %lx.0 to %lx.15 and to output bits %Qx.0 to %Qx.15 for each position (even if the half size module has less I/O).

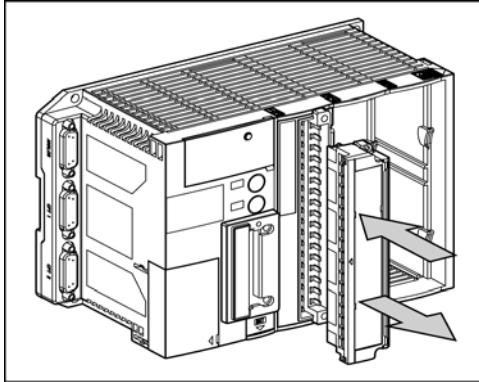
When full size mixed modules are declared, PL7 allows access to input bits %lx.0 to %lx.31 for odd positions, and to output bits %Qx+1.0 to %Qx+1.31. for even positions (even if the half size module has less I/O).

Full size input or output modules are managed as if they were two half size modules occupying two positions laid on top of each other.

Precautions of use

Wiring/Unwiring screw terminal blocks or HE10 connectors

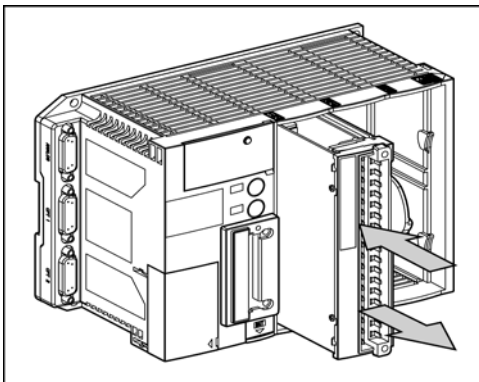
HE10 connectors or screw terminal blocks must be wired or unwired with sensor and pre-actuator power supplies disconnected.



Mounting and removing modules

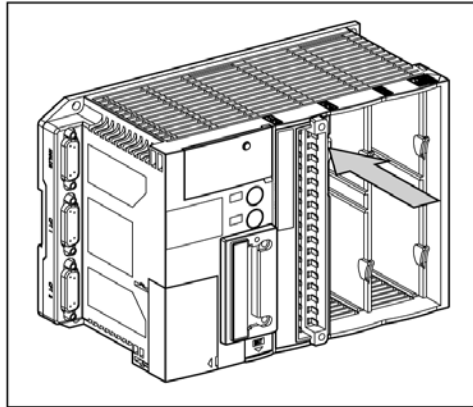
Modules must be mounted and removed with:

- the PLC power turned off,
- sensor and pre-actuator power supplies disconnected.



Locking modules into their slots

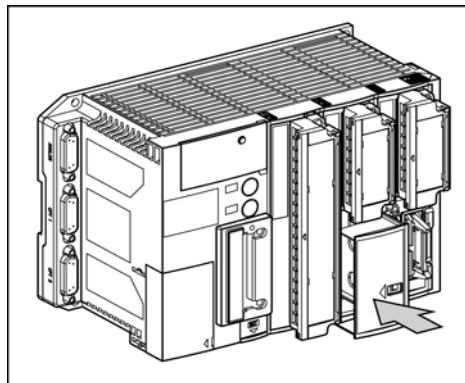
The module fixing latch must be completely engaged so that electrical contacts and ground connections are fully established.



Protecting slots unused by a module

In the event where a position is not used by a module, it must be protected by a TSX RKA 01 protection cover to ensure an IP20 level protection for the PLC configuration.

Note: TSX RKA 01 protection covers are sold in batches of 10.



Selecting direct current supply modules for sensors and pre-actuators**Regulated supply modules or rectified with filtering**

In the event where 24V direct current external supply modules are utilized, it is advisable to use:

- either regulated supply modules which provide better response times for outputs, particularly on the trigger,
- or non-regulated supply modules but which have filtering:
 - for 1000 MicroFarad/A in double flip-flop single-phase rectification and 500 MicroF triple-phase rectification,
 - maximum peak to peak ripple rate: 5%,
 - maximum voltage variation: -20% to + 25% of nominal voltage (ripple included).

Note:

Rectified unfiltered supply modules are banned.

Supply from Cadmium/Nickel battery

This type of supply can be used to supply sensors and pre-actuators, as well as the associated inputs/outputs which function normally with a maximum voltage of 30 VDC.

During the loading process of this type of battery, the voltage can reach 34 VDC over the course of an hour. Because of this, the group of I/O modules which function on 24 VDC can allow a 34 VDC voltage limited to 1 hour per 24 hours. This type of functioning entails the following restrictions:

- the maximum current on 34 VDC supported by output must at no time exceed the current set for a 30 VDC voltage,
 - a de-rating of temperature which limits to:
 - 80% inputs/outputs in state 1 up to 30°C,
 - 50% of inputs/outputs in state 1 at 60°C.
-

General precautions and rules for wiring

Introduction

Discrete inputs/outputs have built-in protection to ensure efficient operation within an industrial environment. However, certain rules must be observed.

External supply modules for sensors and actuators

These supply modules must be protected against short-circuits and overloads by using fast-blow fuses.

	DANGER
	Important: In the event that 24 VDC installation has not been carried out following VLSV standards (very low safety voltage), 24 VDC supply modules must have 0 V connected to the frame ground, which itself is connected to the ground and as close as possible to the supply module. This restriction is necessary to ensure personnel safety should a mains phase come into contact with the 24 VDC. Failure to follow these instructions will result in death or serious injury.

Note: If an input/output module is present (i.e. its inputs/outputs are used in the PLC), it is vital that all the module sensor and actuator voltages are supplied. If not, a **voltage missing** fault appears, indicated by a lit I/O LED. To avoid any I/O faults, do not declare the part of the module which is not used in a task.

Inputs

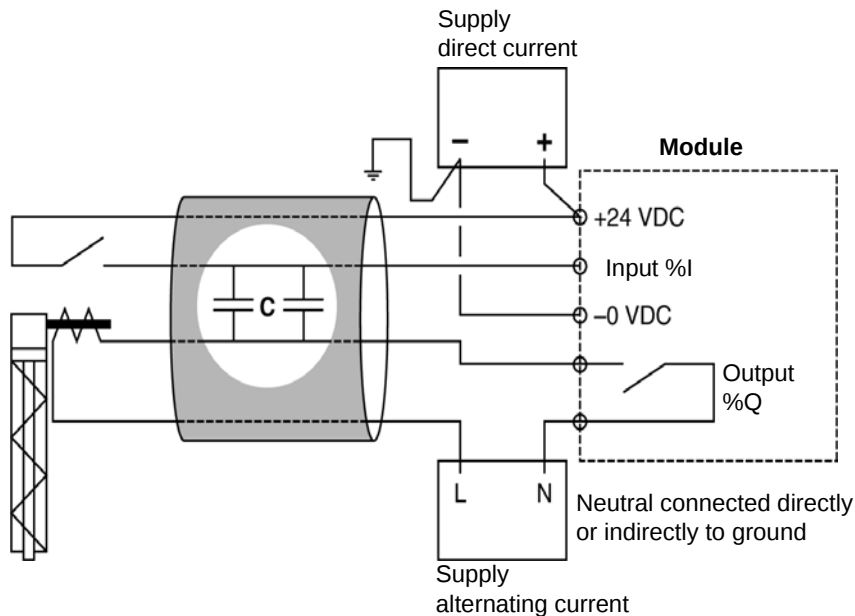
Recommendations of use:

- if 24 VDC direct current inputs are used, you are advised to adapt the filtering time to the desired function,
 - if the filtering time is reduced to a value less than 3 ms, you are advised not to use sensors with mechanical contact outputs. This will prevent bounces being acknowledged when the contact closes,
 - for the best possible performance, you are advised to use inputs and direct current sensors, as alternating current inputs have a greatly increased response time,
 - on negative logic 24 VDC inputs, all the sensors are connected to the (-) on the supply module. For safety reasons, the 0V can be connected to the frame ground. If one of the input wires is disconnected by accident and comes into contact with the frame ground, there is a risk that the input will be set to state 1 and therefore could generate an unwanted command. You are therefore advised not to use negative logic inputs.
-

24 VDC inputs
and line coupling
with the
alternating
current network

Performance may be adversely affected if coupling is too great between wires carrying an alternating current and wires carrying signals for DC inputs.

Process diagram



When the input contact is open, an alternating current exceeding the amount of interference allowed within the wire can generate a current in the input. There is a risk that this current can set the input to 1.

Line capacities which must not be exceeded:

Modules	Maximum coupling capacity allowed with 240 VAC/50 Hz line		
	filtering 0.1 ms	filtering 3.5 ms	filtering 7.5 ms
TSXDMZ64DTK	10nf	15nf	35nf
TSXDEZ32D2	25nf	30nf	60nf
TSXDMZ28DT/DTK	15nf	25nf	35nf
TSXDMZ28DR	15nf	20nf	60nf
TSXDMZ16DTK	15nf	25nf	35nf
TSXDEZ12D2	15nf	20nf	60nf
TSXDEZ12D2K	25nf	30nf	60nf

For coupling with a different voltage, carry out the following:

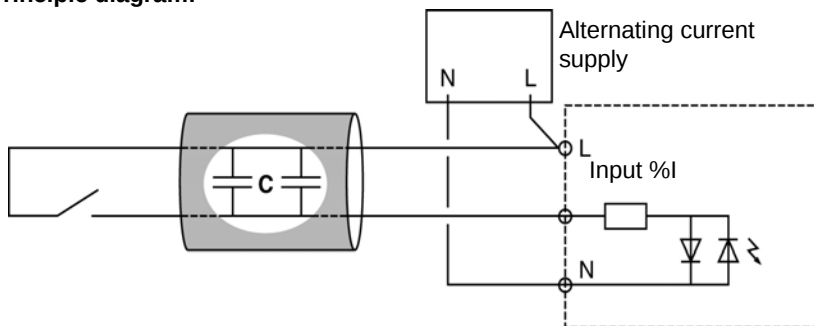
$$\text{Capacity allowed} = \frac{\text{Capacity (line 240 VCA)} \times 240}{\text{Linevoltage}}$$

Note: As a general guide, a standard wire 3 ft 3 in long has a coupling capacity of the order of 100 to 150 pF.

AC input and line coupling

In this case, when the line controlling input is open, the current flows within the coupling capacity of the wire

Principle diagram:



Line capacities which must not be exceeded

Modules TSX DMZ 28AR/DEZ 08A4/DEZ 08A5: 55 nf.

Outputs

If the currents are large, you are advised:

- to split up the starters by protecting each one with a fast-blow fuse,
- to use wires of sufficient size to avoid voltage drops and heating.

Routing cables

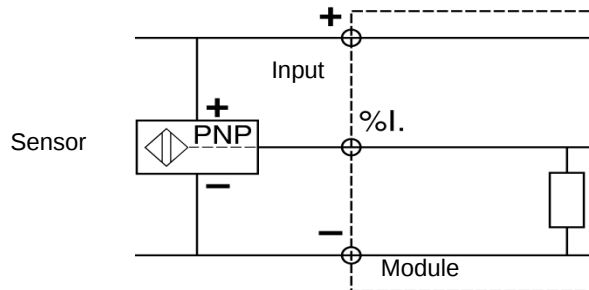
- Inside and outside the device:
to limit AC coupling, the power circuit cables (supply modules, power switches etc.) must be separate from the input (sensors) and output (actuators) cables.
- Outside the device:
Input/output cables must be placed in conduits separate from those holding high-power cables. Preferably the I/O cables should be run along separate metal ducts which are connected to ground. All cables must be at least 3.94 in apart.

Compatibility of sensors with inputs

Compatibility of 3-wire sensors with 24 VDC inputs

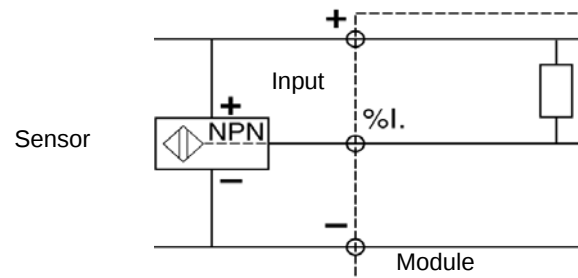
3-wire sensors and positive logic inputs (sink) IEC 1131-2 type 1 and type 2

All inductive or capacitive proximity detectors and 3-wire PNP photo-electric detectors running on 24 VDC are compatible with all positive logic inputs.



3-wire sensor and negative logic inputs (source)

All inductive or capacitive proximity detectors and 3-wire NPN photo-electric detectors running on 24 VDC are compatible with all negative logic inputs.



Compatibility of 2-wire sensors with 24 VDC inputs

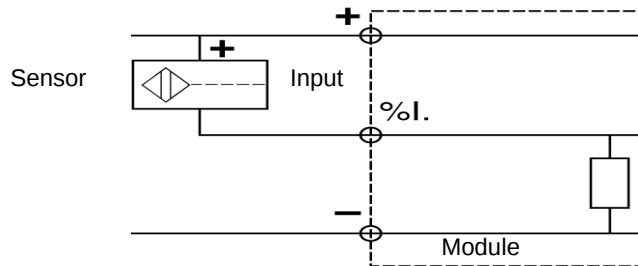
2-wire sensors and positive logic inputs (sink) IEC 1131-2 type 1

All proximity detectors or other 2-wire sensors running on 24 VDC with the following characteristics are compatible with all type 1 positive logic 24 VDC inputs in the TSX Micro range.

Voltage drop when closed: $\leq 7V$.

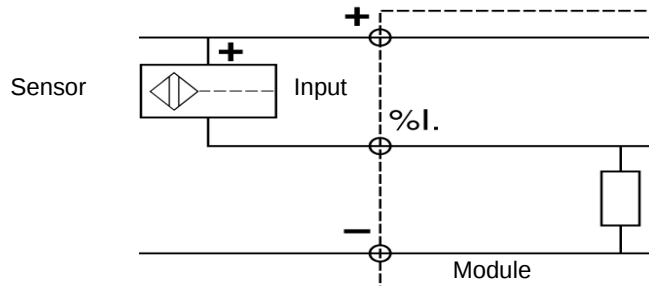
Minimum switched current: $\leq 2.5mA$.

Residual current when open: $\leq 1.5mA$.



2-wire sensors and positive logic inputs (sink) IEC 1131-2 type 2.

All 2-wire proximity detectors running on 24 VDC and complying with standard IEC 947-5-2 are compatible with all type 2 positive logic 24 VDC inputs.



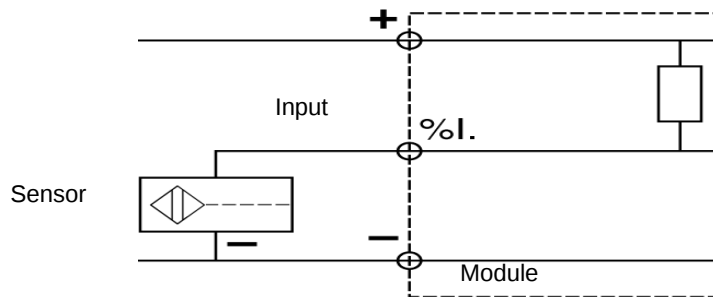
2-wire sensor and negative logic inputs (source)

All proximity detectors or other 2-wire sensors running on 24 VDC with the following characteristics are compatible with all type 1 negative logic 24 VDC inputs in the TSX Micro range.

Voltage drop when closed: $\leq 7V$.

Minimum switched current: $\leq 2.5mA$.

Residual current when open: $\leq 1.5mA$.



Compatibility of 2-wire sensors with 100/120 VAC or 200/240 VAC inputs

All 2-wire AC or AC/DC proximity detectors complying with standard IEC 947-5-2 and other sensors supporting voltages 100...120 VAC or 200...240 VAC are compatible with all 100...120 VAC IEC 1131-2 type 2 and 200...240 VAC IEC 1131-2 type 1 inputs.

Summary table

The table below shows a summary of the compatibility between sensors and inputs.

PD type	Type of inputs				
	positive logic type 1 24 VDC	24 VDC type 2 positive logic	24 VDC negative logic	100...120 VAC type 2	100...120 VAC type 1
All 3-wire PD (DC) PNP type	Compatible	Compatible			
All 3-wire PD (DC) NPN type			Compatible		
2-wire (DC) PD Telemécanique make or other with the following characteristics: Voltage drop when closed $\leq 7V$ Minimum switched current $\leq 2.5mA$ Residual current when open $\leq 1.5 mA$	Compatible	Compatible	Compatible		
2 wire (AC/DC) PD		Compatible		Compatible	Compatible (1)
2 wire (AC) PD				Compatible	Compatible (1)
Key					
DC	Operation with direct current voltage.				
AC	Operation with alternating current voltage.				
AC/DC	Operation with direct or alternating current voltage.				
(1)	Within the 220..240 VAC nominal voltage range.				

Compatibility of actuators with outputs

Compatibility of direct current actuators with outputs

Keep to the maximum current and maximum output switching frequency, which are detailed in the characteristics table.

For actuators which do not consume much power, do not forget to include the output leakage current when they are idle so that the following inequality can be checked:

$$0,1 \times I_{\text{nominal}} \geq 5 \times I_{\text{fuite}}$$

Nominal I = Current consumed by the actuator.

Leakage I = Output leakage current when idle.

Compatibility between tungsten filament lamps and static outputs

For outputs protected against short-circuits, keep to the maximum power of tungsten filament lamps which is detailed in the characteristics table. If you are not careful, there is a risk that the output will trip due to the lamp's inrush current when the lamp lights.

Compatibility of alternating current actuators with relay outputs

Inductive alternating current actuators have an inrush current which can reach 10 times the operating current for a minimum time of 2/F seconds (F = alternating current frequency). For this reason, relay outputs are designed to withstand loads AC14 and AC15.

The characteristics table for relay outputs details the maximum power (in AC) that is allowed on the retaining current according to the number of operations.

Reminder of the definition of thermal current

This is a current which can continuously accept a closed relay with an acceptable level of temperature rise. In no way can this current be switched by the relay.

Handling of Discrete input/output module faults

17

Discrete input/output diagnostics and display

At a Glance

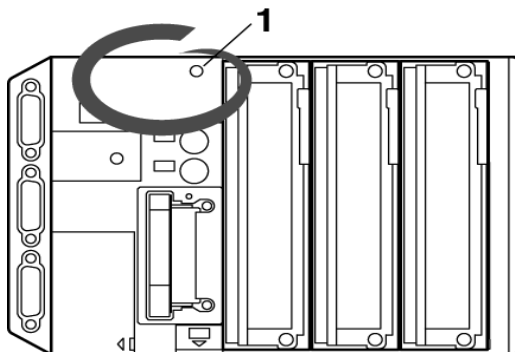
Discrete input/output diagnostics and display is carried out from:

- the I/O LED found on the front of the PLC, which groups all faults involving inputs/ outputs (the LED is lit when there is a fault),
- the centralized display **1** (see picture) on the PLC, and is used:
 - when in display mode, to display the state of each input/output in the base module or the mini-extension rack,
 - when in diagnostics mode, to display module faults (all the module LEDs flash slowly) or channel faults (the LED associated with the channel flashes quickly).

For more detailed information, see *Commissioning/Diagnostics/Maintenance*, p. 499 .

Illustration

See the picture below:



The Discrete input/output mixed module TSX DMZ 64DTK

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At a Glance

Aim of this Chapter

This chapter introduces the TSX DMZ 64DTK module, its characteristics and connections with different sensors and pre-actuators.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Introduction to the TSX DMZ 64DTK module	194
Characteristics of the TSX DMZ64DTK module	196
Connections for the TSX DMZ64DTK module	199

Introduction to the TSX DMZ 64DTK module

At a Glance

The TSX DMZ 64DTK module comprises 64 inputs/outputs distributed as follows:

- 24 VDC 32 inputs, positive logic type 1,
- 24 VDC / 0.1 A 32 static outputs.

It is equipped with 4 male HE10 connectors:

- A and B connectors on the upper part to connect inputs: A (0 to 15), B (16 to 31),
- A and B connectors on the lower part to connect outputs: A (0 to 15), B (16 to 31).

Each connector can receive:

- either a ready-wired TSX CDP •01 lead to connect directly to the terminal, sensor or pre-actuator,
- or a TSX CDP •02 ribbon cable or a TSX CDP ••3 cable for connection to the TELEFAST 2 interface.

Module:

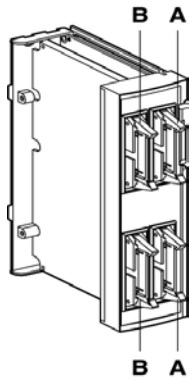
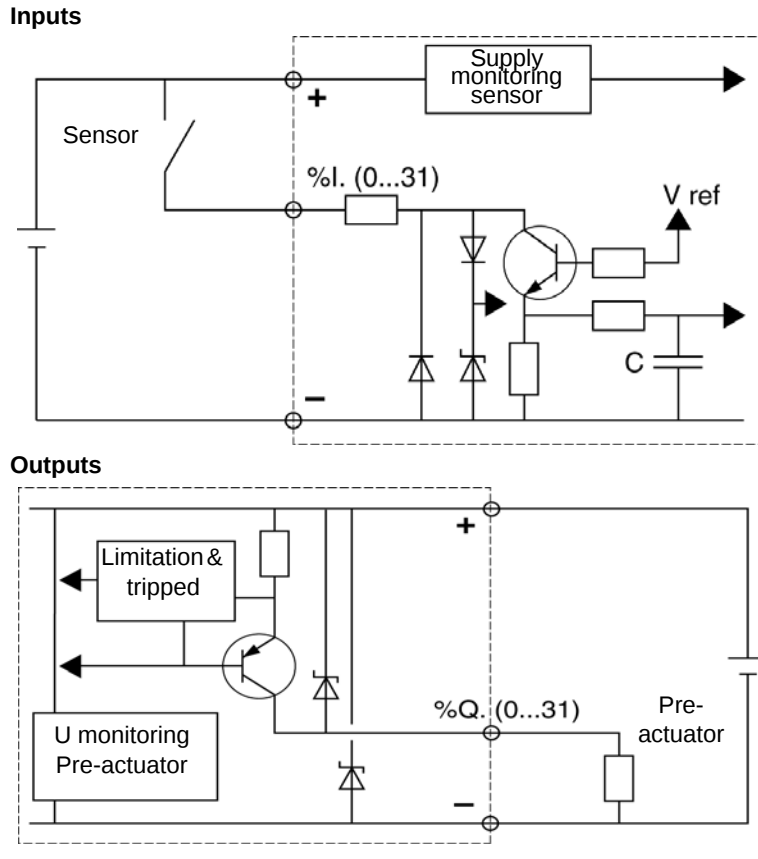


Diagram showing the principle of Inputs/Outputs



Characteristics of the TSX DMZ64DTK module

General characteristics

Modularity	Inputs	32E/24VDC.
	Outputs	32S static 24VDC/0.1A.
Current used on the internal 5V		40 mA+3.5 mA per output at 1
Current used on the sensor supply	Sink inputs	75mA+3.8mA per input at 1
Current used on the 24V actuator (excluding load current)		75mA+4.5mA per output at 1
Dissipated power in the module (load rate = 60%)		5W
Operating temperature		0 to 60°C
Dielectric strength	Input/ground or input/internal logic	1500V r.m.s. 50/60Hz 1min
	Output/ground or output/internal logic	1500V r.m.s. 50/60Hz 1min
Insulation resistance		>10MΩ under 500VDC
Hygrometry		5% to 95% without condensation
Storage temperature		-25°C to 70°C
Operating altitude		0 to 6500 ft
Temperature related performance		The characteristics at 60°C are guaranteed for 60% of inputs and 60% of outputs at state 1.

Characteristics of the 24VDC inputs

Logic			Positive
Nominal input values		Voltage	24V
		Current	3.5mA
Input threshold	In state 1	Voltage	≥ 11 V
		Current for U = 11V	> 2.5mA
	In state 0	Voltage	< 5 V
		Current	< 1.5mA
	Sensor supply (including ripple)		19V to 30V (possible up to 34V, limited to 1 hour per 24 hours)
Input impedance			6.3KΩ
Configurable response time		State 0 to 1	0.1...7.5ms
		State 1 to 0	0.1...7.5ms
Sensor voltage check threshold		OK	> 18V
		Fault	< 14V
Sensor voltage check response time	When 24V disappears		1ms<t<3ms
	When 24V appears		8ms<t<30ms
Type of inputs			Current sinks
Compliance with IEC 1131-2 type1			Type 1
DDP 2 wire compatibility			See <i>Compatibility of 2-wire sensors with 24 VDC inputs</i> , p. 187
DDP 3 wire compatibility			Yes
Reference input			To + on the supply

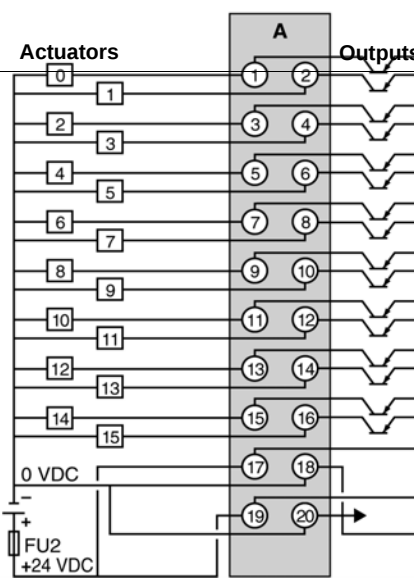
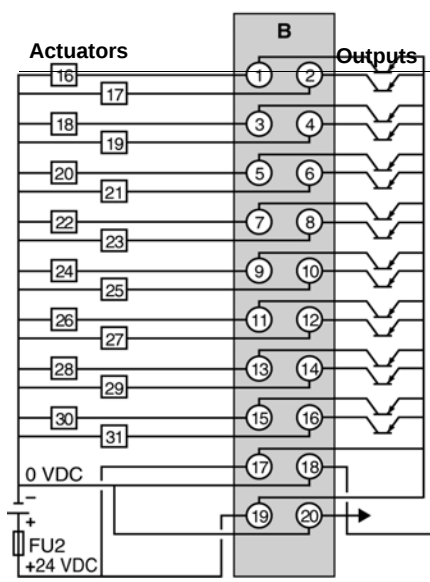
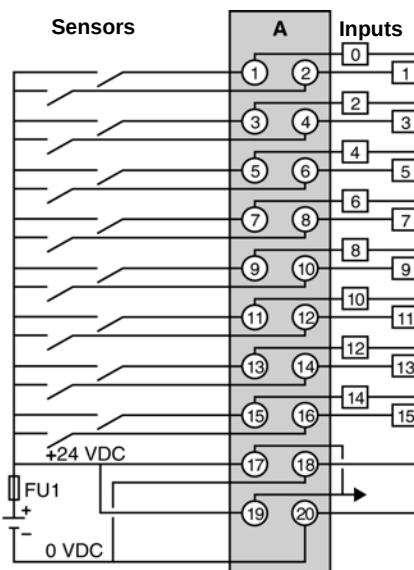
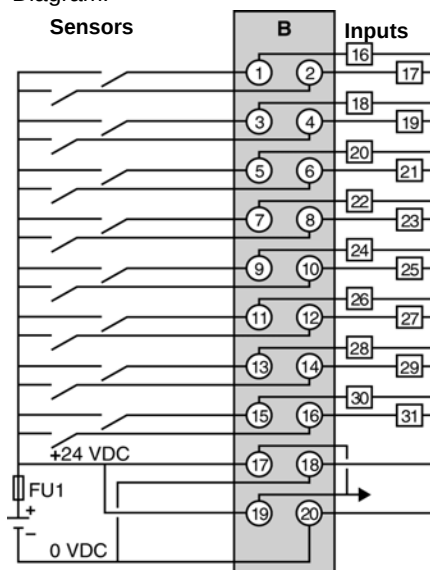
**Characteristics
of the
24VDC/0.1A
static outputs**

Logic		Positive emitted current
Nominal values	Voltage/Current	24V/0.1A
Threshold values ($U \leq 30$ or 34V, including ripple)	Voltage	19V to 30V (possible up to 34V, limited to 1 hour per 24 hours)
	Current/Channel	0.125A
	Current/Module	1.6A
Power of tungsten filament lamp		1.2W max
Leakage current	In state 0	< 0.1mA
Voltage drop	In state 1	< 1.5V
Minimum load impedance		220 Ω
Response time (1)	Transition state 0 to 1	< 250 μ s
	Transition state 1 to 0	< 250 μ s
Switching frequency on inductive load		< 0.5/LI ² H
Compliance with IEC 1131-2		Yes
Output parallelization		Yes, 3 outputs maximum
Compatibility with direct current inputs		All 24VDC IEC 1131-2 type 1 and type 2 inputs
Common of loads		To - on the supply
Built-in protection measures	Against overloads and short-circuits	By current limiter and electronic circuit breaker 125mA $\leq$ 1d $\leq$ 185mA
	Against excess voltage	Yes, by Zener diode
	Against polarity inversions	Yes, by reverse diode on the supply. Plan for a fuse on +24V of the actuators' supply (2A fast-blow type)
Actuator voltage check threshold	OK	> 18V
	Fault	< 14V
Check response time	On appearance	T<4ms
	On disappearance	T<30ms
Dissipated power per channel at state 1		0.07W (for U=24V)
(1): All outputs are equipped with circuits for rapid demagnetizing of solenoids. Solenoid load time < L/R.		

Connections for the TSX DMZ64DTK module

Wiring for Sensors/Inputs and Actuators/Outputs

Diagram:



FU1 = 0.5A fuse with rapid fusion.

FU2 = 2A fuse with rapid fusion.

**Correspondence
between the
HE10 connector
pins and the
TSX CDP .01
wires with a pre-
wired strand.**

A and B sensor/input Wiring

Connection terminals	Wire color (sensor side)
1	White
2	Brown
3	Green
4	Yellow
5	Gray
6	Pink
7	Blue
8	Red
9	Black
10	Purple
11	Gray/Pink
12	Red/Blue
13	White-green
14	Brown-green
15	White-yellow
16	Yellow-brown
17	White/Gray
18	Gray/Brown
19	White/Pink
20	Pink/Brown

A and B actuator/output connectors

Connection terminals	Wire colors actuator side
1	White
2	Brown
3	Green
4	Yellow
5	Gray
6	Pink
7	Blue
8	Red
9	Black
10	Purple
11	Gray/Pink
12	Red/Blue
13	White-green
14	Brown-green
15	White-yellow
16	Yellow-brown
17	White/Gray
18	Gray/Brown
19	White/Pink
20	Pink/Brown

The Discrete input/output mixed module TSX DMZ 28DTK

19

At a Glance

Aim of this Chapter

This chapter introduces the TSX DMZ 28DTK module, its characteristics and connections with different sensors and pre-actuators.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
TSX DMZ 28DTK module	204
Characteristics of the module TSX DMZ 28DTK	206
Connections of the TSX DMZ28DTK module	209

TSX DMZ 28DTK module

Introduction

The TSX DMZ 28DTK module comprises 28 inputs/outputs distributed as follows:

- 16 24VDC inputs, positive logic type 1,
- 12 static outputs 24VDC/0,5A.

The module is equipped with 2 male HE10 connectors:

- connector A to connect inputs,
- connector B to connect outputs,

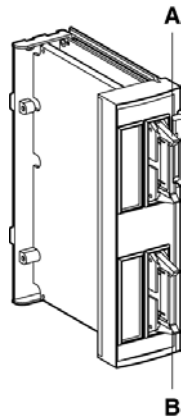
Each connector can receive:

- either a TSX CDP •01 pre-wired strand for direct connection onto the terminal, sensor or pre-actuator,
- or a TSX CDP••3 cable for connection to TELEFAST 2 wiring interface.

Note: A TSX CDP .02 antenna can be used for connection to TELEFAST 2 wiring interface, only for the input part (connector A).

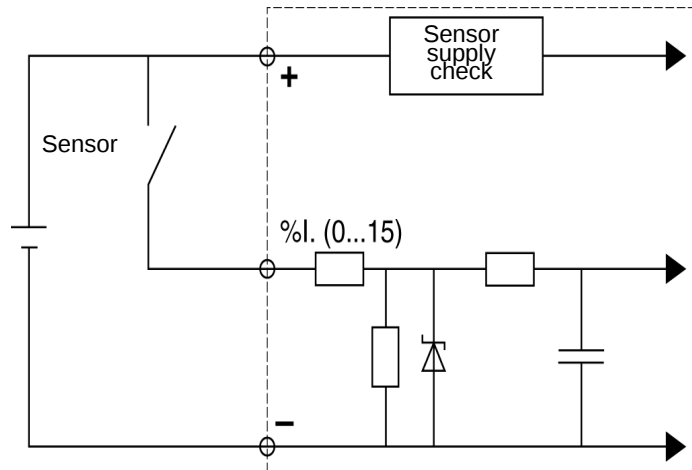
Illustration

Module:

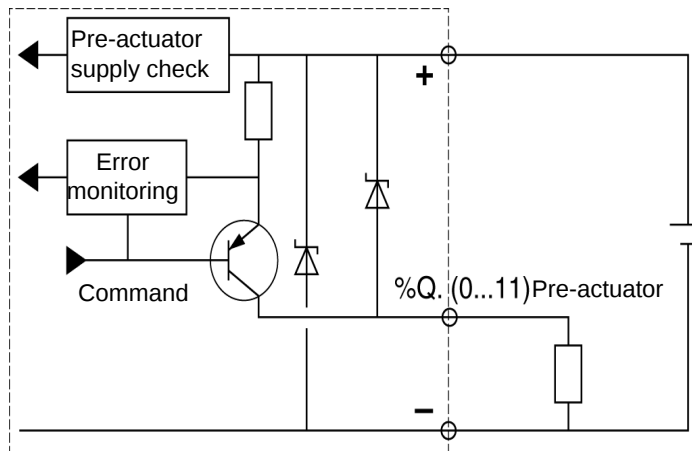


Process diagrams for inputs/outputs

Inputs:



Outputs:



Characteristics of the module TSX DMZ 28DTK

General characteristics

Modularity	Inputs	16E/24VDC
	Outputs	12S static 24VDC/0.5A
Current used on the internal 5V		30 mA+3.2 mA per output at 1
Current used on the sensor supply	Sink inputs	20mA+7mA per output at 1
Current used on the 24V actuator (excluding load current)		40mA+1mA per output at 1
Dissipated power in the module (load rate = 60%)		5W
Operating temperature		0 to 60°C
Dielectric strength	Input/ground or input/internal logic	1500V r.m.s. 50/60Hz 1min
	Output/ground or output/internal logic	1500V r.m.s. 50/60Hz 1min
Insulation resistance		>10MΩ under 500VDC
Hygrometry		5% to 95% without condensation
Storage temperature		-25°C to 70°C
Operating altitude		0 to 6500 ft
Temperature related performance		The characteristics at 60°C are guaranteed for 60% of inputs and 60% of outputs at state 1.

Characteristics of the 24VDC inputs

Logic			Positive
Nominal input values		Voltage	24V
		Current	7mA
Input threshold	In state 1	Voltage	≥ 11 V
		Current for U = 11V	> 2.5mA
	In state 0	Voltage	< 5 V
		Current	< 1.5mA
	Sensor supply (including ripple)		19V to 30V (possible up to 34V, limited to 1 hour per 24 hours)
Input impedance			3.4kΩ
Configurable response time		State 0 to 1	0.1...7.5ms
		State 1 to 0	0.1...7.5ms
Sensor voltage check threshold		OK	> 18V
		Fault	< 14V
Sensor voltage check response time	When 24V disappears		1ms<t<3ms
	When 24V appears		8ms<t<30ms
Type of inputs			Current sinks
Compliance with IEC 1131-2 type1			Type 2
DDP 2 wire compatibility			See <i>Compatibility of 2-wire sensors with 24 VDC inputs, p. 187</i>
DDP 3 wire compatibility			Yes
Reference input			To + on the supply

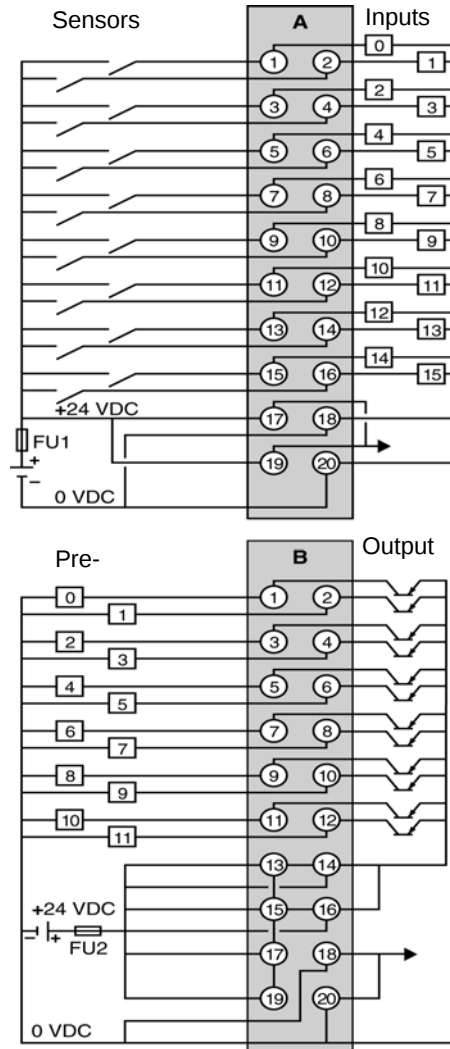
**Characteristics
of the 24VDC/
0.5A static
outputs**

Logic		Positive emitted current
Nominal values	Voltage/Current	24V/0.5A
Threshold values ($U \leq 30$ or 34V, including ripple)	Voltage	19V to 30V (possible up to 34V, limited to 1 hour per 24 hours)
	Current/Channel	0.625A
	Current/Module	6A
Power of tungsten filament lamp		10W max.
Leakage current (state 0)	During normal operation	< 0.5mA
	When module 0V is accidentally disconnected	< 2mA
Voltage drop	state 1	< 1V (for I = 0.5A)
Minimum load impedance		48 Ω
Response time (1)	Transition state 0 to 1	< 500 μ s
	Transition state 1 to 0	< 500 μ s
Switching frequency on inductive load		< 0.6/LI ² Hz
Compliance with IEC 1131-2		Yes
Output parallelization		Yes, 2 outputs maximum
Compatibility with direct inputs		All the 24VDC IEC 1131-2 type 1 and type 2 inputs with input impedance < 15 K Ω
Common of loads		To - on the supply
Built-in protection measures	Against overloads and short-circuits	By current limiter and thermal circuit breaker 0.75A<=1d<=2A
	Against excess voltage	Yes, by Zener diode
	Against polarity inversions	Yes, by reverse diode on supply. Plan for a fast-blow fuse on the +24V of the actuator's supply (6.3A)
Actuator voltage check threshold	OK	> 18V
	Fault	< 14V
Check response time	On appearance	T<4ms
	On disappearance	T<30ms
Dissipated power per channel at state 1		0.45W (for U=24V)
(1): All outputs are equipped with circuits for rapid demagnetizing of solenoids. Solenoid load time < L/R.		

Connections of the TSX DMZ28DTK module

Sensor/input and pre-actuator/output Wiring

Diagram:



FU1 = 0.5A fuse with rapid fusion.

FU2 = 6.3A fuse with rapid fusion.

**Correspondence
between the
HE10 connector
pins and the
different TSX
CDP .01 wires
with a strand.**

Connector A sensors/inputs

Connector terminals	Wire color (sensor side)
1	White
2	Brown
3	Green
4	Yellow
5	Gray
6	Pink
7	Blue
8	Red
9	Black
10	Purple
11	Gray/Pink
12	Red/Blue
13	White-green
14	Brown-green
15	White-yellow
16	Yellow-brown
17	White/Gray
18	Gray/Brown
19	White/Pink
20	Pink/Brown

Pre-actuator/Output B connectors

Connector terminals	Pre-actuator colored wire
1	White
2	Brown
3	Green
4	Yellow
5	Gray
6	Pink
7	Blue
8	Red
9	Black
10	Purple
11	Gray/Pink
12	Red/Blue
13	White-green
14	Brown-green
15	White-yellow
16	Yellow-brown
17	White/Gray
18	Gray/Brown
19	White/Pink
20	Pink/Brown

The Discrete input/output mixed module TSX DMZ 28DT

20

At a Glance

Aim of this Chapter

This chapter describes the TSX DMZ 28DT module, its characteristics and connections with different sensors and pre-actuators.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Module TSX DMZ 28DT	214
Characteristics of the module TSX DMZ 28DT	216
links of the TSX DMZ 28DT module	219

Module TSX DMZ 28DT

At a Glance

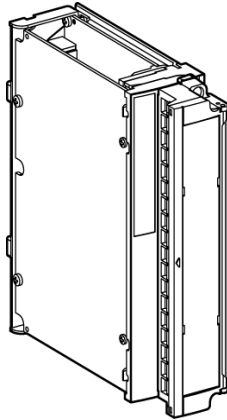
Module TSX DMZ 28DT comprises 28 inputs/outputs distributed as follows:

- 16 24VDC inputs, positive logic type 1,
- 12 static outputs 24VDC/0,5A.

The module is equipped with a 35 post screwed connection terminal block, a carriage allowing inputs and outputs to be linked:

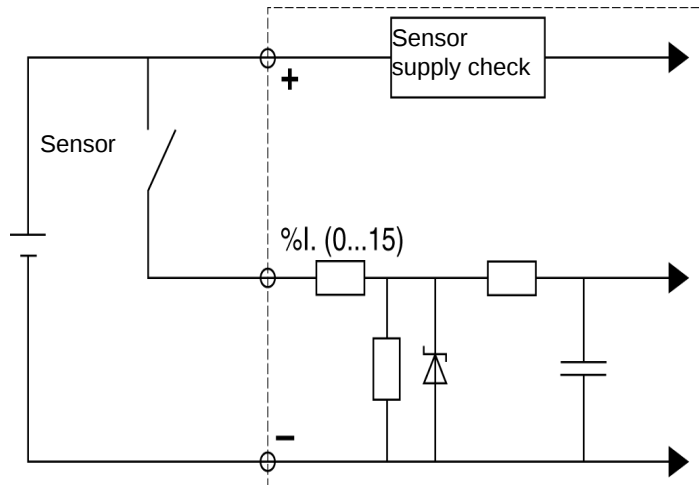
Illustration

Module:

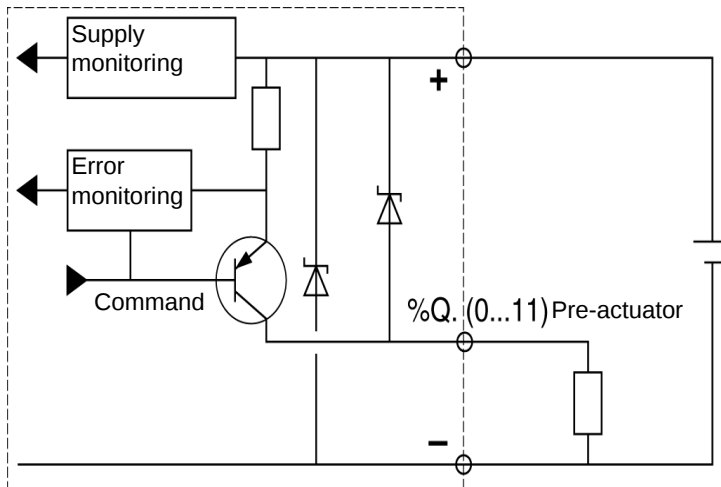


Process diagrams of inputs/outputs

Inputs:



Outputs:



Characteristics of the module TSX DMZ 28DT

General characteristics

Modularity	Inputs	16E/24VDC
	Outputs	12S static 24VDC/0.5A
Current used on the internal 5V		30 mA+3.2 mA per output at 1
Current used on the sensor supply	Sink inputs	20mA+7mA per output at 1
Current used on the 24V actuator (excluding load current)		40mA+1mA per output at 1
Dissipated power in the module (load rate = 60%)		5W
Operating temperature		0 to 60°C
Dielectric strength	Input/ground or input/internal logic	1500V r.m.s. 50/60Hz 1min
	Output/ground or output/internal logic	1500V r.m.s. 50/60Hz 1min
Insulation resistance		>10MΩ under 500VDC
Hygrometry		5% to 95% without condensation
Storage temperature		-25°C to 70°C
Operating altitude		0 to 6500 ft
Temperature related performance		The characteristics at 60°C are guaranteed for 60% of inputs and 60% of outputs at state 1.

Characteristics of the 24VDC inputs

Logic			Positive
Nominal input values		Voltage	24V
		Current	7mA
Input threshold	In state 1	Voltage	≥ 11 V
		Current for U = 11V	> 2.5mA
	In state 0	Voltage	< 5 V
		Current	< 1.5mA
	Sensor supply (including ripple)		19V to 30V (possible up to 34V, limited to 1 hour per 24 hours)
Input impedance			3.4KΩ
Configurable response time		State 0 to 1	0.1...7.5ms
		State 1 to 0	0.1...7.5ms
Sensor voltage check threshold		OK	> 18V
		Fault	< 14V
Sensor voltage check response time	When 24V disappears		1ms<t<3ms
	When 24V appears		8ms<t<30ms
Type of inputs			Current sinks
Compliance with IEC 1131-2 type 1			Type 2
DDP 2 wire compatibility			See <i>Compatibility of 2-wire sensors with 24 VDC inputs, p. 187</i>
DDP 3 wire compatibility			Yes
Reference input			To + on the supply

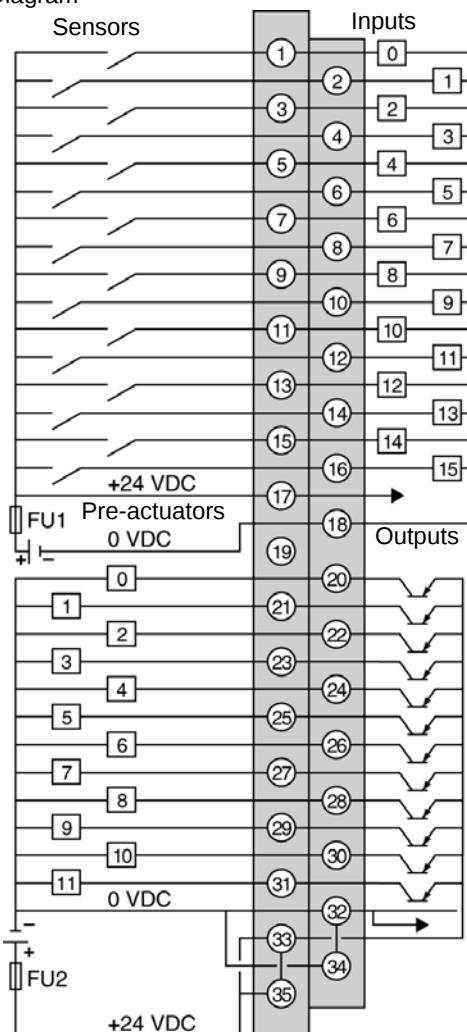
Characteristics of the 24VDC/0.5A static outputs

Logic		Positive emitted current
Nominal values	Voltage/Current	24V/0.5A
Threshold values ($U \leq 30$ or 34V, including ripple)	Voltage	19V to 30V (possible up to 34V, limited to 1 hour per 24 hours)
	Current/Channel	0.625A
	Current/Module	6A
Power of tungsten filament lamp		10W max.
Leakage current (state 0)	During normal operation	< 0.5mA
	When module 0V is accidentally disconnected	< 2mA
Voltage drop	state 1	< 1V (for $I = 0.5A$)
Minimum load impedance		48 Ω
Response time (1)	Transition state 0 to 1	< 500 μs
	Transition state 1 to 0	< 500 μs
Switching frequency on inductive load		< 0.6/LI ² Hz
Compliance with IEC 1131-2		Yes
Output parallelization		Yes, 2 outputs maximum
Compatibility with direct inputs		All the 24VDC IEC 1131-2 type 1 and type 2 inputs with input impedance < 15 K Ω
Common of loads		To - on the supply
Built-in protection measures	Against overloads and short-circuits	By current limiter and thermal circuit breaker 0.75A $\leq$ 1d $\leq$ 2A
	Against excess voltage	Yes, by Zener diode
	Against polarity inversions	Yes, by reverse diode on supply. Plan for a fast-blow fuse on the +24V of the actuator's supply (6.3A)
Actuator voltage check threshold	OK	> 18V
	Fault	< 14V
Check response time	On appearance	T<4ms
	On disappearance	T<30ms
Dissipated power per channel at state 1		0.45W (for U=24V)
(1): All outputs are equipped with circuits for rapid demagnetizing of solenoids. Solenoid load time < L/R.		

links of the TSX DMZ 28DT module

Sensor/input connections and pre-actuator/outputs

Diagram



FU1 = 0.5A fuse with rapid fusion.

FU2 = 6.3A fuse with rapid fusion.

The Discrete input/output mixed module TSX DMZ 28DR

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At a Glance

</

Module TSX DMZ 28DR

At a Glance

Module TSX DMZ 28DR comprises 28 inputs/outputs distributed as follows:

- 16 24VDC inputs, positive logic type 1, or negative logic,
- 12 relay outputs.

The module is equipped with a detachable 35 post screwed connection terminal block.

The inputs can be:

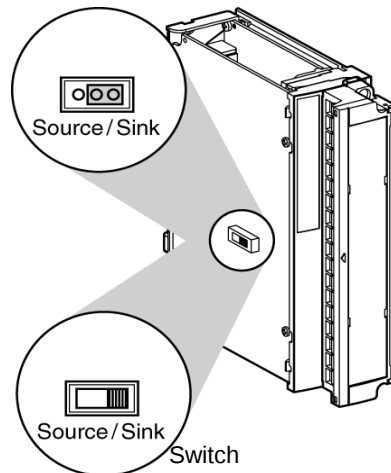
- either positive logic (sink position), in which case the common for the sensors is connected to the + on the supply,
- or negative logic (source position), in which case the common for the sensors is connected to the - on the supply.

The choice is made by:

- positioning a switch or jumper on the module to enable physical adaptation. By default, the material configuration is sink (positive logic),
- software configuration to adapt the signals to the logical direction.

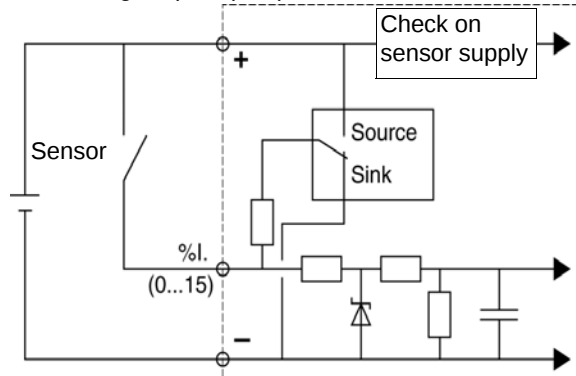
Illustration

Jumper

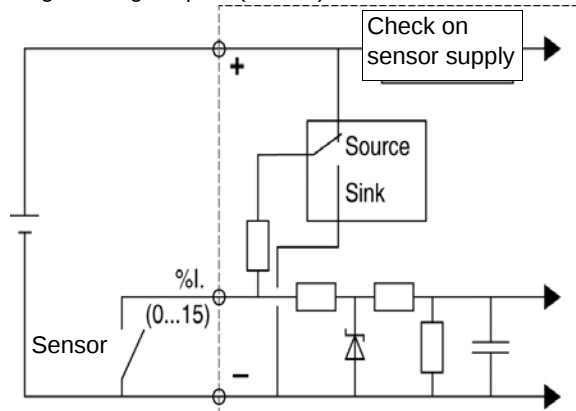


Process diagrams of inputs/outputs

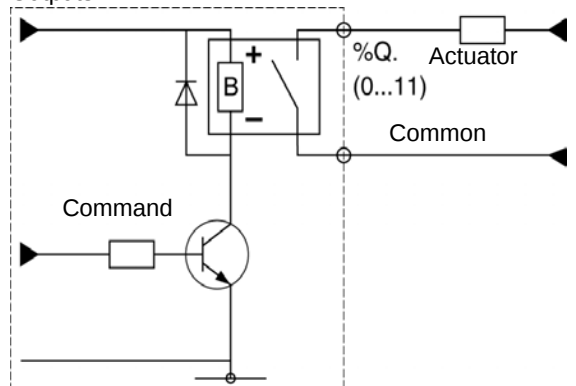
Positive logic inputs (sink):

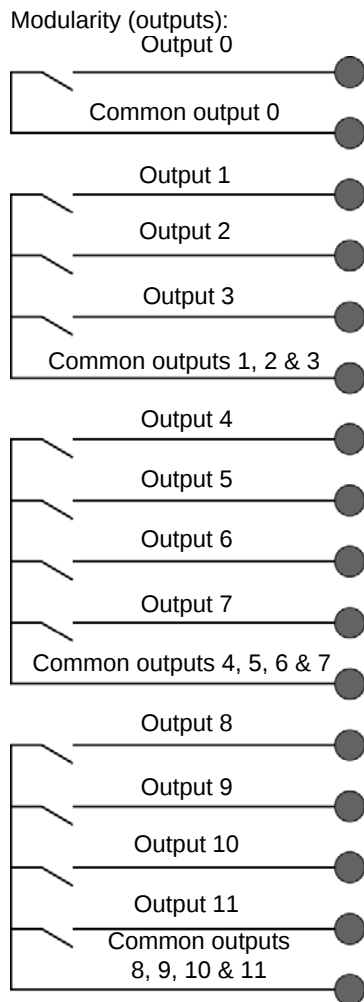


Negative logic inputs (source):



Outputs:





Note: To ensure the service reliability of the relay contact, it is mandatory to fit the following to the actuators' terminals:

- an RC circuit or MOV (ZNO) suppressor for use with alternating current,
- a discharge diode for use with direct currents.

Characteristics of the module TSX DMZ 28DR

General characteristics

Modularity	Inputs	16E/24VDC.
	Outputs	12S relay
Current used on the internal 5V		45 mA
Current used on the sensor supply	Sink inputs	15mA+9mA per output at 1
	Source inputs	35mA+6mA per input at 1
Current used on the 24V relay (1)		5mA+10mA per output at 1
Dissipated power in the module (load rate = 60%)		4.5W
Operating temperature		0 to 60°C
Dielectric strength	Input/ground or input/internal logic	1500V r.m.s. 50/60Hz 1min
	Output/ground or output/internal logic	2,000V r.m.s. 50/60Hz 1min
Insulation resistance		>10MΩ under 500VDC
Hygrometry		5% to 95% without condensation
Storage temperature		-25°C to 70°C
Operating altitude		0 to 6500 ft
Temperature related performance		The characteristics at 60°C are guaranteed for 60% of inputs and 60% of outputs at state 1.
(1) If the 24V relay is delivered by an external supply (as in the mini-extension rack in particular), the value of this supply must be within a maximum tolerance of 24V +/-10%.		

Characteristics of the 24VDC inputs

Logic			Positive or negative
Nominal input values	Voltage		24V
	Current	Positive logic	9mA
		Negative logic	-6mA
Input threshold	In state 1	Voltage (positive logic)	≥ 11 V
		Voltage (negative logic)	≤ 8 V
		Current for U = 11V	> 2.5 mA
	In state 0	Voltage (positive logic)	< 5 V
		Voltage (negative logic)	> Ual - 5 V
		Current	< 1.5 mA
	Sensor supply (including ripple)		19V to 30V (possible up to 34V, limited to 1 hour per 24 hours)
Input impedance		Positive logic	2.4KΩ
		Negative logic	4KΩ
Configurable response time		State 0 to 1	0.1...7.5ms
		State 1 to 0	0.1...7.5ms
Sensor voltage check threshold		OK	> 18V
		Fault	< 14V
Sensor voltage check response time	When 24V disappears		1ms<t<3ms
	When 24V appears		8ms<t<30ms
Type of inputs			Resistive.
Compliance with IEC 1131-2 type 1	Positive logic input		Type 1
	Negative logic input		Not specified in the standard
DDP 2 wire compatibility		See <i>Compatibility of 2-wire sensors with 24 VDC inputs</i> , p. 187	
DDP 3 wire compatibility			Yes
Reference input (selected by switch located on the module and by software)	Positive logic		To + on the supply
	Negative logic		To - on the supply

Characteristics of the relay outputs

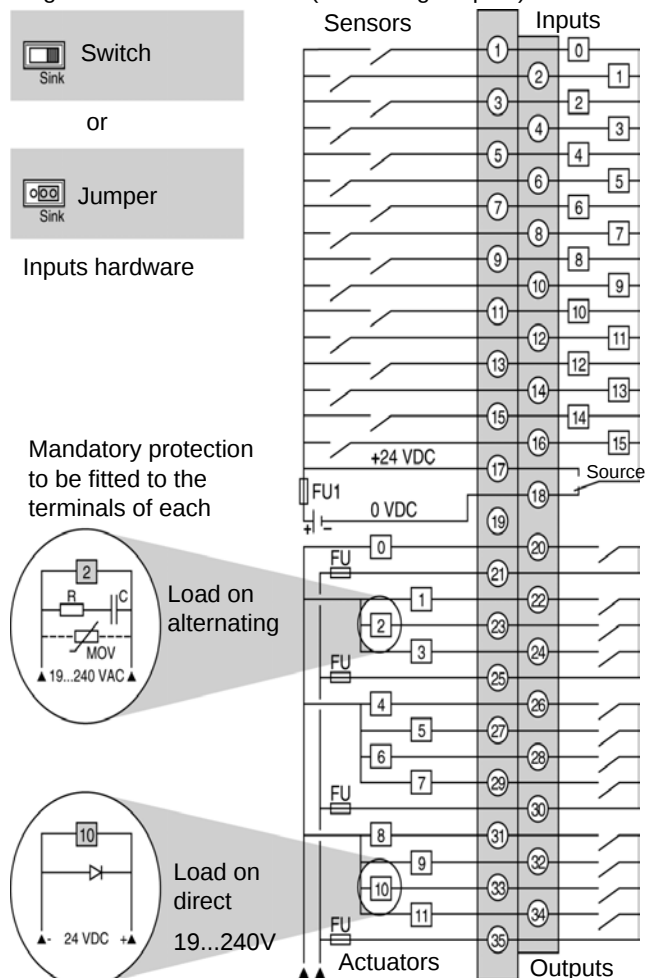
Job limit voltage		Direct/ alternating	10 to 34VDC/19 to 264VAC			
Thermal current		3A				
Common maximum current		5A				
Alternating current load	Resistive load AC12	Voltage	24VAC	48VAC	110VAC	220VAC
		Power	50VA (5)	50VA (6) 110VA (4)	110VA (6) 220VA (4)	220VA (6)
	Inductive regime AC14 and AC15.	Voltage	24VAC	48VAC	110VAC	220VAC
		Power	24VA (4)	10VA (10) 24VA (8)	10VA (11) 50VA (7) 110VA (2)	10VA (11) 50VA (9) 110VA (6) 220VA (1)
Direct current load	Resistive load DC12	Voltage	24VDC			
		Power	24W (6) 40W (3)			
	Inductive regime DC13 (L/R=60 ms)	Voltage	24VDC			
		Power	10W (8) 24W (6)			
	Minimum switchable load		1mA/5V			
Response time (1)	On trigger		<10ms			
	Trigger		<10ms			
Type of contact			On close			
(1): 0.1x10 ⁶ operations (2): 0.15 x 10 ⁶ operations (3): 0.3 x 10 ⁶ operations (4): 0.5 x 10 ⁶ operations		(5): 0.7x10 ⁶ operations (6): 1x10 ⁶ operations (7): 1.5x10 ⁶ operations (8): 2x10 ⁶ operations		(9): 3x10 ⁶ operations (10): 5x10 ⁶ operations (11): 10x10 ⁶ operations		

Built-in protection measures	Against overloads and short-circuits	None It is mandatory to fit a fast-blow fuse per channel or group of channels
	Against alternating current inductive overload	None An RC circuit or MOV (ZNO) suppressor appropriate to the voltage must be mounted parallel to the terminals of each actuator.
	Against direct current inductive overload	None A discharge diode must be mounted on the terminals of each actuator
(1): 0.1×10^6 operations (2): 0.15×10^6 operations (3): 0.3×10^6 operations (4): 0.5×10^6 operations	(5): 0.7×10^6 operations (6): 1×10^6 operations (7): 1.5×10^6 operations (8): 2×10^6 operations	(9): 3×10^6 operations (10): 5×10^6 operations (11): 10×10^6 operations

Connections of the TSX DMZ 28DR module

Wiring for Sensors/Inputs and Actuators/Outputs

Diagram of TSX DMZ 28DR ("SINK" logic inputs):

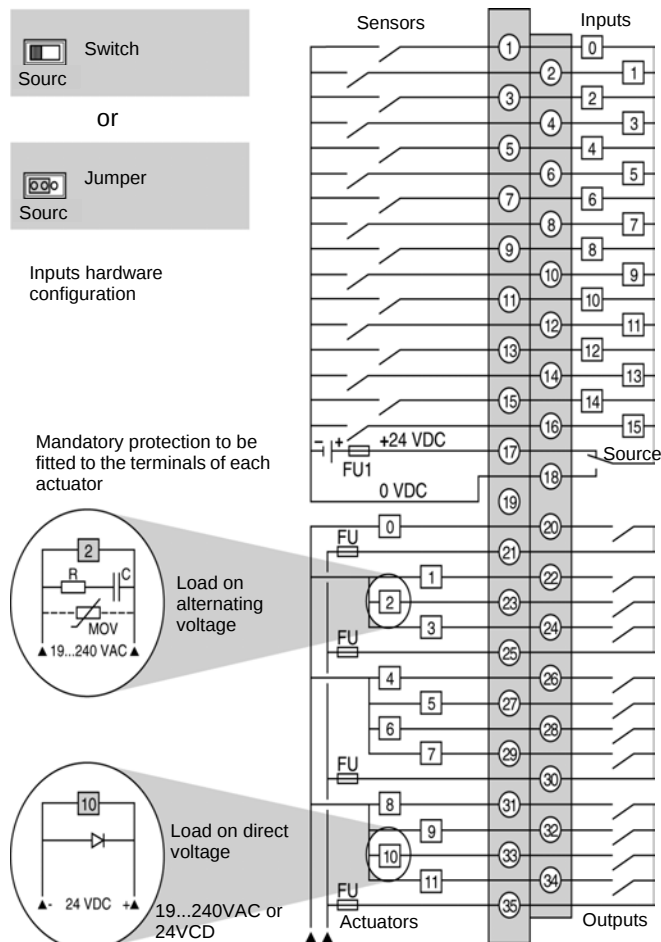


FU1 = 0.5A fast-blow fuse.

FU = Fast-blow fuses to be calibrated according to the load.

Note: In the case where the supply voltage of the actuators is obtained from a triple-phase network and is equal to or greater than 200VAC, the actuators must be supplied from the same phase.

Diagram of TSX DMZ 28DR ("Source" negative logic inputs)



FU1 = 0.5A fast-blow fuse.

FU = Fast-blow fuses to be calibrated according to the load

Note: In the case where the supply voltage of the actuators is obtained from a triple-phase network and is equal to or greater than 200VAC, the actuators are supplied from the same phase.

The Discrete input/output mixed module TSX DMZ 28AR

22

At a Glance

Aim of this Chapter

This chapter introduces the TSX DMZ 28AR module, its characteristics and connections to different sensors and pre-actuators.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Module TSX DMZ 28AR	232
Characteristics of the module TSX DMZ 28AR	234
links of the TSX DMZ 28AR module	237

Module TSX DMZ 28AR

At a Glance

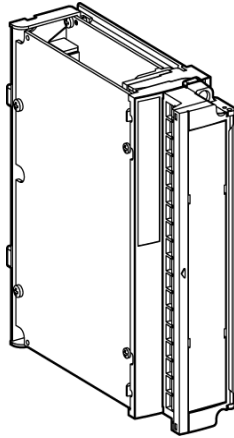
Module TSX DMZ 28AR comprises 28 inputs/outputs distributed as follows:

- 16 inputs 110/120VAC,
- 12 relay outputs.

The module is equipped with a screw terminal block, removable and with 35 terminals, allowing the connection of inputs and outputs.

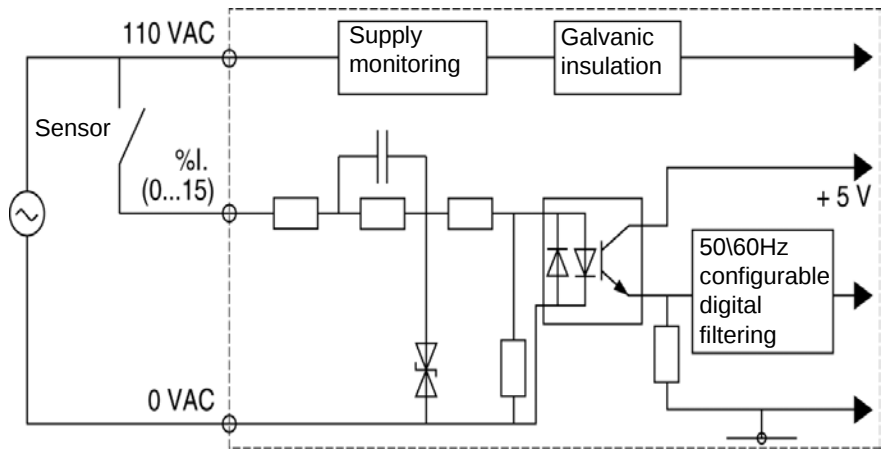
Illustration

Module:

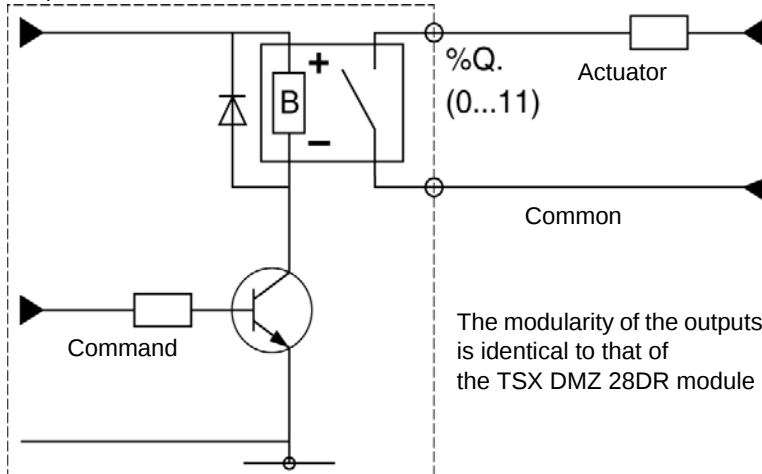


Process diagrams of inputs/outputs

Inputs:



Outputs:



The modularity of the outputs is identical to that of the TSX DMZ 28DR module

Note: To ensure the service reliability of the relay contact, it is mandatory to fit the following to the actuators' terminals:

- an RC circuit or MOV (ZNO) suppressor for use with alternating current,
- a discharge diode for use with direct currents.

Characteristics of the module TSX DMZ 28AR

General characteristics

Modularity	Inputs	16E/110 to 120VAC
	Outputs	12S relay
Current used on the internal 5V		40 mA
Current used on the sensor supply	Sink inputs	13mA+13mA per input at 1
Current used on the 24V relay (1)		5mA+10mA per output at 1
Dissipated power in the module (load rate = 60%)		5.6W
Operating temperature		0 to 60°C
Dielectric strength	Input/ground or input/internal logic	2,000V r.m.s. 50/60Hz 1min
	Output/ground or output/internal logic	2,000V r.m.s. 50/60Hz 1min
Insulation resistance		>10MΩ under 500VDC
Hygrometry		5% to 95% without condensation
Storage temperature		-25°C to 70°C
Operating altitude		0 to 6500 ft
Temperature related performance		The characteristics at 60°C are guaranteed for 60% of inputs and 60% of outputs at state 1.
(1) If the 24V is delivered by an external supply (as in the mini-extension rack in particular), the value of this supply must be within a maximum tolerance of 24V +/- 10%.		

**Characteristics
of the
100...120VAC
inputs**

Nominal input values	Voltage		100...120V
	Current	50 Hz	11mA
		60 Hz	13mA
	Nominal		50/60 Hz
Input threshold	In state 1	Voltage	≥ 74 V
		Current for U = 74V	> 6mA
	In state 0	Voltage	< 20V
		Current	< 4mA
	Nominal		47...63 Hz
	Sensor supply		85...132V
	Peak current on trigger		160mA RC = 1kΩ/0.33μF
Configurable response time	State 0 to 1	50 Hz	11...18ms
		60 Hz	9...16ms
	State 1 to 0	50 Hz	11...24ms
		60 Hz	10...22ms
Sensor voltage check threshold		OK	> 82V
		Fault	<Ucom+10V (1)
Sensor voltage check response time	On disappearance		5ms<t<11ms
	On appearance		20ms<t<50ms
Type of inputs			Capacitive
Compliance with IEC 1131-2 type 1			Type 2
DDP 2 wire compatibility			See <i>Compatibility of 2-wire sensors with 24 VDC inputs</i> , p. 187
(1) Ucom = real switching voltage of the input. This value (Ucom + 10V) ensures coherence between the threshold of the sensor voltage check and that of the inputs.			

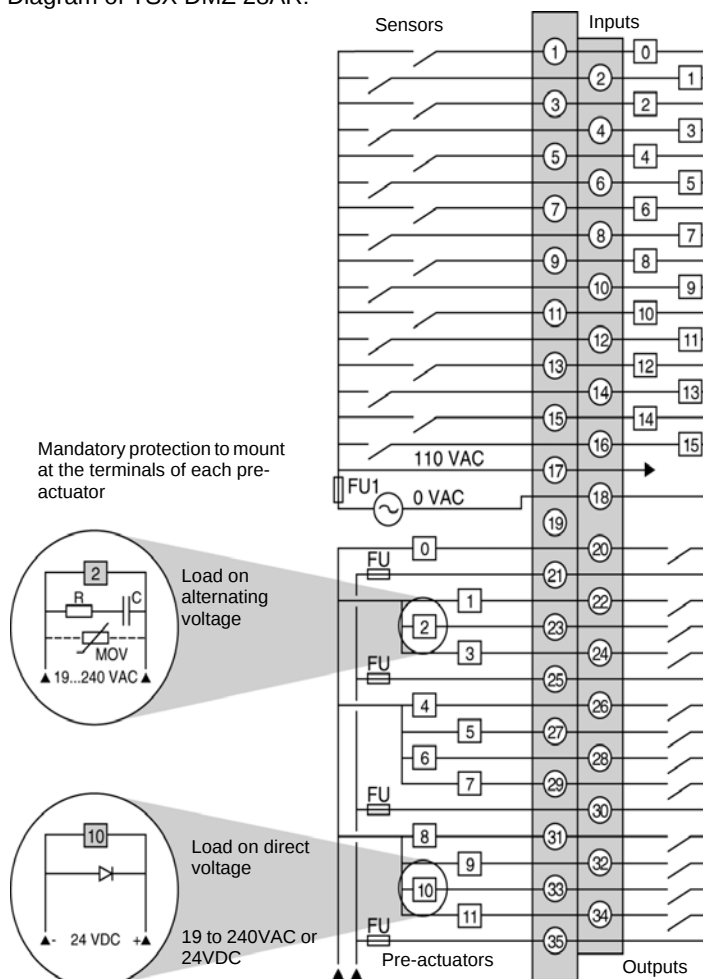
Characteristics of the relay outputs

Threshold operating voltage		Direct/ alternating	10 to 34VDC/19 to 264VAC			
Thermal current		3A				
Common maximum current		5A				
Alternating current load	Resistive load AC12	Voltage	24VAC	48VAC	110VAC	220VAC
		Power	50VA (5)	50VA (6) 110VA (4)	110VA (6) 220VA (4)	220VA (6)
	Inductive regime AC14 and AC15.	Voltage	24VAC	48VAC	110VAC	220VAC
		Power	24VA (4)	10VA (10) 24VA (8)	10VA (11) 50VA (7) 110VA (2)	10VA (11) 50VA (9) 110VA (6) 220VA (1)
Direct current load	Resistive load DC12	Voltage	24VDC			
		Power	24W (6) 40W (3)			
	Inductive regime DC13 (L/R=60 ms)	Voltage	24VDC			
		Power	10W (8) 24W (6)			
	Minimum switchable load		1mA/5V			
Response time (1)	On trigger	<10ms				
	Trigger	<10ms				
Type of contact			On close			
Built-in protection measures	Against overloads and short-circuits		None It is mandatory to fit a fast-blow fuse per channel or group of channels			
	Against alternating current inductive overload		None An RC circuit or MOV (ZNO) suppressor appropriate to the voltage must be mounted parallel to the terminals of each actuator.			
	Against direct current inductive overload		None A discharge diode must be mounted on the terminals of each actuator			
(1): 0.7x10 ⁶ operations (2): 0.15 x 10 ⁶ operations (3): 0.3 x 10 ⁶ operations (4): 0.5 x 10 ⁶ operations		(5): 0.7x10 ⁶ operations (6): 1x10 ⁶ operations (7): 1.5x10 ⁶ operations (8): 2x10 ⁶ operations		(9): 3x10 ⁶ operations (10): 5x10 ⁶ operations (11): 10x10 ⁶ operations		

Links of the TSX DMZ 28AR module

Sensor/input connections and pre-actuator/outputs

Diagram of TSX DMZ 28AR:



FU1 = 0.5A fuse with rapid fusion.

FU = Fast blow fuses to be calibrated according to the load.

Note: In this case where the supply voltage of the pre-actuators is obtained from a triple-phase network and it is equal to or greater than 200VAC, the pre-actuators should be supplied starting at the same phase.

Discrete input module

TSX DEZ 32D2

23

At a Glance

Aim of this Chapter

This chapter introduces the TSX DEZ 32D2 module, its characteristics and connections to different sensors and pre-actuators.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Module TSX DEZ 32D2	240
Characteristics of the TSX DEZ 32D2 module	241
links of the TSX DEZ 32D2 module	243

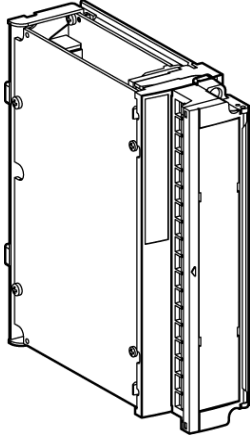
Module TSX DEZ 32D2

At a Glance

The module TSX DEZ 32D2 consists of 32 24VDC positive logic inputs, type 2. The module is equipped with a removable 35 post screwed connection terminal block, allowing sensors to be linked with supplies.

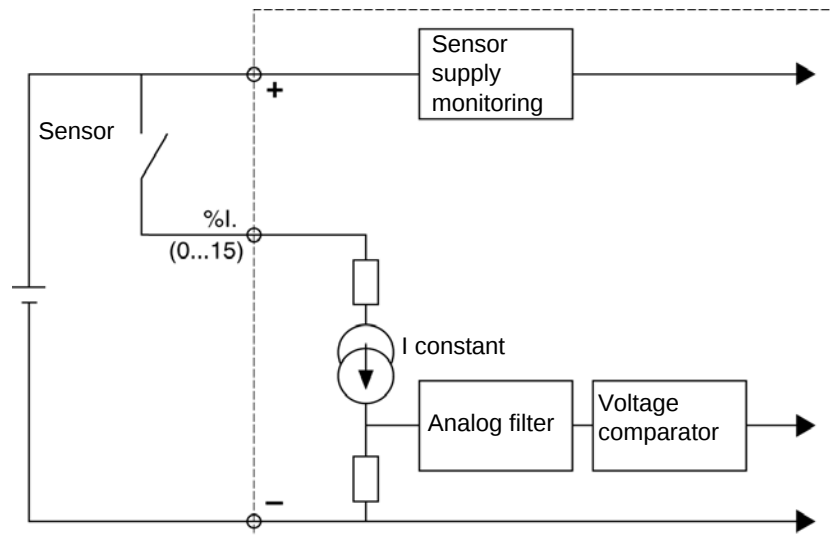
Illustration

Module:



Process diagrams for an input

Input:



Characteristics of the TSX DEZ 32D2 module

General characteristics

Table

Modularity	Inputs 32E/24VDC
Current used on the internal 5V	60mA
Current used on the sensor supply	30mA+7mA per output at 1
Dissipated power in the module (load rate = 60%)	6W
Operating temperature	0 to 60°C
Dielectric strength Input/ground	1500V r.m.s. 50/60Hz 1min
Insulation resistance	>10MΩ under 500VDC
Hygrometry	5% to 95% without condensation
Storage temperature	-25°C to 70°C
Operating altitude	0 to 6500 feet
Temperature related performance	The characteristics at 60°C are guaranteed for 60% of inputs and 60% of outputs at state 1.

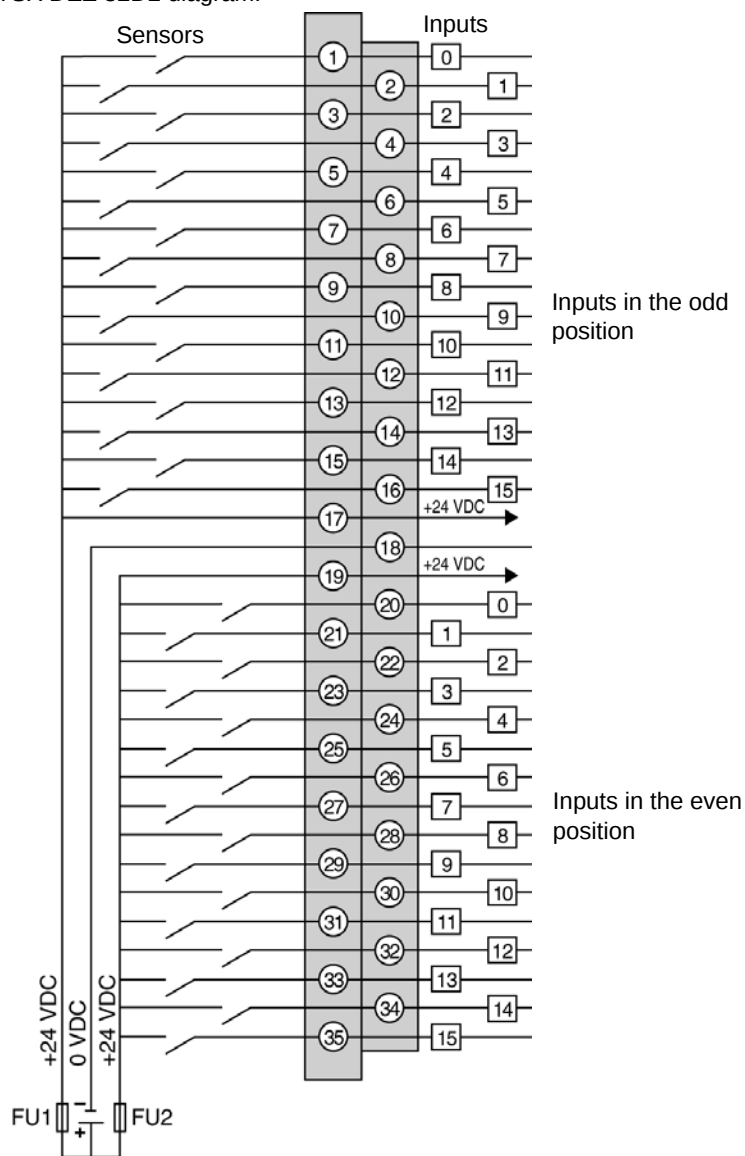
Characteristics of the 24VDC inputs

Logic			Positive
Nominal input values		Voltage	24V
		Current	7mA
Input threshold	In state 1	Voltage	≥ 11 V
		Current for U = 11V	> 6mA
	In state 0	Voltage	< 5 V
		Current	< 2mA
	Sensor supply (including ripple)		19V to 30V (possible up to 34V, limited to 1 hour per 24 hours)
Input impedance			3.4KΩ
Configurable response time		State 0 to 1	0.1...7.5ms
		State 1 to 0	0.1...7.5ms
Sensor voltage check threshold		OK	> 18V
		Fault	< 14V
Sensor voltage check response time	When 24V disappears		1ms<t<3ms
	When 24V appears		8ms<t<30ms
Type of inputs			Current sinks
Compliance with IEC 1131-2 type 1			Type 2
DDP 2 wire compatibility			Yes
DDP 3 wire compatibility			Yes
Reference input			To + on the supply

links of the TSX DEZ 32D2 module

Sensor/input connections

TSX DEZ 32D2 diagram:



FU1 and FU2 = 0.5A rapid fusion fuses.

Discrete output module

TSX DSZ 32T2

24

At a Glance

Aim of this Chapter

This chapter introduces the TSX DSZ 32T2 module, its characteristics and connections to different sensors and pre-actuators.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Module TSX DSZ 32T2	246
Characteristics of the TSX DSZ 32T2 module	247
Links of the TSX DSZ 32T2 module	249

Module TSX DSZ 32T2

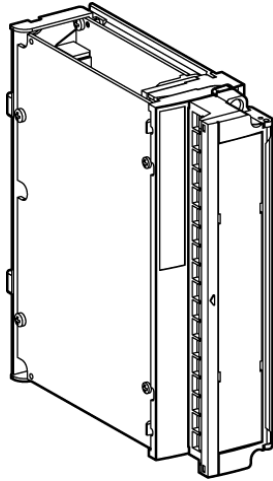
At a Glance

The TSX DSZ 32T2 comprises 32 24VDC/0.5A outputs.

The module is equipped with a removable 35 post screwed connection terminal block, allowing actuators to be linked with supplies.

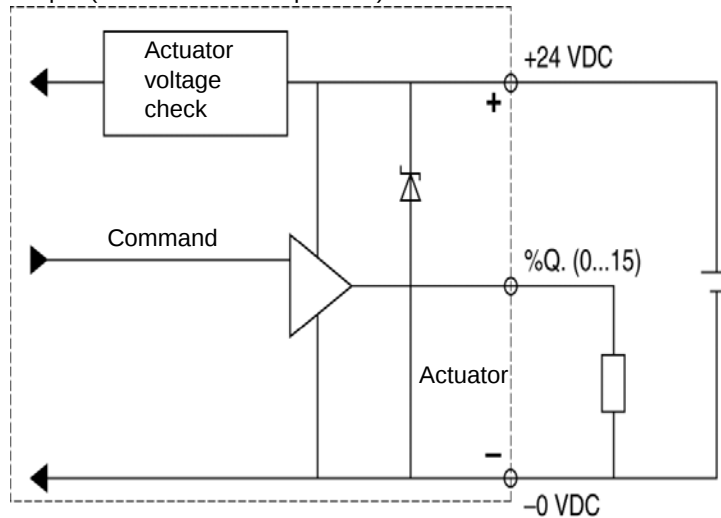
Illustration

Module:



Process diagrams for an output

Output (in even or uneven position):



Characteristics of the TSX DSZ 32T2 module

General characteristics

Table

Modularity	Static 32S outputs 24VDC/0.5A
Current used on the internal 5V	40mA+3.3mA per output at 1
Current used on the 24V actuator (excluding load current)	30mA+2mA per output at 1
Dissipated power in the module (load rate = 60%)	3.2W
Operating temperature	0 to 60°C
Dielectric strength Output/ground or Output/internal logic	1500V r.m.s. 50/60Hz 1min
Insulation resistance	>10MΩ under 500VDC
Hygrometry	5% to 95% without condensation
Storage temperature	-25°C to 70°C
Operating altitude	0 to 6500 ft
Temperature related performance	The characteristics at 60°C are guaranteed for 60% of inputs and 60% of outputs at state 1.

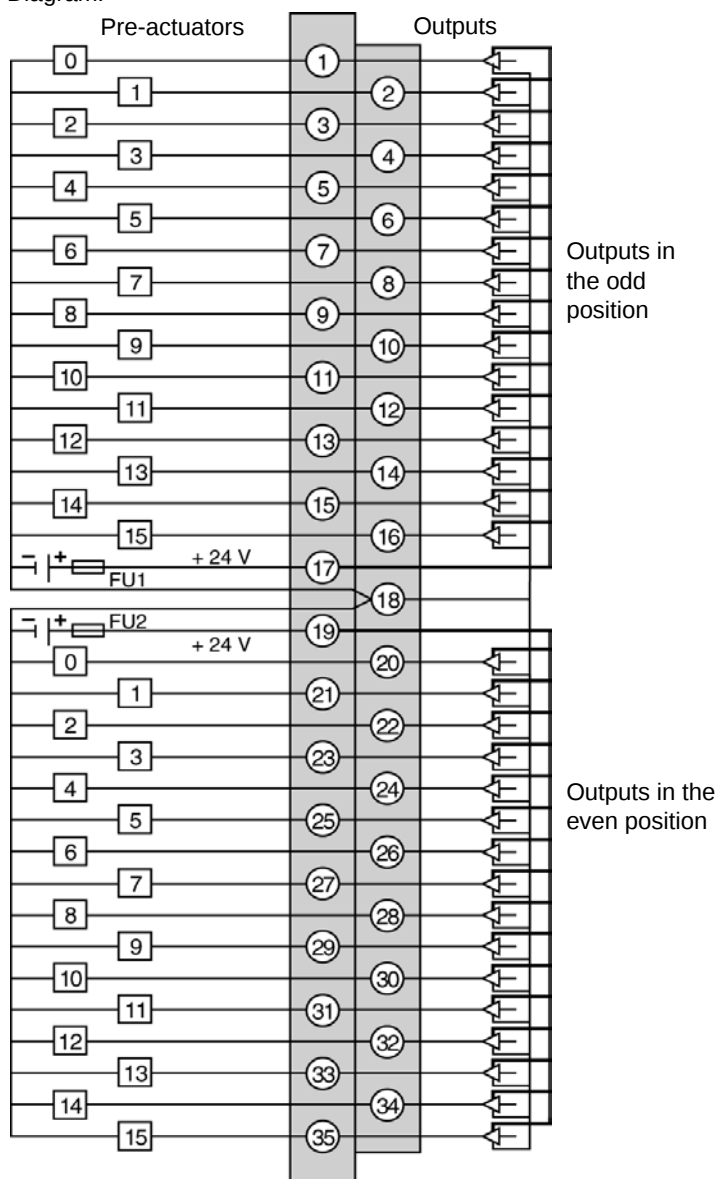
**Characteristics
of the 24VDC/
0.5A static
outputs**

Logic		Positive emitted current
Nominal values	Voltage/Current	24V/0.5A
Threshold values (U_{≤30} or 34V, including ripple)	Voltage	19V to 30V (possible up to 34V, limited to 1 hour per 24 hours)
	Current/Channel	0.625A
	Current/Module	7A
Power of tungsten filament lamp		10W max.
Leakage current (state 0)	During normal operation	< 0.5mA
	When module 0V is accidentally disconnected	< 2mA
Voltage drop	state 1	< 0.3V (for I = 0.5A)
Minimum load impedance		48 Ω
Response time (1)	Transition state 0 to 1	< 500 μs
	Transition state 1 to 0	< 500 μs
Switching frequency on inductive load		<0.6/LI ² Hz
Compliance with IEC 1131-2		Yes
Output parallelization		Yes, 2 outputs maximum
Compatibility with direct inputs		All the 24VDC IEC 1131-2 type 1 and type 2 inputs with input impedance < 15 KΩ
Common of loads		To - on the supply
Built-in protection measures	Against overloads and short-circuits	By current limiter and thermal circuit breaker 0.75A≤I _d ≤2A
	Against excess voltage	Yes, by Zener diode
	Against polarity inversions	Yes, by reverse diode on supply. Plan for a fast-blow fuse on the +24V of the actuator's supply (10A)
Actuator voltage check threshold	OK	> 18V
	Fault	< 14V
Check response time	On appearance	T<4ms
	On disappearance	T<30ms
Common of loads		To - on the supply
Dissipated power per channel at state 1		0.05W (for U=24V)
(1): All outputs are equipped with circuits for rapid demagnetizing of solenoids. Solenoid load time < L/R.		

Links of the TSX DSZ 32T2 module

Pre-actuator/ Output sensors

Diagram:



FU1 and FU2 = 10A rapid fusion fuses.

Discrete output module

TSX DSZ 32R5

25

At a Glance

Aim of this Chapter

This chapter introduces the TSX DSZ 32R5 module, its characteristics and connections to different sensors and pre-actuators.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Module TSX DSZ 32R5	252
Characteristics of the TSX DSZ 32R5 module	255
Connection of the TSX DSZ 32R5 module	257

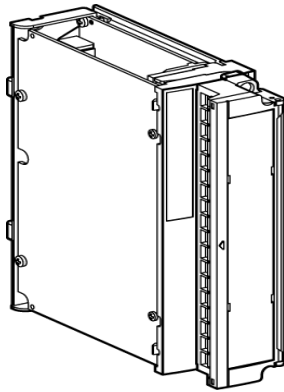
Module TSX DSZ 32R5

At a Glance

The TSX DSZ 32R5 comprises 32 relay outputs.

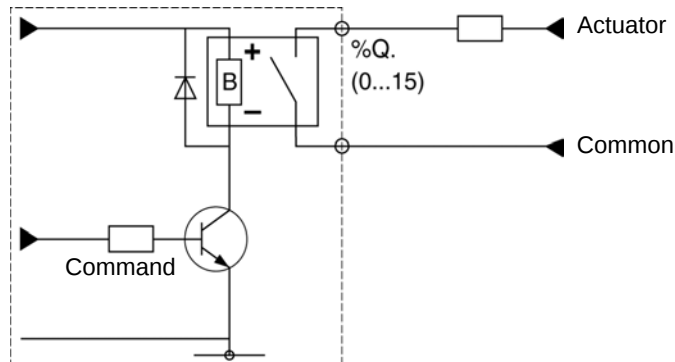
The module is equipped with a removable 35-terminal screwed connection terminal block, allowing actuators to be linked with supplies.

Module:



Process diagram for an output

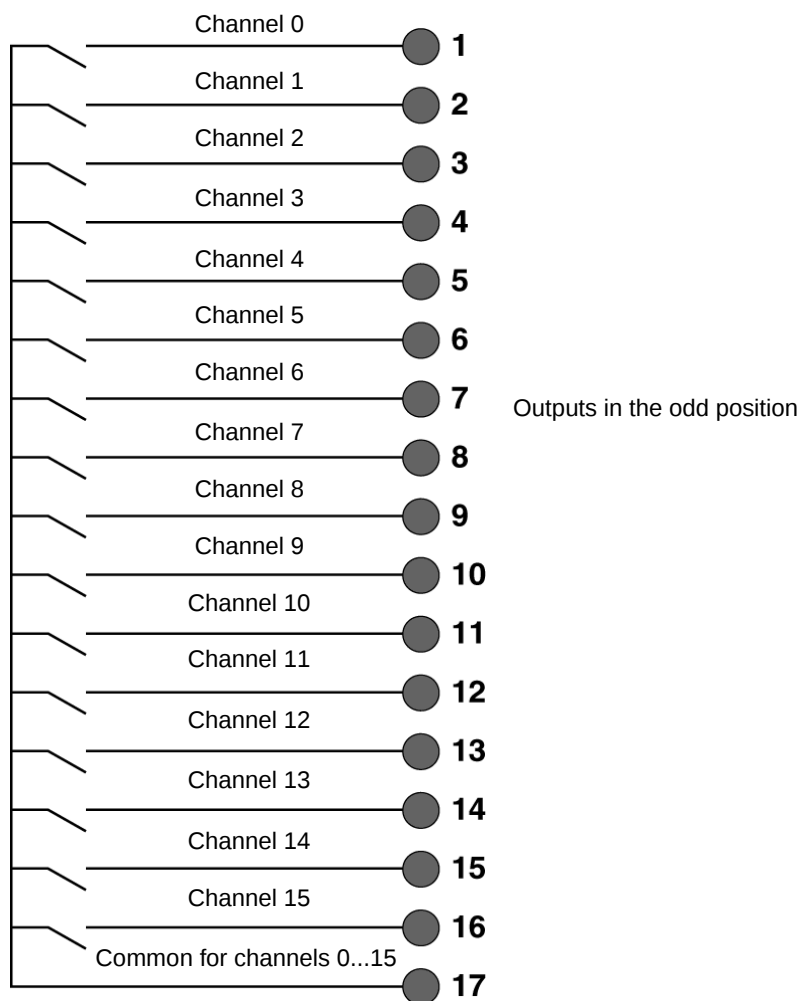
Output:



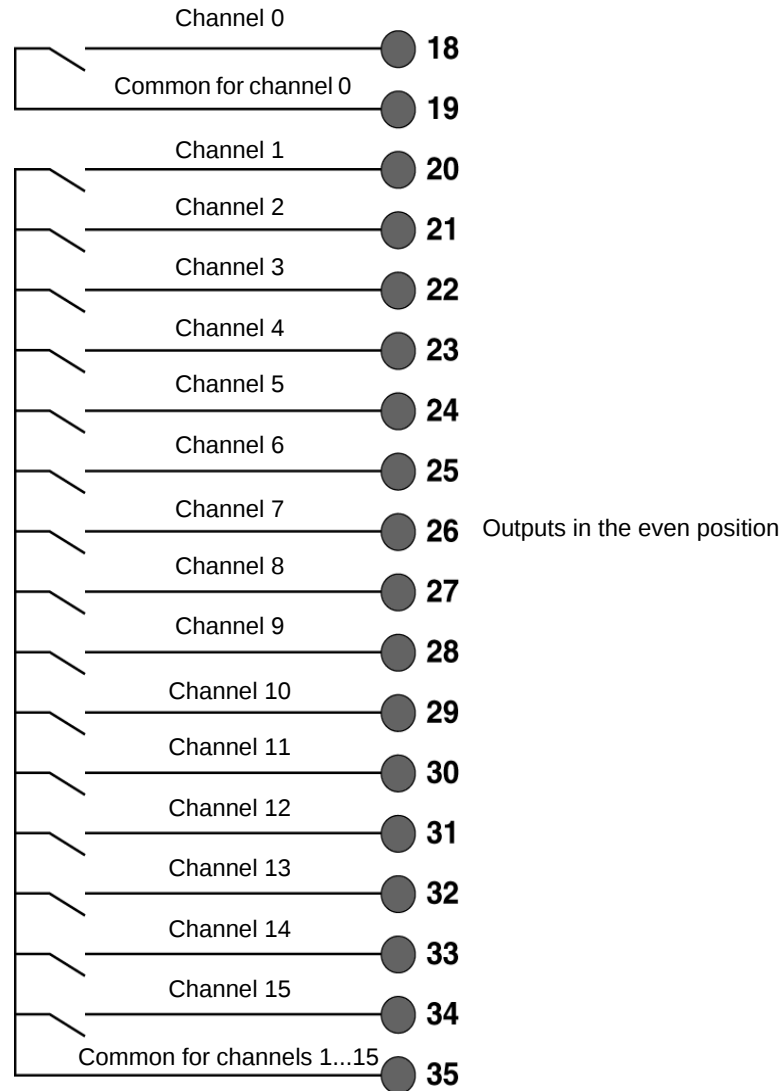
Note: To ensure the service reliability of the relay contact, it is mandatory to fit the following to the actuators' terminals:

- an RC circuit or MOV (ZNO) suppressor for use with alternating current,
- a discharge diode for use with direct current.

Modularity



Modularity



Characteristics of the TSX DSZ 32R5 module

General characteristics

Modularity	32S relay
Current used on the internal 5V	50mA
Current used on the 24V relay (1)	15mA + 5 mA per output at 1
Dissipated power in the module (load rate = 60%)	3.5W
Operating temperature	0 to 60°C
Dielectric strength Input/ground or output/ground or output/internal logic	2000V r.m.s. 50/60Hz-1min
Insulation resistance	>10MΩ under 500VDC
Hygrometry	5% to 95% without condensation
Storage temperature	-25° to 70°C
Operating altitude	0 to 6500 ft
Temperature related performance	The characteristics at 60°C are guaranteed for 60% of inputs and 60% of outputs at state 1.
Key	
(1)	If the 24V relay is delivered by an external supply (as in the mini-extension rack in particular), the value of this supply must be within a maximum tolerance of 24V +/- 10%.

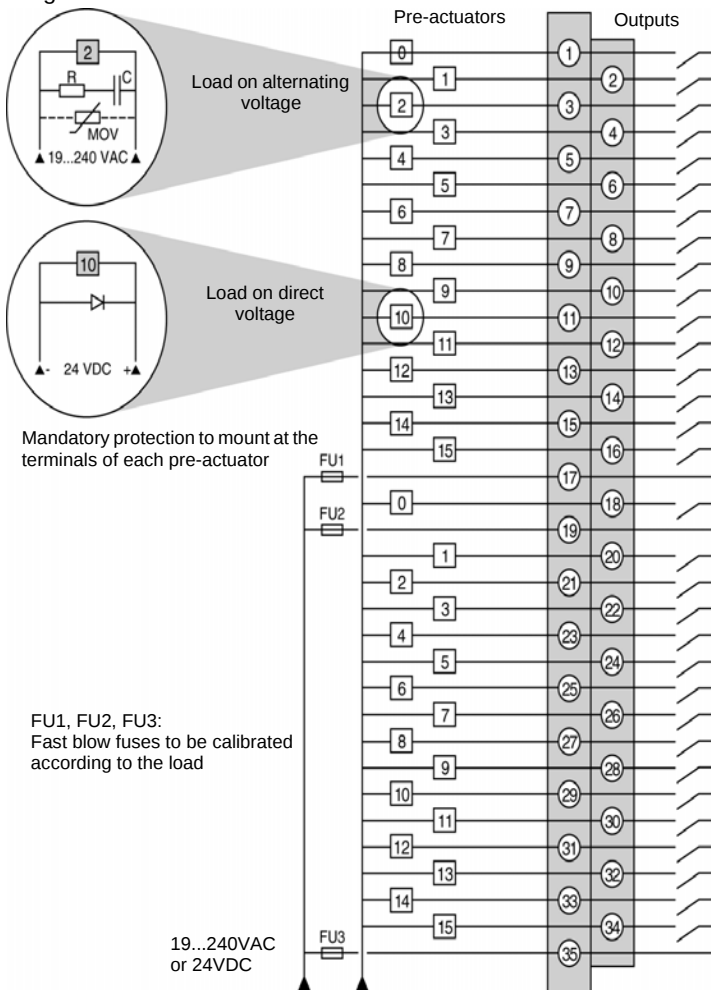
Characteristics of the relay outputs

Threshold operating voltage		Direct/ alternating	10 to 34VDC/19 to 264VAC			
Thermal current		2A				
Common maximum current		2A for a single channel 7A for a group of 15 or 16 channels				
Alternating current load	Resistive load AC12	Voltage	24VAC	48VAC	100...120VAC	200...240VAC
		Power	50VA (5)	100VA (4)	200VA (3)	200VA (5)
	Inductive regime AC14 and AC15.	Voltage	24VAC	48VAC	100...120VAC	200...240VAC
		Power	24VA (1)	50VA (1)	10VA (6) 50VA (2)	10VA (7) 50VA (4)
Direct current load	Resistive load DC12	Voltage	24VDC			
		Power	12W (0.6x10 ⁶ operations) 24W (0.3x10 ⁶ operations) 40W (0.15x10 ⁶ operations)			
	Inductive regime DC13 (L/R=60 ms)	Voltage	24VDC			
		Power	6W (0.12x10 ⁶ operations) 12W (0.06x10 ⁶ operations) 24W (0.3x10 ⁶ operations)			
	Minimum switchable load		1mA/5V			
Response time (1)	On trigger	<10ms				
	Trigger	<10ms				
Type of contact		On close				
Built-in protection measures	Against overloads and short-circuits	None It is mandatory to fit a fast-blow fuse per channel or group of channels				
	Against alternating current inductive overload	None An RC circuit or MOV (ZNO) suppressor appropriate to the voltage must be mounted parallel to the terminals of each actuator.				
	Against direct current inductive overload	None A discharge diode must be mounted on the terminals of each actuator				
(1): 0.1x10 ⁶ operations (2): 0.15 x 10 ⁶ operations (3): 0.2 x 10 ⁶ operations		(4): 0.25 x 10 ⁶ operations (5): 0.3x10 ⁶ operations (6): 0.8x10 ⁶ operations			(7): 1.2x10 ⁶ operations	

Connection of the TSX DSZ 32R5 module

Pre-actuators/ Output connections

Diagram



Note: In this case where the supply voltage of the pre-actuators is obtained from a triple-phase network and it is equal to or greater than 200VAC, the pre-actuators should be supplied starting at the same phase.

Discrete input module

TSX DEZ 12D2K

26

At a Glance

Aim of this Chapter

This chapter introduces the TSX DEZ 12D2K module, its characteristics and connections to different sensors and pre-actuators.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Module TSX DEZ 12D2K	260
Characteristics of the TSX DEZ 12D2K module	261
links of the TSX DEZ 12D2K module	263

Module TSX DEZ 12D2K

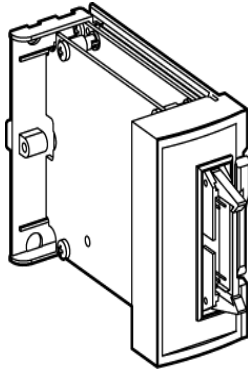
At a Glance

The module TSX DEZ 12D2K consists of 12 24VDC positive logic inputs, type 2.

The module is equipped with a HE10 type connector that can receive:

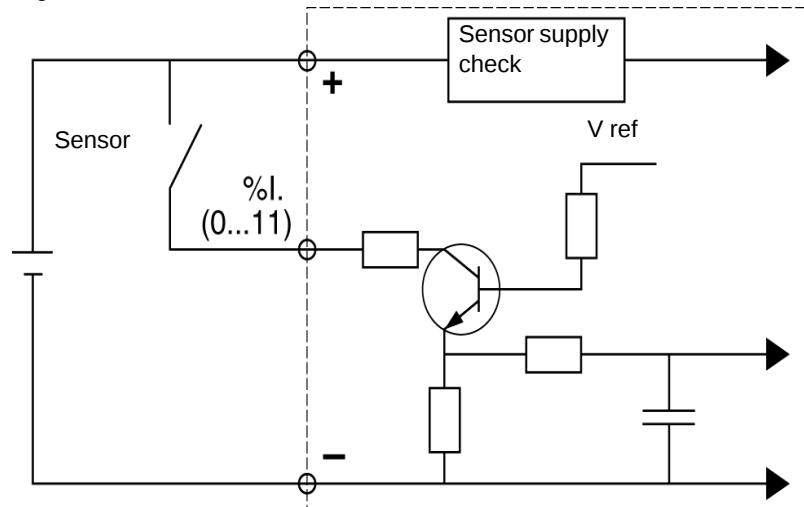
- either TSX CDP•01 pre-wired spiral for direct connection onto the post or sensor,
- either a TSX CDP•02 cable or a TSX CDP••03 cable to allow connection to the interface of the TELEFAST 2 cable.

Module:



Process diagram for an input

Diagram:



Characteristics of the TSX DEZ 12D2K module

General characteristics

Table:

Modularity	Inputs 12E/24VDC
Current used on the internal 5V	20mA
Current used on the sensor supply	20mA+7mA per output at 1
Sink inputs	
Dissipated power in the module (load rate = 60%)	2.7W
Operating temperature	0 to 60°C
Dielectric strength	1500V r.m.s. 50/60Hz 1min
Input/ground	
Input/internal logic	
Insulation resistance	>10MΩ under 500VDC
Hygrometry	5% to 95% without condensation
Storage temperature	-25°C to 70°C
Operating altitude	0 to 6500 ft
Temperature related performance	The characteristics at 60°C are guaranteed for 60% of inputs and 60% of outputs at state 1.

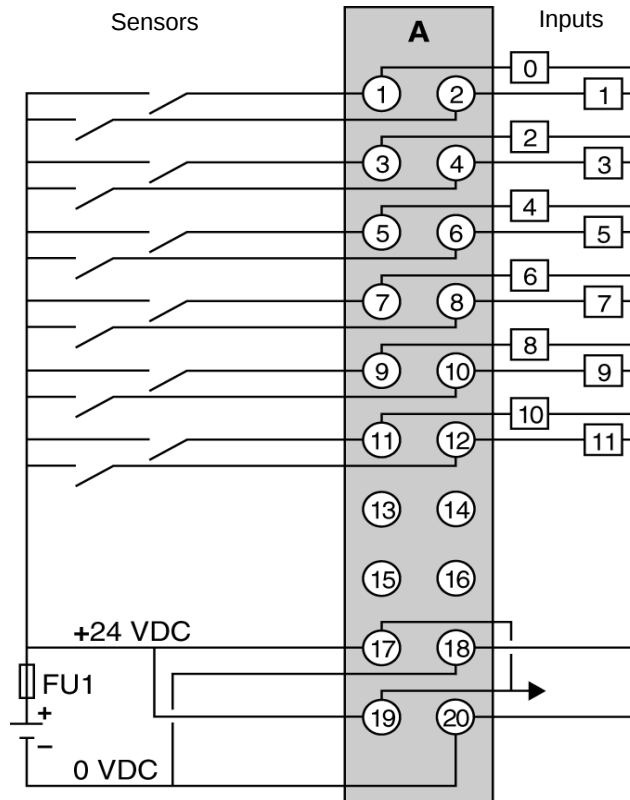
Characteristics of the 24VDC inputs

Logic			Positive
Nominal input values		Voltage	24V
		Current	7mA
Input threshold	In state 1	Voltage	≥ 11 V
		Current for U = 11V	> 6mA
	In state 0	Voltage	< 5 V
		Current	< 2mA
	Sensor supply (including ripple)		19V to 30V (possible up to 34V, limited to 1 hour per 24 hours)
Input impedance			3.4KΩ
Configurable response time		State 0 to 1	0.1...7.5ms
		State 1 to 0	0.1...7.5ms
Sensor voltage check threshold		OK	> 18V
		Fault	< 14V
Sensor voltage check response time	When 24V disappears		1ms<t<3ms
	When 24V appears		8ms<t<30ms
Type of inputs			Current sinks
Compliance with IEC 1131-2 type 1			Type 2
DDP 2 wire compatibility			Yes
DDP 3 wire compatibility			Yes
Reference input			To + on the supply

links of the TSX DEZ 12D2K module

Sensor/input connections

TSX DEZ 12D2K diagram:



FU1 = 0.5A fuse with rapid fusion.

**Correspondence
between the
HE10 connector
pins and the
TSX CDP 01
wires with a pre-
wired spiral.**

Sensors/Inputs:

Binding posts	Dimensioned sensors wire color
1	White
2	Brown
3	Green
4	Yellow
5	Gray
6	Pink
7	Blue
8	Red
9	Black
10	Purple
11	Gray/Pink
12	Red/Blue
13	
14	
15	
16	
17	White/Gray
18	Gray/Brown
19	White/Pink
20	Pink/Brown

Discrete input module

TSX DEZ 12D2

27

At a Glance

Aim of this Chapter

This chapter introduces the TSX DEZ 12D2 module, its characteristics and connections to different sensors and pre-actuators.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Module TSX DEZ 12D2	266
Characteristics of the TSX DEZ 12D2 module	268
links of the TSX DEZ 12D2 module	270

Module TSX DEZ 12D2

At a Glance

The module TSX DEZ 12D2 consists of 12 24VDC positive logic inputs, type 1 or negative logic.

The module is equipped with a removable 15 post screwed connection terminal block, allowing inputs to be connected:

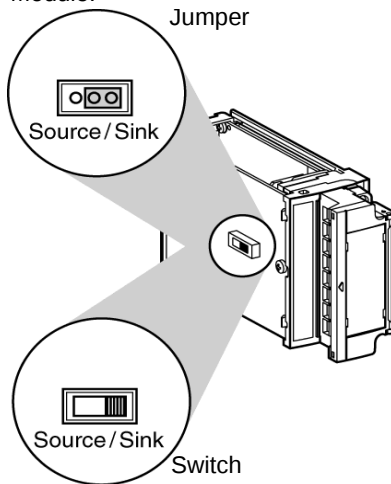
The inputs can be:

- either positive logic (sink position), in which case the common for the sensors is connected to the + on the supply,
- or negative logic (source position), in which case the common for the sensors is connected to the - on the supply.

The choice is made by:

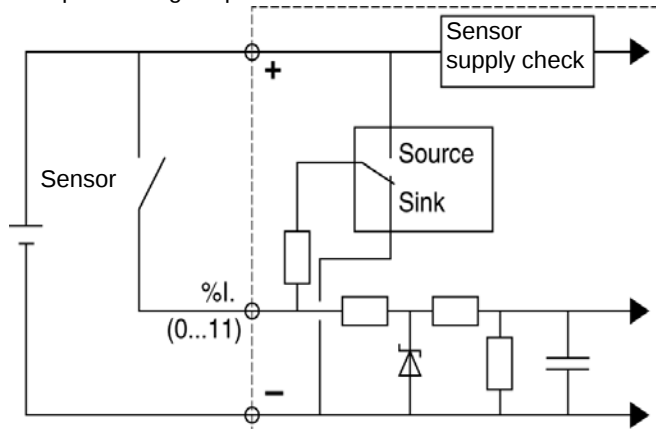
- positioning a switch or jumper on the module to enable physical adaptation. By default, the material configuration is sink (positive logic),
- and by software configuration to adapt the signals to the logical direction.

Module:

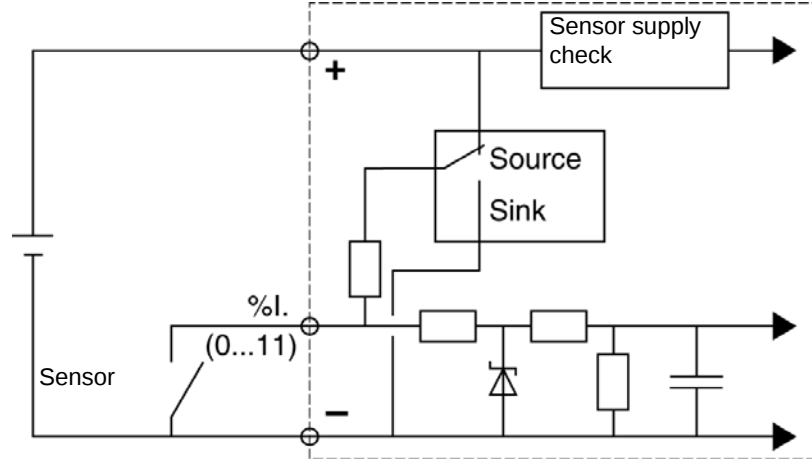


Process diagrams of inputs

Sink positive logic inputs:



Source negative logic inputs:



Characteristics of the TSX DEZ 12D2 module

General characteristics

Table:

Modularity		Inputs 12E/24VDC
Current used on the internal 5V		20mA
Current used on the sensor supply	Sink inputs	15mA+9mA per output at 1
	Source inputs	35mA+6mA per input at 1
Dissipated power in the module (load rate = 60%)		2W
Operating temperature		0 to 60°C
Dielectric strength Input/ground Input/internal logic		1500V r.m.s. 50/60Hz 1min.
Insulation resistance		>10MΩ under 500VDC
Hygrometry		5% to 95% without condensation
Storage temperature		-25°C to 70°C
Operating altitude		0 to 6500 ft
Temperature related performance		The characteristics at 60°C are guaranteed for 60% of the inputs and 60% of the outputs at state 1.

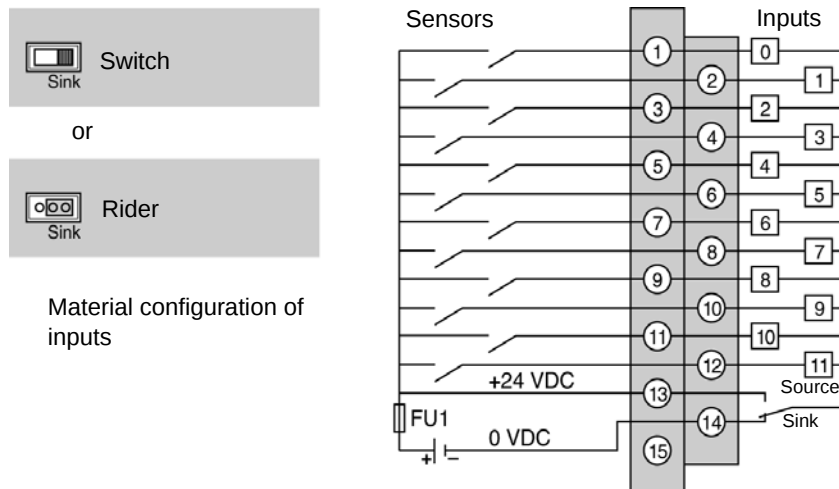
Characteristics of the 24VDC inputs

Logic			Positive or negative
Nominal input values	Voltage		24V
	Current	Positive logic	9mA
		Negative logic	-6mA
Input threshold	In state 1	Voltage (positive logic)	≥ 11 V
		Voltage (negative logic)	≤ 8 V
		Current for U = 11V	> 2.5 mA
	In state 0	Voltage (positive logic)	< 5 V
		Voltage (negative logic)	> Ual - 5 V
		Current	< 1.5 mA
	Sensor supply (including ripple)		19V to 30V (possible up to 34V, limited to 1 hour per 24 hours)
Input impedance		Positive logic	2.4KΩ
		Negative logic	4KΩ
Configurable response time		State 0 to 1	0.1...7.5ms
		State 1 to 0	0.1...7.5ms
Sensor voltage check threshold		OK	> 18V
		Fault	< 14V
Sensor voltage check response time	When 24V disappears		1ms<t<3ms
	When 24V appears		8ms<t<30ms
Type of inputs			Resistive.
Compliance with IEC 1131-2 type 1	Positive logic input		Type 1
	Negative logic input		Not specified in the standard
DDP 2 wire compatibility		See <i>Compatibility of 2-wire sensors with 24 VDC inputs, p. 187</i>	
DDP 3 wire compatibility			Yes
Reference input (selected by switch located on the module and by software)		Positive logic	To + on the supply
		Negative logic	To - on the supply

Links of the TSX DEZ 12D2 module

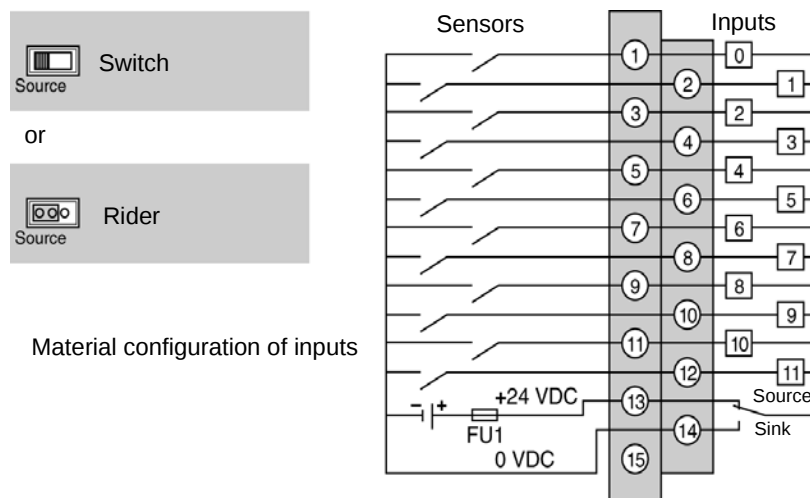
Sensor/input connections

Diagrams of TSX DEZ 12D2 (Sink positive logic inputs):



FU1 = 0.5A fuse with rapid fusion.

Diagrams of TSX DEZ 12D2 (Source negative logic input):



FU1 = 0.5A fuse with rapid fusion.

Discrete input module

TSX DEZ 08A4

28

At a Glance

Aim of this Chapter

This Chapter describes the TSX DEZ 08A4 module, its characteristics and links with different sensors.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Module TSX DEZ 08A4	272
Characteristics of the TSX DEZ 08A4 module	273
links of the TSX DEZ 08A4 module	275

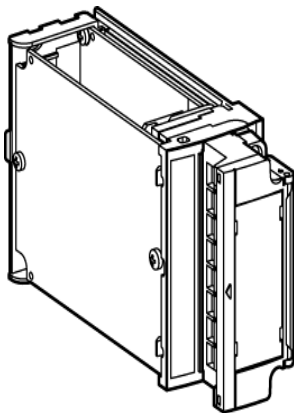
Module TSX DEZ 08A4

At a Glance

The TSX DEZ 08A4 module comprises 8 100...120VAC inputs.

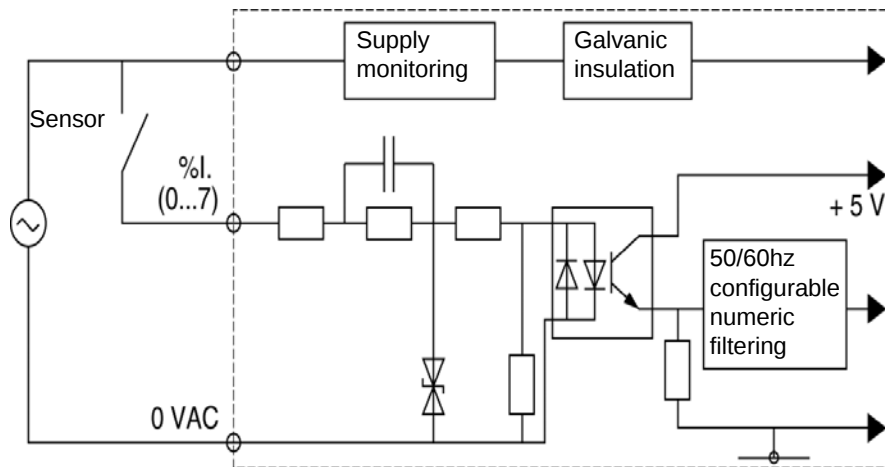
It is equipped with a 15 post screwed connection terminal block, a carriage allowing sensors to be linked and supplies.

Module:



Process diagrams for an input

Sink positive logic inputs:



Characteristics of the TSX DEZ 08A4 module

General characteristics

Table:

Modularity	8E/100...120VAC inputs
Current used on the internal 5V	20mA
Current used on the sensor supply Sink inputs	13mA+13mA per input at 1
Dissipated power in the module (load rate = 60%)	2.7W
Operating temperature	0 to 60°C
Dielectric strength Input/ground Input/internal logic	2,000V r.m.s. 50/60Hz 1min
Insulation resistance	>10M Ω under 500VDC
Hygrometry	5% to 95% without condensation
Storage temperature	-25°C to 70°C
Operating altitude	0 to 6500 ft
Temperature related performance	The characteristics at 60°C are guaranteed for 60% of the inputs and 60% of the outputs at state 1.

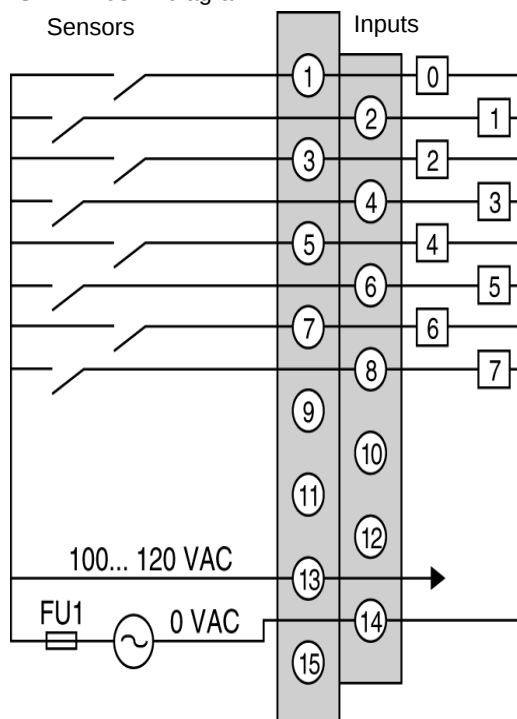
Characteristics of the 100...120VAC inputs

Nominal input values	Voltage		100...120V
	Current	50 Hz	11mA
		60 Hz	13mA
	Nominal		50/60 Hz
Input threshold	In state 1	Voltage	≥ 74 V
		Current for U = 74V	> 6mA
	In state 0	Voltage	< 20V
		Current	< 4mA
	Nominal		47...63 Hz
	Sensor supply		85...132V
	Peak current on trigger		160mA RC = 1kΩ/0.33μF
Configurable response time	State 0 to 1	50 Hz	11...18ms
		60 Hz	9...16ms
	State 1 to 0	50 Hz	11...24ms
		60 Hz	10...22ms
Sensor voltage check threshold		OK	> 82V
		Fault	<Ucom+10V (1)
Sensor voltage check response time	On disappearance		5ms<t<11ms
	On appearance		20ms<t<50ms
Type of inputs			Capacitive
Compliance with IEC 1131-2 type 1			Type 2
DDP 2 wire compatibility			See <i>Compatibility of 2-wire sensors with 24 VDC inputs</i> , p. 187
(1) Ucom = real switching voltage of the input. This value (Ucom + 10V) ensures coherence between the threshold of the sensor voltage check and that of the inputs.			

links of the TSX DEZ 08A4 module

Sensor/input connections

TSX DEZ08A4 diagram:



FU1 = 0.5A fuse with rapid fusion.

Discrete input module

TSX DEZ 08A5

29

At a Glance

Aim of this Chapter

This Chapter describes the TSX DEZ 08A5 module, its characteristics and links with different sensors.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Module TSX DEZ 08A5	278
Characteristics of the TSX DEZ 08A5 module	279
links of the TSX DEZ 08A5 module	281

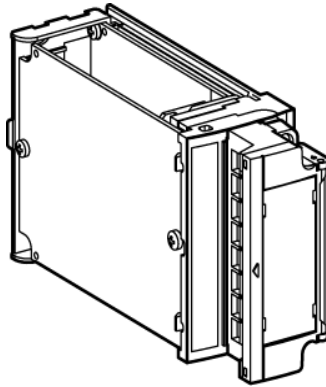
Module TSX DEZ 08A5

At a Glance

The TSX DEZ 08A5 module comprises 8 inputs (200 to 240VAC).

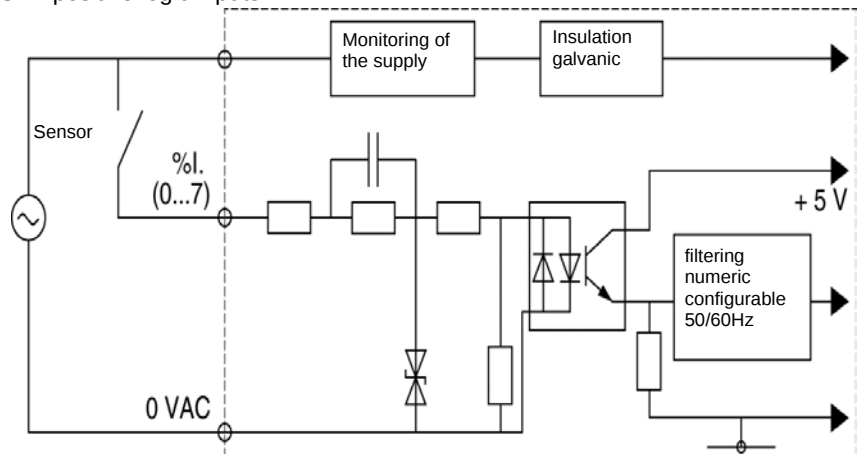
It is equipped with a 15 post screwed connection terminal block, a carriage allowing sensors to be linked and supplies.

Module:



Process diagram for an input

Sink positive logic inputs:



Characteristics of the TSX DEZ 08A5 module

General characteristics

Table:

Modularity	8E/200...240VAC inputs
Current used on the internal 5V	20mA
Current used on the sensor supply Sink inputs	12mA+12mA per input at 1
Dissipated power in the module (load rate = 60%)	1.4W
Operating temperature	0 to 60°C
Dielectric strength Input/ground Input/internal logic	2,000V r.m.s. 50/60Hz 1min
Insulation resistance	>10M Ω under 500VDC
Hygrometry	5% to 95% without condensation
Storage temperature	-25°C to 70°C
Operating altitude	0 to 6500 ft
Temperature related performance	The characteristics at 60°C are guaranteed for 60% of the inputs and 60% of the outputs at state 1.

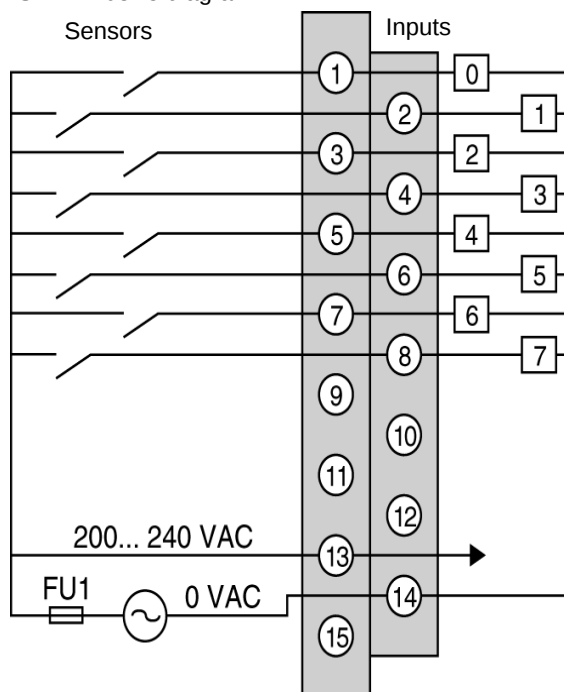
**Characteristics
of the
200...240VAC
inputs**

Nominal input values	Voltage		200...240V
	Current	50 Hz	10mA
		60 Hz	12mA
	Nominal		50/60 Hz
Input threshold	In state 1	Voltage	≥ 159 V
		Current for U = 159V	> 6mA
	In state 0	Voltage	< 40V
		Current	< 3.5mA
	Nominal		47...63 Hz
	Sensor supply		170...264V
	Peak current on trigger		320mA RC = 1kΩ/0.15μF
Configurable response time	State 0 to 1	50 Hz	11...18ms
		60 Hz	9...16ms
	State 1 to 0	50 Hz	11...24ms
		60 Hz	10...22ms
Sensor voltage check threshold		OK	> 164V
		Fault	<Ucom+10V (1)
Sensor voltage check response time	On disappearance		5ms<t<10ms
	On appearance		20ms<t<50ms
Type of inputs			Capacitive
Compliance with IEC 1131-2 type 1			Type 1
DDP 2 wire compatibility			See <i>Compatibility of 2-wire sensors with 24 VDC inputs</i> , p. 187
(1) Ucom = real switching voltage of the input. This value (Ucom + 10V) ensures coherence between the threshold of the sensor voltage check and that of the inputs.			

links of the TSX DEZ 08A5 module

Sensor/input connections

TSX DEZ08A5 diagram :



FU1 = 0.5A fuse with rapid fusion.

Discrete output module

TSX DSZ 08T2K

30

At a Glance

Aim of this Chapter

This chapter introduces the TSX DSZ 08T2K module, its characteristics and connections to different sensors and pre-actuators.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Module TSX DSZ 08T2K	284
Characteristics of the TSX DSZ 08T2K module	285
Links of the TSX DSZ 08T2K module	288

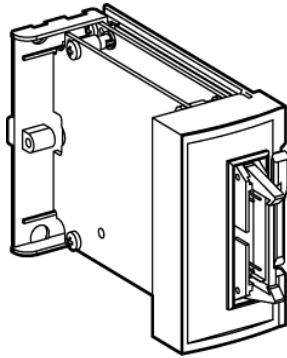
Module TSX DSZ 08T2K

At a Glance

The TSX DSZ 08T2K comprises 8 24VDC/0.5A outputs.

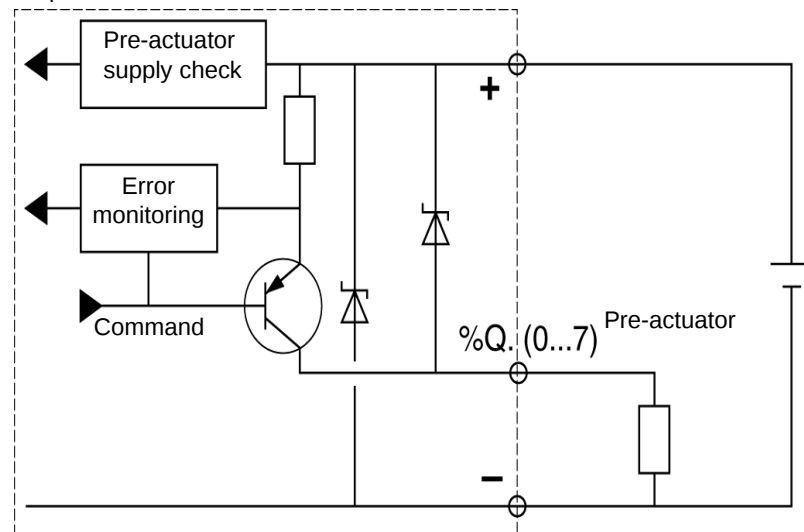
The module is equipped with a male HE10 connector allowing the outputs to be connected. This connector can receive either TSX CDP•01 pre-wired spiral for direct connection onto the post, sensor or pre-actuator, or a TSX CDP••3 cable for connection onto the interface of the TELEFAST 2 wiring.

Module:



Process diagram for an output

Output:



Characteristics of the TSX DSZ 08T2K module

General characteristics

Modularity	Static 8S outputs 24VDC/0.5A
Current used on the internal 5V	30mA+3.2mA per output at 1
Current used on the 24V actuator (excluding load current)	30mA+1mA per output at 1
Dissipated power in the module (load rate = 60%)	3W
Operating temperature	0 to 60°C
Dielectric strength Output/ground Output/internal logic	1500V r.m.s. 50/60Hz 1min
Insulation resistance	>10M Ω under 500VDC
Hygrometry	5% to 95% without condensation
Storage temperature	-25°C to 70°C
Operating altitude	0 to 6500 ft
Temperature related performance	The characteristics at 60°C are guaranteed for 60% of the inputs and 60% of the outputs at state 1.

**Characteristics
of the
24VDC/0.5A
static outputs**

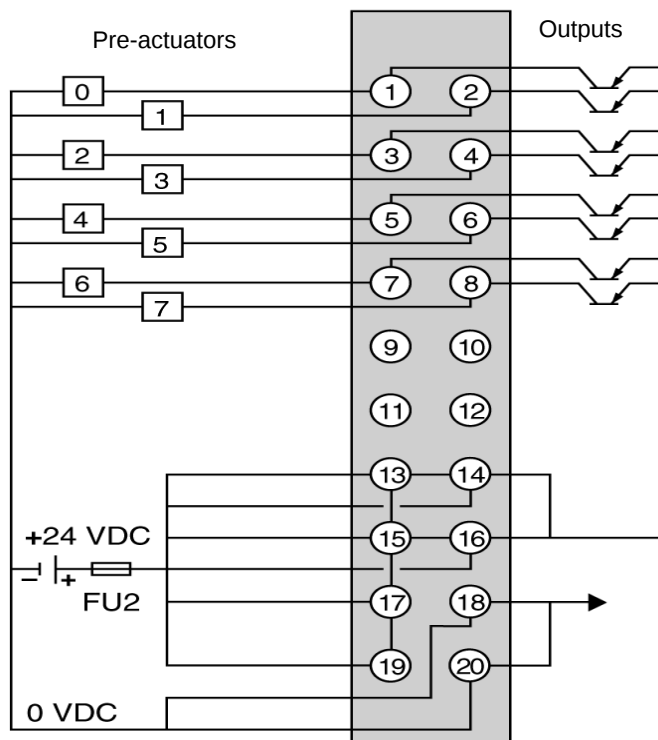
Logic		Positive emitted current
Nominal values	Voltage/Current	24V/0.5A
Threshold values ($U \leq 30$ or 34V, including ripple)	Voltage	19V to 30V (possible up to 34V, limited to 1 hour per 24 hours)
	Current/Channel	0.625A
	Current/Module	4A
Power of tungsten filament lamp		10W max.
Leakage current (state 0)	During normal operation	< 0.5mA
	When module 0V is accidentally disconnected	< 2mA
Voltage drop	state 1	< 1V (for $I = 0.5A$)
Minimum load impedance		48 Ω
Response time (1)	Transition state 0 to 1	< 500 μs
	Transition state 1 to 0	< 500 μs
Switching frequency on inductive load		< 0.6/LI ² Hz
Compliance with IEC 1131-2		Yes
Output parallelization		Yes, 2 outputs maximum
Compatibility with direct inputs		All the 24VDC IEC 1131-2 type 1 and type 2 inputs with input impedance < 15 K Ω
Common of loads		To - on the supply
Built-in protection measures	Against overloads and short-circuits	By current limiter and thermal circuit breaker $0.75A \leq I_d \leq 2A$
	Against excess voltage	Yes, by Zener diode
	Against polarity inversions	Yes, by reverse diode on supply. Plan for a fast-blow fuse on the +24V of the actuator's supply (4A)
Actuator voltage check threshold	OK	> 18V
	Fault	< 14V
Check response time	On appearance	T < 4ms
	On disappearance	T < 30ms
(1): All outputs are equipped with circuits for rapid demagnetizing of solenoids. Solenoid load time < L/R.		

Common of loads	To - on the supply
Dissipated power per channel at state 1	0.45W (for U=24V)
(1): All outputs are equipped with circuits for rapid demagnetizing of solenoids. Solenoid load time < L/R.	

Links of the TSX DSZ 08T2K module

Pre-actuators/ Output connections

Diagram:



FU2 = 6.3A fuse with rapid fusion.

**Correspondence
between the
HE10 connector
pins and the
different
TSX CDP 01
wires with pre-
wired spiral.**

Pre-actuators/Outputs:

Binding posts	Pre-actuator colored wire
1	White
2	Brown
3	green
4	yellow
5	gray
6	pink
7	blue
8	red
9	
10	
11	
12	
13	White-green
14	Brown-green
15	White-yellow
16	Yellow-brown
17	White/Gray
18	Gray/Brown
19	White/Pink
20	Pink/Brown

Discrete output module

TSX DSZ 08T2

31

At a Glance

Aim of this Chapter

This chapter describes the TSX DSZ 08T2 module, its characteristics and connections to different sensors and pre-actuators.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Module TSX DSZ 08T2	292
Characteristics of the TSX DSZ 08T2 module	293
Links of the TSX DSZ 08T2 module	295

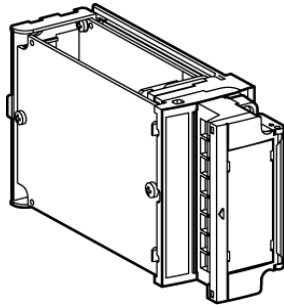
Module TSX DSZ 08T2

At a Glance

The TSX DSZ 08T2 comprises 8 24VDC/0.5A outputs.

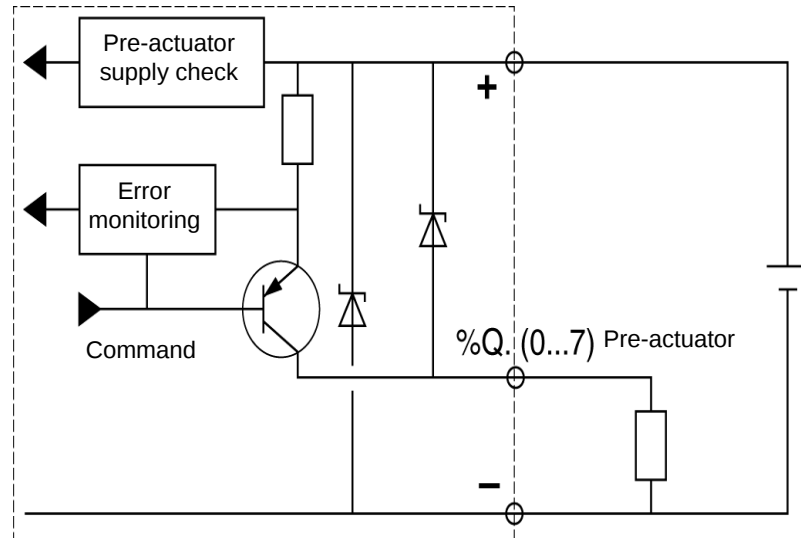
The module is equipped with a removable 15 post screwed connection terminal block, allowing outputs to be connected:

Module:



Process diagram for an output

Output:



Characteristics of the TSX DSZ 08T2 module

General characteristics

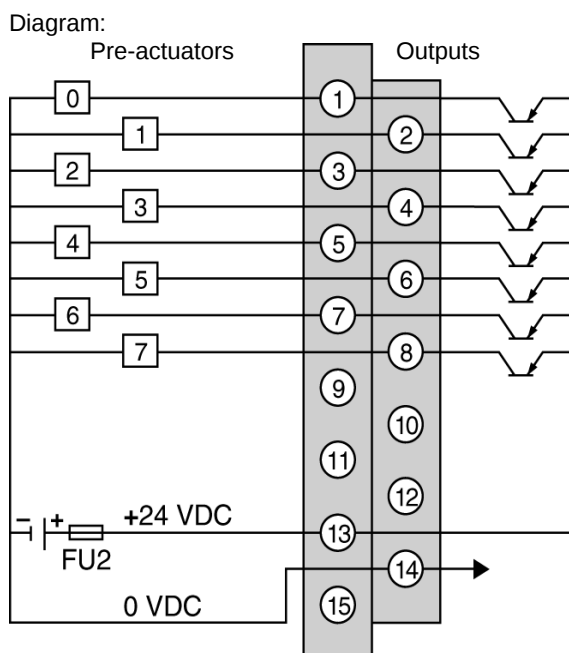
Modularity	Static 8S outputs 24VDC/0.5A
Current used on the internal 5V	30mA+3.2mA per output at 1
Current used on the 24V actuator (excluding load current)	30mA+1mA per output at 1
Dissipated power in the module (load rate = 60%)	3W
Operating temperature	0 to 60°C
Dielectric strength Output/ground Output/internal logic	1500V r.m.s. 50/60Hz 1min
Insulation resistance	>10M Ω under 500VDC
Hygrometry	5% to 95% without condensation
Storage temperature	-25°C to 70°C
Operating altitude	0 to 6500 ft
Temperature related performance	The characteristics at 60°C are guaranteed for 60% of the inputs and 60% of the outputs at state 1.

Characteristics of the 24VDC/0.5A static outputs

Logic		Positive emitted current
Nominal values	Voltage/Current	24V/0.5A
Threshold values (U≤30 or 34V, including ripple)	Voltage	19V to 30V (possible up to 34V, limited to 1 hour per 24 hours)
	Current/Channel	0.625A
	Current/Module	4A
Power of tungsten filament lamp		10W max.
Leakage current (state 0)	During normal operation	< 0.5mA
	When module 0V is accidentally disconnected	< 2mA
Voltage drop	state 1	< 1V (for I = 0.5A)
Minimum load impedance		48 Ω
Response time (1)	Transition state 0 to 1	< 500 μs
	Transition state 1 to 0	< 500 μs
Switching frequency on inductive load		<0.6/LI ² Hz
Compliance with IEC 1131-2		Yes
Output parallelization		Yes, 2 outputs maximum
Compatibility with direct inputs		All the 24VDC IEC 1131-2 type 1 and type 2 inputs with input impedance < 15 KΩ
Common of loads		To - on the supply
Built-in protection measures	Against overloads and short-circuits	By current limiter and thermal circuit breaker 0.75A≤Id≤2A
	Against excess voltage	Yes, by Zener diode
	Against polarity inversions	Yes, by reverse diode on supply. Plan for a fast-blow fuse on the +24V of the actuator's supply (4A)
Actuator voltage check threshold	OK	> 18V
	Fault	< 14V
Check response time	On appearance	T<4ms
	On disappearance	T<30ms
Common of loads		To - on the supply
Dissipated power per channel at state 1		0.45W (for U=24V)
(1): All outputs are equipped with circuits for rapid demagnetizing of solenoids. Solenoid load time < L/R.		

Links of the TSX DSZ 08T2 module

Pre-actuator/ Output connections



FU2 = 6.3A fuse with rapid fusion.

Discrete output module

TSX DSZ 04T22

32

At a Glance

Aim of this Chapter

This chapter introduces the TSX DSZ 04T22 module, its characteristics and connections to different sensors and pre-actuators.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Module TSX DSZ 04T22	298
Characteristics of the TSX DSZ 04T22 module	299
Connection of the TSX DSZ 04T22 module	301

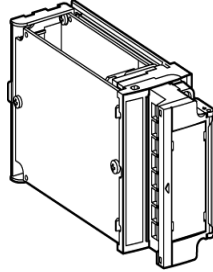
Module TSX DSZ 04T22

At a Glance

The TSX DSZ 04T22 comprises 4 static 24VDC/2A outputs.

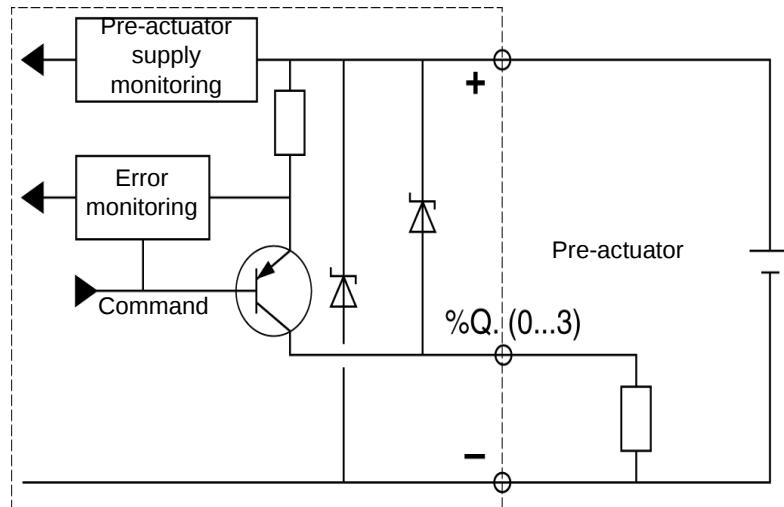
The module is equipped with a removable 15 post screwed connection terminal block, allowing outputs to be connected:

Module:



Process diagram for an output

Output:



Characteristics of the TSX DSZ 04T22 module

General characteristics

Table:

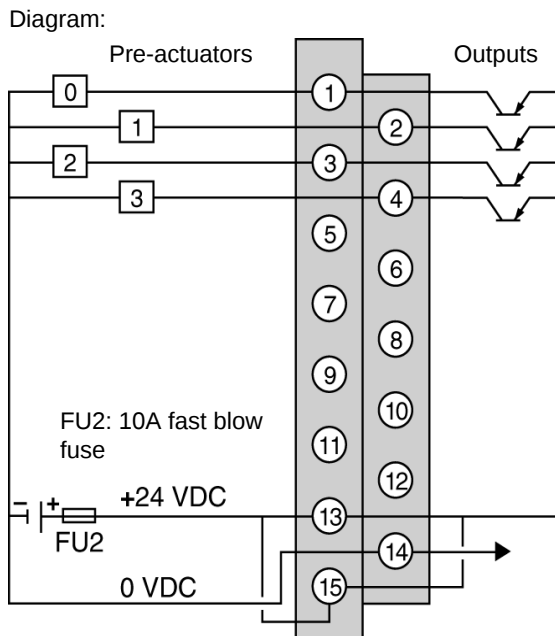
Modularity	Static 4S outputs 24VDC/2A
Current used on the internal 5V	30mA
Current used on the 24V actuator (excluding load current)	20mA + 4 mA per output at 1
Dissipated power in the module (load rate = 60%)	3.8W
Operating temperature	0 to 60°C
Dielectric strength Output/ground Output/internal logic	1500V r.m.s. 50/60Hz 1min
Insulation resistance	>10MΩ under 500VDC
Hygrometry	5% to 95% without condensation
Storage temperature	-25°C to 70°C
Operating altitude	0 to 6500 ft
Temperature related performance	The characteristics at 60°C are guaranteed for 60% of the inputs and 60% of the outputs at state 1.

Characteristics of the 24VDC/2A static outputs

Logic		Positive emitted current
Nominal values	Voltage/Current	24V/2A
Threshold values ($U \leq 30$ or 34V, including ripple)	Voltage	19V to 30V (possible up to 34V, limited to 1 hour per 24 hours)
	Current/Channel	2.5A
	Current/Module	8A
Power of tungsten filament lamp		15W max.
Leakage current	(state 0)	< 0.5mA
Voltage drop	state 1	< 0.8V (for $I = 2A$)
Minimum load impedance		12 Ω
Response time (1)	Transition state 0 to 1	<= 1 ms
	Transition state 1 to 0	<= 1 ms
Switching frequency on inductive load		<0.5/LI ² Hz
Compliance with IEC 1131-2		Yes
Output parallelization		Yes, 2 outputs maximum
Compatibility with direct inputs		All the 24VDC IEC 1131-2 type 1 and type 2 inputs with input impedance < 15 K Ω
Common of loads		To - on the supply
Built-in protection measures	Against overloads and short-circuits	By current limiter and electronic circuit breaker 2.6A $\leq I_d \leq 5A$
	Against excess voltage	Yes, by Zener diode
	Against polarity inversions	Yes, by reverse diode on supply. Plan for a fast-blow fuse on the +24V of the actuator's supply (10A)
Actuator voltage check threshold	OK	> 18V
	Fault	< 14V
Check response time	On appearance	T<4ms
	On disappearance	T<30ms
Common of loads		To - on the supply
Dissipated power per channel at state 1		1.15W (for U=24V)
Dielectric strength	Outputs/ground	1500V r.m.s. 50/60Hz for 1min
Insulation resistance	Outputs/internal logic	> 10M Ω under 500VDC
(1): All outputs are equipped with circuits for rapid demagnetizing of solenoids. Solenoid load time < L/R.		

Connection of the TSX DSZ 04T22 module

Pre-actuators/ Output connections



Discrete output module

TSX DSZ 08R5

33

At a Glance

Aim of this Chapter

This chapter introduces the TSX DSZ 08R5 module, its characteristics and connections to different sensors and pre-actuators.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Module TSX DSZ 08R5	304
Characteristics of the TSX DSZ 08R5 module	306
connection of the TSX DSZ 08R5 module	308

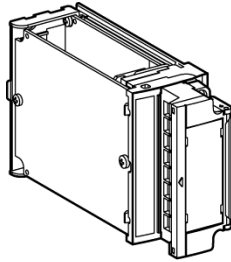
Module TSX DSZ 08R5

At a Glance

The TSX DSZ 08R5 comprises 8 relay outputs.

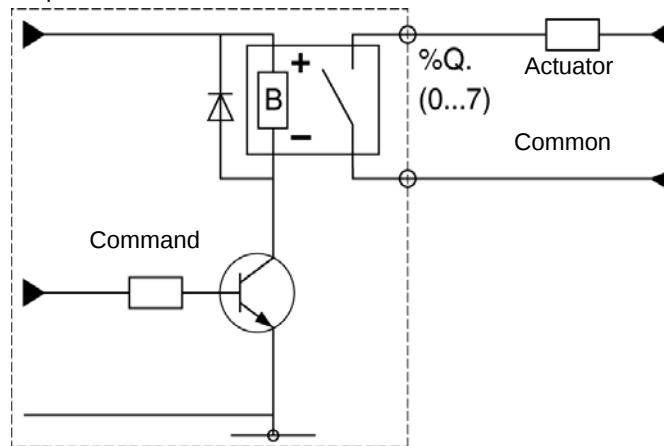
The module is equipped with a removable 15-terminal screwed connection terminal block, allowing outputs to be connected:

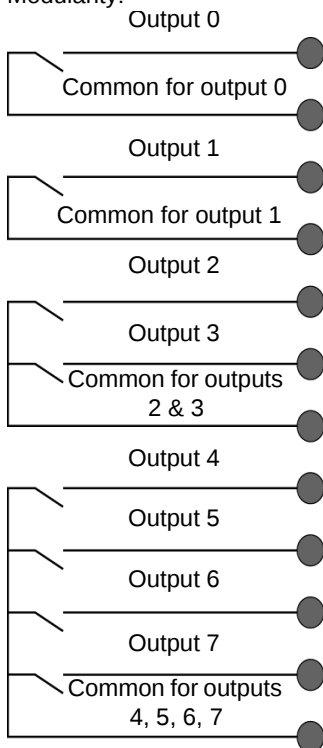
Module:



Process diagram for an output

Output:



Modularity:

Note: To ensure the service reliability of the relay contact, it is mandatory to fit the following to the actuators' terminals:

- an RC circuit or MOV (ZNO) suppressor for use with alternating current,
- a discharge diode for use with direct current.

Characteristics of the TSX DSZ 08R5 module

General characteristics

Table:

Modularity	8O Relays
Current used on the internal 5V	25mA
Current used on the 24V relay (1)	5mA+10mA per output at 1
Dissipated power in the module (load rate = 60%)	1.5W
Operating temperature	0 to 60°C
Dielectric strength Output/ground Output/internal logic	2,000V r.m.s. 50/60Hz 1min
Insulation resistance	> 10MΩ under 500VDC
Hygrometry	5% to 95% without condensation
Storage temperature	-25°C to 70°C
Operating altitude	0 to 6500 ft
Temperature related performance	The characteristics at 60°C are guaranteed for 60% of the inputs and 60% of the outputs at state 1.
Key	
(1)	If the 24V relay is delivered by an external supply (as in the mini-extension rack in particular), the value of this supply must be within a maximum tolerance of 24V +/- 10%.

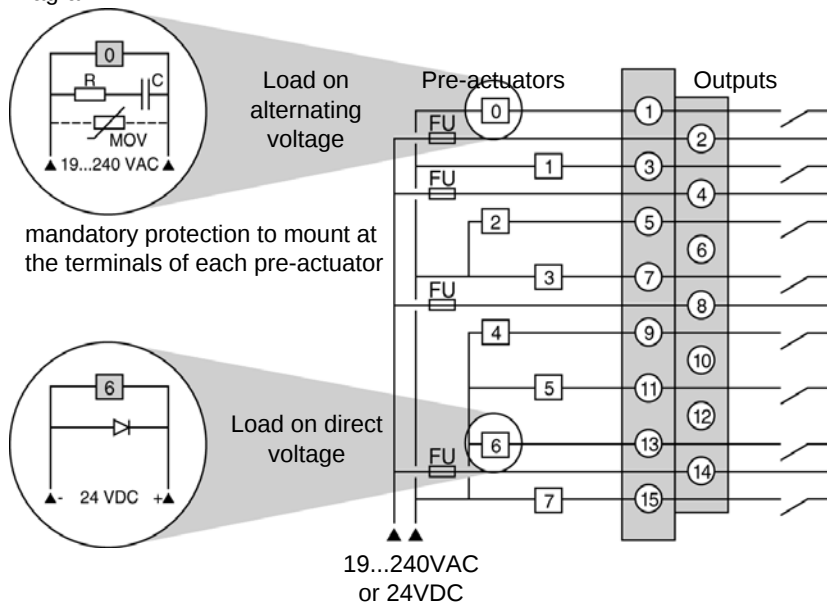
Characteristics of the relay outputs

Threshold operating voltage		Direct/ alternating	10 to 34VDC/19 to 264VAC			
Thermal current		3A				
Common maximum current		5A				
Alternating current load	Resistive load AC12	Voltage	24VAC	48VAC	110VAC	220VAC
		Power	50VA (5)	50VA (6) 110VA (4)	110VA (6) 220VA (4)	220VA (6)
	Inductive regime AC14 and AC15.	Voltage	24VAC	48VAC	110VAC	220VAC
		Power	24VA (4)	10VA (10) 24VA (8)	10VA (11) 50VA (7) 110VA (2)	10VA (11) 50VA (9) 110VA (6) 220VA (1)
Direct current load	Resistive load DC12	Voltage	24VDC			
		Power	24W (6) 40W (3)			
	Inductive regime DC13 (L/R=60 ms)	Voltage	24VDC			
		Power	10W (8) 24W (6)			
	Minimum switchable load		1mA/5V			
Response time (1)	On trigger		<10ms			
	Trigger		<10ms			
Type of contact			On close			
Built-in protection measures	Against overloads and short-circuits		None It is mandatory to fit a fast-blow fuse per channel or group of channels			
	Against alternating current inductive overload		None An RC circuit or MOV (ZNO) suppressor appropriate to the voltage must be mounted parallel to the terminals of each actuator.			
	Against direct current inductive overload		None A discharge diode must be mounted on the terminals of each actuator			
(1): 0.1x10 ⁶ operations (2): 0.15 x 10 ⁶ operations (3): 0.3 x 10 ⁶ operations (4): 0.5 x 10 ⁶ operations		(5): 0.7x10 ⁶ operations (6): 1x10 ⁶ operations (7): 1.5x10 ⁶ operations (8): 2x10 ⁶ operations		(9): 3x10 ⁶ operations (10): 5x10 ⁶ operations (11): 10x10 ⁶ operations		

Connection of the TSX DSZ 08R5 module

Pre-actuators/ Output connections

Diagram:



FU = Fast blow fuses to be calibrated according to the load.

Note: In this case where the supply voltage of the pre-actuators is obtained from a triple-phase network and it is equal to or greater than 200 VAC, the pre-actuators should be supplied starting at the same phase.

The Discrete input/output mixed module TSX DMZ 16DTK

34

At a Glance

Aim of this Chapter

This chapter introduces the TSX DMZ 16DTK module, its characteristics and connections to different sensors and pre-actuators.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Module TSX DMZ 16DTK	310
Characteristics of the module TSX DMZ 16DTK	312
Connection of the module TSX DMZ 16DTK	315
Connections of the TSX DMZ 16DTK module to the Dialbase Tego base	316
TSX DMZ 16 DTK module connections to (Tego Power) communication module	319

Module TSX DMZ 16DTK

At a Glance

Module TSX DMZ 16DTK comprises 16 inputs/outputs distributed as follows:

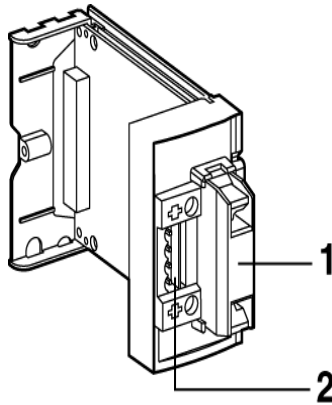
- 8 24VDC inputs, positive logic type 1,
- 8 static outputs 24VDC/0.5A.

The module is equipped:

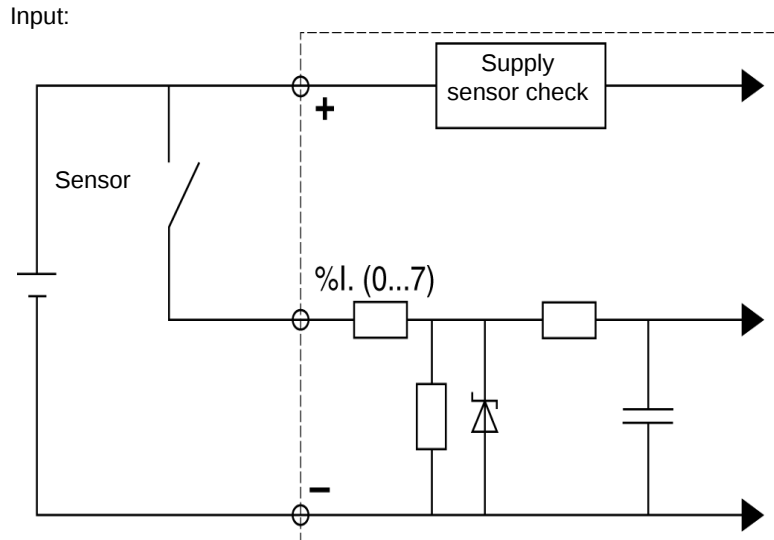
- with a HE10 type connector (1), which can receive,
 - either a ready-wired TSX CDP•01 lead to connect directly to the terminals, sensors or pre-actuators,
 - or a TSXCDP••3 cable to connect to the Tego Dial or Tego Power wiring interface.
- with a tunnel terminal block allowing the sensors and pre-actuators to be connected if the current they use is $>0.7A$.

Note: If the consumption of the sensors and pre-actuators is $\leq 0.7A$, the power supply can be cabled from the HE10 connector.

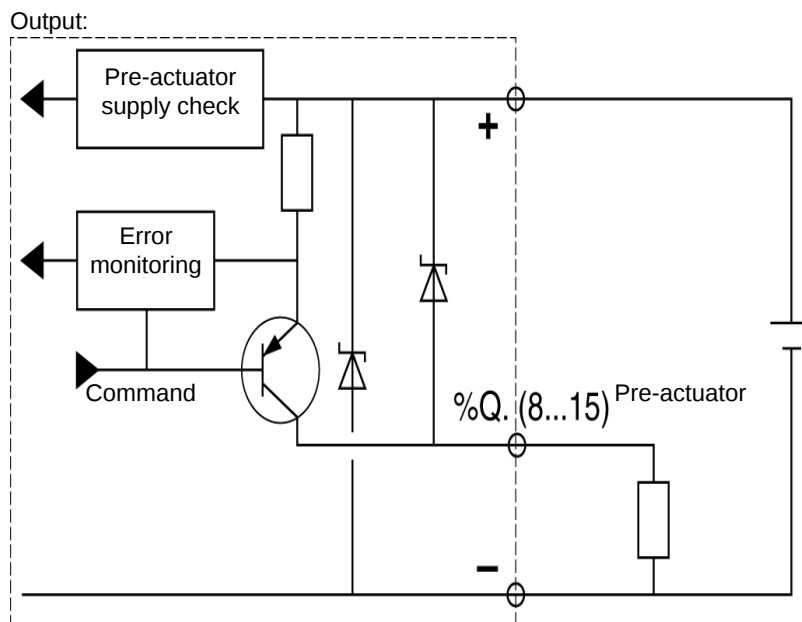
Module:



Process diagrams for an input



Process diagram for an output



Characteristics of the module TSX DMZ 16DTK

General characteristics

Modularity	Inputs	8E/24VDC
	Outputs	8S static 24VDC/0.5A
Current used on the internal 5V		30mA+3.2mA per output at 1
Current used on the sensor supply		20mA+7mA per output at 1
Current used on the 24V actuator (excluding load current)		30mA+1mA per output at 1
Dissipated power in the module (load rate = 60%)		3W
Operating temperature		0 to 60°C
Dielectric strength	Input/ground or input/internal logic	1500V r.m.s. 50/60Hz 1min
	Output/ground or output/internal logic	500V r.m.s. 50/60Hz 1min
Insulation resistance		>10MΩ under 500VDC
Hygrometry		5% to 95% without condensation
Storage temperature		-25°C to 70°C
Operating altitude		0 to 6500 feet
Temperature related performance		The characteristics at 60°C are guaranteed for 60% of the inputs and 60% of the outputs at state 1.

Characteristics of the 24VDC inputs

Logic			Positive
Nominal input values		Voltage	24V
		Current	7mA
Input threshold	In state 1	Voltage	≥ 11 V
		Current for U = 11V	> 2.5mA
	In state 0	Voltage	< 5 V
		Current	< 1.5mA
	Sensor supply (including ripple)		19V to 30V (possible up to 34V, limited to 1 hour per 24 hours)
Input impedance			3.4kΩ
Configurable response time		State 0 to 1	0.1...7.5ms
		State 1 to 0	0.1...7.5ms
Sensor voltage check threshold		OK	> 18V
		Fault	< 14V
Sensor voltage check response time	When 24V disappears		1ms<t<3ms
	When 24V appears		8ms<t<30ms
Type of inputs			Resistive.
Compliance with IEC 1131-2 type 1			Type 1
DDP 2 wire compatibility			See <i>Compatibility of 2-wire sensors with 24 VDC inputs, p. 187</i>
DDP 3 wire compatibility			Yes
Reference input			To + on the supply

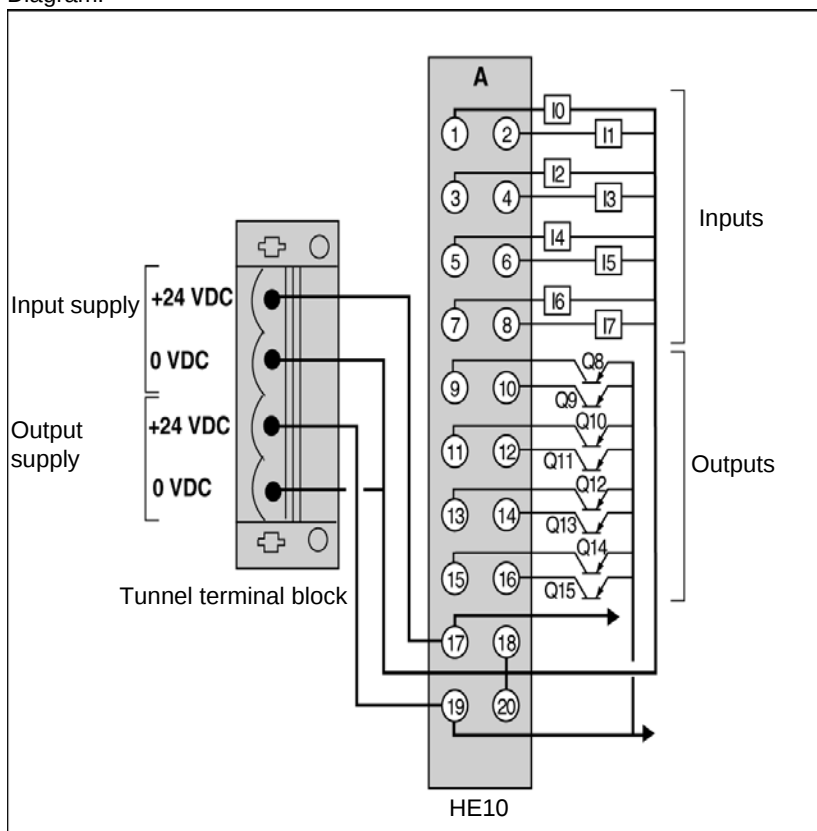
**Characteristics
of the
24VDC/0.5A
static outputs**

Logic		Positive emitted current
Nominal values	Voltage/Current	24V/0.5A
Threshold values ($U \leq 30$ or 34V, including ripple)	Voltage	19V to 30V (possible up to 34V, limited to 1 hour per 24 hours)
	Current/Channel	0.625A
	Current/Module	6A
Power of tungsten filament lamp		10W max.
Leakage current (state 0)	During normal operation	< 0.5mA
	When module 0V is accidentally disconnected	< 2mA
Voltage drop	state 1	< 0.3V (for $I = 0.5A$)
Minimum load impedance		48 Ω
Response time (1)	Transition state 0 to 1	< 500 μs
	Transition state 1 to 0	< 500 μs
Switching frequency on inductive load		< $0.6/LI^2$ Hz
Compliance with IEC 1131-2		Yes
Output parallelization		Yes, 2 outputs maximum
Compatibility with direct inputs		All the 24VDC IEC 1131-2 type 1 and type 2 inputs with input impedance < 15 K Ω
Common of loads		To - on the supply
Built-in protection measures	Against overloads and short-circuits	By current limiter and thermal circuit breaker $0.75A \leq I_d \leq 2A$
	Against excess voltage	Yes, by Zener diode
	Against polarity inversions	Yes, by reverse diode on supply. Plan for a fast-blow fuse on the +24V of the actuator's supply (6.3A)
Actuator voltage check threshold	OK	> 18V
	Fault	< 14V
Check response time	On appearance	T < 4ms
	On disappearance	T < 30ms
Common of loads		To - on the supply
Dissipated power per channel at state 1		0.05W (for $U = 24V$)
(1): All outputs are equipped with circuits for rapid demagnetizing of solenoids. Solenoid load time < L/R.		

Connection of the module TSX DMZ 16DTK

Principle of the connection between the different internal elements of the module

Diagram:



Connections of the TSX DMZ 16DTK module to the Dialbase Tego base

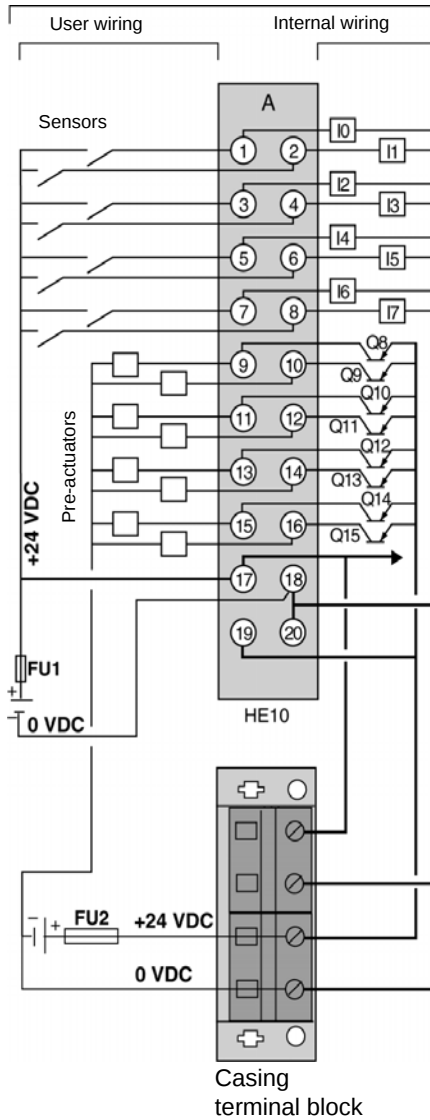
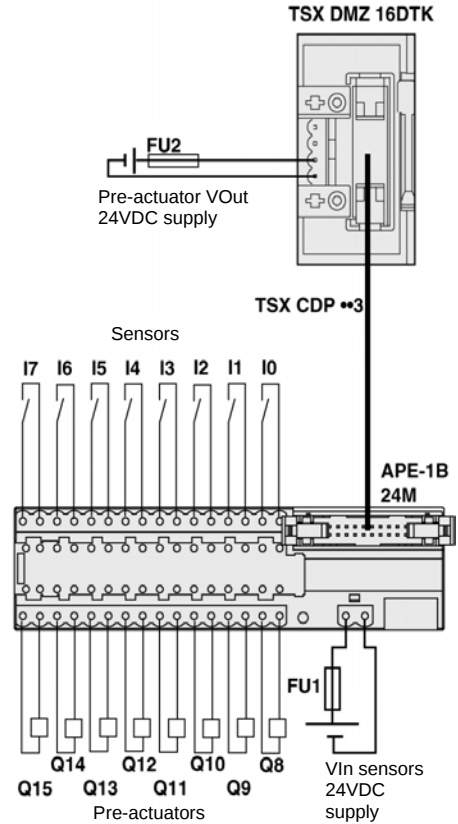
At a Glance

The TSX DMZ 16DTK module offers 2 possibilities for connecting the power supply of the sensors and pre-actuators:

- **First possibility:**
 - connecting the power supply of the sensors from the Dialbase Tego base,
 - connecting the power supply of the pre-actuators from the tunnel terminal block. In all cases, connecting the power supply of the pre-actuators must be performed on this terminal block.

Diagram:

Connection process diagram

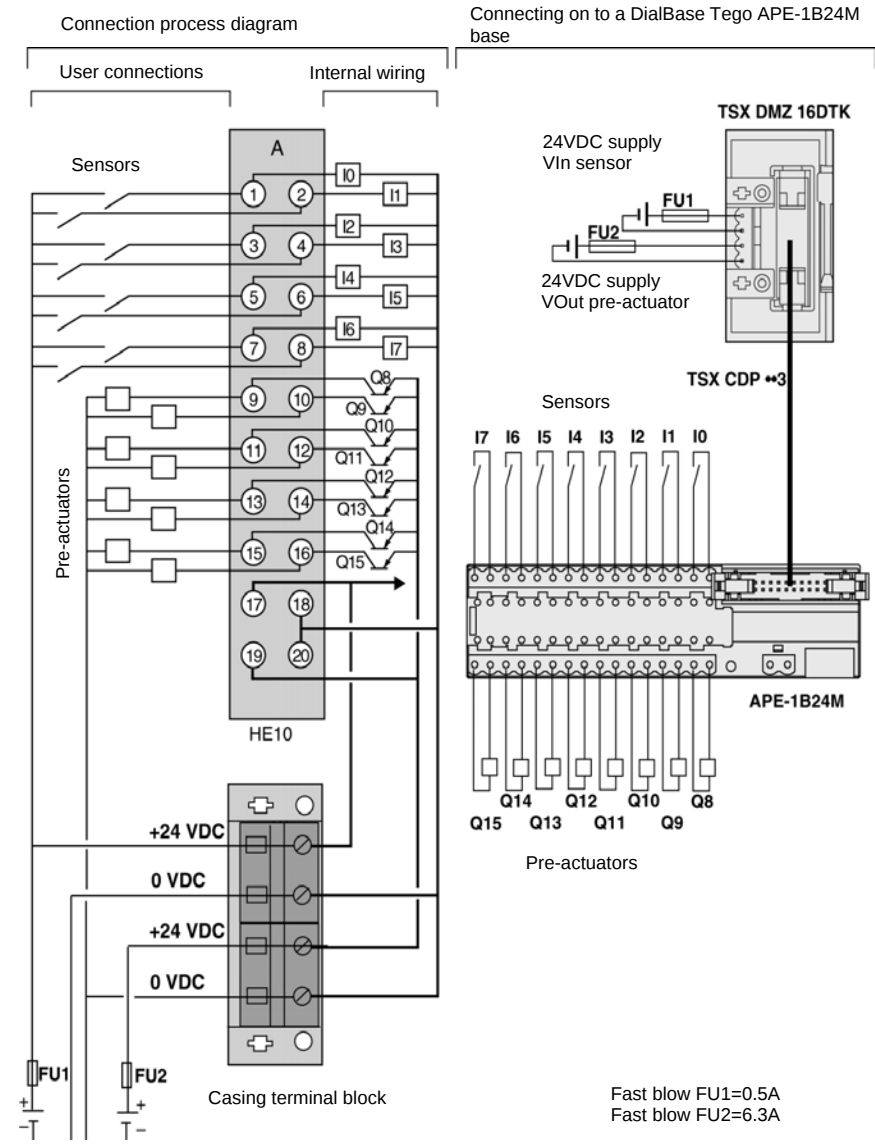
Connection to a Dialbase Tego
APE-1B24M base

FU1 = 0.5A fast blow fuse
FU2 = 6.3A fast blow fuse

● **Second possibility:**

- connecting the power supply of the sensors and pre-actuators from the TSX DMZ 16DTK module tunnel terminal block.

Diagram:



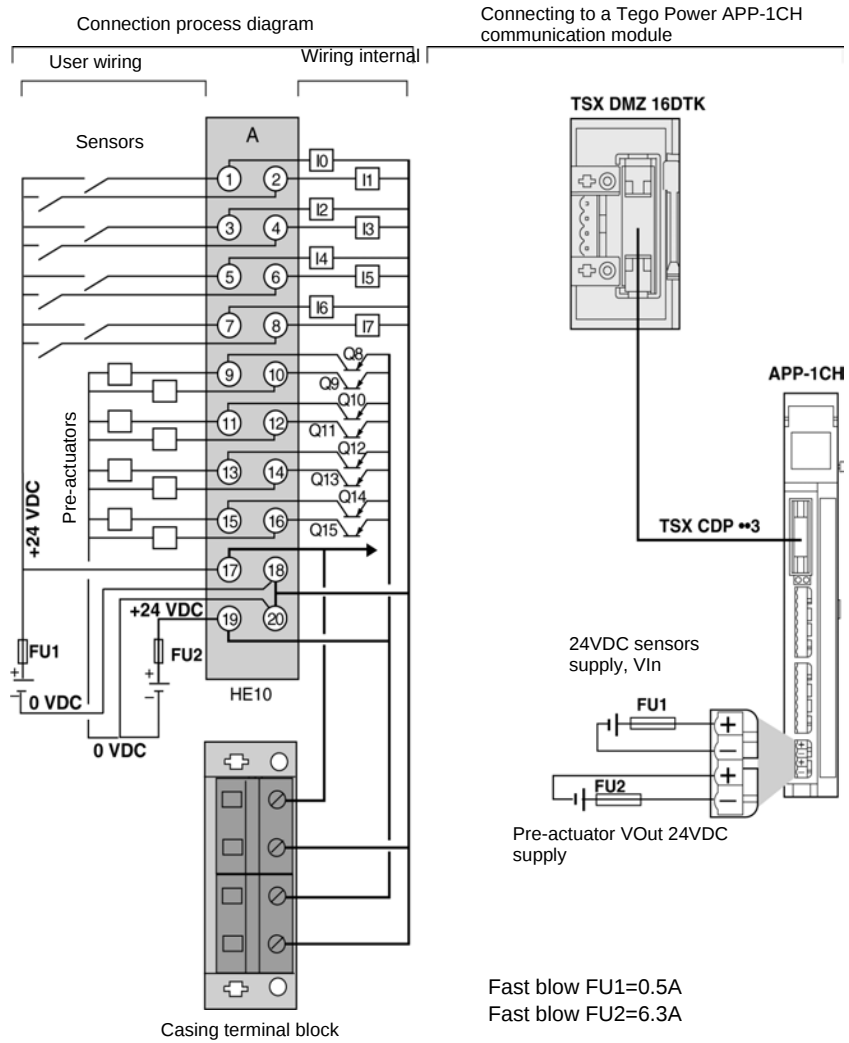
TSX DMZ 16 DTK module connections to (Tego Power) communication module

At a Glance

The TSX DMZ 16DTK module offers 2 possibilities for connecting the power supply of the sensors and pre-actuators:

- **First possibility:**
 - connecting power supply of sensors and pre-actuators to the APP-1CH communication module. In this case, the consumption of all the pre-actuators will be $\leq 0.7A$,

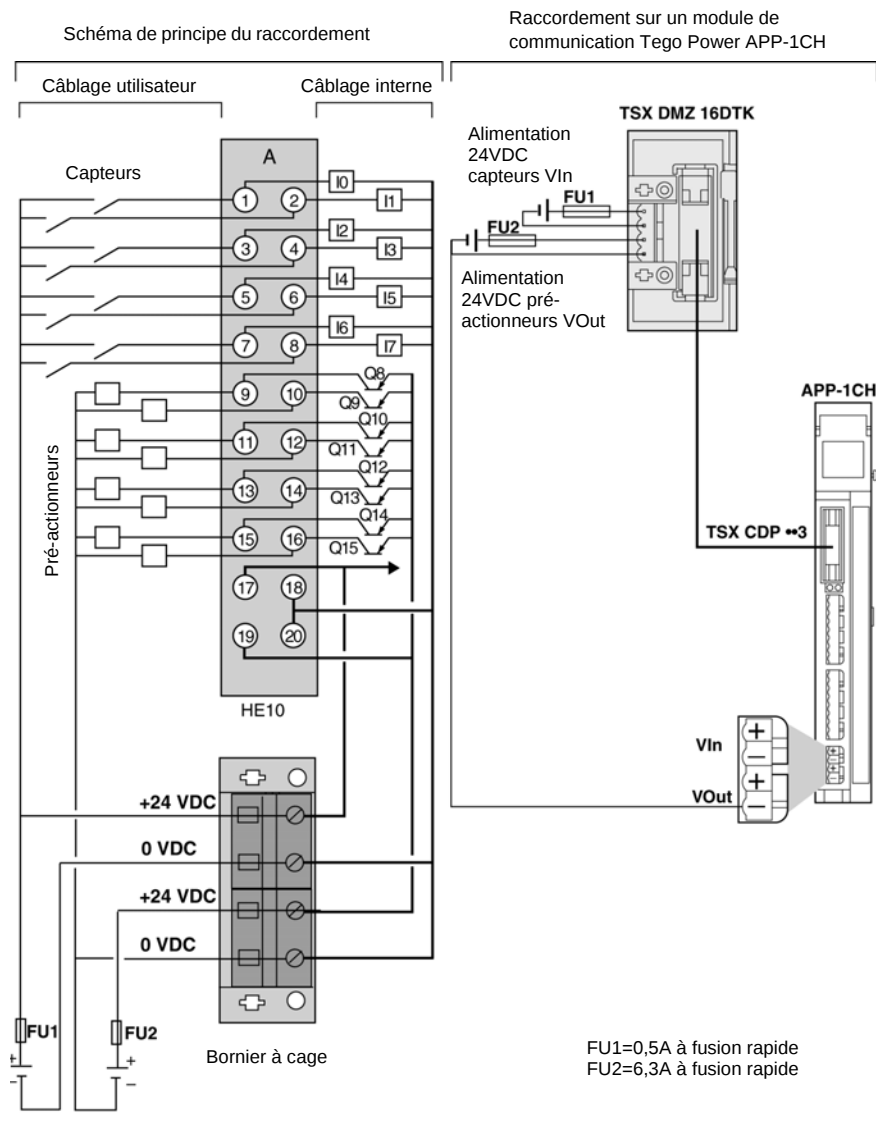
Diagram:



- **Second possibility:**

- Connecting the power supply of the sensors and pre-actuators from the TSX DMZ 16DTK module tunnel terminal block. Connection to use if the consumption of the pre-actuators is $\geq 0.7A$.

Diagram



Emergency stop monitoring module

35

At a Glance

Aim of this chapter This chapter describes the TSX DPZ 10 D2A emergency stop monitoring module: main functions, operating modes, troubleshooting, connecting emergency stop push buttons, detailed features, etc

What's in this Chapter? This chapter contains the following sections:

Section	Topic	Page
35.1	Module for monitoring the emergency stop	324
35.2	Safety function of the emergency stop monitoring module	326
35.3	Connections and wiring examples of the emergency stop monitoring module	335
35.4	Diagnostics of the safety string of the emergency stop monitoring module	343
35.5	Monitoring and display of the emergency stop monitoring module	346
35.6	Electrical characteristics of the emergency stop monitoring module	349
35.7	Usage precautions for the emergency stop monitoring module	352

35.1 Module for monitoring the emergency stop

Introduction to the emergency stop monitoring module

Built-in safety system	The safety system built into the TSX DPZ 10 D2A module enables the machine emergency stop (ES) circuits to be controlled in total safety. Emergency stop monitoring is fitted with a hardwired logic safety unit. It allows safety functions up to category 3 to be covered, to standard EN 954-1.
Diagnostics of the safety system	The TSX DPZ module carries out complete diagnostics of the safety system by reading the status of the push buttons or the position switches in the emergency stop input system, the return loop and the controller in charge of the two output circuits. This information is transmitted to the PLC processor in the form of 10 discrete input bits.
Module behavior	The TSX DPZ module behaves like a discrete input module. The PLC does not act on the safety module
Module functions	The TSX DPZ module offers the following functions: • Monitoring emergency stop PBs and position interrupters (PI) on mobile covers for an immediate stop (Category 0 emergency stop according to standard EN 418). • Hardwired safety units, independent of the TSX Micro processor. • Guaranteeing the safety function, irrespective of what the first failure in a safety system component may be, by using: • 2 safety output circuits, • 4 double contact input channels for emergency stop PBs or PIs. • Redundant, self-checking design (identical to the PREVENTA XPS AL range). • Rebooting check by activating an auxiliary input: validation input or Start PB. • Complete troubleshooting of the safety system by: • Reading the status of emergency stop PB or PI inputs, • Reading the validation input or Start PB (return loop), • Reading the command of the 2 safety outputs. • Monitoring the external supply of the module. • Option to modify the filtering value of the diagnostics discrete input bits (see (Programmable filtering on inputs)).

Symbolization

The following symbolization is used:

- PB: Push Button
 - ES: Emergency Stop
 - PI: Position Interrupter
-

35.2

Safety function of the emergency stop monitoring module

At a Glance

Aim of this section

This section introduces the safety function of the emergency stop monitoring module.

What's in this Section?

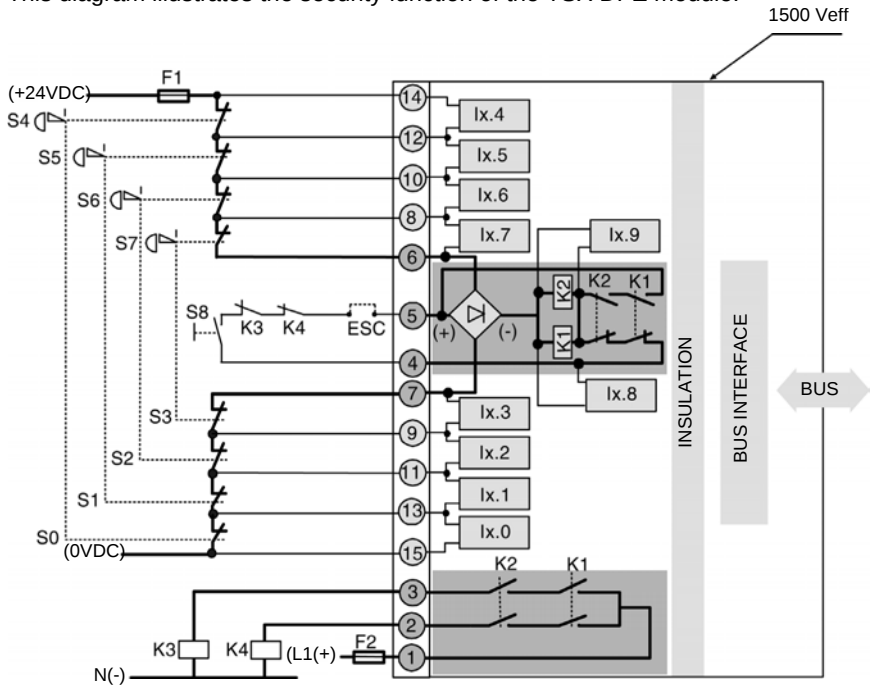
This section contains the following topics:

Topic	Page
Security function	327
Functional cross-section of the TSX DPZ security function module:	328
Functional diagram of the security function	331
Operating modes and troubleshooting	332
Protecting inputs and outputs	334

Security function

Functional diagram

This diagram illustrates the security function of the TSX DPZ module:



Terminal block

The following table describes the terminal block to enable module wiring:

Terminal	Description
6 - 7	Power supply for the security string
1 - 2 and 1 - 3	Security outputs, potential free
4 - 5	Return loop (ESC = supplementary validation conditions)
14 - 15	Monitoring the external 24 VDC supply of the module
14 - 12, 12 - 10, 10 - 8, 8 - 6, 7 - 9, 9 - 11, 11 - 13 and 13 - 15	8 reading channels for dry input contacts, emergency stop PB or PI

Functional cross-section of the TSX DPZ security function module:

At a Glance

The security function of the emergency stop monitoring module breaks down in the following way:

- The external supply of the module.
 - The security block made up of cabled components.
 - The reading blocks for automatic diagnostics which are made up of discrete components (symbolized by $I \times n$ in the functional diagram (see *Security function*, p. 327)).
 - The galvanic insulation block and interface with the PLC bus.
-

External supply to the module

The module requires a 24 VDC supply to supply the reading blocks for the PB or PI inputs (terminals 14 and 15) and the security block (terminals 6 and 7).

It should be noted that:

- The security outputs are potential free (terminals 1-2 and 1-3).
 - The module is protected from polarity inversions.
-

Security block

24 VDC voltage is applied between terminals 6 and 7, via the string of position interrupters' open contacts or the emergency stop buttons. Wiring of the security string is **mandatory**.

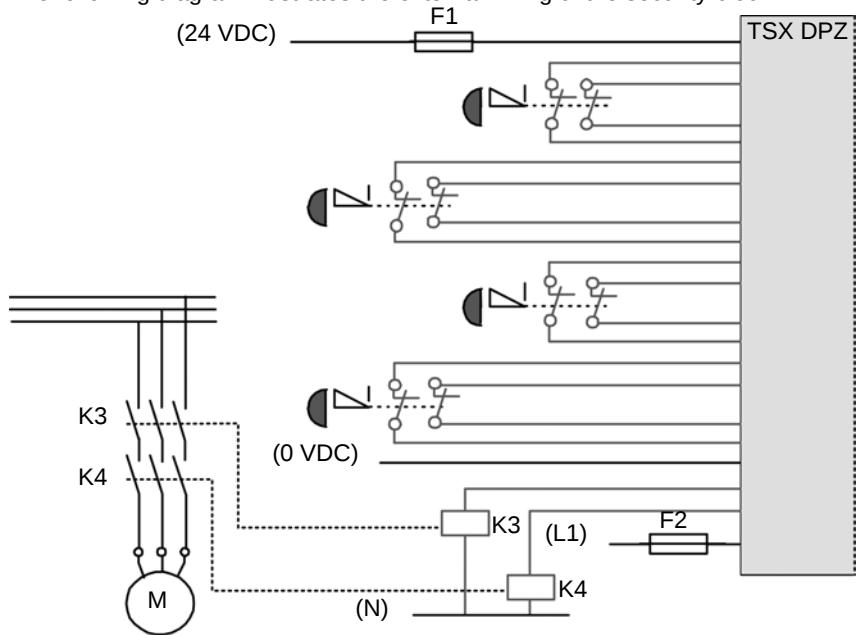
An external supply cut or pressing one of the emergency stop buttons causes the security output circuits to open immediately.

After reactivating the emergency stop PB or closing the input string position interrupters, you must send a pulse to the validation input (terminals 4 and 5) in order to supply the K1 and K2 security relays again, and close the security output contacts (terminals 1-2 and 1-3).

In order to guarantee the security function, irrespective of what the first failure may be, it is mandatory to use:

- In inputs: emergency stop PB or double-contact PI.
- In outputs: 2 guided contact relays.
- On the module supply: an F1 protective fuse.

The following diagram illustrates the external wiring of the security block:



**Reading blocks
for PLC
diagnostics**

These diagnostics blocks allow the following functions to be carried out:

- Diagnostics of the input string (blocks I x 0 to I x 7). Wired in parallel to the input string contacts, these blocks read independent of each contact. Using (wiring) reading blocks depends on the number and the type (single or double contact) of inputs to go through the diagnostics process.
- Reading the validation input (block I x 8).
- Reading the status of the K1 and K2 (block I x 9) relay command.

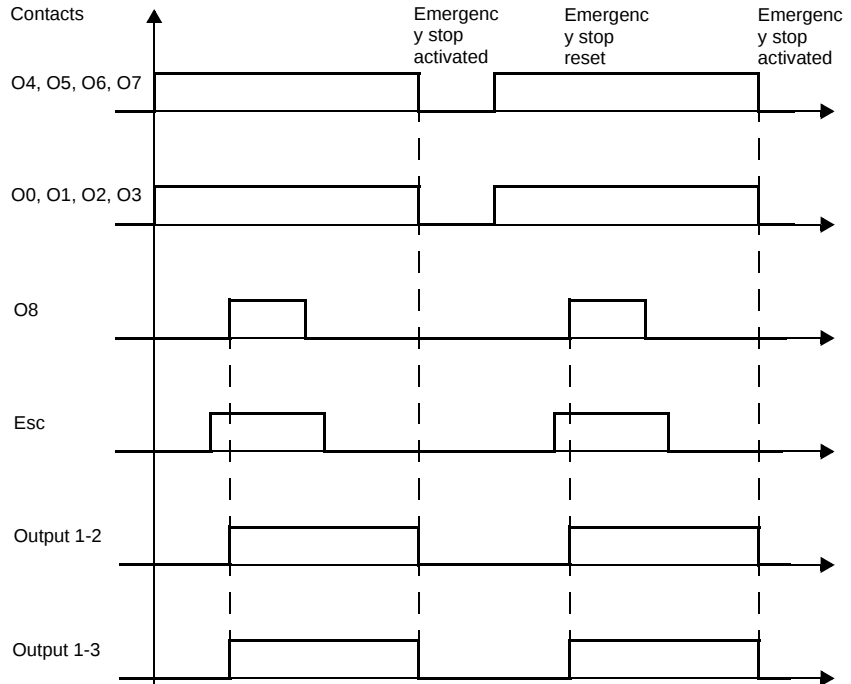
**Interface block
with the PLC bus**

This block guarantees 1500 Veff. galvanic insulation and the interface with the PLC bus.

Functional diagram of the security function

Status of security outputs

The functional diagram of the security function is as follows:



When all the S0 to S3 and S4 to S7 contacts are closed and the conditions for rebooting (ESC) are met, pressing the S8 push button closes the 2 output security circuits.

Opening one of the S0 to S7 contacts opens the 2 output security circuits.

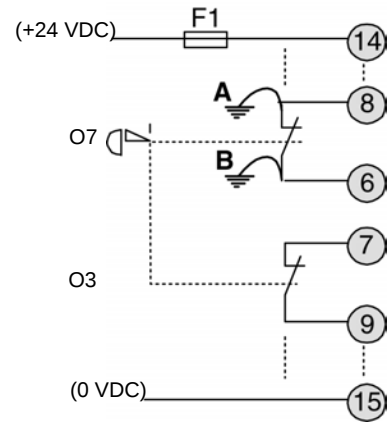
Operating modes and troubleshooting

Operating modes	The module is independent of the PLC. The status or change of status (Stop, Run, off, on, etc) of the PLC has no effect on the security function of the emergency stop monitoring module.
Detecting faults on the outputs	Detecting the first fault on outputs requires contactors or mechanically-linked contact relays to be used. The "O" contacts of the K3 and K4 relays must be relooped in series on the return loop (terminals 4-5). This wiring prohibits the validation of the security string on bonding of one of the two command relays (K3 or K4).
Detecting faults inside the module	When an internal component fails for the first time, the TSX DPZ module guarantees the security function by opening the output contacts (K1, K2) or by opening these contacts when next requested (opening an ES PB or PI, switched off). In this case, it becomes impossible to close the output contacts (K1, K2), therefore it is appropriate to change the module.
Detecting ground faults with an insulated supply	The TSX DPZ module was developed to meet the demands of the EN60204-1 standard, dealing in particular with short circuits to ground. If a module with an external 24 VDC supply, which is insulated from the ground, is used, the first ground fault does not affect the operation of the module, on the other hand, the second ground fault causes: • Either short-circuiting of one or several PB ES or PI (see figure 1). • Or short-circuiting of the external 24 VDC supply (see figure 2).

Graphic representation of the short-circuit faults

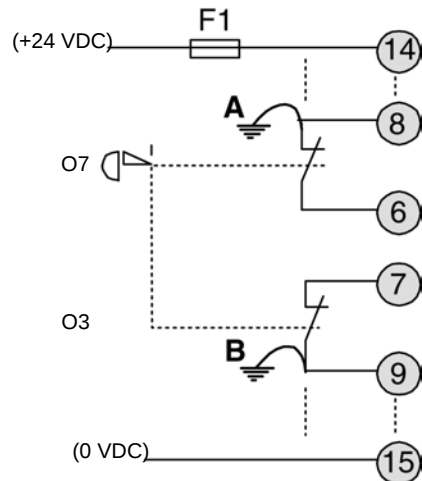
Short-circuiting of one or several PB ES or PI:

Error A	No consequence
Error B	O7 in short circuit (not detected)
Pressing BP	Opening the safety outputs with AU
Diagnostics	O3 and O7 inconsistent



Short-circuiting of the external 24 VDC supply:

Error A	No consequence
Error B	Opening the safety relays by destroying fuse F1



Detecting ground faults with referenced supply

If a module with an external supply of 24 VDC referenced to the ground is used (0 VDC connected to ground), the short-circuits described above occur with the **first** ground fault.

Protecting inputs and outputs

Protecting safety string inputs

It is necessary and **mandatory** to protect the safety block and module supply with a **single fuse** (F1 in the examples of wiring). This fuse is an **active element** of the safety string.

Protecting safety outputs

The safety outputs must be protected by a fuse (F2 in the examples of wiring). This fuse offers protection against short-circuits or overloading. This protection avoids fusing the internal safety relays in the TSX DPZ module.

35.3 Connections and wiring examples of the emergency stop monitoring module

At a Glance

Aim of this section

This section introduces the connections and wiring examples of the emergency stop monitoring module.

What's in this Section?

This section contains the following topics:

Topic	Page
Connecting an emergency stop PB or PI with 2 open contacts	336
Connecting an emergency stop PB or PI to one single open contact	338
Global diagnostics of a input string with several single contacts	340
Serialization of the emergency stop monitoring modules	342

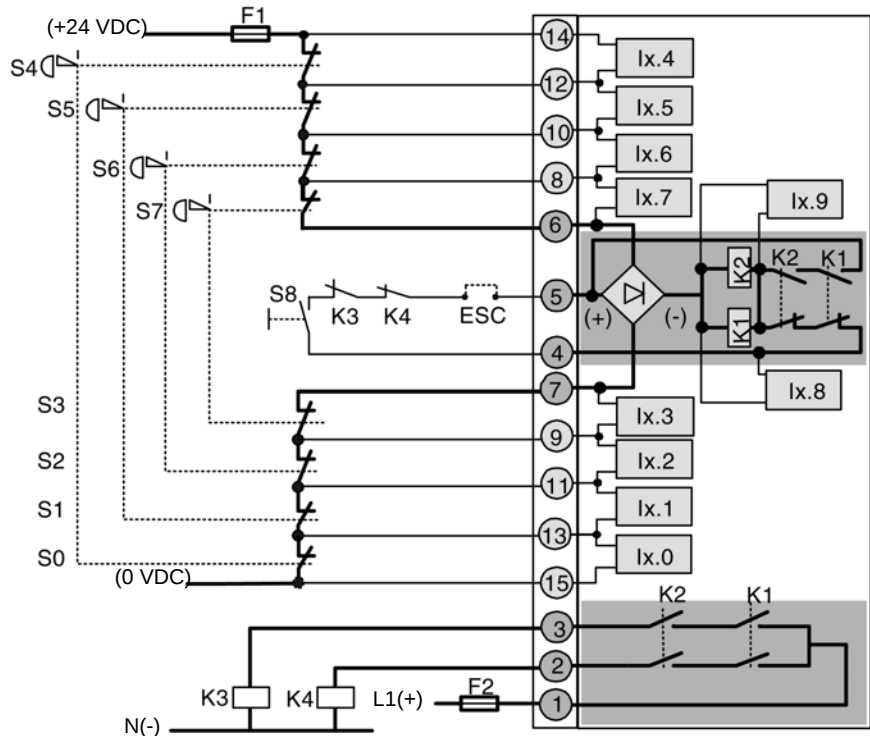
Connecting an emergency stop PB or PI with 2 open contacts

Wiring diagram

The following category 3 wiring diagram allows the full diagnostics of an input string which can contain up to 4 double contacts.

This diagram makes it possible to diagnose all the security string contacts.

PB ES or PI with 2 open contacts.



Module channels This table, fitting in with the wiring diagram, provides information about the terminals and the symbol associated with the different channels in the module.

Channel		Symbol
0		S0
1		S1
2		S2
3		S3
4		S4
5		S5
6		S6
7		S7
8		Status of the S8 return loop
9		Status of the output command

Esc = supplementary validation conditions.

Using less than 4 double contacts When using less than 4 double contacts, the unused input limits must be shorted-out.
For example, if contacts S0 and S4 are not used, limits 13 and 15 (S0) then 14 and 12 (S4) must be shorted-out.

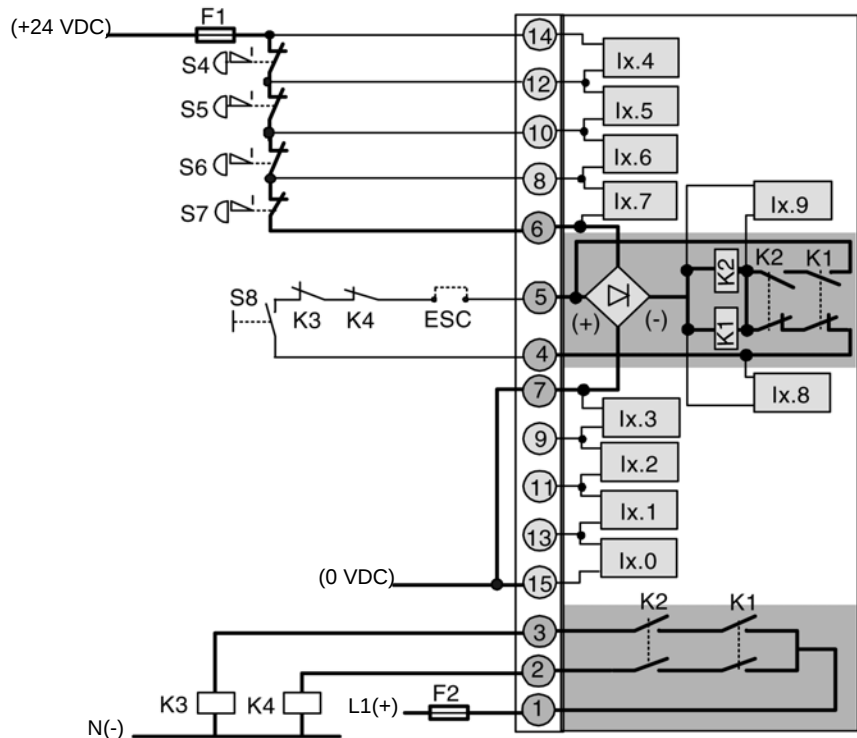
Connecting an emergency stop PB or PI to one single open contact

Wiring diagram

The following wiring diagram allows the diagnostics of an input string which can contain up to 4 single contacts.

The safety string contacts are all wired on the positive pole.

PB ES or PI with 1 open contact.



Module channels This table, fitting in with the wiring diagram, provides information about the terminals and the symbol associated with the different channels in the module.

Channel	Symbol
0	Insignificant
1	Insignificant
2	Insignificant
3	Insignificant
4	S4
5	S5
6	S6
7	S7
8	Status of the S8 return loop
9	Status of the output command

Esc = supplementary validation conditions.

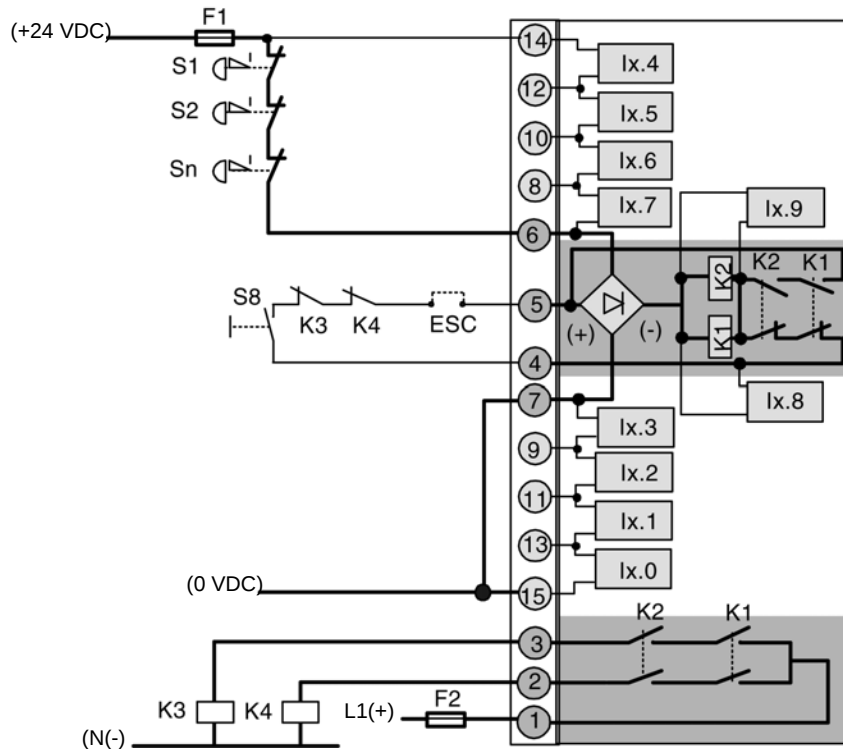
Using less than 4 single contacts When using less than 4 single contacts, the unused input limits must be shorted-out. For example, if the S5 contact is not used, limits 10 and 12 must be shorted-out.

Undetected faults All the faults are undetected. A short-circuit on a PB ES or PI is not detected. Activating this button does not make the security relays open.

Global diagnostics of a input string with several single contacts

Wiring diagram

The following wiring diagram makes it possible to implement the global diagnostics of an input string with several single contacts.



Module channels This table, fitting in with the wiring diagram, provides information about the terminals and the symbol associated with the different channels in the module.

Channel	Symbol
0	Insignificant
1	Insignificant
2	Insignificant
3	Insignificant
4	S1, S2, etc, Sn
5	Insignificant
6	Insignificant
7	Insignificant
8	Status of the S8 return loop
9	Status of the output command

Esc = supplementary validation conditions.

Undetected faults

All the faults are undetected. A short-circuit on a PB ES or PI is not detected. Activating this button does not make the security relays open.

Serialization of the emergency stop monitoring modules

Applications with more than 4 inputs

If the applications have more than 4 inputs, several serialized TSX DPZ modules can be used.

Whatever the contacts on the inputs may be (single or double contacts), the following must be cabled:

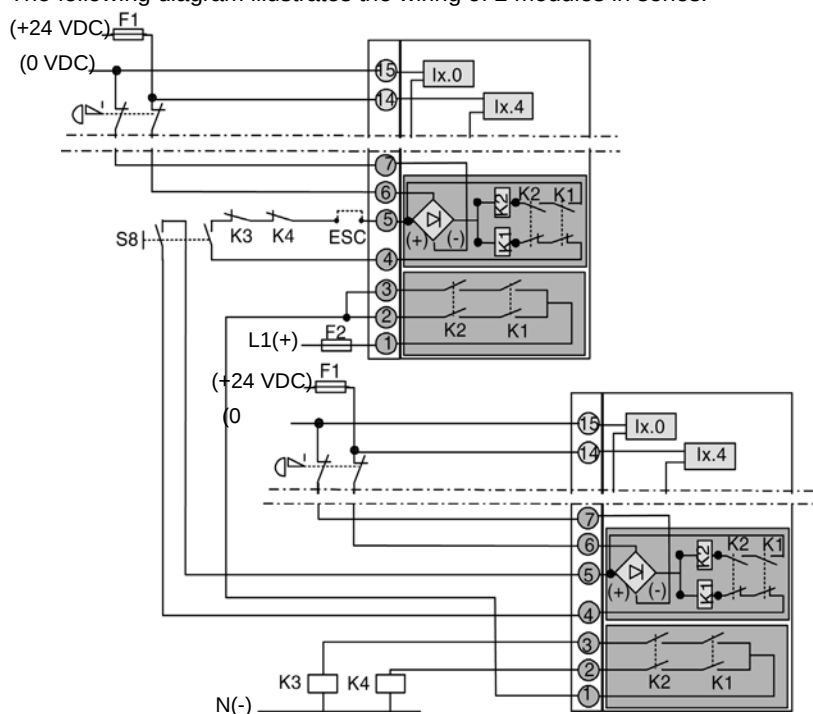
- Serialized security output modules.
- An S8 validation contact via serialized module (electrically insulated contact).

The following example illustrates the wiring, which must be performed in order to serialize 2 emergency stop monitoring modules.

The number of modules, which can be serialized varies according to the number of slots offered by the TSX Micro PLC, which can be a maximum of 8 half-size modules.

Wiring 2 modules in series

The following diagram illustrates the wiring of 2 modules in series.



Note: One fuse (F1) must be used per module.

35.4 Diagnostics of the safety string of the emergency stop monitoring module

At a Glance

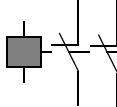
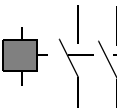
Aim of this section This section introduces the diagnostics of the security string of the emergency stop monitoring module.

What's in this Section? This section contains the following topics:

Topic	Page
Diagnostics of the safety string	344
Improving safety with software	345

Diagnostics of the safety string

Diagnostic bits The following table describes the diagnostic bits of the channels of the emergency stop monitoring module.

Terminals	Channels	Bits	Meaning	Value
13 - 15	0	%Ix.0	ES monitoring input	1 contact
11 - 13	1	%Ix.1		 → 1
9 - 11	2	%Ix.2		
7 - 9	3	%Ix.3		
14 - 12	4	%Ix.4		
12 - 10	5	%Ix.5		 → 0
10 - 8	6	%Ix.6		
8 - 6	7	%Ix.7		
5 - 4	8	%Ix.8	Validation input	1 contact
				 → 1
				 → 0
/	9	%Ix.9	Status of the output command	2 contacts
				 → 1
				 → 0

x = 3 to 10 according to the position of the module in the PLC..

Language Objects

Software implementation and the description of TSX DPZ language objects are identical to those of the discrete modules.

Improving safety with software

Diagnostics information

In addition to the security functions, which are managed by the TSX DPZ module, diagnostics information makes it possible to detect and signal faults. This information also helps you to adhere to the test manual procedures.

Signaling faults via the program

Adapted to the redundant inputs, the consistency test on the status of the contacts, which are linked to the same sensor, make it possible to detect a short circuit and find the faulty contact.

This type of detection may be performed together with the locking of validation inputs (ESC) by a potential free PLC relay output. Opening the PLC output when a fault is detected prevents the PLC from rebooting.

Monitoring the validation input

According to the needs of the application, this function consists of checking the possible short-circuit in the validation input. Checking the consistency of the validation input and the command status of the outputs makes it possible to detect this fault.

35.5

Monitoring and display of the emergency stop monitoring module

At a Glance

Aim of this section

This section introduces the monitoring, display and maintenance of the emergency stop monitoring module.

What's in this Section?

This section contains the following topics:

Topic	Page
Control and display	347
Maintenance	348

Control and display

Supply control

Identical to the discrete modules, the emergency stop monitoring module incorporates a control of the supply voltage for the input reading block.

Voltage lower than 16V causes a fault in the module (%Ix.MOD.ERR = 1). The input bits are no longer significant (%Ix.0 to %Ix.9 = 0). In this case, the security string remains operational, because if the voltage drops too much, then the safe position is adopted by the security outputs opening.

The validation of the security string cannot be guaranteed if the voltage becomes lower than 21.6V.

Supply fault

The supply fault is indicated by:

- A lit I/O LED.
 - The %Ix.MOD.ERR module fault bit, which switches to 1.
 - The %MWx.MOD.2:X9 module fault bit, which switches to 1.
 - The %Ix.i.ERR channel fault bits, which all switch to 1.
-

Display

The status of inputs and faults of the TSX DPZ module can be accessed via the centralized display.

Maintenance

Maintenance table

This table shows the possible causes of these faults and the checks to be carried out when the faults occur.

Errors	Possible causes	Check
Unwanted opening of safety outputs	No external supply or destruction of F1 fuse	Read %Ix.MOD ERR and the I/O LEDs on the PLC
		Voltage between terminals 14 and 15 greater than 16V
	Emergency stop open	Read %Ix.0 to %Ix 7
		Check the consistency of the status of each contact
Start up not possible	More relay commands	Read %Ix.9
	Destruction of F2 fuse	Check the status and the characteristics of the fuse
	No external supply or destruction of F1 fuse	Read %Ix.MOD ERR and the I/O LEDs on the PLC
		Voltage between terminals 14 and 15 greater than 16V
	Insufficient command voltage	Voltage between terminals 6 and 7 greater than 21.6V
	Emergency stop open	Read %Ix 0 to %Ix 7
		Check the consistency of the status of each contact
Automatic start up	PB not functioning	Read %Ix 8 on PB action
		Check the contacts on the return loop
	Command not possible	Read %Ix 9 on PB action
	Destruction of F2 fuse	Check the status and the characteristics of the fuse
Incorrect input information	Fall in voltage over the wires	Voltage between terminals 6 and 7 must be: > 21.6 V all ES closed > 2.8 V all ES open

If the error persists after the wiring has been checked, the module must be changed.

35.6 Electrical characteristics of the emergency stop monitoring module

At a Glance

Aim of this section

This section introduces the electrical characteristics of the emergency stop monitoring module.

What's in this Section?

This section contains the following topics:

Topic	Page
Electrical characteristics	350
Environment characteristics	351

Electrical characteristics

Table of characteristics

The following table indicates the electrical characteristics of the TSX DPZ 10D2A emergency stop monitoring module:

Reference module			TSX DPZ 10D2A				
Modularity			8 discrete emergency stop inputs 1 discrete input (Validation) 2 safety relay outputs				
Supply							
	Nominal voltage		24 VDC (-10%, +20%)				
	Voltage limits		21,6 ... 30 VDC				
	Threshold Check		Error < 16 VDC				
	Consumption		<= 200 mA				
Module protected externally by a fuse according to IEC 947-5-1, DIN VDE 0660 part 200			1 A (gl)				
Consumption on internal 5V			20 mA				
Inputs							
	Logic		Positive				
	IEC 1131-2 conformity		Type 1				
	Insulation (test voltage)	Inputs/ground Inputs/internal logic	1500 Veff - 50/60 Hz - for 1 min				
	Configurable filtering		0,1 ... 7.5 ms				
	Job limit voltage	Alternating current		19 ... 264 VAC			
		Direct current		17 ... 250 VDC			
	Permanent maximum current			1.25 A			
	Alternating current load	Inductive	Voltage (V eff)	24	48	110	220
		AC15 load	Power (VA)	30	60	140	275
	Direct current load	Inductive	Voltage (VDC)	24			
		DC123 load (L/R = 100 ms)	Power (W)	30			
	Module protected externally by a fuse according to IEC 947-5-1, DIN VDE 0660 part 200			4 A (gl)			
	Minimum current			10 mA			
	Response time on ES activation			<= 100 ms			
	Type of contact			Ag, Ni, Au on closing			
	Insulation (test voltage)	Outputs/ground Outputs/internal logic		2000 Veff - 50/60 Hz - for 1 min			
	Insulation resistance			> 10 MOhms at 500 VDC			

Environment characteristics

Table of characteristics

The following table indicates the environment characteristics of the TSX DPZ 10D2A emergency stop monitoring module:

Module reference		TSX DPZ 10D2A
Operating temperature	Module	+0 Degrees C to +60 Degrees C
	Safety system	-10 Degrees C to +60 Degrees C
Storage temperature		-25 Degrees C to +70 Degrees C
Hygrometry without condensation		5 ... 95%
Altitude		0 ... 6500 ft
Degree of protection according to IEC 529		Install the module in an IP54 envelope (minimum)
Power dissipated in the module		4.5 W
Ground		0.28 kg
Standards		
	Machine safety	IEC 204-1, EN 292, EN 418, EN 60204-1, EN 954 category 3
	PLC products	NFC 63-850, IEC 1131, UL 508, UL 746L, UL 94, CSA 22-2 number 142

Note: The cumulative current at the 2 safety outputs must not exceed 2.5A
The module is capable of switching weak loads (10mA / 17V) as long as the output has never switched a large load before, as this could damage the gold layer on the contacts.

35.7

Usage precautions for the emergency stop monitoring module

At a Glance

Aim of this section

This section introduces the usage precautions for the emergency stop monitoring module.

What's in this Section?

This section contains the following topics:

Topic	Page
General precautions for wiring	353
Standards and precautions for use	354

General precautions for wiring

General precautions and rules for wiring

Precautions relative to the use of discrete input/output modules apply to the TSX DPZ emergency stop monitoring modules (see *General precautions and rules for wiring*, p. 182).

The safety system must be wired in accordance with the regulations in chapter 15 of standard EN 60204-1. This chapter describes the rules concerning wiring and the mechanical protection of cables.

Cross-section and length of wires

Each terminal can receive bare wires fitted with open or closed terminal-wire end ferrules. The capacity of each terminal is:

- A minimum of: 1 x 0.28 mm² wire without end ferrule.
- A maximum of: 2 x 0.000434 in² wires with end ferrule.

Maximum length of input system wires:

Wire cross-section	Resistivity	Maximum length
0.28 mm ²	50 Ohms/km	1181 ft
0.00155 in ²	20 Ohms/km	2953 ft

Voltage drop over the wires

The voltage drop over the wires must ensure that the voltage measured between terminals 6 and 7 is greater than:

- 21.6 VDC (all ES and PI contacts closed to guarantee operation of the safety system).
- 2.8 VDC (all ES and PI contacts open to guarantee reading of the %Ix.0 to %Ix.9 diagnostic information.)

Standards and precautions for use

Standards

The TSX DPZ module was developed to meet the demands of European and international standards concerning industrial automation electronics and safety circuits.

PLC-specific regulations	EN 61131-2 (IEC 1131-2) CSA 22-2, UL 508
Electrical qualities	UL 746L, UL 94
Electrical equipment on machines	EN 60204-1 (IEC 204-1)
Emergency stop equipment	EN 418
Machine safety - Command system components relative to safety	EN 954-1 PR EN 954-2

Service conditions

Service conditions relative to the TSX Micro PLCs apply to TSX DPZ modules (see *Commissioning standards and conditions*, p. 89).

Note: The whole of the safety system, the emergency stop PB or PI, the TSX DPZ module, the protective fuses and the command relays must be incorporated into envelopes with a minimum protection index of IP54, as prescribed in draft standard EN 954-2.

Usage precautions

See *Precautions of use*, p. 179.

TELEFAST 2 connection interface links for the Discrete I/O modules

36

At a Glance

Aim of this Chapter This chapter describes the **TELEFAST 2** interface links for the Discrete input/output modules.

What's in this Chapter? This chapter contains the following sections:

Section	Topic	Page
36.1	Introduction to the TELEFAST 2 connection interfaces for discrete I/O	357
36.2	Connection principles for the TELEFAST 2 interfaces for discrete I/O	367
36.3	TELEFAST 2 ABE-7H08R10/08R11 and ABE-7H16R10/16R11 connection bases	375
36.4	TELEFAST 2 ABE-7H12R10/12R11 connection bases	377
36.5	TELEFAST 2 ABE-7H08R21 and ABE-7H16R20/16R21/16R23 connection bases	379
36.6	TELEFAST 2 ABE-7H12R20/12R21 connection bases	381
36.7	TELEFAST 2 ABE-7H08S21/16S21 connection bases	383
36.8	TELEFAST 2 ABE-7H12S21 connection base	385
36.9	TELEFAST 2 ABE-7H16R30/16R31 connection bases	387
36.10	TELEFAST 2 ABE-7H12R50 connection base	389
36.11	TELEFAST 2 ABE-7H16R50 connection base	391
36.12	TELEFAST 2 ABE-7H16F43 connection base	393
36.13	TELEFAST 2 ABE-7H16S43 connection base	395
36.14	TELEFAST 2 ABE-7R08S111/16S111 connection bases	397
36.15	TELEFAST 2 ABE-7R08S210/16S210 connection bases	402
36.16	TELEFAST 2 ABE-7R16S212 connection base	408

Section	Topic	Page
36.17	Connection bases TELEFAST 2 ABE-7S16E2B1/E2E1/E2E0/E2F0/E2M0	412
36.18	TELEFAST 2 ABE-7S16S2BO/S2B2 connection bases	416
36.19	TELEFAST 2 ABE-7S08S2B1connection base	419
36.20	TELEFAST 2 ABE-7S08S2B0 connection base	422
36.21	TELEFAST 2 ABE-7R16T210/P16T210 connection bases	425
36.22	TELEFAST 2 ABE-7R16T212/P16T212 connection bases	427
36.23	TELEFAST 2 ABE-7R16T230 connection base	429
36.24	TELEFAST 2 ABE-7R16T231 connection base	431
36.25	TELEFAST 2 ABE-7P16T214 connection base	433
36.26	TELEFAST 2 ABE-7P16T215 connection base	435
36.27	TELEFAST 2 ABE-7R16T330/P16T330 connection bases	437
36.28	TELEFAST 2 ABE-7R16T332/P16T332 connection bases	439
36.29	TELEFAST 2 ABE-7R16T370 connection base	441
36.30	TELEFAST 2 ABE-7P16T334 connection base	443
36.31	TELEFAST 2 ABE-7P16T318 connection base	445
36.32	TELEFAST 2 ABE-7P16F310 connection base	447
36.33	TELEFAST 2 ABE-7P16F312 connection base	449
36.34	TELEFAST 2 connection base accessories	451

36.1 Introduction to the TELEFAST 2 connection interfaces for discrete I/O

At a Glance

Aim of this section This section describes the range of **TELEFAST 2** products which allow the discrete input and output modules to be connected quickly to the operating pieces.

What's in this Section? This section contains the following topics:

Topic	Page
General overview of TELEFAST 2 connection interfaces for discrete I/O modules	358
Catalogue of TELEFAST 2 bases	359
Associating TSX Micro input/output modules and TELEFAST 2 bases	365

General overview of TELEFAST 2 connection interfaces for discrete I/O modules

At a Glance

The **TELEFAST 2** system is a group of products which enable the discrete input and output modules to be connected quickly.

The **TELEFAST 2** system can only be connected to the modules which are fitted with **HE10** connectors and is made up of interface and linking cable bases.

Several base types can be identified:

- interface connection bases for discrete inputs/outputs, 8/12/16 channels;
 - interface connection and input adaptation bases, 16 isolated channels;
 - interface connection and adaptation of static outputs bases, 8 and 16 channels;
 - interface connection and adaptation of relay output bases, 8 and 16 channels;
 - 16-channel adapter bases to 2 x 8 channels;
 - interface connection and output adaptation bases with or without removable electromagnetic or static relay, 16 channels;
 - input bases for 12.5mm-wide static relays.
-

Catalogue of TELEFAST 2 bases

At a Glance The catalog of **TELEFAST 2** bases for discrete input/output modules is shown here.

Catalog The table below shows the catalog of interface connection bases for discrete I/O, 8/ 12/16 channels.

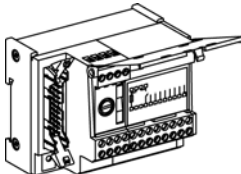
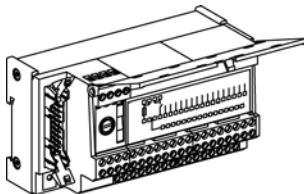
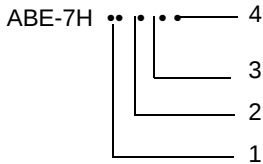
Base types	Interface connection bases for discrete I/O, 8/12/16 channels.						
Sub groups	8-channel bases		12 and 16 compact channel bases	12 and 16 channel bases			
Illustration							
Reference ABE-7H**	08R10 08R11 08R21	08S21	12R50 16R50	12R10 12R11 12R20 12R21	16R10 16R11 16R20 16R21 16R23 16R30 16R31	12S21 16S21	16S43 (1) 16F43 (2)
Description	-	with 1 sectionner /channel	-	-		with 1 sectionner/ channel	with 1 fuse + 1 sectionner/ channel
Key							
(1)	For inputs.						
(2)	For outputs.						

Illustration The principle for identifying the interface connection bases for discrete I/S, 8/12/16 channel is as follows:



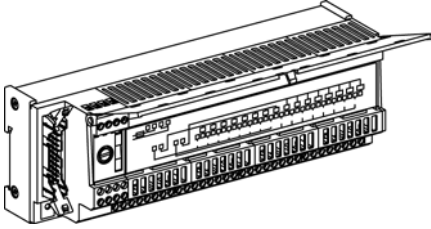
Description

The table below describes the different elements which make it possible to identify the interface connection bases for discrete I/O, 8/12/16 channels.

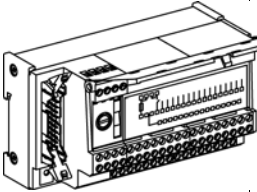
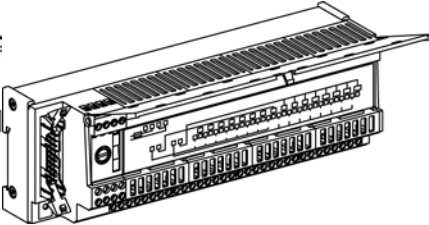
Number	Description
1	08 = 8-channel base 12 = 12-channel base 16 = 16-channel base
2	Primary function: ● R = simple connection; ● S = sectionner/channel; ● F = fuse/channel.
3	1 = with 1 screw block terminal on 1 level 2 = with 2 screw block terminals on 2 levels 3 = with 3 screw block terminals on 3 levels 4 = with 2 screw block terminals on 1 level 5 = with 1 screw block terminal on 2 levels
4	0 or even number = without display by channel DEL uneven number = with display by channel DEL

Catalog

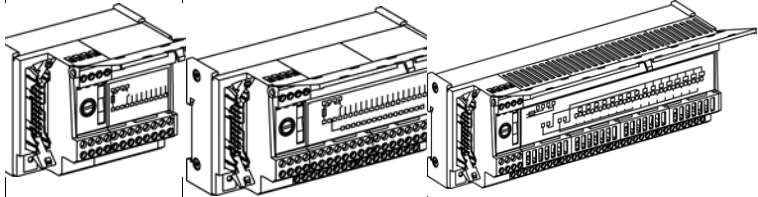
The table below shows the catalog of interface connection bases and input adaptation, 16 isolated channels.

Base types	Interface connection bases and input adaptation, 16 isolated channels.				
Illustration	TELEFAST 2 base 				
ABE-7S** reference	16E2B1	16E2E1	16E2E0	16E2F0	16E2M0
Description	16 24 VDC inputs	16 48 VDC inputs	16 48 VAC inputs	16 110...120 VAC inputs	16 220...240 VAC inputs

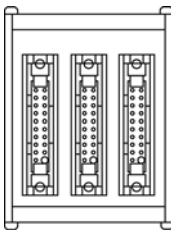
The table below shows the catalog of interface connection bases and adaptation of static outputs, 8 and 16 channels.

Base types	Interface connection bases and adaptation of static outputs, 8 and 16 channels.			
Sub groups	8-channel bases		16-channel bases	
Illustration	TELEFAST 2 base 		TELEFAST 2 base 	
ABE-7S** reference	08S2B0	08S2B1	16S2B0	16S2B2
Description	8 static 24 VDC / 0.5A outputs, with error detection report to PLC.	8 static 24 VDC / 2A outputs, with error detection report to PLC.	16 static 24 VDC / 0.5A outputs, with error detection report to PLC.	16 static 24 VDC / 0.5A outputs, without error detection report to PLC.

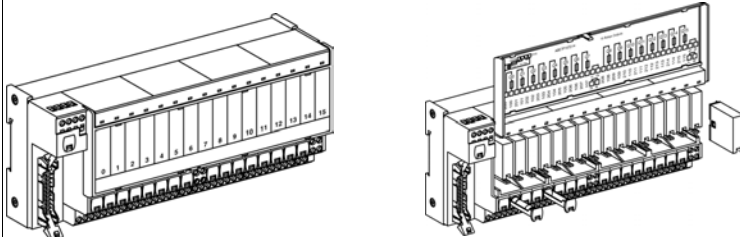
The table below shows the catalog of interface connection bases and adaptation of relay outputs, 8 and 16 channels.

Base types	Interface connection bases and adaptation of relay outputs, 8 and 16 channels.				
Sub groups	8-channel bases		16-channel bases		
Illustration	TELEFAST 2 base		TELEFAST 2 base		TELEFAST 2 base
					
ABE-7R** reference	08S111	08S210	16S111	16S210	16S212
Description	8 relay outputs, 1 F with polarity + or alternative distribution.	8 relay outputs, 1 F, potential free contact.	16 relay outputs, 1 F, 2 x 8 shared + or alternative.	16 relay outputs, 1 F, potential free contact.	16 relay outputs, 1 F with distribution of the 2 polarities by 8-channel group.

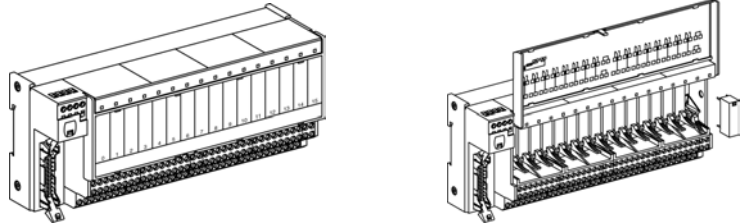
The table below displays the catalog of the 16 channel-adapter base to 2 in 8 channels.

Base types	16-channel adapter bases to 2 x 8 channels.
Illustration	TELEFAST 2 base 
ABE-7A•• reference	CC02
Description	allows the distribution of: • 16 channels as two x 8 channels; • 12 channels as 8 channels + 4 channels.

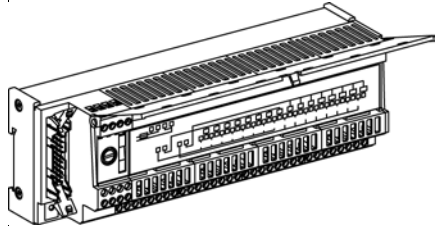
The table below shows the catalog of interface output adaptation bases with or without removable electromagnetic or static relay , 16 channels.

Base types	Interface output adaptation bases with or without removable electromagnetic or static relay, 16 channels						
Sub groups	Output bases, 1 F, potential free contact.			Output bases, 1 F, distribution of the 2 polarities by 8-channel group.		Output base, 1 F, distribution of the 2 polarities by 4-channel group.	
Illustration	TELEFAST 2 base 						
ABE-7** reference	R16T210	P16T210	P16T214	R16T212	P16T212	P16T215	P16T318
Description	with 10mm-wide electromagnetic relay.	10mm-wide relay, not provided.	10mm-wide relay, not provided + 1 fuse/channel.	with 10mm-wide electromagnetic relay.	10mm-wide relay, not provided.	10mm-wide relay, not provided + 1 fuse/channel.	without electromagnetic relay, 1 fuse + 1 sectionner/channel.

The table below shows the catalog of interface output adaptation bases with or without removable electromagnetic or static relay, 16 channels (continued).

Base types	Interface output adaptation bases with or without removable electromagnetic or static relay, 16 channels (continued).							
Sub groups	Output bases, 1 OF, potential free contact.				Output bases, 1 OF, shared by 8-channel group.	Output bases, 1 OF, distribution of the 2 polarities by 8-channel group.		Output bases, 2 OF, potential free contact.
Illustration	TELEFAST 2 base 							
ABE-7•• reference	R16T230	R16T330	P16T330	P16T334	R16T231	R16T332	P16T332	R16T370
Description	with 10mm-wide electromagnet relay.	with 12.5 mm-wide electromagnet relay.	12.5 mm-wide relay, not provided.	12.5 mm-wide relay, not provided + 1 fuse/channel.	with 10 mm-wide electromagnet relay.	with 12.5 mm-wide electromagnet relay.	12.5 mm-wide relay, not provided.	with 12.5 mm-wide electromagnet relay.

The table below shows the input base catalog for 12.5mm-wide static relays.

Base types	Input bases for 12.5mm-wide static relays	
Illustration	TELEFAST 2 base 	
ABE-7P** reference	16F310	16F312
Description	potential free.	distribution of the 2 polarities by 8-channel group.

Associating TSX Micro input/output modules and TELEFAST 2 bases

At a Glance

The possibilities for associating I/O discrete modules and **TELEFAST 2** connection bases are introduced here.

Compatibility table

The following table gives a summary of the discrete I/O modules with the **TELEFAST 2** bases.

	Discrete I/O TSX •• modules and modularity					
	DMZ 28DTK		DMZ 64DTK		DEZ 12D2K	DSZ 08T2K
	1 x 16E	1 x 12S	2 x 16E	2 x 16S	1 x 12E	1 x 8S
Bases TELEFAST 2						
Connection bases						
8 channels						
ABE-7H08R••	Yes (1)	-	Yes (1)	Yes (1)	-	Yes
ABE-7S08S21	Yes (1)	-	Yes (1)	Yes (1)	-	Yes
12 channels						
ABE-7H12R••	-	Yes	-	-	Yes	-
ABE-7H12S21	-	Yes	-	-	Yes	-
16 channels						
ABE-7H16R••	Yes	-	Yes	Yes	-	-
ABE-7H16S21	Yes	-	Yes	Yes	-	-
ABE-7H16R23	Yes	-	Yes	-	-	-
ABE-7H16F43	-	-	-	Yes	-	-
ABE-7H16S43	Yes	-	Yes	-	-	-
Input adaptation bases						
16 channels						
ABE-7S16E2••	Yes	-	Yes	-	-	-
ABE-7P16F3••	Yes	-	Yes	-	-	-
Output adaptation bases						
8 channels						
ABE-7S08S2••	-	-	-	Yes (1)	-	Yes (2)
ABE-7R08S•••	-	-	-	Yes (1)	-	Yes
16 channels						
ABE-7R16S•••	-	Yes (3)	-	Yes	-	-
ABE-7R16T•••	-	Yes (3)	-	Yes	-	-

	Discrete I/O TSX ** modules and modularity					
	DMZ 28DTK		DMZ 64DTK		DEZ 12D2K	DSZ 08T2K
	1 x 16E	1 x 12S	2 x 16E	2 x 16S	1 x 12E	1 x 8S
Bases TELEFAST 2						
ABE-7P16T**	-	Yes (3)	-	Yes	-	-
Key						
(1)	With 16 channel adapter with 8 channels twice ABE-7ACC02 .					
(2)	Except for ABE-7S08S2B0 .					
(3)	The unused outputs are at state 1.					

36.2 Connection principles for the TELEFAST 2 interfaces for discrete I/O

At a Glance

Aim of this section This section describes the connection principles for the **TELEFAST 2** products for discrete input/output modules.

What's in this Section? This section contains the following topics:

Topic	Page
Ways of connecting discrete I/O modules: connecting modules to TELEFAST interfaces using an HE10 connector	368
Module/base connection principle	370
Dimensions and mounting of the TELEFAST 2 connection bases	372

Ways of connecting discrete I/O modules: connecting modules to TELEFAST interfaces using an HE10 connector

At a Glance

Connecting discrete input/output modules to **TELEFAST** interfaces for connecting and adapting fast wiring **HE10** connectors, is done with:

- a 28 gage multi-stranded sheathed cable (0.08 mm²);
 - a 22 gage connection cable (0.34 mm²).
-

TSX CDP 102/ 202/302 connection cable

The 28 gage connection cable (0.08 mm²) comes in three different lengths:

- 1 meter length: **TSX CDP 102**;
- 2 meter length: **TSX CDP 202**;
- 3 meter length: **TSX CDP 302**.

This cable is made up of 2 **HE10** connectors and a multi-stranded sheathed ribbon cable, where each wire has a cross-section area of 0.08 mm².

Given the small area of each of the wires, you are advised to only use it for low current inputs or outputs (< 100 mA per input or output).

TSX CDP 053/ 103/203/303 /503 connection cable

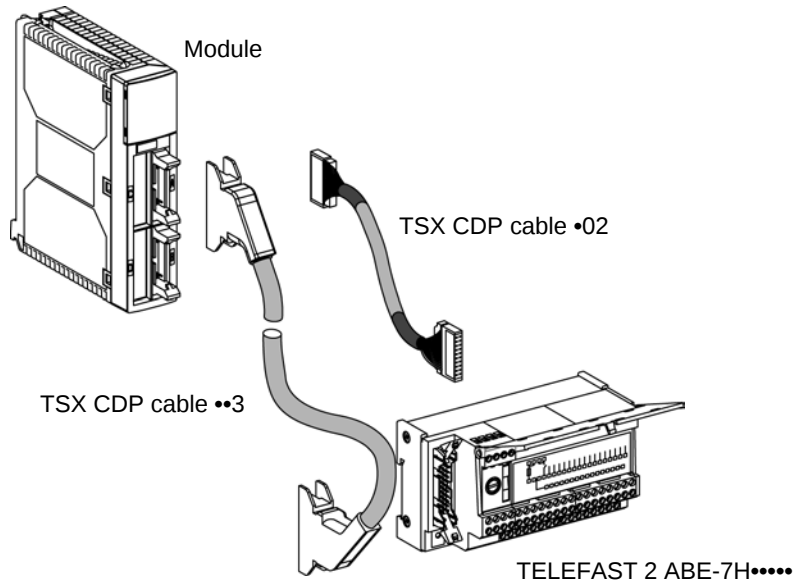
The 22 gage connection cable (0.34 mm²) comes in five different lengths:

- 0.5 meter length: **TSX CDP 053**;
- 1 meter length: **TSX CDP 103**;
- 2 meter length: **TSX CDP 203**;
- 3 meter length: **TSX CDP 303**;
- 5 meter length: **TSX CDP 503**.

This cable is made up of 2 sheathed **HE10** connectors, and a cable with a cross-section of 0.34 mm², which can take higher currents (> 500 mA).

Illustration

The illustration below shows the two types of connection to the **TELEFAST** interface via multi-strand cable or other cable.



Note: The maximum screw-tightening torque for **TSX CDP •** connector cables is 0.5 N.m

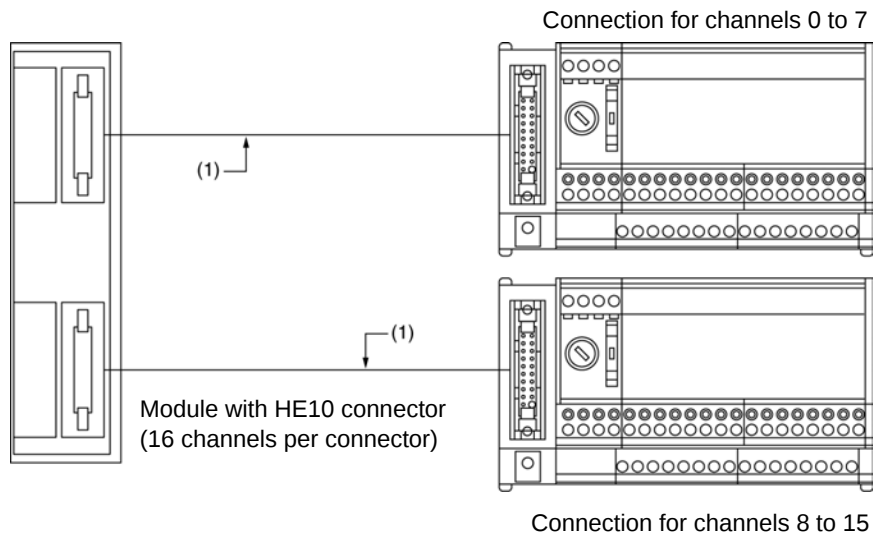
Module/base connection principle

At a Glance

The principle for connecting the discrete input/output module to a **TELEFAST 2** interface is shown here.

Illustration

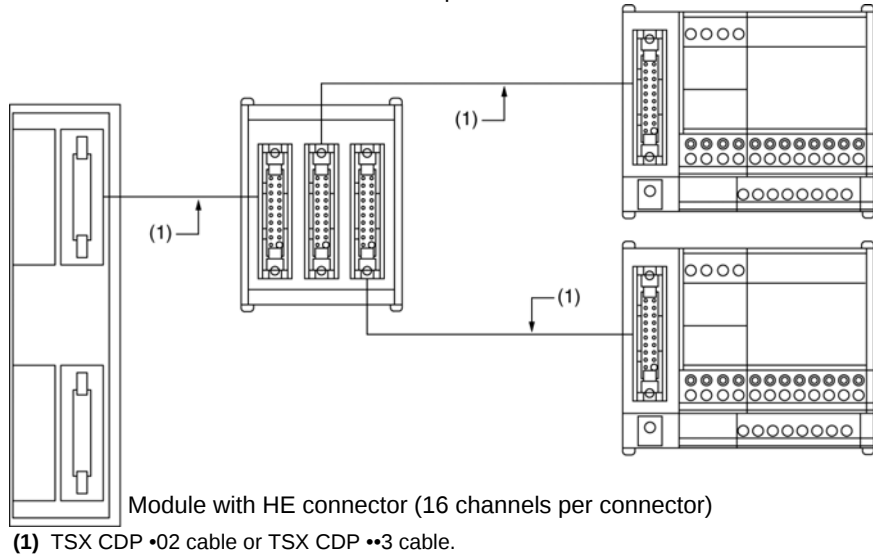
The diagram below shows the connection between a discrete I/O module with an **HE10** connector and a **TELEFAST 2** base.



(1) TSX CDP •02 cable or TSX CDP ••3 cable.

Illustration

The diagram below shows the specific case of connecting 16 channels as 8 channels twice via the **ABE-7ACC02** adapter base.



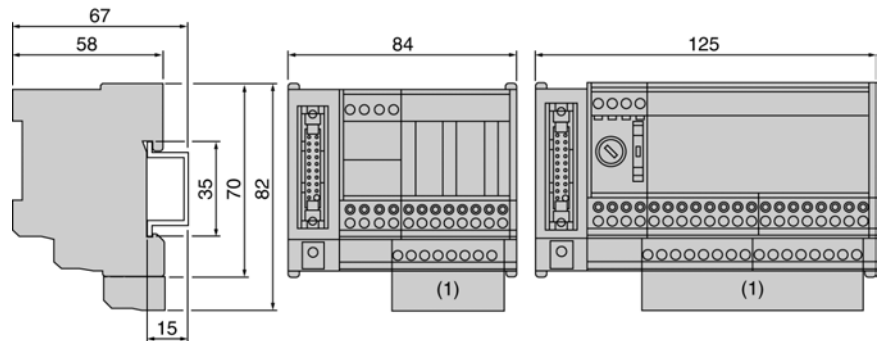
Dimensions and mounting of the TELEFAST 2 connection bases

At a Glance

Here is an overview of the dimensions of different connection **TELEFAST 2** connection products and their mounting modalities.

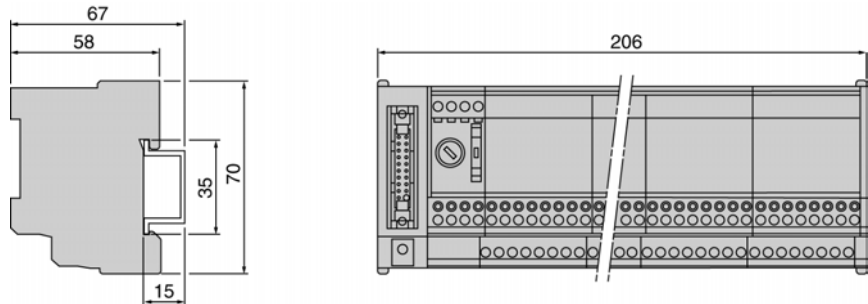
Illustration

The illustration below shows the dimensions of the products: **ABE-7H••R1•**, **ABE-7H••R5•**, **ABE-7H••2•**, **ABE-7H••S21**, **ABE-7H16R3•**, **ABE-7S08S2B0**, **ABE-7R••S1••**, **ABE-7R08S210**.

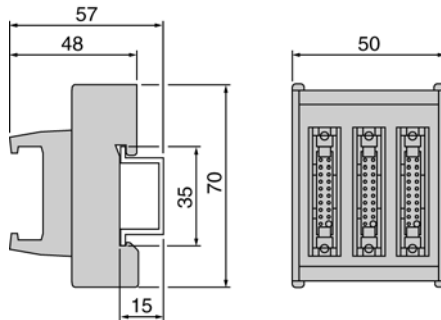


(1) Dimension with additional shunt terminal block ABE-7BV20 or ABE-7BV10.

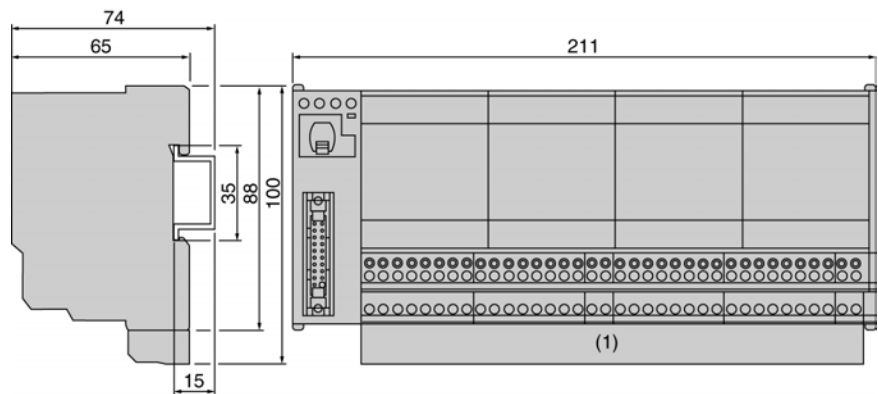
The illustration below shows the dimensions of the products: **ABE-7H16S43**, **ABE-7S16E2••**, **ABE-7S08S2B1**, **ABE-7S16S2B•**, **ABE-7H16F43•**, **ABE-7R16S21•**.



The illustration below shows the dimensions of the product **ABE-7ACC02**



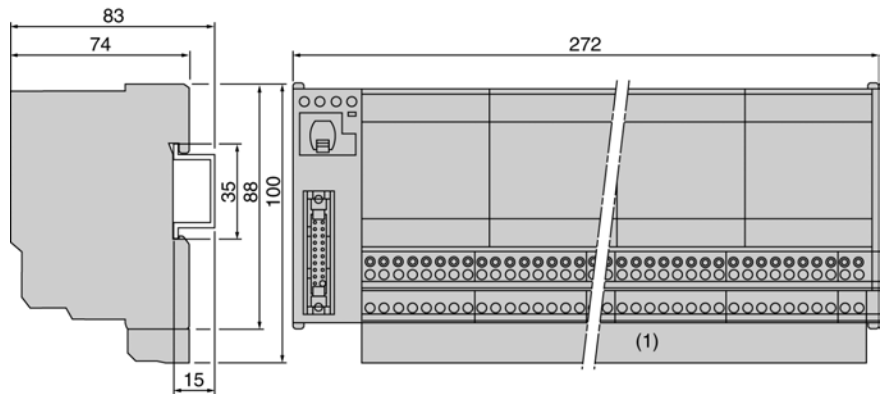
The illustration below shows the dimensions of the products: **ABE-7R16T2••**, **ABE-7P16T2••**.



Reference measuring 211 x 88 mm (product designed with removable relays and non-mounted screws).

(1) Dimension with additional shunt terminal block ABE-7BV20 or ABE-7BV10.

The illustration below shows the dimensions of the products: **ABE-7R16T3••**, **ABE-7P16T3••**.



Reference measuring 272 x 88 mm (product designed with removable relays and non-mounted screws).

(1) Dimension with additional shunt terminal block ABE-7BV20 or ABE-7BV10.

Mounting

The **TELEFAST 2** bases are mounted on 35mm-wide DIN mounting rails.

	WARNING General precautions for mounting The input adaptation bases ABE-7S16E2E1 and static output bases ABE-7S••S2B must be mounted vertically and in a horizontal position. Failure to follow these instructions can result in death, serious injury, or equipment damage.
---	---

36.3 TELEFAST 2 ABE-7H08R10/08R11 and ABE-7H16R10/16R11 connection bases

Sensor and pre-actuator connections on the ABE-7H08R10/R11 and ABE-7H16R10/R11 bases

At a Glance

This is an overview of the sensor and pre-actuator connections on **TELEFAST 2** bases.



WARNING

Usage precautions

At manufacture, the bases are equipped with a 2 A fast blow caliber fuse for general use. In order to guarantee an optimum level of protection, this fuse should be calibrated according to the application (connection to input or output functions) and the maximum current allowable in the base.

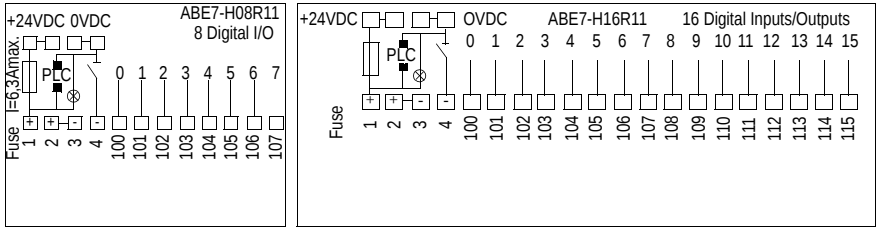
Nature and caliber of fuse to be mounted on the base:

- input functions: 0.5A fast blow;
- output functions:
 - 2A fast blow on the **ABE-7H16R••** base;
 - 6.3A fast blow on the **ABE-7H08R••** base.

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

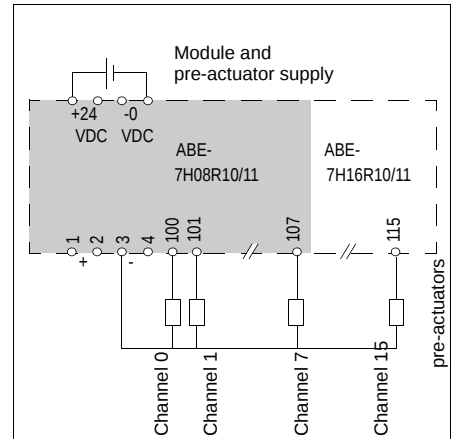
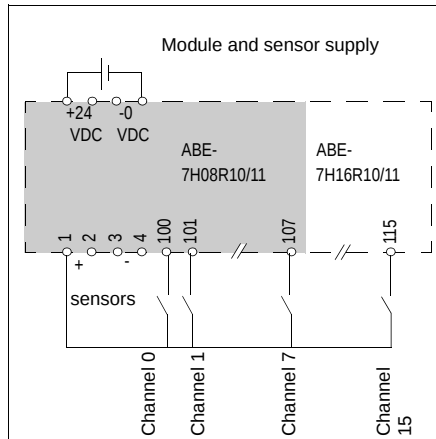
Illustration

Description of the connecting terminal blocks.



Illustration

Connecting input and output functions.



Connecting shared sensors:

- onto terminals 1 or 2: sensors to the '+' of the supply (positive logic inputs).

Connecting shared pre-actuators:

- onto terminals 3 or 4: pre-actuators to the '-' of the supply (positive logic outputs).

36.4 TELEFAST 2 ABE-7H12R10/12R11 connection bases

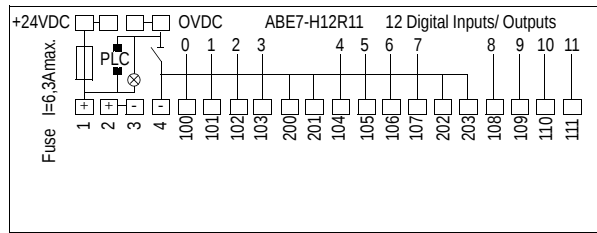
Sensor and pre-actuator connections on the ABE-7H12R10/R11 bases

At a Glance This is an overview of the sensor and pre-actuator connections on **TELEFAST 2** bases.

	WARNING
	Usage precautions At manufacture, the bases are equipped with a 6.3 A fast blow caliber fuse for general use. In order to guarantee an optimum level of protection, this fuse should be calibrated according to the application (connection to input or output functions) and the maximum current allowable in the base. Nature and caliber of fuse to be mounted on the base: • input functions: 0.5A fast blow; • output functions: 6.3A fast blow on the ABE-7H12R•• base. Failure to follow these instructions can result in death, serious injury, or equipment damage.

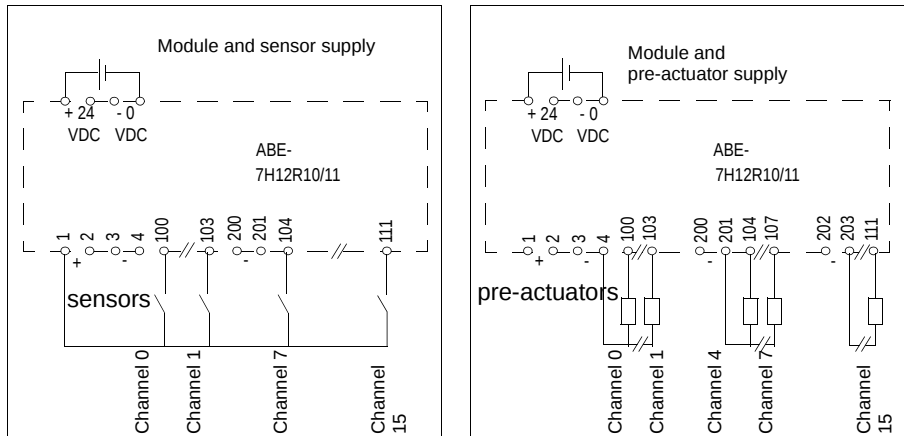
Illustration

Description of the connecting terminal blocks.



Illustration

Connecting input and output functions.



Connecting shared sensors:

- onto terminals 1 or 2: sensors to the '+' of the supply (positive logic inputs).

Connecting shared pre-actuators:

- several terminals linked to the '-' polarity (3, 4, 200, 201, 202, and 203) allowing sharing in groups of 4 or 2 channels (positive logic outputs).

36.5 TELEFAST 2 ABE-7H08R21 and ABE-7H16R20/16R21/16R23 connection bases

Sensor and pre-actuator connections on the ABE-7H08R21 and ABE-7H16R20/R21/R23 bases for type 2 inputs

At a Glance

This is an overview of the sensor and pre-actuator connections on **TELEFAST 2** bases.



WARNING

Usage precautions

At manufacture, the bases are equipped with a 2 A fast blow caliber fuse for general use. To guarantee an optimum level of protection, this fuse should be calibrated according to the application (connection to input or output functions) and the maximum current allowable in the base.

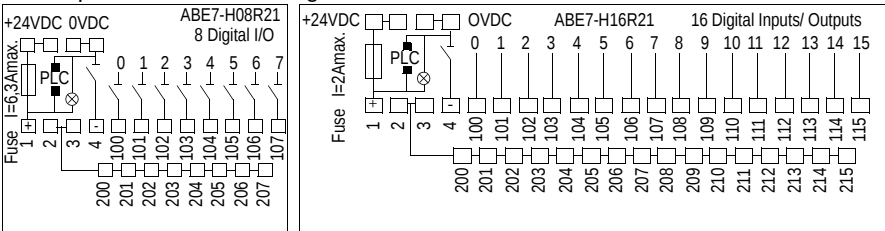
Nature and caliber of fuse to be mounted on the base:

- input functions: 0.5A fast blow;
- output functions:
 - 2A fast blow on the **ABE-7H16R••** base;
 - 6.3A fast blow on the **ABE-7H08R••** base.

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

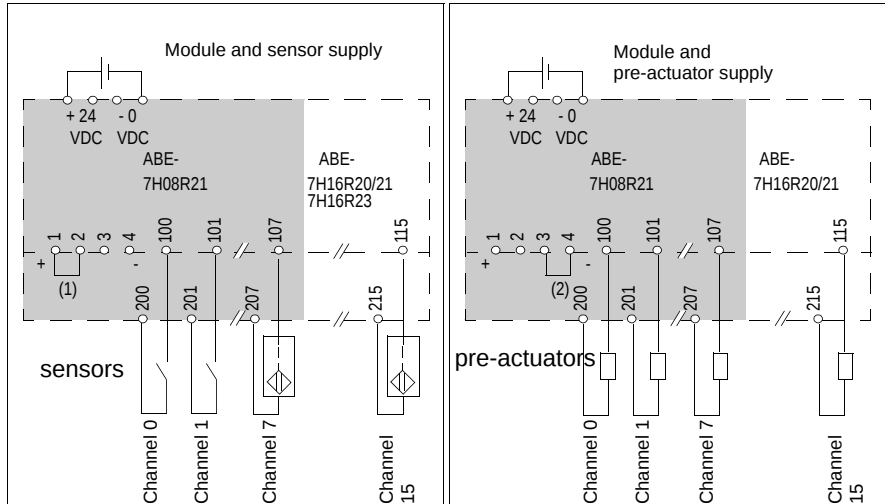
Illustration

Description of the connecting terminal blocks.



Illustration

Connecting input and output functions.



Connecting shared sensors:

- in order to generate the common supply for the sensor, set the jumper wire (1) on terminals 1 and 2: terminal blocks 200 to 215 in "+" of the supply (positive logic inputs).

Shared connection of pre-actuators:

- in order to generate the common supply for the pre-actuators, set the jumper wire (2) on terminals 3 and 4: terminal blocks 200 to 215 will be in "-" of the supply (positive logic outputs).

36.6 TELEFAST 2 ABE-7H12R20/12R21 connection bases

Sensor and pre-actuator connections on the ABE-7H12R20/R21 bases

At a Glance This is an overview of the sensor and pre-actuator connections on **TELEFAST 2** bases.



WARNING

Usage precautions

The bases are equipped as standard with a fast blow fuse for general use of 6.3 A caliber. In order to guarantee an optimum level of protection, this fuse should be calibrated according to the application (connection to input or output functions) and the maximum current allowable in the base.

Nature and caliber of fuse to be mounted on the base:

- input functions: 0.5A fast blow;
- output functions: 6.3A fast blow on the **ABE-7H12R••** base.

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

Illustration

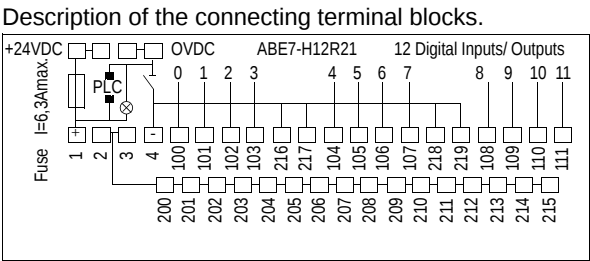
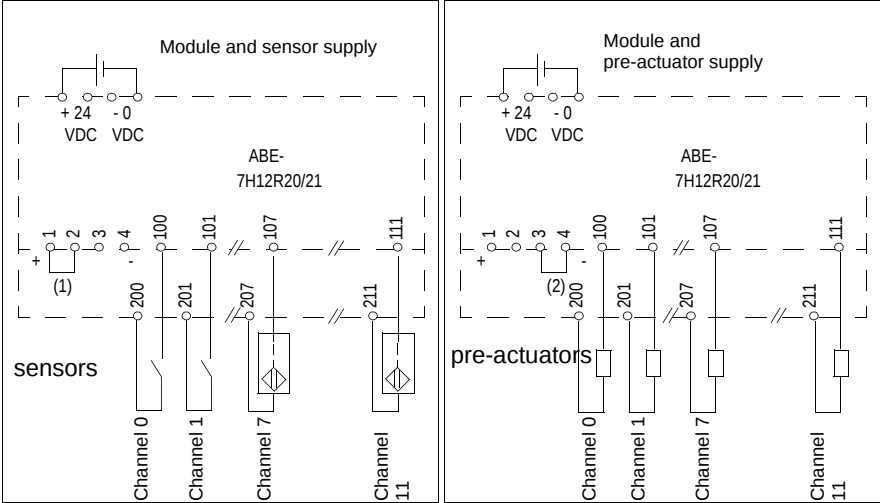


Illustration Connecting input and output functions.



Connecting shared sensors:

- in order to generate the shared sensor supply, set the jumper wire (1) on terminal blocks 1 and 2: terminal blocks 200 to 215 in "+" of the supply (positive logic inputs).

Shared connection of pre-actuators:

- in order to generate the common supply for the pre-actuators, set the jumper wire (2) on terminals 3 and 4: terminals 200 to 215 will be in "-" of the supply (positive logic outputs).

	WARNING
	Usage precautions
	Terminals 216,217, 218 and 219 are linked to the '-' polarity. Failure to follow these instructions can result in death, serious injury, or equipment damage.

36.7 TELEFAST 2 ABE-7H08S21/16S21 connection bases

Sensor and pre-actuator connections on ABE-7H08S21/16S21 bases with one sectionner per channel

At a Glance

This is an overview of the sensor and pre-actuator connections on **TELEFAST 2** bases.



WARNING

Usage precautions

The bases are equipped as standard with a fast blow fuse for general use of 2 A caliber. In order to guarantee an optimum level of protection, this fuse should be calibrated according to the application (connection to input or output functions) and the maximum current allowable in the base.

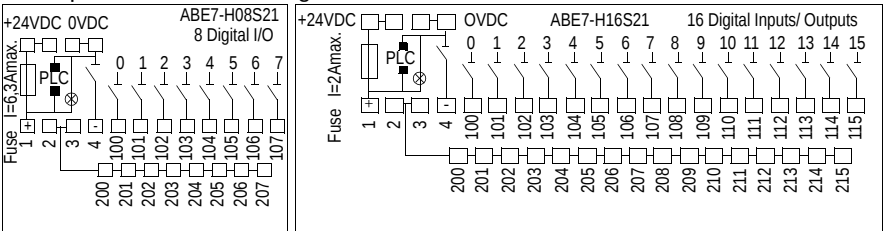
Nature and caliber of fuse to be mounted on the base:

- input functions: 0.5A fast blow;
- output functions:
 - 2A fast blow on the **ABE-7H16S21** base;
 - 6.3 A fast blow on the **ABE-7H08S21** base.

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

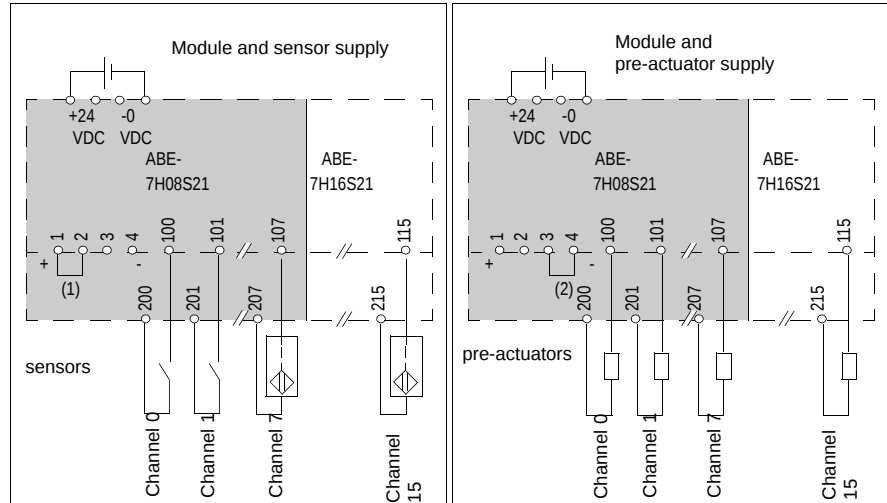
Illustration

Description of the connecting terminal blocks.



Illustration

Connecting input and output functions.



Shared connection of the sensors:

- in order to generate the common supply for the sensors, set the jumper wire (1) on terminals 1 and 2: terminal blocks 200 to 215 in "+" of the supply (positive logic inputs).

Shared connection of the pre-actuators:

- in order to generate the common supply for the pre-actuators, set the jumper wire (2) on terminals 3 and 4: terminal blocks 200 to 215 will be in "-" of the supply (positive logic outputs).

36.8 TELEFAST 2 ABE-7H12S21 connection base

Sensor and pre-actuator connections on the ABE-7H12S21 base

At a Glance This is an overview of the sensor and pre-actuator connections on the **TELEFAST 2** base.



WARNING

Usage precautions

At manufacture, the base is equipped with a 6.3A fast blow caliber fuse for general use. In order to guarantee an optimum level of protection, this fuse should be calibrated according to the application (connection to input or output functions) and the maximum current allowable in the base.

Nature and caliber of fuse to be mounted on the base:

- input functions: 0.5A fast blow;
- output functions: 6.3A fast blow on the **ABE-7H12S21** base.

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

Illustration

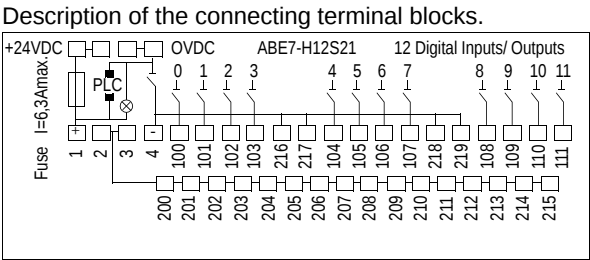
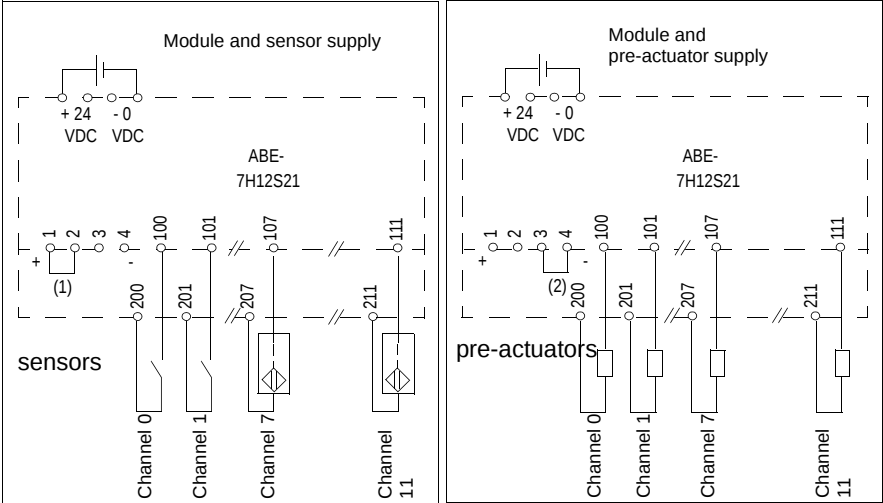


Illustration Connecting input and output functions.



Connecting shared sensors:

- in order to generate the shared sensor supply, set the jumper wire (1) on terminal blocks 1 and 2: terminal blocks 200 to 215 in "+" of the supply (positive logic inputs).

Shared connection of the pre-actuators:

- in order to generate the whole supply of the pre-actuators, set the jumper wire (2) on terminal blocks 3 and 4: terminal blocks 200 to 215 will be in "-" of the supply (positive logic outputs).

	WARNING
	Usage precautions
	Terminals 216,217, 218 and 219 are linked to the '-' polarity. Failure to follow these instructions can result in death, serious injury, or equipment damage.

36.9

TELEFAST 2 ABE-7H16R30/16R31 connection bases

Sensor and pre-actuator connections on the ABE-7H16R30/R31 bases

At a Glance

This is an overview of the sensor connections on TELEFAST 2 bases.



WARNING

Usage precautions

The bases are equipped as standard with a fast blow fuse for general use of 2 A caliber. To ensure optimal protection, this fuse should be calibrated according to the application and the maximum permissible current in the base.

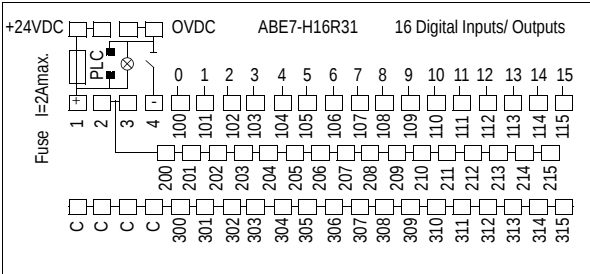
Nature and caliber of fuse to be mounted on the base:

- input functions: 0.5A fast blow.

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

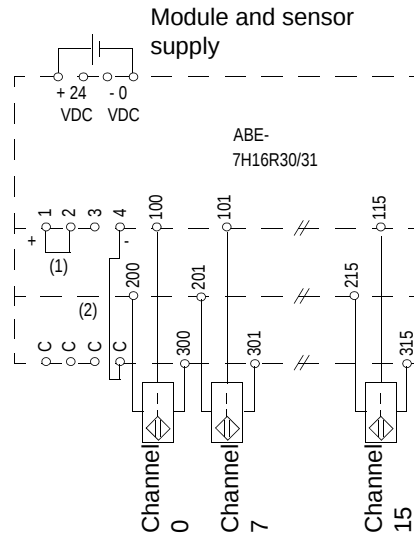
Illustration

Description of the connecting terminal blocks.



Illustration

Input function connections.



Connecting shared sensors:

- to create the shared sensor supply:
 - position the jumper wire (1) on terminals 1 and 2: terminal blocks 200 to 215 will be at the "+" of the supply;
 - link terminal 4 to one of the C terminals of the 3rd level (2): terminal blocks 300 to 315 will be at the "-" of the supply.

36.10 TELEFAST 2 ABE-7H12R50 connection base

Sensor and pre-actuator connections on the ABE-7H12R50 bases

At a Glance This is an overview of the sensor and pre-actuator connections on the **TELEFAST 2** base.

	WARNING
	Usage precautions
	At manufacture, the base is equipped with a 6.3 A fast blow caliber fuse for general use. In order to guarantee an optimum level of protection, this fuse should be calibrated according to the application (connection to input or output functions) and the maximum current allowable in the base. Nature and caliber of fuse to be mounted on the base: ● input functions: 0.5A fast blow; ● output functions: 6.3A fast blow on the ABE-7H12R50 base. Failure to follow these instructions can result in death, serious injury, or equipment damage.

Illustration Description of the connecting terminal blocks.

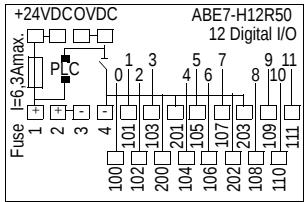
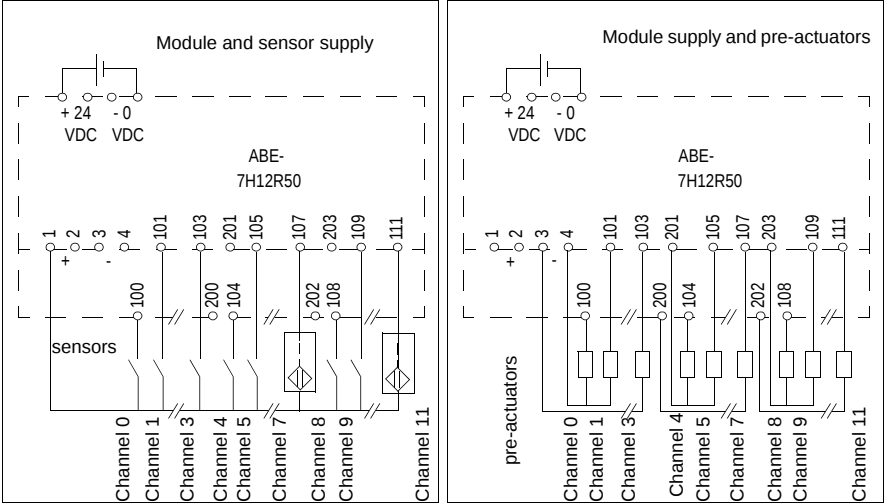


Illustration Connecting input and output functions.



Connecting shared sensors:

- onto terminals 1 or 2: sensors to the '+' of the supply (positive logic inputs).

	WARNING
	Usage precautions
	Terminals 200, 201, 202 and 203 are linked to the '-' polarity. Shared connection of the pre-actuators: • several terminals linked to the '-' polarity (3, 4, 202, 202, and 203) allowing sharing in groups of 4 or 2 channels (positive logic outputs). Failure to follow these instructions can result in death, serious injury, or equipment damage.

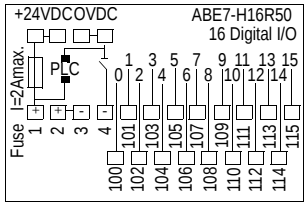
36.11 TELEFAST 2 ABE-7H16R50 connection base

Sensor and pre-actuator connections on the ABE-7H16R50 base

At a Glance This is an overview of the sensor and pre-actuator connections on the **TELEFAST 2** base.

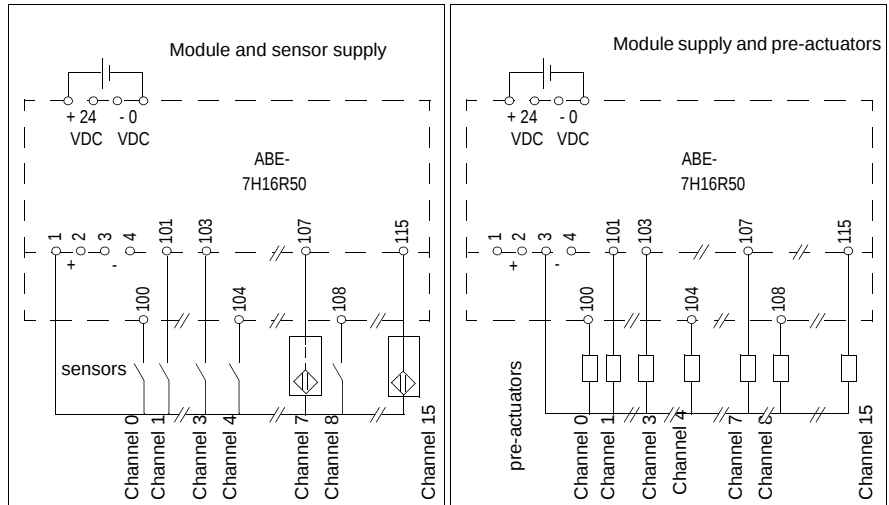
	WARNING
	Usage precautions
	At manufacture, the base is equipped with a 6.3 A fast blow caliber fuse for general use. In order to guarantee an optimum level of protection, this fuse should be calibrated according to the application (connection to input or output functions) and the maximum current allowable in the base. Nature and caliber of fuse to be mounted on the base: ● input functions: 0.5A fast blow; ● output functions: 2A fast blow on the ABE-7H16R50 base. Failure to follow these instructions can result in death, serious injury, or equipment damage.

Illustration Description of the connecting terminal blocks.



Illustration

Connecting input and output functions.



Connecting shared sensors:

- onto terminals 1 or 2: sensors to the '+' of the supply (positive logic inputs).

Shared connection of the pre-actuators:

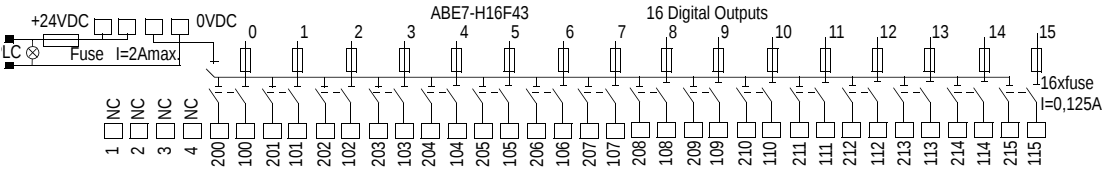
- onto terminals 3 or 4: pre-actuators to the '-' of the supply (positive logic outputs).

36.12 TELEFAST 2 ABE-7H16F43 connection base

Pre-actuator connections on ABE-7H16F43 output base with one fuse and one sectionner per channel

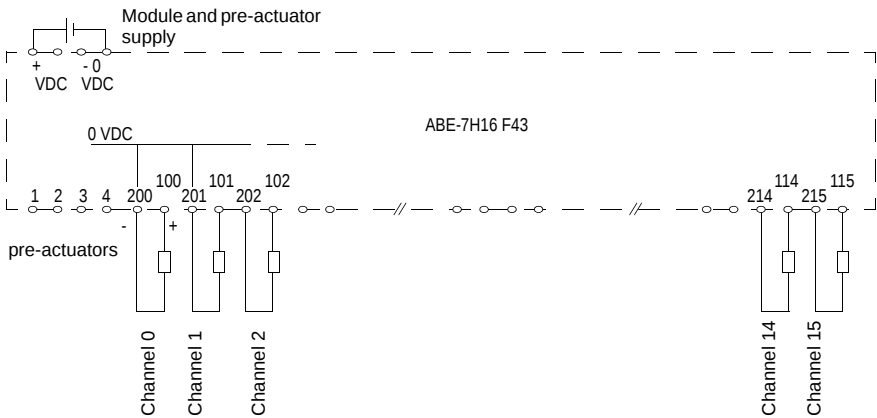
At a Glance This is an overview of the pre-actuator connections on **TELEFAST 2** bases.

Illustration Description of the connecting terminal blocks.



Illustration

Output connection functions.



Functionality via channel:

- 0.125 A fuse original position;
- sectionner cuts simultaneously the '-' and the channel signal.

	WARNING
	Usage precautions
	The base is originally equipped with a 2 A fast blow caliber fuse for general use. Terminals 200..215 are connected to the '-' polarity of the supply. Failure to follow these instructions can result in death, serious injury, or equipment damage.

36.13 TELEFAST 2 ABE-7H16S43 connection base

Sensor connections on ABE-7H16S43 output base with one fuse and one sectionner per channel

At a Glance This is an overview of the sensor connections on **TELEFAST 2** bases.

Illustration Description of the connecting terminal blocks.

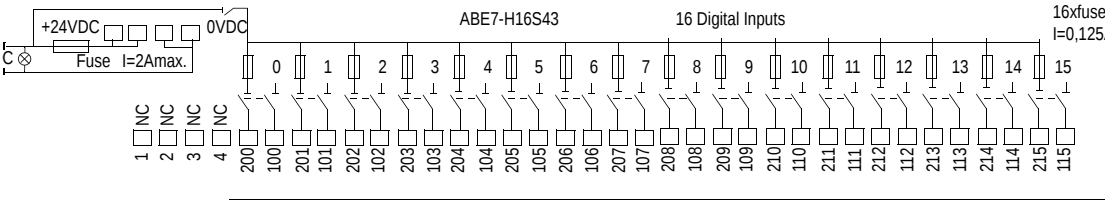
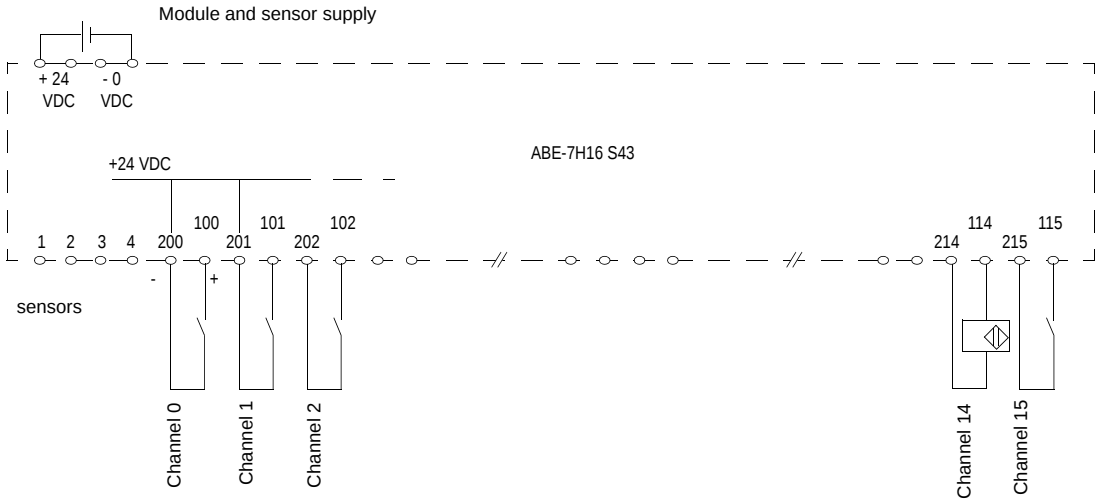


Illustration Input function connections.



Functionality via channel:

- 0.125 A fuse original position;
- sectionner cuts simultaneously the '+' and the channel signal.

	WARNING
	Usage precautions The base is originally equipped with a 2 A fast blow caliber fuse for general use. Terminals 200..215 are connected to the '+' polarity of the supply. Failure to follow these instructions can result in death, serious injury, or equipment damage.

36.14 TELEFAST 2 ABE-7R08S111/16S111 connection bases

At a Glance

Aim of this section This section introduces the **TELEFAST 2 ABE-7R08S111/16S111** connection bases.

What's in this Section? This section contains the following topics:

Topic	Page
Pre-actuator connections on non removable relay output adaptation bases ABE-7R08S111/16S111.	398
Characteristics of non removable relay output adaptation bases ABE-7R08S111/16S111.	400

Pre-actuator connections on non removable relay output adaptation bases ABE-7R08S111/16S111.

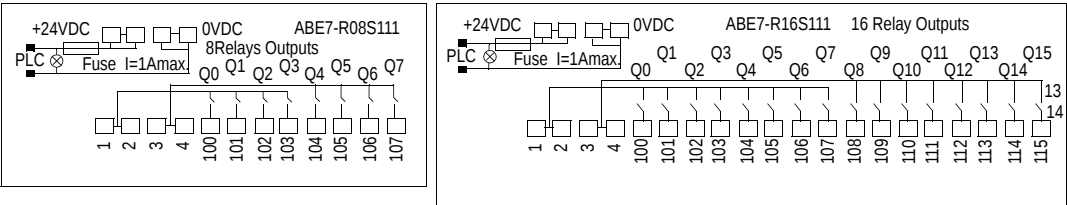
At a Glance

This is a description of the pre-actuator connections with:

- base **TELEFAST 2 ABE-7R08S111**, 8 relay outputs, 1 F twice , four common DC or AC currents;
- base **TELEFAST 2 ABE-7R16S111**, 16 relay outputs, 1 F twice , eight common DC or AC currents.

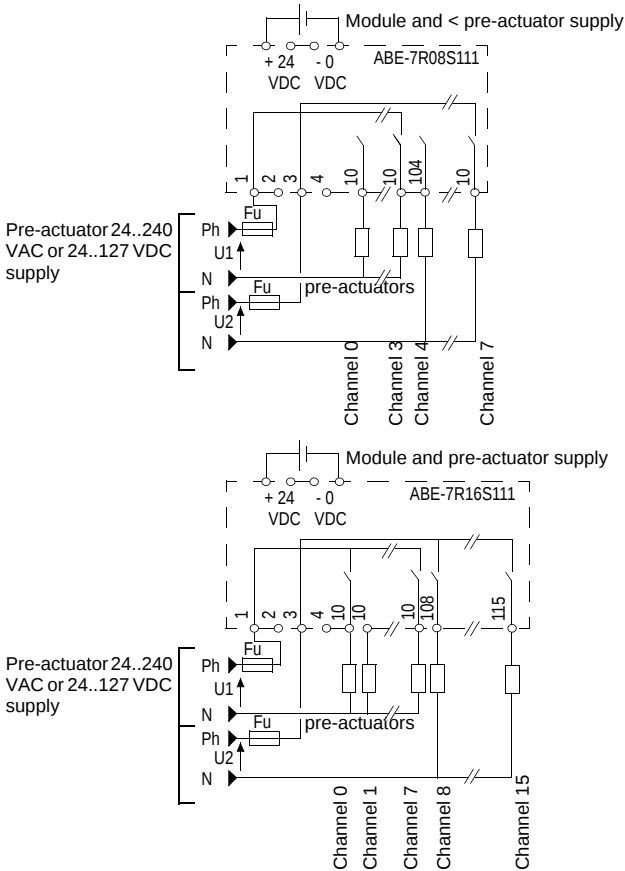
Illustration

Description of the connecting terminal blocks.



Illustration

Output connection functions.



Fu Fuse caliber according to the load.

	WARNING Usage precautions The bases are originally equipped with a fuse for general use of 1 A rapid fusion caliber. Protection of relay contacts: • each pre-actuator from a protection circuit must be mounted on the posts: • RC or MOV circuit on an alternating current; • discharge diode on direct current. Failure to follow these instructions can result in death, serious injury, or equipment damage.
---	---

Characteristics of non removable relay output adaptation bases ABE-7R08S111/16S111.

At a Glance

This section describes the general characteristics of bases
TELEFAST 2 ABE-7R08S111/16S111.

General characteristics

This table describes the general characteristics of bases **ABE-7R08S111/16S111**

Base types		ABE-7R08S111	ABE-7R16S111
Channel number		8	16
Contact characteristics			
Job limit voltage		Alternating	250 V
		Direct	30 V
Thermal current		3 A	
Alternating current load	Resistive, load AC12	Voltage	230 VAC
		Current (1)	0.6 A
	Inductive, load AC15	Voltage	230 VAC
		Current (1)	0.4 A
Direct current load	Resistive, load DC12	Voltage	24 VDC
		Current (1)	0.6 A
	Inductive, load DC13 (2)	Voltage	24 VDC
		Current (1)	0.2 A
Minimum switching		Current	1 mA
		Voltage	5 V
Response time		State 0 to 1	10 ms
		State 1 to 0	6 ms
Maximum speed of function loading		0.5 Hz	
Built-in protection measures	Against overloads and short-circuits:		None, provide one rapid fusion fuse per channel or group of channels.
	Against alternating current inductive overcharging		None, each RC circuit or MOV (ZNO) suppressor, must be mounted on the posts of each pre-actuator appropriate to the voltage.
	Against direct current inductive overcharging		none, each discharge diode must be mounted on the posts of each pre-actuator.
Voltage assigned to insulation		Coil/contact	300 V
Voltage assigned to shock resistance (1.2/50)		Coil/contact	2.5 kV
Key			
(1)	For 0.5 x 10 ⁶ maneuvers.		
(2)	L/R = 10 ms.		

36.15

TELEFAST 2 ABE-7R08S210/16S210 connection bases

At a Glance

Aim of this section

This section introduces the **TELEFAST 2 ABE-7R08S210/16S210** connection bases.

What's in this Section?

This section contains the following topics:

Topic	Page
Pre-actuator connections on non removable relay output adaptation bases ABE-7R08S210/16S210.	403
Characteristics of non removable relay output adaptation bases ABE-7R08S210/16S210.	406

Pre-actuator connections on non removable relay output adaptation bases ABE-7R08S210/16S210.

At a Glance The pre-actuator connections are described here on **TELEFAST 1 ABE-7R16T370** bases, 8 or 16 relay outputs, 1 OF, potential free contact.

Illustration Description of the connecting terminal blocks.

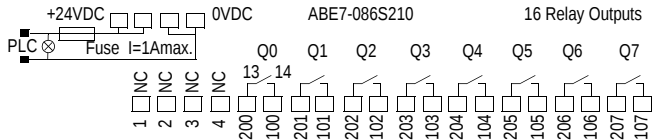
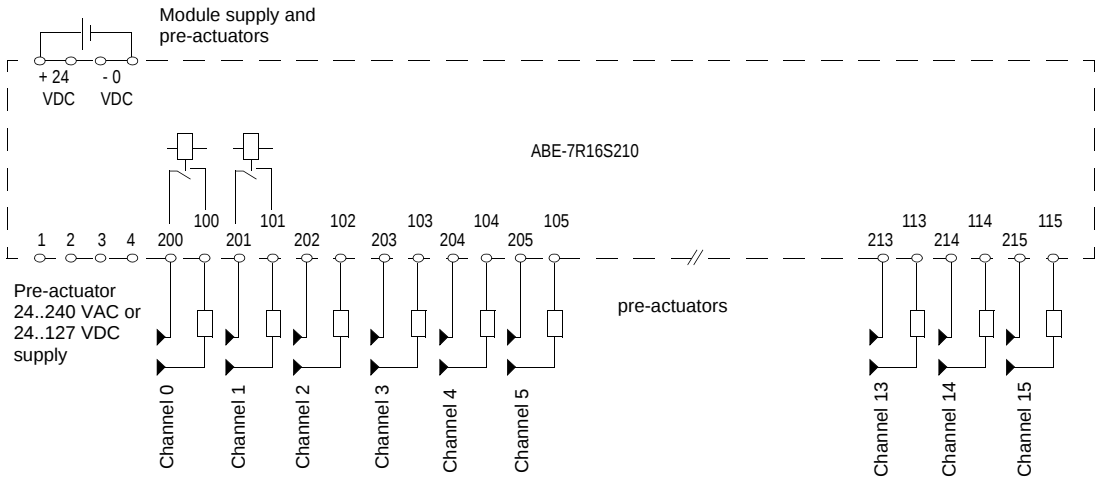
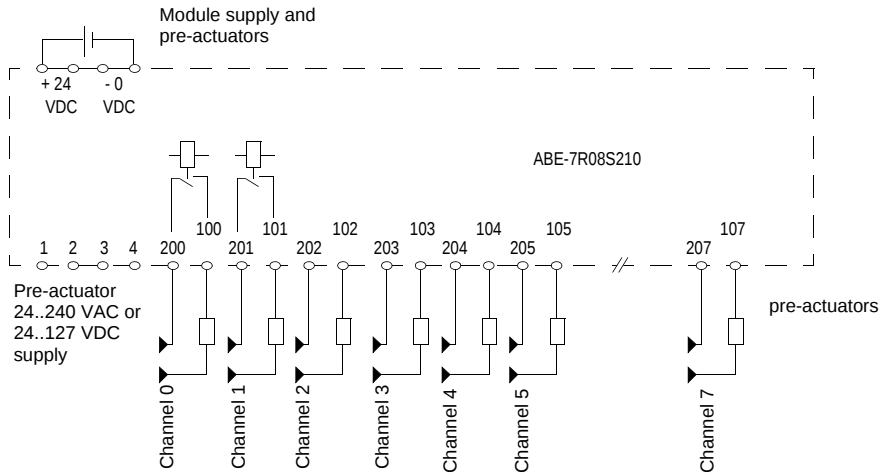


Illustration Output connection functions.



	WARNING Usage precautions The bases are originally equipped with a fuse for general use of 1 A rapid fusion caliber. Protection of relay contacts: • each pre-actuator from a protection circuit must be mounted on the posts: • RC or MOV circuit on an alternating current; • discharge diode on direct current. Provide one protection fuse per pre-actuator or per group if supplied from the same voltage. Failure to follow these instructions can result in death, serious injury, or equipment damage.
---	--

Characteristics of non removable relay output adaptation bases ABE-7R08S210/16S210.

At a Glance

This section describes the general characteristics of bases **TELEFAST 2 ABE-7R08S210/16S210**.

General characteristics

This table describes the general characteristics of bases **ABE-7R08S210/16S210**

Base types		ABE-7R08S210	ABE-7R16S210
Channel number		8	16
Contact characteristics			
Job limit voltage		Alternating	250 V
		Direct	125 V
Thermal current		5 A	
Alternating current load	Resistive, load AC12	Voltage	230 VAC
		Current (1)	1.5 A
	Inductive, load AC15	Voltage	230 VAC
		Current (1)	0.9 A
Direct current load	Resistive, load DC12	Voltage	24 VDC
		Current (1)	1.5 A
	Inductive, load DC13 (2)	Voltage	24 VDC
		Current (1)	0.6 A
Minimum switching		Current	10 mA
		Voltage	5 V
Response time		State 0 to 1	10 ms
		State 1 to 0	5 ms
Maximum speed of function loading		0.5 Hz	
Built-in protection measures	Against overloads and short-circuits:		None, provide one rapid fusion fuse per channel or group of channels.
	Against alternating current inductive overcharging		None, each RC circuit or MOV (ZNO) suppressor, must be mounted on the posts of each pre-actuator appropriate to the voltage.
	Against direct current inductive overcharging		None, each discharge diode must be mounted on the posts of each pre-actuator.
Voltage assigned to insulation		Coil/contact	300 V
Voltage assigned to shock resistance (1.2/50)		Coil/contact	2.5 kV
Key			
(1)	For 0.5 x 10 ⁶ maneuvers.		
(2)	L/R = 10 ms.		

36.16 TELEFAST 2 ABE-7R16S212 connection base

At a Glance

Aim of this section This section describes the connection base **TELEFAST 2 ABE-7R16S212**.

What's in this Section? This section contains the following topics:

Topic	Page
Pre-actuator connections on non removable relay output adaptation bases ABE-7R16s212.	409
Characteristics of non removable relay output adaptation bases ABE-7R16S212.	411

Pre-actuator connections on non removable relay output adaptation bases ABE-7R16s212.

At a Glance

The pre-actuator connections are described here for base
TELEFAST 2 ABE-7R16S212, 16 relay outputs, 1F, with distribution of the polarities
by 8 channel group.

Illustration

Description of the connecting terminal blocks.

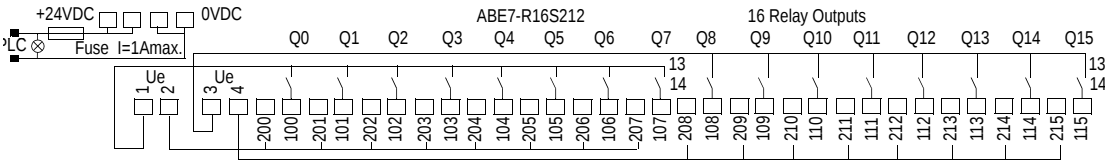
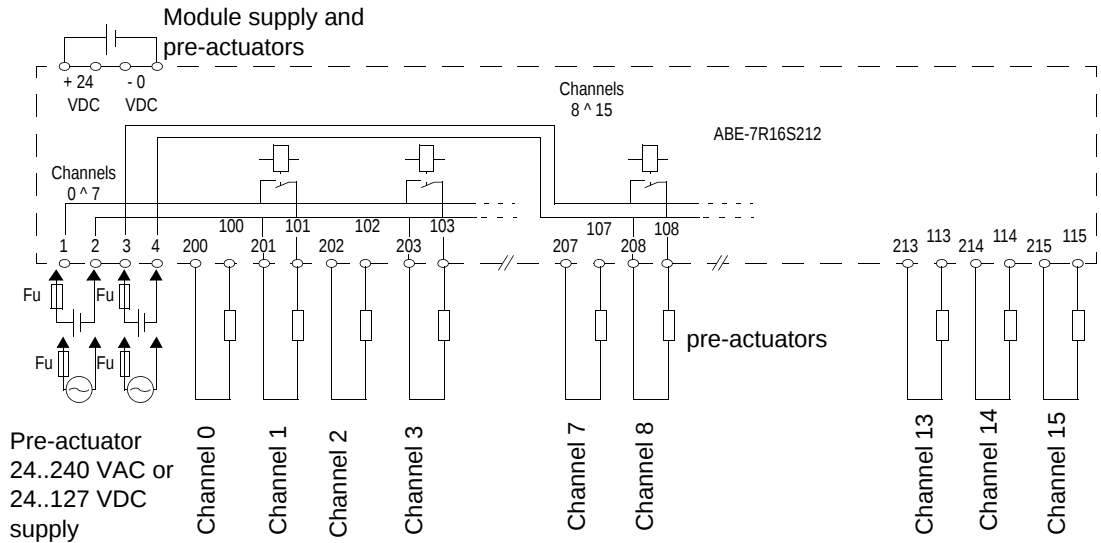


Illustration Output connection functions.



Fu Fuse caliber according to the load.

	WARNING
	Usage precautions The base is originally equipped with a 1 A fast blow caliber fuse for general use. Protection of relay contacts: • each protection circuit must be mounted on the posts of each pre-actuator: • RC or MOV circuit on an alternating current; • discharge diode on direct current. Failure to follow these instructions can result in death, serious injury, or equipment damage.

Characteristics of non removable relay output adaptation bases ABE-7R16S212.

At a Glance

This section describes the general characteristics of base **TELEFAST 2 ABE-7R16S212**.

General characteristics

This table describes the general characteristics of base **ABE-7R16S212**

Base type		ABE-7R16S212	
Channel number		16	
Contact characteristics			
Job limit voltage		Alternating	250 V
		Direct	125 V
Thermal current			5 A
Alternating current load	Resistive, load AC12	Voltage	230 VAC
		Current (1)	1.5 A
	Inductive, load AC15	Voltage	230 VAC
		Current (1)	0.9 A
Direct current load	Resistive, load DC12	Voltage	24 VDC
		Current (1)	1.5 A
	Inductive, load DC13 (2)	Voltage	24 VDC
		Current (1)	0,6 A
Minimum switching		Current	10 mA
		Voltage	5 V
Response time		State 0 to 1	10 ms
		State 1 to 0	5 ms
Maximum speed of function loading			0.5 Hz
Built-in protection measures	Against overloads and short-circuits		None, provide one rapid fusion fuse per channel or group of channels.
	Against alternating current inductive overcharging		None, each RC circuit or MOV (ZNO) suppressor, must be mounted on the posts of each pre-actuator appropriate to the voltage.
	Against direct current inductive overcharging		None, each discharge diode must be mounted on the posts of each pre-actuator.
Voltage assigned to insulation		Coil/contact	300 V
Voltage assigned to shock resistance (1.2/50)		Coil/contact	2.5 kV
(1)	For 0.5 x 10 ⁶ maneuvers.		
(2)	L/R = 10 ms.		

36.17

Connection bases TELEFAST 2 ABE-7S16E2B1/E2E1/E2E0/E2F0/E2M0

At a Glance

Aim of this section

This section introduces the **TELEFAST 2 ABE-7 S16E2B1/E2E1/E2E0/E2F0/E2M0** connection bases.

What's in this Section?

This section contains the following topics:

Topic	Page
Sensor connections on non removable static relay input adaptation bases ABE-7S16E2B1/E2E1/E2E0/E2F0/E2M0	413
Characterisitics of non removable static relay input adaptation bases ABE-7S16E2B1/E2E1/E2E0/E2F0/E2M0	415

Sensor connections on non removable static relay input adaptation bases ABE-7S16E2B1/E2E1/E2E0/E2F0/E2M0

At a Glance

This is an overview of the sensor connections on **TELEFAST 2** bases.

Illustration

Description of the connecting terminal blocks.

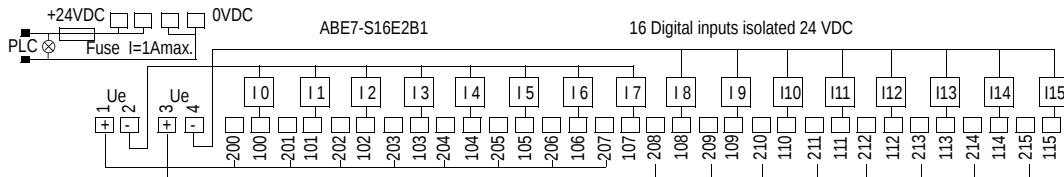
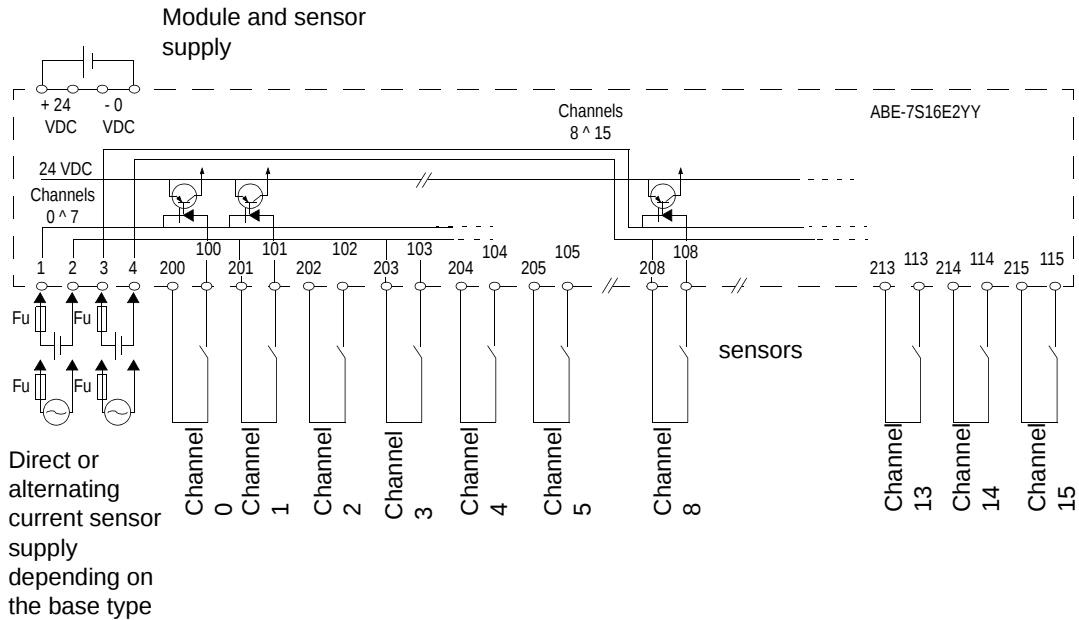


Illustration Input function connections.



Fu Fuse caliber according to the load.

	WARNING
	Usage precautions
	The bases are originally equipped with a fuse for general use of 1 A rapid fusion caliber. Input protection: • by 2 A rapid fusion fuse. Failure to follow these instructions can result in death, serious injury, or equipment damage.

Characteristics of non removable static relay input adaptation bases ABE-7S16E2B1/E2E1/E2E0/E2F0/E2M0

At a Glance

This section describes the general characteristics of bases
TELEFAST 2 ABE-7S16E2B1/E2E1/E2E0/E2F0/E2M0.

General characteristics

This table describes the general characteristics of bases
ABE-7S16E2B1/E2E1/E2E0/E2F0/E2M0

Base types			ABE-7S16E2B1	ABE-7S16E2E1	ABE-7S16E2E0	ABE-7S16E2F0	ABE-7S16E2M0	
Channel number			16					
Command circuit characteristics (1)								
Nominal values		Voltage	24 VDC	48 VDC	48 VAC	110..130 VAC	230..240 VAC	
		Current	12 mA	13 mA	12 mA	8.3 mA	8 mA	
		Speed	-	-	50/60 Hz			
Input threshold	In state 1	Voltage	>= 13.7 V	>= 30 V	>= 32 V	>= 79 V	>= 164 V	
		Current	>= 5 mA	>= 6 mA	>= 5 mA			>= 4.5 mA
	In state 0	Voltage	<= 5 V	<= 10 V			<= 30 V	<= 40 V
		Current	<= 2 mA			<= 1.5 mA	<= 2 mA	
	Speed		-	-	47/63 Hz			
	Sensor supply (ripple included)		19..30 V	38,4..60 V	38,4..53 V	96..143 V	184..264 V	
Compliance with IEC 1131-2			type 1	type 2	type 1			
Response time		State 0 to 1	0.05 ms			20 ms		
		State 1 to 0	0.4ms			20 ms		
Maximum switching speed			1000 Hz			25 Hz		
Voltage assigned to insulation		Input/output	300 V					
Voltage assigned to shock resistance (1.2/50)		Input/output	2.5 kV					
Key								
(1)		Operating piece inputs.						

36.18

TELEFAST 2 ABE-7S16S2B0/S2B2 connection bases

At a Glance

Aim of this section

This section introduces the **TELEFAST 2 ABE-7S16S2B0/S2B2** connection bases.

What's in this Section?

This section contains the following topics:

Topic	Page
Pre-actuator connections on ABE-7S16S2B0/S2B2 static output adaptation bases	417
Characteristics of static output adaptation bases ABE-7S16S2B0/S2B2	418

Pre-actuator connections on ABE-7S16S2B0/S2B2 static output adaptation bases

At a Glance This is an overview of pre-actuator connections on the **TELEFAST 2 ABE-7S16S2B0/S2B2** bases, 16 static outputs, 24 VDC, 0.5 A.

Illustration Description of the connection terminals.

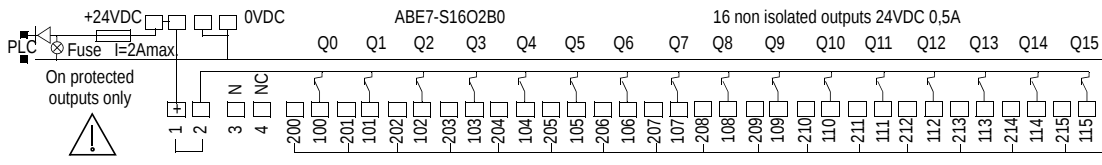
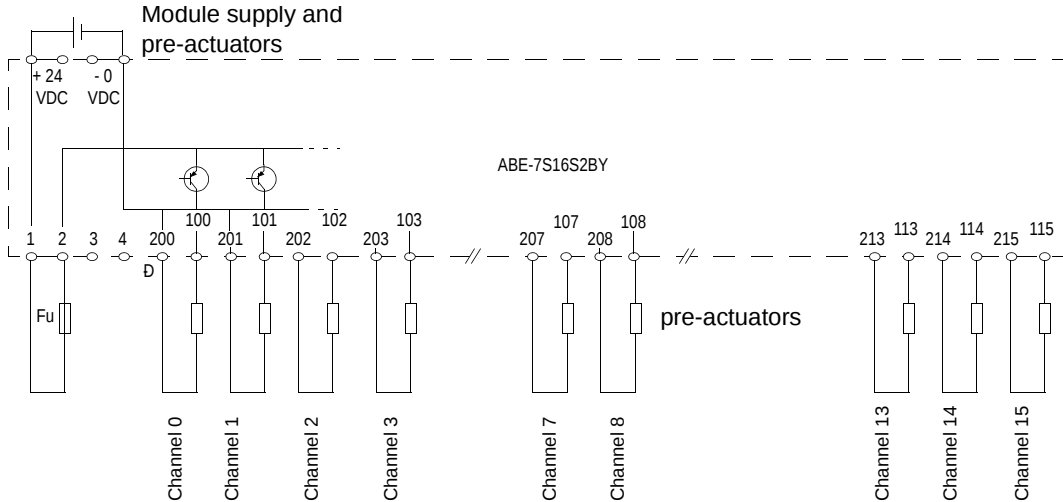


Illustration Output function connections.



Fu Fuse caliber according to the load.

	WARNING
	Usage precautions
	The bases are equipped as standard with a fuse for general use with 2 A fast blow caliber. Failure to follow these instructions can result in death, serious injury, or equipment damage.

Characteristics of static output adaptation bases ABE-7S16S2B0/S2B2

At a Glance

This section describes the general characteristics of bases **TELEFAST 2 ABE-7S16S2B0/S2B2**.

General characteristics

This table describes the general characteristics of bases **ABE-7S16S2B0/S2B2**

Base types			ABE-7S16S2B0	ABE-7S16S2B2
Channel number			16	
Output circuit characteristics				
Direct current load	Resistive, load DC12	Voltage	24 VDC	
		Current	0.5 A	
	Inductive, load DC13	Voltage	24 VDC	
		Current	0.25 A	
	Filament lamp		10 W	
Thresholds		Voltage	19..30 VDC	
Leakage current at state 0			<= 0.3 mA	
Breakdown voltage at state 1			<= 0.6 V	
Minimum current through channel			1 mA	
Response time		State 0 to 1	0,1 ms	
		State 1 to 0	0.02 ms	
Built-in protection measures	Against overloads and short-circuits		Yes by current limiter and disjunctioner Id >0.75 A.	
	Against inductive voltage overflow		Yes by integrated breakdown diode.	
	Against polarity inversions		Yes by suppressor	
Switching frequency on inductive load			< 0.6 Lj ²	
Error detection report			Yes	No
Voltage assigned to insulation		Input/output	300 V	
Voltage assigned to shock resistance (1.2/50)		Input/output	2.5 kV	

36.19 TELEFAST 2 ABE-7S08S2B1connection base

At a Glance

Aim of this section This section describes the connection base **TELEFAST 2 ABE-7S08S2B1**.

What's in this Section? This section contains the following topics:

Topic	Page
Pre-actuator connections on ABE-7S08S2B1 static output adaptation base	420
Characteristics of ABE-7S08S2B1 static output adaptation bases	421

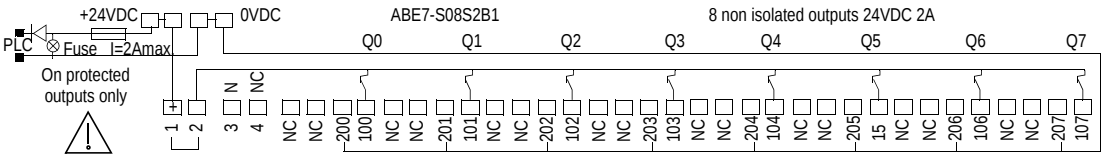
Pre-actuator connections on ABE-7S08S2B1 static output adaptation base

At a Glance

This is an overview of the pre-actuator connections on the **TELEFAST 2 ABE-7S08S2B1** bases, 8 static outputs, 24 VDC, 2 A.

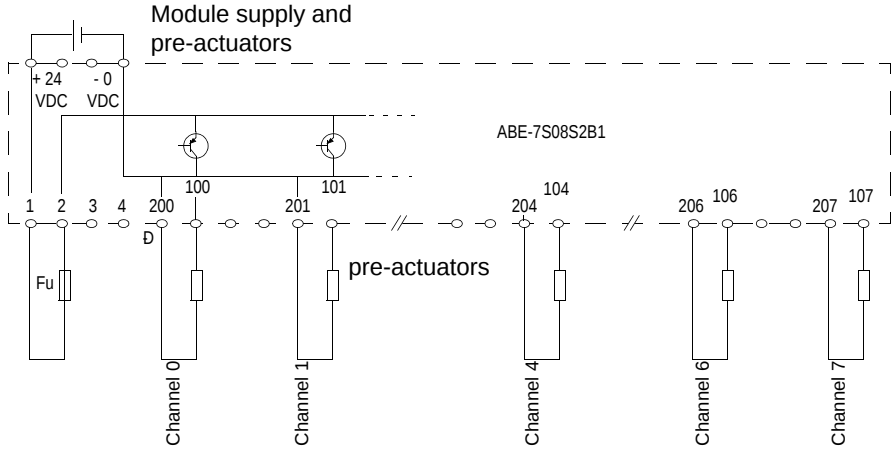
Illustration

Description of the connection terminals.



Illustration

Output function connections.



Fu Fuse caliber according to the load.

	WARNING
	Usage precautions
	The bases are equipped as standard with a fuse for general use with 2 A fast blow caliber. Do not connect filament lamps.
Failure to follow these instructions can result in death, serious injury, or equipment damage.	

Characteristics of ABE-7S08S2B1 static output adaptation bases

At a Glance

This section describes the general characteristics of **TELEFAST 2 ABE-7S08S2B1** base.

General characteristics

This table describes the general characteristics of **ABE-7S08S2B1** base.

Base type			ABE-7S08S2B1
Channel number			8
Output circuit characteristics			
Direct current load	Resistive, load DC12	Voltage	24 VDC
		Current	2 A (1)
	Inductive, load DC13	Voltage	24 VDC
		Current	0.5 A (1)
	Filament lamp		no
Thresholds		Voltage	19..30 VDC
Leakage current at state 0			<= 0.5 mA
Breakdown voltage at state 1			<= 0.5 V
Minimum current through channel			1 mA
Response time		State 0 to 1	0.1 ms
		State 1 to 0	0.02 ms
Built-in protection measures	Against overloads and short-circuits		Yes by current limiter and disjunctioner Id >2.6 A.
	Against inductive voltage overflow		Yes by integrated breakdown diode.
	Against polarity inversions		Yes by suppressor
Switching frequency on inductive load			< 0.5 LI ²
Error detection report			Yes
Voltage assigned to insulation		Input/ output	300 V
Voltage assigned to shock resistance (1.2/50)		Input/ output	2.5 kV
Key			
(1)	1 channel out of 2 alternating between 50 °C and +60 °C		

36.20 TELEFAST 2 ABE-7S08S2B0 connection base

At a Glance

Aim of this section This section describes the **TELEFAST 2 ABE-7S08S2B0** connection base.

What's in this Section? This section contains the following topics:

Topic	Page
Pre-actuator connections on the ABE-7S08S2B0 static output adaptation base	423
Characteristics of the ABE-7S08S2B0 static output adaptation bases	424

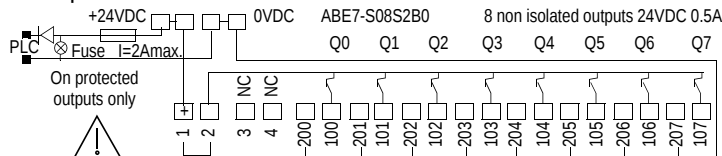
Pre-actuator connections on the ABE-7S08S2B0 static output adaptation base

At a Glance

This is an overview of the pre-actuator connections on the **TELEFAST 2 ABE-7S08S2B0** bases, 8 static outputs, 24 VDC, 0.5 A.

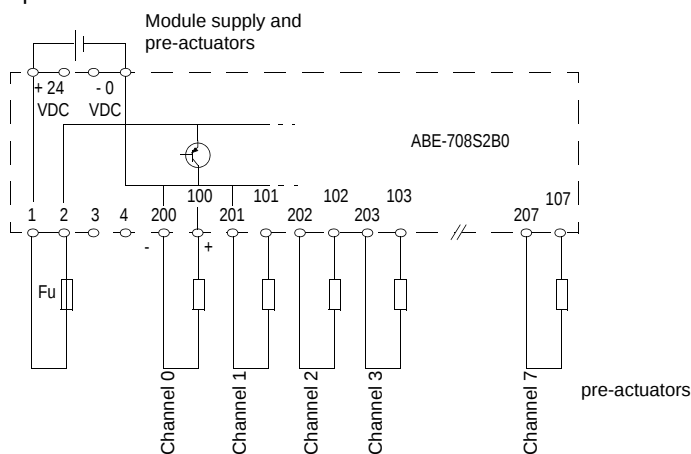
Illustration

Description of the connection terminal.



Illustration

Output function connections.



Fu Fuse caliber according to the load.

	WARNING
	Usage precautions
	The bases are equipped as standard with a fuse for general use with 2 A fast blow caliber. Failure to follow these instructions can result in death, serious injury, or equipment damage.

Characteristics of the ABE-7S08S2B0 static output adaptation bases

At a Glance

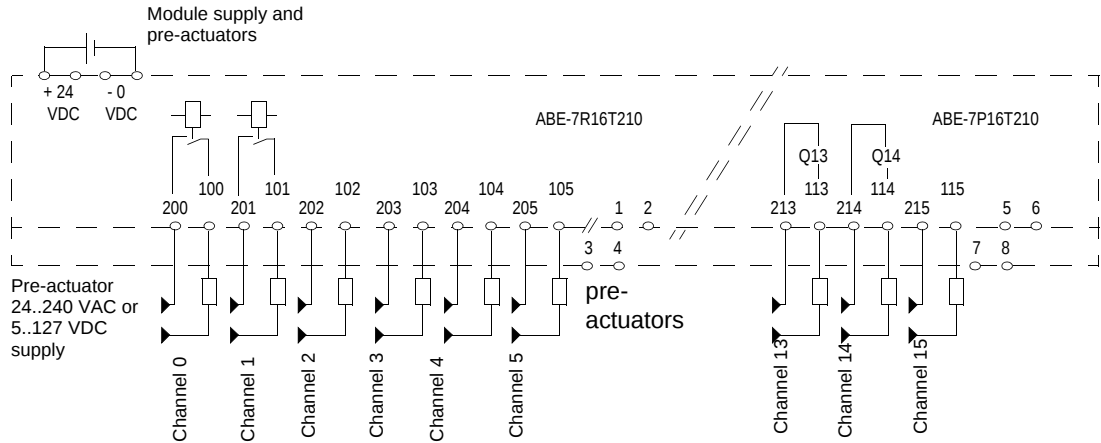
This section describes the general characteristics of the **TELEFAST 2 ABE-7S08S2B0** base.

General characteristics

This table describes the general characteristics of the **ABE-7S08S2B0** base.

Base type			ABE-7S08S2B0
Channel number			8
Output circuit characteristics			
Direct current load	Resistive, load DC12	Voltage	24 VDC
		Current	0.5 A
	Inductive, load DC13	Voltage	24 VDC
		Current	0.25 A
	Filament lamp		10 W
Thresholds		Voltage	19..30 VDC
Leakage current at state 0			<= 0.3 mA
Breakdown voltage at state 1			<= 0.6 V
Minimum current through channel			1 mA
Response time		State 0 to 1	0.1 ms
		State 1 to 0	0.02 ms
Built-in protection measures	Against overloads and short-circuits		Yes by current limiter and circuit breaker Id >0.75 A.
	Against inductive voltage overflow		Yes by integrated breakdown diode.
	Against polarity inversions		Yes by suppressor
Switching frequency on inductive load			< 0.6 LI ²
Error detection report			Yes
Voltage assigned to insulation		Input/output	300 V
Voltage assigned to shock resistance (1.2/50)		Input/output	2.5 kV

The diagram shows the power supply and output modules of the PLC. The power supply section includes a +24VDC input, a Fuse (I=1Amax.), and an OVDC output. The output modules are labeled ABE7-P16T210 and 16 Relay Outputs. The output modules are numbered 00 to 15, with corresponding input/output points 200 to 215. The output modules are connected to a common ground (0V) and a common output line (200...215 = +/~).

Illustration Output connection functions**WARNING****Usage precautions**

During manufacture, the bases are equipped with a fuse for general use of 1 A fast blow caliber.

Protection of relay contacts :

- each protection circuit must be mounted on the posts of each pre-actuator:
 - RC or MOV circuit on an alternating current;
 - discharge diode with direct current.

Provide one protection fuse per pre-actuator or per group if supplied from the same voltage.

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

36.22 TELEFAST 2 ABE-7R16T212/P16T212 connection bases

Pre-actuator links on ABE-7R16T212/P16T212 output electromechanical relay bases (size 10 mm)

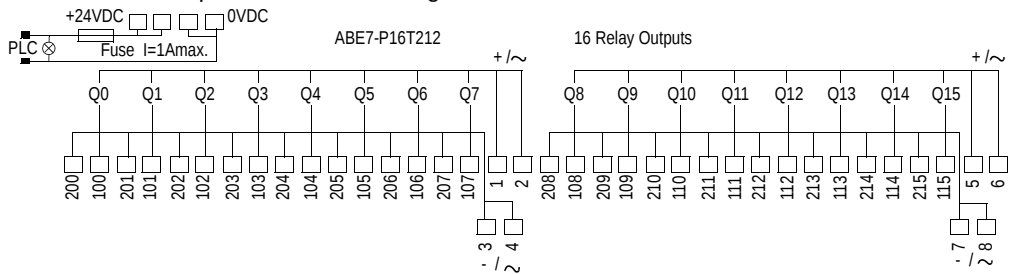
At a Glance

This is a description of the pre-actuator connections on:

- base **TELEFAST 2 ABE-7R16T212**, 16 relay outputs, 1 F, with distribution of the 2 polarities by an 8 channel group, with electromechanical relay;
- base **TELEFAST 2 ABE-7P16T212**, 16 relay outputs, 1 F, distribution of the 2 polarities by 8 channel group, relay not provided.

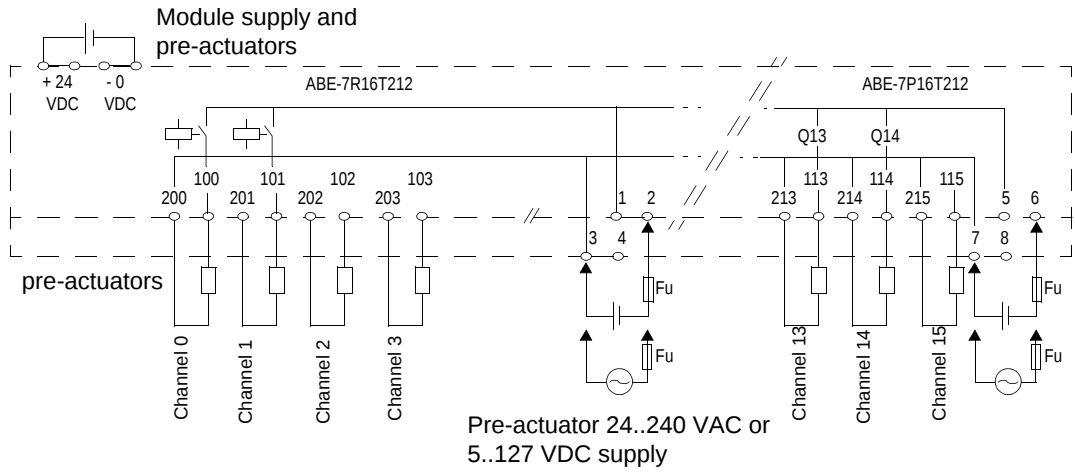
Illustration

Description of the connecting terminal blocks.



Illustration

Output connection functions.



Fu Fuse caliber according to the load.

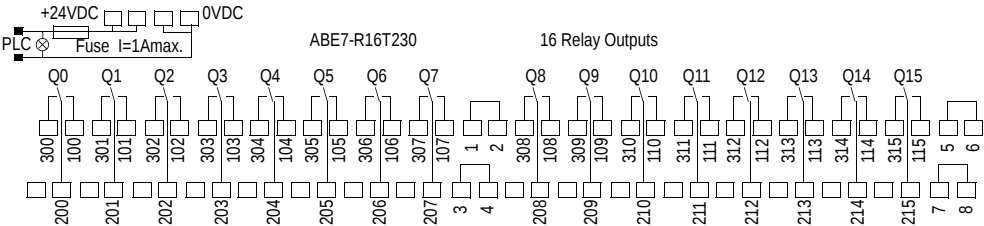
	WARNING
	Usage precautions During manufacture, the bases are equipped with a fuse for general use of 1 A fast blow caliber. Protection of relay contacts: • each protection circuit must be mounted on the posts of each pre-actuator: • RC or MOV circuit on an alternating current; • discharge diode with direct current. Failure to follow these instructions can result in death, serious injury, or equipment damage.

36.23 TELEFAST 2 ABE-7R16T230 connection base

Pre-actuator links on ABE-7R16T230 output electromechanical relay bases (size 10 mm)

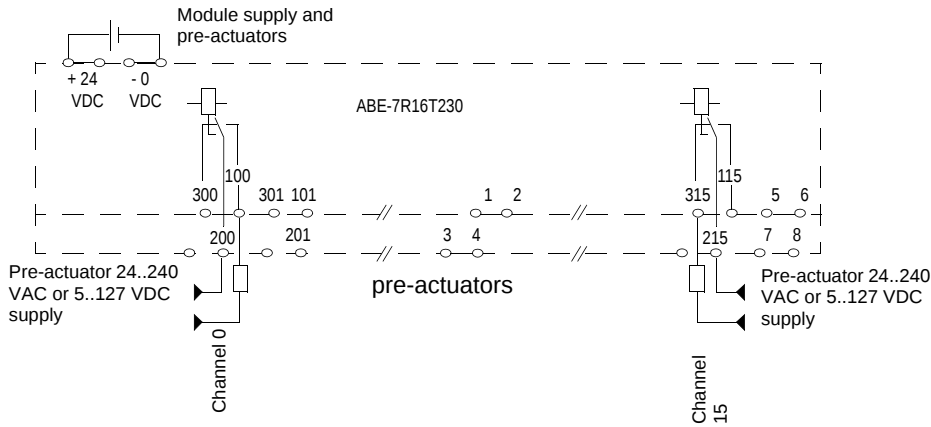
At a Glance The pre-actuator links are presented here on the **TELEFAST 2 ABE-7R16T230** base, with 1 OF electromagnetic relay, potential free contact.

Illustration Description of the connecting terminal blocks.



Illustration

Output connection functions.



	WARNING
	Usage precautions At manufacture, the base is equipped with a 1A fast blow caliber fuse for general use. Protection of relay contacts : • each protection circuit must be mounted on the posts of each pre-actuator: • RC or MOV circuit on an alternating current; • discharge diode on a direct current. Provide one protection fuse per pre-actuator or per group if supplied from the same voltage. Failure to follow these instructions can result in death, serious injury, or equipment damage.

36.24 TELEFAST 2 ABE-7R16T231 connection base

Pre-actuator links on ABE-7R16T231 output electromechanical relay bases (size 10 mm)

At a Glance The pre-actuator connections are described here for base **TELEFAST 2 ABE-7R16S231**, with 1 OF electromechanical relays, distribution of what is shared per group of 8 channels.

Illustration Description of the connecting terminal blocks.

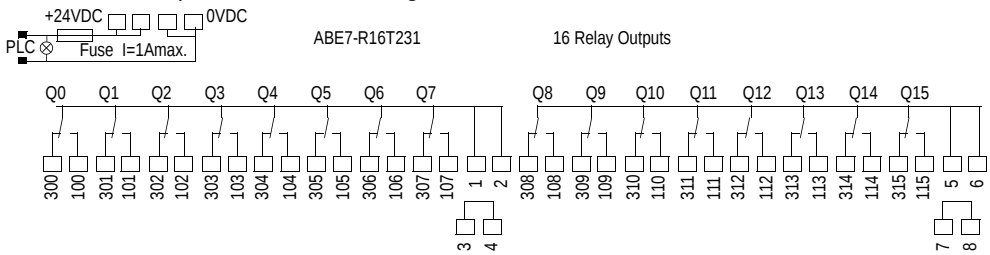
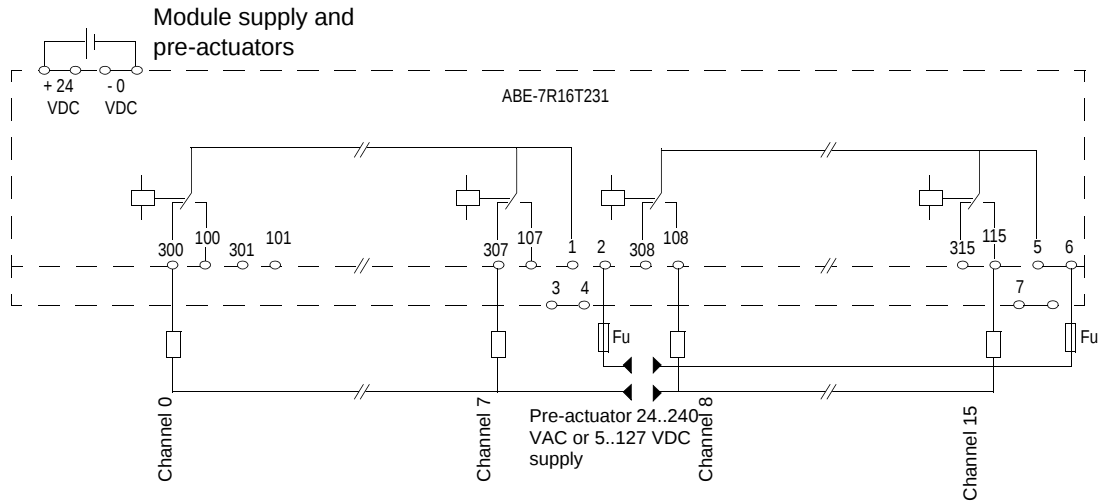


Illustration Output connection functions.

Fu Fuse caliber according to the load.

**WARNING****Usage precautions**

At manufacture, the base is equipped with a 1A fast blow caliber fuse for general use.

Protection of relay contacts :

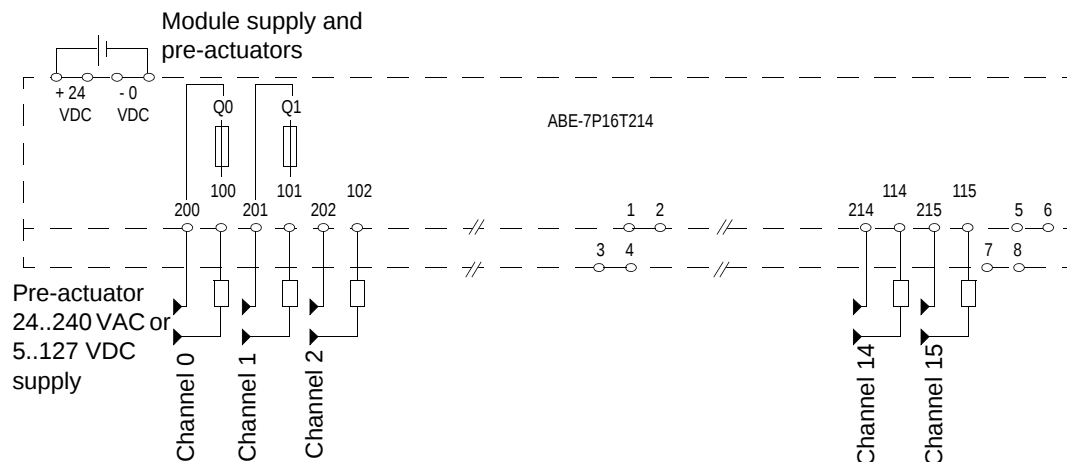
- each protection circuit must be mounted on the posts of each pre-actuator:
 - RC or MOV circuit on an alternating current;
 - discharge diode on a direct current.

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

Figure 1: Schematic diagram of the PLC power supply and output modules. The diagram shows a power supply section with +24VDC and 0VDC rails, a PLC unit, and a Fuse labeled 'I=1Amax.'. Below this, there are two main sections: 'ABE7-P16T214' and '16 Relay Outputs'. The 'ABE7-P16T214' section contains 16 output modules labeled Q0 through Q7, each with a 200V and 100V terminal. The '16 Relay Outputs' section contains 16 output modules labeled Q8 through Q15, each with a 200V and 100V terminal. A note at the bottom left states '200...215 = + / ~'. A note at the bottom center states '1...4 = 1...4'.

Illustration

Output connection functions.

**WARNING****Usage precautions**

At manufacture, the base is equipped with a 1A fast blow caliber fuse for general use.

Protection of relay contacts :

- each protection circuit must be mounted on the posts of each pre-actuator:
 - RC or MOV circuit on an alternating current;
 - discharge diode on a direct current.

Function via channel:

- 0.5 A fuse.

Provide one protection fuse per pre-actuator or per group if supplied from the same voltage.

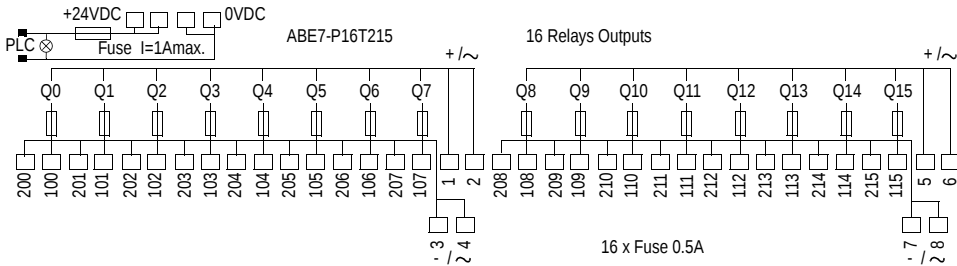
Failure to follow these instructions can result in death, serious injury, or equipment damage.

36.26 TELEFAST 2 ABE-7P16T215 connection base

Pre-actuator links on ABE-7P16T215 output electromechanical relay bases (size 10 mm)

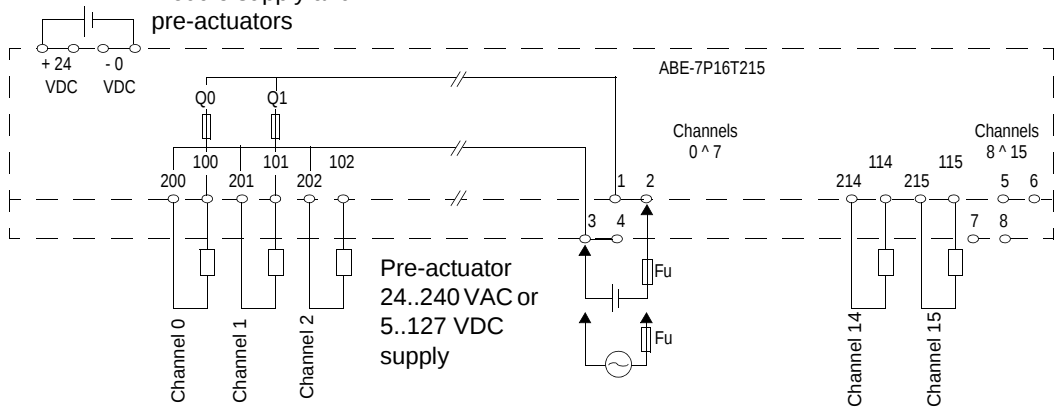
At a Glance The pre-actuator links are presented here on the **TELEFAST 1 ABE-7R16T215** base, 16 relay outputs, 1 F, distribution of 2 polarities per group of 8 channels, 1 fuse per channel relay not provided.

Illustration Description of the connecting terminal blocks.



Illustration

Output connection functions.
Module supply and
pre-actuators



Fu Fuse caliber according to the load.

WARNING**Usage precautions**

At manufacture, the base is equipped with a 1A fast blow caliber fuse for general use.

Protection of relay contacts :

- each protection circuit must be mounted on the posts of each pre-actuator:
 - RC or MOV circuit on an alternating current ;
 - discharge diode on a direct current.

Function via channel :

- 0.5 A fuse.

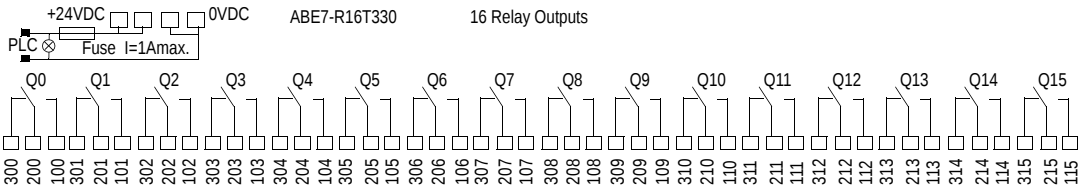
Failure to follow these instructions can result in death, serious injury, or equipment damage.

36.27 TELEFAST 2 ABE-7R16T330/P16T330 connection bases

Pre-actuator links on ABE-7R16T330/P16T330 output electromechanical relay bases (size 12.5 mm)

- At a Glance**
- This is a description of the pre-actuator connections on:
- the **TELEFAST 2 ABE-7R16T330** bases, 16 relay outputs, free potential contact, with electromagnetic relay;
 - the **TELEFAST 2 ABE-7R16T330** bases, 16 relay outputs, free potential contact, relay not provided.

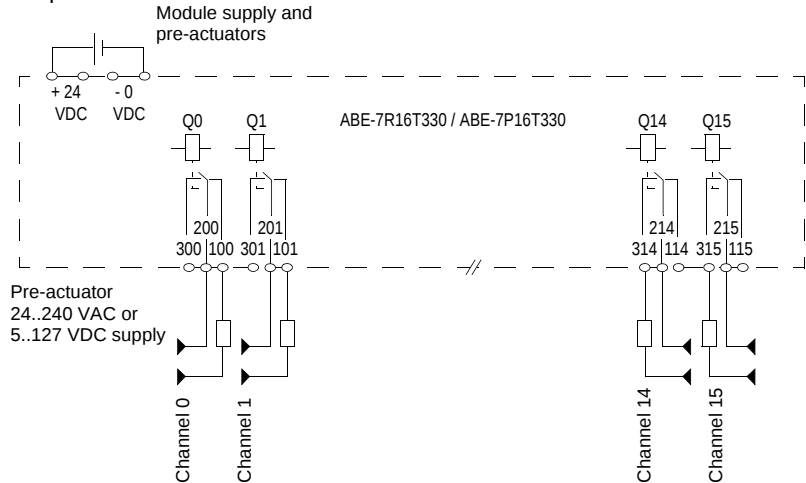
Illustration Description of the connection terminals.



ABE-7R16T330/P16T330 16 output relays, 1 OF, free potential contact, ABE-7R16T330 with electromagnetic relays, ABE-7P16T330 relays not provided.

Illustration

Output function connections.



WARNING



Usage precautions

The bases are equipped as standard with a fuse for general use with 1 A fast blow caliber.

Protection of relay contacts:

- each protection circuit must be mounted on the posts of each pre-actuator:
 - RC or MOV circuit on an alternating current ;
 - discharge diode on a direct current.

Provide one protection fuse per pre-actuator or per group if supplied from the same voltage.

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

36.28 TELEFAST 2 ABE-7R16T332/P16T332 connection bases

Pre-actuator links on ABE-7R16T332/P16T332 output electromechanical relay bases (size 12,5 mm)

At a Glance

The pre-actuator links are presented here on:

- base **TELEFAST 2 ABE-7R16T332**, 16 relay outputs, 1 OF, distribution of the 2 polarities by a 4 channel group, with electromagnetic relays;
- base **TELEFAST 2 ABE-7P16T332**, 16 relay outputs, 1 OF, distribution of the 2 polarities by a 4 channel group, relays not provided.

Illustration

Description of the linking posts.

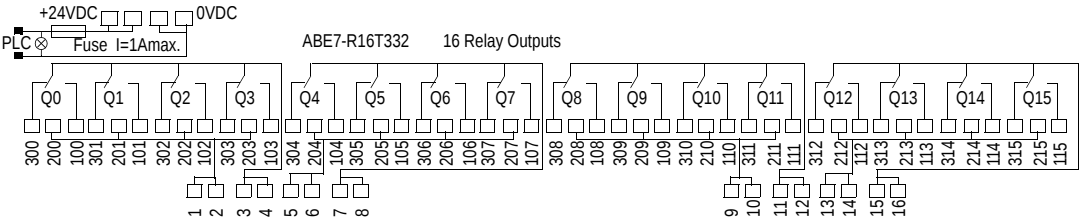
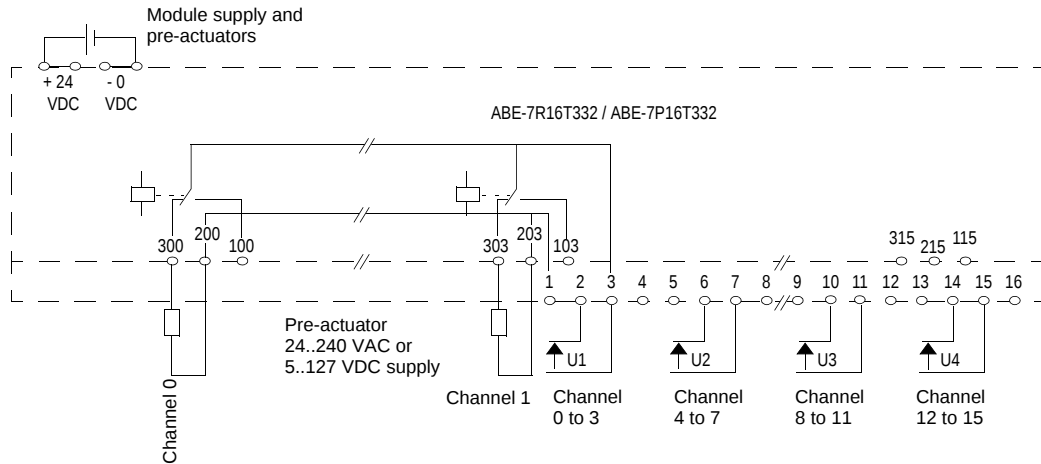


Illustration Output linking functions.**WARNING****Usage precautions**

The bases are originally equipped with a fuse for general use of 1 A rapid fusion calibre.

Protection of relay contacts :

- Each pre-actuator form a protection circuit must be mounted on the posts.
 - RC or MOV circuit on an alternating current;
 - discharge diode on direct current.

Scheduling a protection fuse through the pre-actuator or group if supplied from the same voltage.

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

36.29 TELEFAST 2 ABE-7R16T370 connection base

Pre-actuator links on ABE-7R16T370 output electromechanical relay bases (size 12.5 mm)

At a Glance The pre-actuator links are presented here on the **TELEFAST 2 ABE-7R16T370** base, 16 relay outputs, 2 OF, potential free contact.

Illustration

Description of the linking posts.

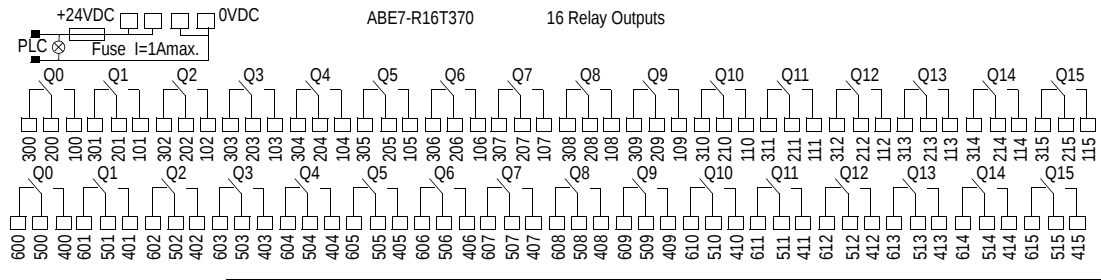
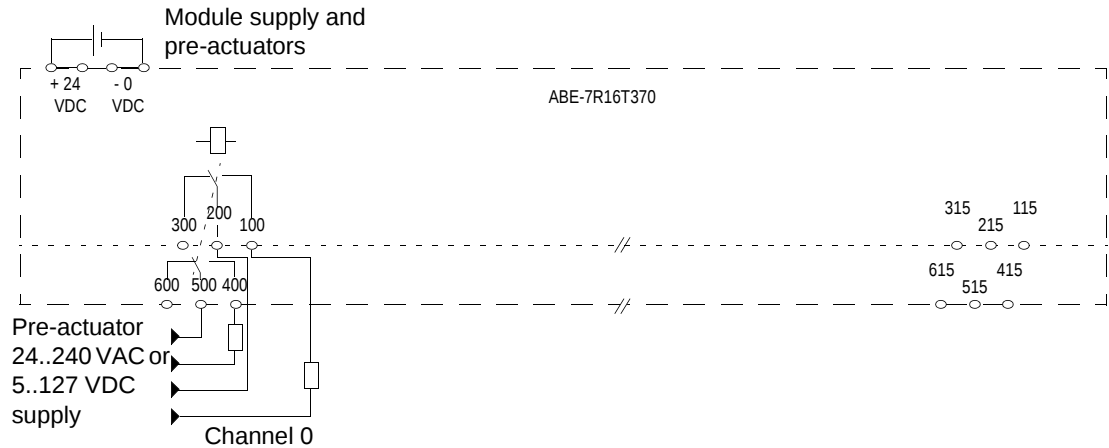


Illustration Output linking functions.**WARNING****Usage precautions**

The base is originally equipped with a fuse for general use of 1 A rapid fusion caliber.

Protection of relay contacts :

- Each pre-actuator form a protection circuit must be mounted on the posts.
 - RC or MOV circuit on an alternating current;
 - discharge diode on direct current.

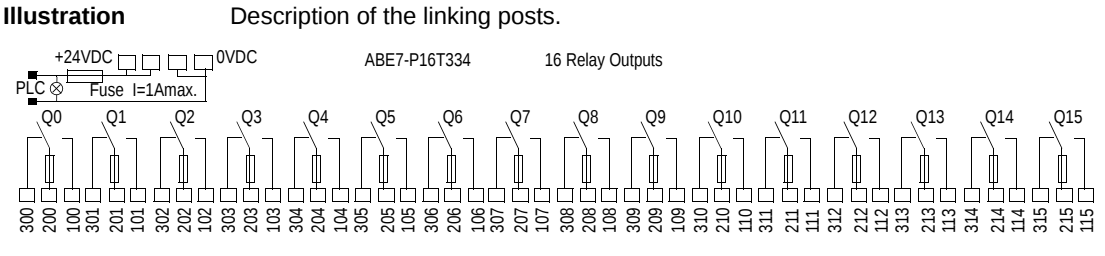
Scheduling a protection fuse through the pre-actuator or group if supplied from the same voltage.

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

36.30 TELEFAST 2 ABE-7P16T334 connection base

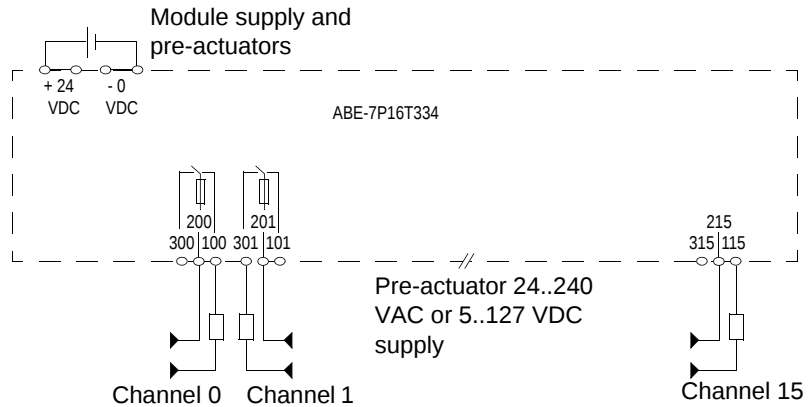
Pre-actuator links on ABE-7R16T334 output electromechanical relay bases (size 12.5 mm)

At a Glance The pre-actuator links are presented here on the **TELEFAST 1 ABE-7R16T334** base, 16 relay outputs, 1 OF, potential free contact.



Illustration

Output linking functions.

**WARNING****Usage precautions**

The base is originally equipped with a fuse for general use of 1 A rapid fusion caliber.

Protection of relay contacts :

- Each pre-actuator form a protection circuit must be mounted on the posts.
 - RC or MOV circuit on an alternating current;
 - discharge diode on direct current.

Functionality via channel :

- 2 A fuse.

Scheduling a protection fuse through the pre-actuator or group if supplied from the same voltage.

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

36.31 TELEFAST 2 ABE-7P16T318 connection base

Pre-actuator connections on ABE-7P16T318 relay base, electromechanical or static output (width 12.5 mm)

At a Glance The pre-actuator connections on the **TELEFAST 2 ABE-7P16T318** base are described here: 16 relay outputs, 1 OF, distribution of the 2 polarities per group of 4 channels, relays not provided.

Illustration Description of the connecting terminal blocks.

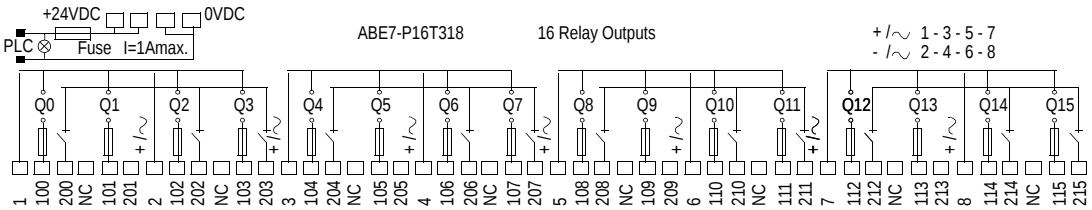
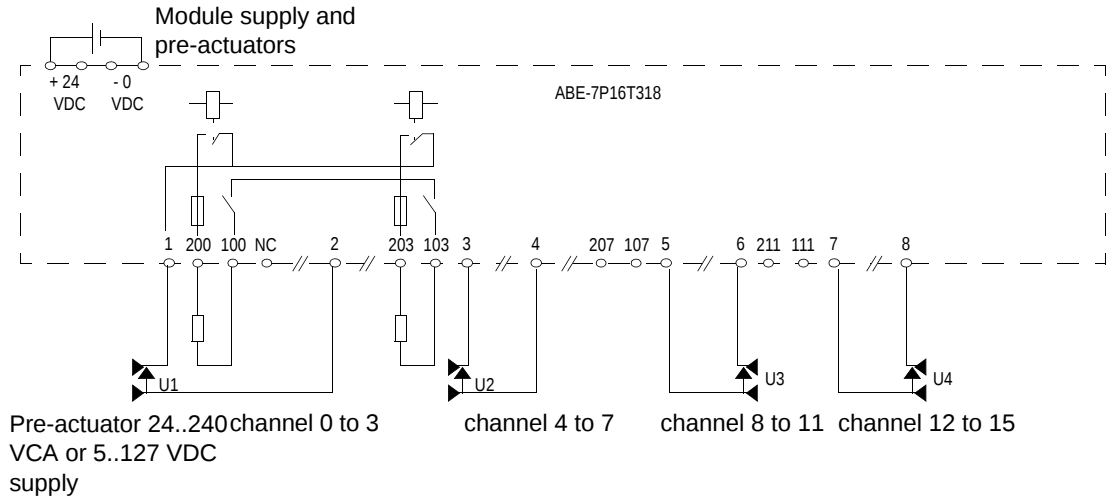


Illustration Output connection functions.



WARNING

Usage precautions

At manufacture, the base is equipped with a fuse for general use of 1 A fast blow caliber.

Protection of relay contacts:

- each pre-actuator from a protection circuit must be mounted onto the terminals:
 - RC or MOV circuit in the case of an alternating current;
 - discharge diode for a direct current.

Functionality per channel:

- 2 A fuse;
- shared division.

Provide a protection fuse on the pre-actuator supply.

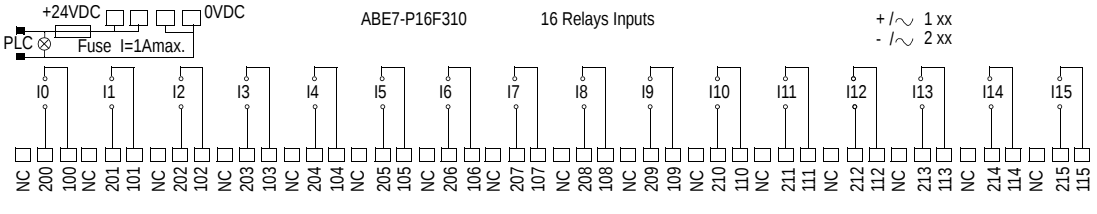
Failure to follow these instructions can result in death, serious injury, or equipment damage.

36.32 TELEFAST 2 ABE-7P16F310 connection base

Sensor connections on ABE-7P16F310 input static relay bases (width 12.5 mm)

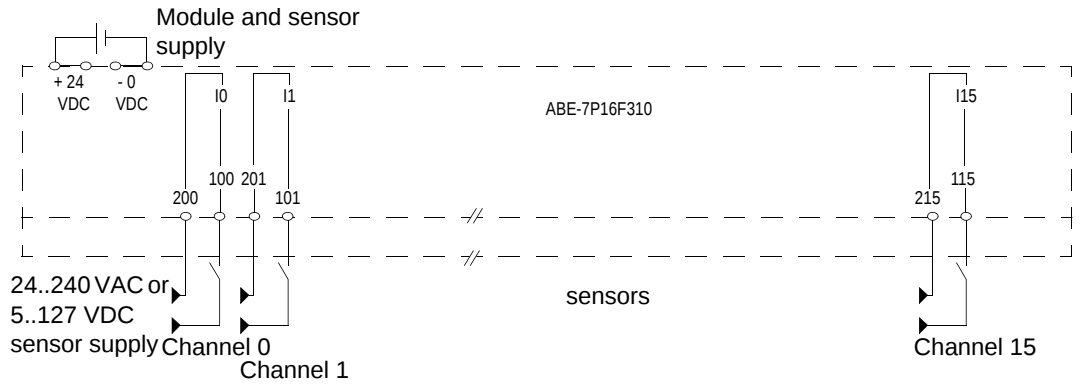
At a Glance The sensor connections on the **TELEFAST 1 ABE-7P16F310** base are described here: 16 relay outputs, potential free contact, relays not provided.

Illustration Description of the connection terminals.



Illustration

Output function connections.



	WARNING
	Usage precautions At manufacture, the base is equipped with a fuse for general use of 1A fast blow caliber. Provide one protection fuse per group of sensors if supplied from the same voltage. Failure to follow these instructions can result in death, serious injury, or equipment damage.

36.33 TELEFAST 2 ABE-7P16F312 connection base

Sensor links on ABE-7P16F312 input static relay bases (size 12.5 mm)

At a Glance The sensor links are presented here on the **TELEFAST 1 ABE-7P16F312** base, 16 relay outputs, distribution of the 2 polarities by an 8 channel group, relays not provided.

Illustration Description of the connecting terminal blocks.

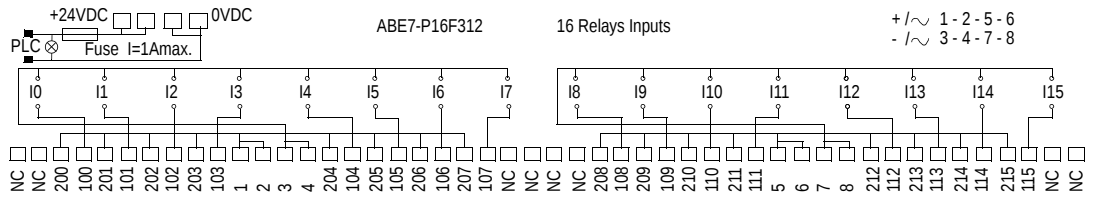
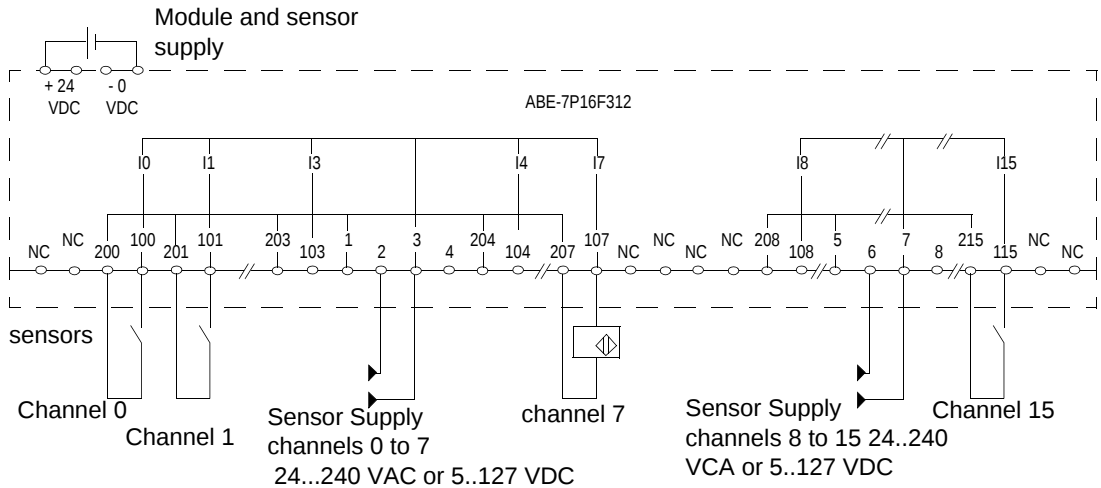


Illustration Output connection functions.



WARNING



Usage precautions

The base is originally equipped with a 1A fast blow caliber fuse for general use.
Plan for a protection fuse for the sensor supply.

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

36.34 TELEFAST 2 connection base accessories

At a Glance

Aim of this section This section introduces the **TELEFAST 2** connection bases' range of accessories.

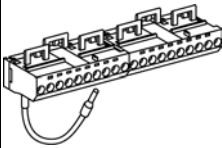
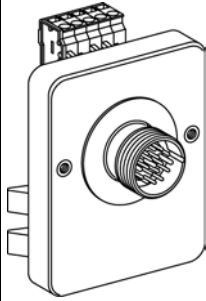
What's in this Section? This section contains the following topics:

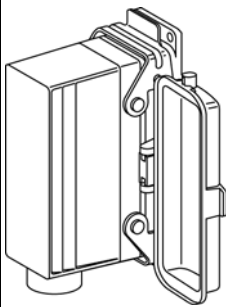
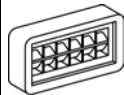
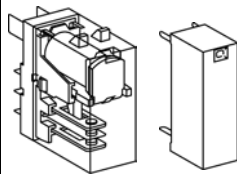
Topic	Page
Catalog of TELEFAST 2 connection base accessories	452
Association table for the relays on ABE-7R16Txxx, ABE-7P16Txxx and ABE-7P16Fxxx bases.	455
Characteristics of the removable ABR-7xxx electromechanical output relays	456
Characteristics of the removable ABS-7Exx static input relays	457
Characteristics of the removable ABS-7Sxx static output relays	458

Catalog of TELEFAST 2 connection base accessories

At a Glance The catalog of connection base accessories is shown here **TELEFAST 2** for discrete I/O modules.

Catalog The table below shows the catalog of connection base accessories **TELEFAST 2**.

Product reference	Illustration	Description
Additional shunt terminal block		
ABE-7BV10	-	Terminal block fitted with 10 screw terminal blocks.
ABE-7BV20	TELEFAST 2 accessory 	Terminal block fitted with 20 screw terminal blocks.
Adapter base		
ABE-7ACC02	-	Enables the changeover from 16 channels to 2 x 8 channels.
Mounting kit		
ABE-7ACC01	-	Allows the bases to be mounted on full boards.
Waterproof cable bushing		
ABE-7ACC84	-	Allows the enclosure to be fed through without dividing up the leads.
Enclosure feed-through		
ABE-7ACC83	-	Connectors HE10 for 8/12 channels -> M23 cylindrical connector.
ABE-7ACC82	TELEFAST 2 accessory 	Connectors HE10 for 16 channels -> M23 cylindrical connector.

Product reference	Illustration	Description
ABE-7ACC80	TELEFAST 2 accessory 	Connectors HE10 for 32 channels -> HARTING type connector.
ABE-7ACC81	-	Plug-in descriptive form for ABE-7ACC80 .
Removable continuity module		
ABE-7ACC20	-	10mm-wide.
ABE-7ACC21	-	12.5 mm-wide.
Client address-labeling software		
ABE-7LOGV10	-	-
Rapid fusion 5 x 20 glass fuse		
ABE-7FU012	-	0.125 A
ABE-7FU050	-	0.5 A
ABE-7FU100	-	1 A
ABE-7FU200	-	2 A
ABE-7FU630	-	6.3 A
Self-adhesive address holder		
AR1-SB3	TELEFAST 2 accessory 	For AB1-R / AB1-G address types.
Relays for ABE-7R16T***, ABE-7P16T*** and ABE-7P16F*** bases		
ABR-7S*** (1)	ABE-7S3** and ABE-7S2** 	Electromagnetic output relays (4).
ABS-7S*** (2)		Static output relays (4).
ABS-7SE** (3)	-	Static output relays (4).

Product reference	Illustration	Description
Key		
(1)		For electrical characteristics, see <i>Characteristics of the removable ABR-7xxx electromechanical output relays</i> , p. 456.
(2)		For electrical characteristics, see <i>Characteristics of the removable ABS-7Sxx static output relays</i> , p. 458.
(3)		For electrical characteristics, see <i>Characteristics of the removable ABS-7Exx static input relays</i> , p. 457.
(4)		Association table for base relays, see <i>Association table for the relays on ABE-7R16Txxx, ABE-7P16Txxx and ABE-7P16Fxxx bases.</i> , p. 455.

Association table for the relays on ABE-7R16Txxx, ABE-7P16Txxx and ABE-7P16Fxxx bases.

At a Glance

The table for comparison between the **TELEFAST 2 ABE-7R16T***, ABE-7P16T*** and ABE-7P16F***** link bases and the electromagnetic or static relays is described here.

Compatibility table

The table below shows the association possibilities for the electromagnetic or static relays on the **TELEFAST 2** bases.

Bases ABE-7**		equipped with electromagnetic relays				not equipped with relays			
		R16T21•	R16T23•	R16T33•	R16T370	P16T21•	P16T33•	P16T318	P16F31•
Electromagnetic relays from ABR-7*** output									
10 mm	S21 1F	Yes	-	-	-	Yes	-	-	-
	S23 1OF	Yes (1)	Yes	-	-	-	-	-	-
12.5 mm	S33 1OF	-	-	Yes	-	-	Yes	Yes	-
	S37 2OF	-	-	-	Yes	-	-	-	-
Static relays from ABS-S** output									
10 mm	C2E	Yes (1)	-	-	-	Yes	-	-	-
	A2M	Yes (1)	-	-	-	Yes	-	-	-
12.5 mm	C3BA	-	-	Yes (1)	-	-	Yes (2)	Yes	-
	C3E	-	-	Yes (1)	-	-	Yes	Yes	-
	A3M	-	-	Yes (1)	-	-	Yes	Yes	-
Static relays from ABS-7E** input									
12.5 mm	C3AL	-	-	-	-	-	-	-	Yes
	C3B2	-	-	-	-	-	-	-	Yes
	C3E2	-	-	-	-	-	-	-	Yes
	A3E5	-	-	-	-	-	-	-	Yes
	A3F5	-	-	-	-	-	-	-	Yes
	A3F6	-	-	-	-	-	-	-	Yes
	A3M5	-	-	-	-	-	-	-	Yes
	A3M6	-	-	-	-	-	-	-	Yes
ABE-7*** continuity block									
10 mm	ACC20	Yes	-	-	-	Yes	-	-	-
12.5 mm	ACC21	-	-	Yes	-	-	Yes	Yes	-
Key									
(1)		Relays can be inline.							
(2)		Except on ABE-7P16T334 .							

Characteristics of the removable ABR-7xxx electromechanical output relays

At a Glance

The general characteristics of the removable **ABR-7...** electromechanical output relays for **TELEFAST 2** bases are described in this section.

General characteristics

This table shows the general characteristics of the **ABR-7...** relays.

ABR-7... reference			S21	S23	S33	S37
Relay width			10 mm		12.5 mm	
Characteristics of the contacts						
Composition of the contacts			1 F	1 OF		2 OF
Max. operating voltage according to IEC 947-5-1		Alternating	250 V		264 V	
		Direct	125 V			
Thermal current			4 A		5 A	
Frequency of current used			50/60 Hz			
Alternating current load	Resistive, load AC12	Voltage	230 VAC			
		Current	1.5 A	1.2 A	3 A	2.5 A
	Inductive load AC15	Voltage	230 VAC			
		Current	0.9 A	0.7 A	1.7 A	1.3 A
Direct current load	Resistive, load DC12	Voltage	24 VDC			
		Current	1.5 A	1.2 A	3 A	2.5 A
	Inductive load DC13, L/R = 10 ms	Voltage	24 VDC			
		Current	0.6 A	0.45 A	1.4 A	1 A
Minimum switching		Current	10 mA		100 mA	
		Voltage	5 V			
Response time		State 0 to 1	10 ms		13 ms	15 ms
		State 1 to 0	5 ms		13 ms	20 ms
Maximum speed of function loading			0.5 Hz			
Voltage assigned insulation		Coil/ contact	300 V			
Voltage assigned shock resistance (1.2/50)		Coil/ contact	2.5 kV			
Key						
(1)	For 0.5 x 10 ⁶ maneuvers.					

Characteristics of the removable ABS-7Exx static input relays

At a Glance

The general characteristics of the removable **ABS-7E••** static input relays for **TELEFAST 2** bases are described in this section.

General characteristics

This table shows the general characteristics of the **ABS-7E••** relays.

ABS-7E** reference		C3AL	C3B2	C3E2	A3E5	A3F5	A3M5
Relay width		12.5 mm					
Command characteristics							
Assigned operating voltage (Us)	Direct	5 V	24 V	48 V	-		
	Alternating	-			48 V	110...130 V	230...240 V
Max. operating voltage (including ripple)		6 V	30 V	60 V	53 V	143 V	264 V
Max. current at Us		13.6 mA	15 mA		12 mA	8.3 mA	8 mA
State 1 guaranteed	Voltage	3.75 V	11 V	30 V	32 V	79 V	164 V
	Current	4.5 mA	6 mA		5 mA		4.5 mA
State 0 guaranteed	Voltage	2 V	5 V	10 V		30 V	40 V
	Current	0.09 mA	2 mA		1.5 mA	2 mA	
Maximum switching frequency (cyclic report 50%)		1000 Hz			25 Hz		
Complies with IEC1131-2		-	Type 2		Type 1		
Response time	State 0 to 1	0.05 ms			20 ms		
	State 1 to 0	0.4 ms			20 ms		
Voltage assigned to insulation	Input/output	300 V					
Voltage assigned to shock resistance (1.2/50)	Input/output	2.5 kV					

Characteristics of the removable ABS-7Sxx static output relays

At a Glance

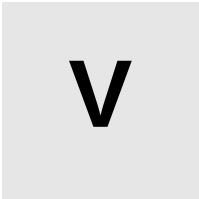
The general characteristics of the removable **ABS-7S••** static output relays for **TELEFAST 2** bases are described in this section.

General characteristics

This table shows the general characteristics of the **ABS-7S••** relays.

ABS-7S** reference			C2E	A2M	C3BA	C3E	A3M
Relay width			10 mm		12.5 mm		
Output circuit characteristics							
Voltage assigned to job		Direct	5..48 V	-	24 V	5..48 V	-
		Alternating	-	24..240 V	-		24..240 V
Max. voltage			57.6 VDC	264 VAC	30 VDC	60 VDC	264 VAC
Alternating current load	Resistive, load AC12	Current	-	0.5 A	-		2 A
	Direct current load	Resistive, load DC12	Current	0.5 A	-	2 A	1.5 A
Direct current load	Inductive load DC13	Current	-	-		0.3 A	-
	Filament lamp load DC6		-			10 W	-
	Leakage current at state 0			<= 0.5 mA	<= 2 mA	<= 0.3 mA	
Breakdown voltage at state 1			<= 1 V	<= 1.1 V	<= 0.3 V	<= 1.3 V	
Minimum current through channel			1 mA	10 mA	1 mA		10 mA
Response time		State 0 to 1	0.1 ms	10 ms	0.1 ms		10 ms
		State 1 to 0	0.6 ms	10 ms	0.02 ms	0.6 ms	10 ms
Switching frequency on inductive load			-		< 0.5 LI ²	-	
Voltage assigned to insulation		Input/output	300 V				
Voltage assigned to shock resistance (1.2/50)		Input/output	2.5 kV				

Discrete I/O offset module



At a Glance

Aim of this Part This part describes the discrete I/O offset modules.

What's in this Part? This part contains the following chapters:

Chapter	Chapter Name	Page
37	TSX STZ 10 extension Bus module	461
38	AS-i bus interface module: TSX SAZ 10	473

At a Glance

Aim of this Chapter

This chapter describes the TSX STZ 10 extension Bus module.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Operating principle	462
Link characteristics	463
Description	464
Implementation	466
Connection	467
equipment addressing	470
Diagnostic on the TSX STZ 10 modules	472

Operating principle

Introduction

The TSX STZ 10 communication demi-module links a TSX 3710/21/22 PLC with the TSX 07 PLCs which can be used either as discrete (Discrete I/O) inputs/outputs, or as PLCs (AP) of the TSX 07 EX input/output extension modules . (Discrete I/O), TSX AMN4 analog input/output modules . (ANA. I/O).

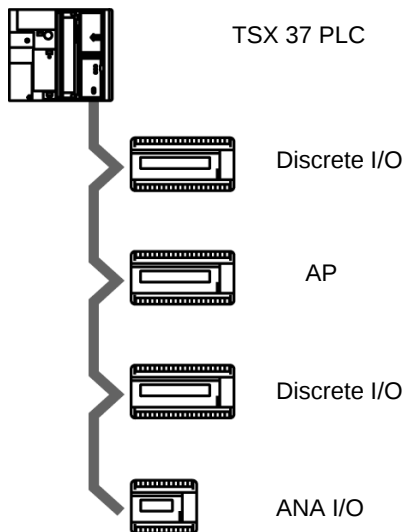
Possibilities of connection

It is possible to connect up to a maximum of four elements to a TSX 37 PLC via this module.

These four elements can be selected from the following elements :

- either the PLCs TSX 07 20 ./21 ./30 ./31 . are used :
 - or as the offset inputs/outputs (**Discrete I/O**),
 - or as the PLCs (**AP**), (**three PLCs maximum**),
- or the TSX AMN 4 analog input/output modules . (**ANA I/O**) (three modules maximum),
- or the TSX 07 EX analog input/output extension modules . (**Discrete I/O**) (1 module maximum),

Illustration:



This type of link used as an input/output bus allows the use of the TSX 07 PLCs with an application data exchange service.

Note: the TSX 37 05 and TSX 37 08 PLCs do not accept the TSX STZ 10 module.

Link characteristics

Table of characteristics:

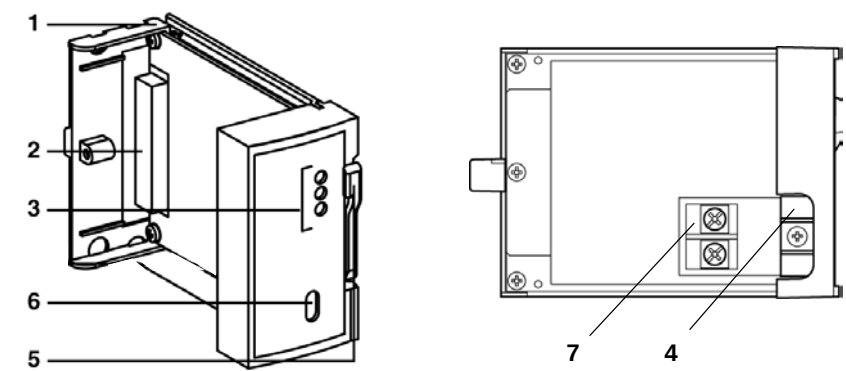
The characteristics of the nano-PLC (TSX 07) link are defined in the following table:

Structure	Physical interface Protocol	Unremote RS 485 Master-slave type
Transmission	Mode Throughput	Asynchronous in baseband 19200 Bauds with a slave PLC , or 38400 Bauds with the I/O blocks (4 max.).
	Medium	Armored twisted pair
Configuration	Number of devices	5 (1 TSX 37 - 4 TSX 07) Up until 200 meters.

Description

Illustration

The TSX STZ 10 nano-PLC half-size link module consists of various elements:



Number table

The table describes the module in relation to the different numbers in the illustration:

Number	Description
1	Body of module.
2	Linking connector to PLC bus.
3	Diagnostic display LEDs. There are three of these and they indicate the operating status of the bus extension module. The display LEDs are defined as follows : ● RUN (green): indicates that the module is operating normally, ● ERR (red): indicates a module or configuration error, ● COM (yellow): shows that there is traffic on the communication link.
4	Connection terminals. These are used to connect the TSX STC 050 or 200 cable to the link module. Both terminals can accept two wires in the event of linked PLCs.
5	Locking lever. This allows the half-size module to be locked when installed in a PLC. It can also be used as a handle for withdrawing the half-size module from the PLC rack.
6	Cable path.
7	Ground terminal strip This is used to connect the cable ground to the link module ground.

Dimensions

The module dimensions conform to those of other half-size modules in the TSX 37 range. It is imperative for this link module to be placed at **position 4** in the PLC rack.

Implementation

General

The TSX STZ 10 module is lodged in the fourth position in the PLC rack to link up to the nano-PLC link. This mounting operation switches off the equipment.

After having inserted the module into the slot, the lever must be pushed back in order to ensure that the module is efficiently locked into the rack.

Before extracting the module from the slot, it is necessary to cut the supply from the PLC. To exit the module, turn and then pull the lever.

Connection

Connecting the module

Connecting up to the nano-PLC requires neither accessories nor special tools. Cables are secured to the terminals with the aid of a screwdriver.

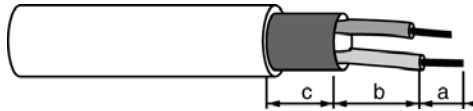
Electrical connections are made to the terminals located inside the module (since the upper part is always open).

Cable preparation

To connect the cable(s) to the terminals in the TSX STZ 10 module, the following lengths of wire must be stripped:

Cable	Length
Core (a)	0.31 in
Insulator (b)	0.59 in
Shielding (c)	0.39 in

UNI-TELWAY TSX CSA 100/200 cable:



The module must be out of the rack when connection work is being carried out. It is advisable to put a tip on each wire (AWG 24).

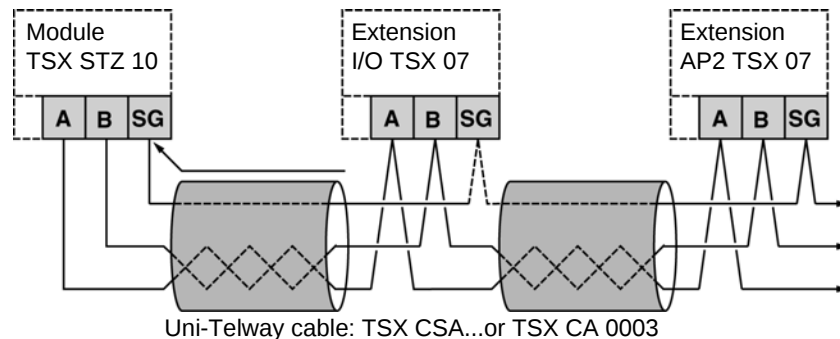
Connecting the nano-PLC link

To carry out connection, the TSX STZ 10 module must be withdrawn from the PLC.

The pin assignment of the connection cables is as follows:

- terminals A and B in the STZ 10 module are coupled with terminals A and B in the TSX 07 or TSX 07 EX module . or the TSX AMN4 analog module .,
- ground terminal strip: cable shielding.

Connection by chaining:

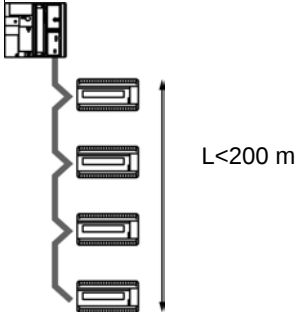
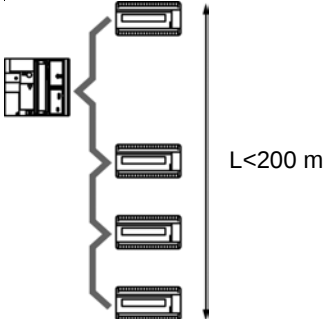


Note: The various elements of the nano-PLC link cannot be removed.

Note: For further information on wiring TSX 07 PLCs, please refer to the TLXDM07DS installation manual.

Different types of connections

The following table shows the different types of links:

Link	Illustration
The TSX STZ 10 link module can be connected to one end of the nano-PLC link.	
The module can also be mounted in the middle of the link by chaining.	

Consumption

The current consumption of the TSX STZ 10 under 5V is:

- maximum current: $I_{max} = 175 \text{ mA}$,
- typical current: $I_{typ} = 130 \text{ mA}$.

Equipment addressing

General

The TSX 07 bus extension link is a multi-pin link. This is to make sure that each piece of on-line equipment can be located by an address allowing it to be identified in a unique way:

- The TSX 37 PLC is the master of the link. Number 0 is automatically assigned to it,
- the TSX 07 PLC and the TSX AMN 4 analog modules. are equipped with a selector, whose position determines:
 - for the TSX 07 20 PLC ./TSX 07 21 ./TSX 07 31 ., the role of discrete (Discrete I/O) inputs/outputs or PLC (AP) and the slave number on the link,
 - for the TSX AMN4 analog input/output modules. (ANA I/O), the slave number on the link,
- the discrete TSX 07 EX input/output extension modules . (EXT discrete) have in its database the slave number 1 address.

It is the slave number that will be used as the address in the application program.

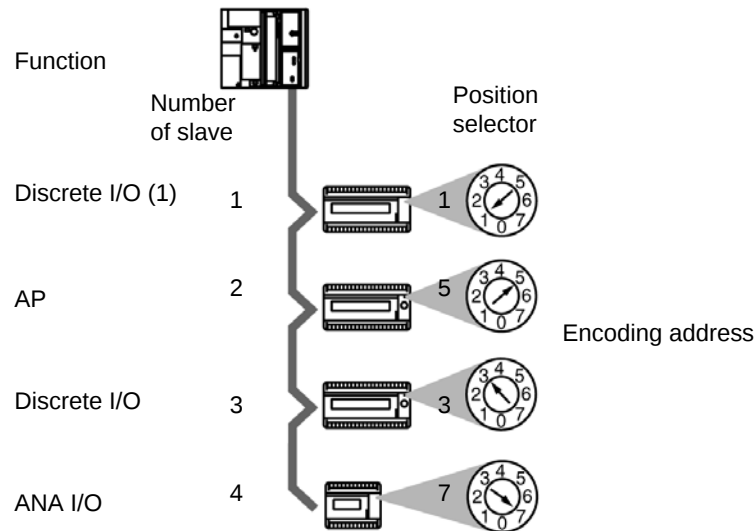
Coordination of hardware and software addresses

The following table shows the coordination of hardware and software addresses

Elements	Role	Selector position	Slave number
TSX072 ../3 ..	Discrete I/O	1	1
TSX072 ../3 ..	Discrete I/O	2	2
TSX072 ../3 ..	Discrete I/O	3	3
TSX072 ../3 ..	Discrete I/O	4	4
TSX072 ../3 ..	AP	5	2
TSX AMN4 .	ANA I/O		
TSX072 ../3 ..	AP	6	3
TSX AMN4 .	ANA I/O		
TSX072 ../3 ..	AP	7	4
TSX AMN4 .	ANA I/O		
TSX07EX .	Discrete I/O	-	1

Example of link addressing

Illustration:



Note: The acknowledgment of the slave number defined by the selector will only take effect once it has been switched on.

(1) The slave N°1 **must be** :

- either a TSX 07 PLC used uniquely in discrete I/O mode if it exists,
- or the discrete TSX 07 EX input/output extension modules . .

Diagnostic on the TSX STZ 10 modules

Diagnostic table This module is fitted with 3 LED's which provide information on the operating status of the nano-PLC link.

RUN	ERR	COM	Meanings	Corrective actions
			Module switched off	Switch on the equipment
			Normal operation Exchange on the Bus	
			Normal operation No exchange on the Bus	
	 or 	 	Configuration error The software configuration is different from the configuration declared or 1 faulty equipment	Check the configuration. Find the faulty equipment.
			Normal operation Initialization module	
			Auto-test module Normal operation	
		NS	Serious fault	Replace the module
 LED lit NS : non significant  LED off  LED blinking				

AS-i bus interface module: TSX SAZ 10

38

At a Glance

Aim of this Chapter

This chapter introduces the AS-i TSX SAZ 10 bus interface module

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Reminder about the AS-i bus	474
General overview of the main elements which make up the AS-i bus	477
Main characteristics of AS-i bus	481
Description of the TSX SAZ 10 module	483
Installation/mounting of the TSX SAZ 10 module	484
Connecting the TSX SAZ 10 modules	485
Module status display	487
Technical characteristics of the TSX SAZ 10 module and the AS-i Bus	488
Personnel safety	489
Addressing input/output objects	490
Diagnostics for TSX SAZ 10 module and AS-i bus	491
Display of the presence of each slave on the AS-i bus (R I/O – DIAG mode)	494
Displaying the status of the input/output bits of each slave (R I/O mode)	496
Usage precautions	498

Reminder about the AS-i bus

General

The AS-i bus is a field bus (level 0), and can be used to connect sensors/actuators. This allows "discrete" type information to run between a bus "master" and sensor/actuator type "slaves".

AS-i is composed of 3 main base elements:

- a specific supply providing a 30 VDC voltage,
 - a bus master,
 - some slaves (sensors and actuators).
-

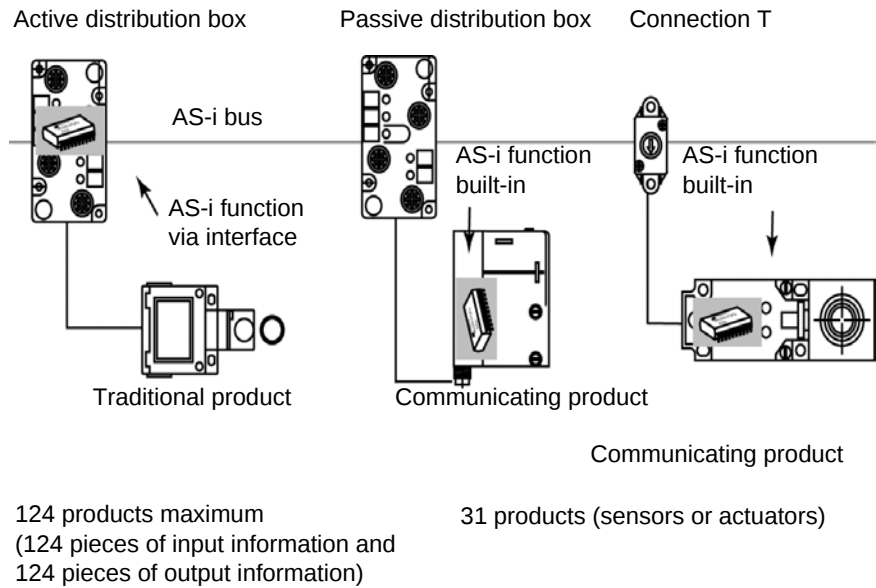
The main types of sensors/actuators

Table of the main types of sensors:

Type of sensor	Description
Communicating sensors/actuators	Thanks to the integrated AS-i feature, they connect directly to the AS-i bus via a passive dispatcher or a connection T.
The traditional IP65 sensors/actuators	They connect to the bus via an AS-i interface (active dispatcher or discrete Telefast IP 20 input/output interface bus). These interfaces connect the traditional sensors and actuators to the AS-i bus and provide them with dialog capacity on the bus.

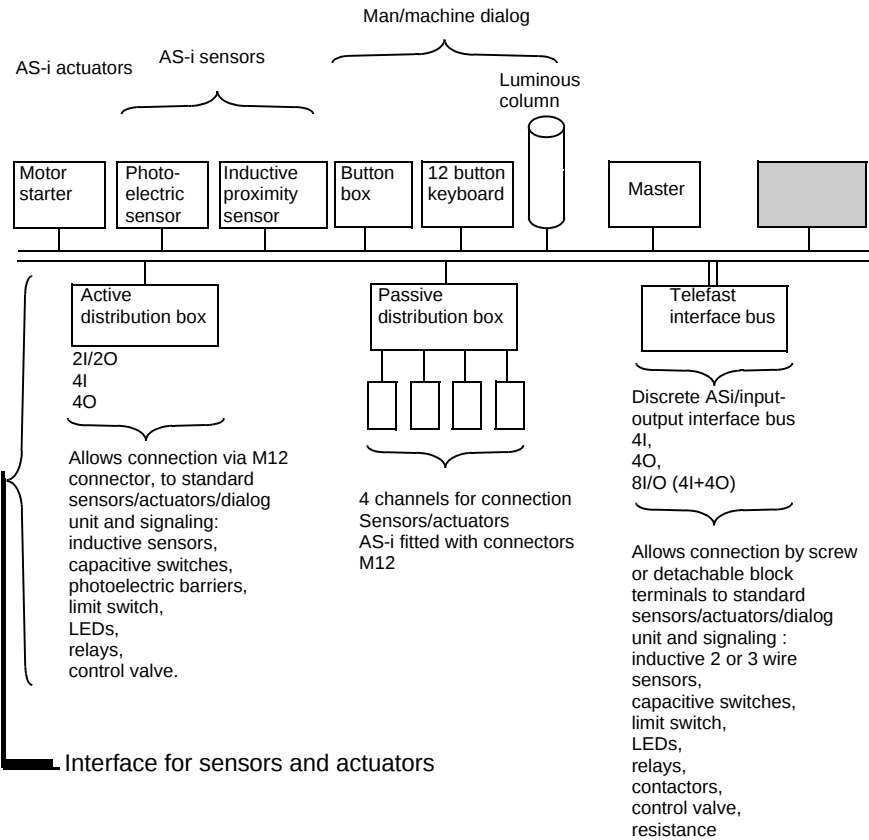
Illustration

Illustration:



Overview of a certain number of products from the Telemecanique catalogue which can be connected to the AS-i bus

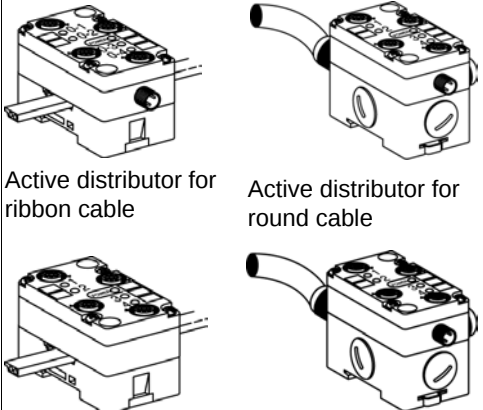
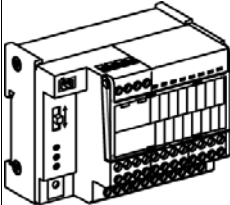
Non-exhaustive list:

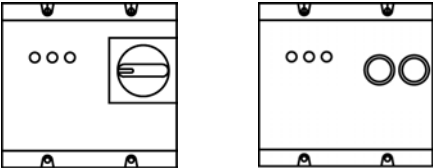
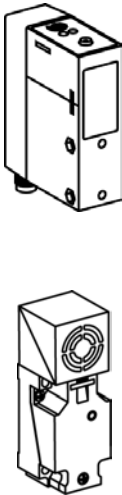
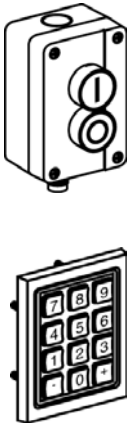


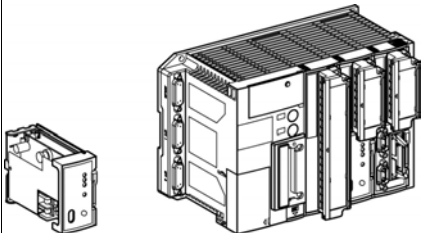
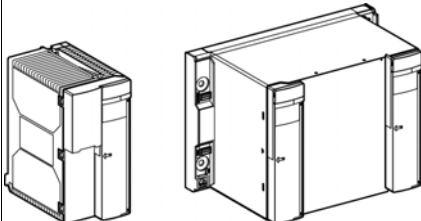
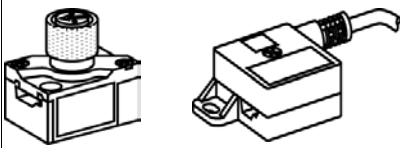
General overview of the main elements which make up the AS-i bus

General overview of the main constituent elements

The following table draws up the list of the main elements in an AS-i bus

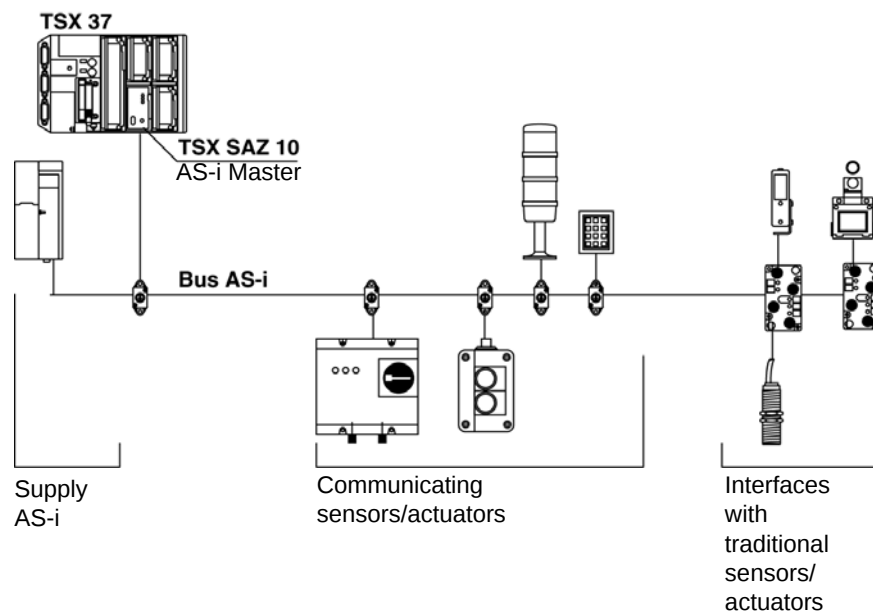
Element	Illustration
the cable It transmits the data and carries the energy. It can be made up from: • either a flat, unshielded, polarized two-wire cable, • or a round, standard, shielded or unshielded two-wire cable.	 Guiding ribbon cable Round cable
The active and passive dispatchers IP67 waterproof interfaces for connecting sensors/actuators using M12 connectors: • the active dispatchers, with built-in AS-i function make it possible to connect the "traditional", non-communicating sensors/actuators, • the passive dispatchers do not have any electronics and can therefore connect the "communicating" sensors/actuators.	 Active distributor for ribbon cable Active distributor for round cable Passive distributor for ribbon cable Passive distributor for round cable
The discrete Telefast SB2 bus/ inputs-outputs interface IP20 waterproof interface with built in AS-i function. It allows connection by screw terminal blocks to all types of "traditional" non-communicating sensors/actuators.	

Element	Illustration
The AS-i actuators The direct and reverser motor start-ups in waterproof boxes (IP54 and IP65) guarantee the command and protection of electrical motors up to 4KW under 400 VAC.	
The AS-i sensors ● photo-electric detectors: they guarantee the detection of all kinds of objects (opaque, reflective, etc) with 5 system databases (barrier, reflex, polarized reflex, proximity and proximity with deletion of background). They offer an IP67 protection level, ● inductive proximity detectors: they detect all metal objects and provide information on the object presence/absence test functions. They offer an IP67 protection level.	
Dialog function products ● button boxes: they are made up of dialog tools, which are perfectly adapted to an exchange of information between operator and machine. They offer an IP65 protection level, ● keyboards: man/machine dialog tools, they have 12 touch-sensitive keys. The information delivered is coded in BCD on 4 bits. They offer an IP65 protection level.	

Element	Illustration
Signaling elements ● illuminated columns: optical or sound signaling elements.	
The bus master Built in to a TSX 37 10/21/22 PLC, the TSX SAZ 10 module (master of AS-i bus) manages all the exchanges of data on the AS-i network.	 TSX SAZ 10 TSX 37 ●●
The AS-i supplies AS-i-specific supplies, designed to supply the components connected to the AS-i bus. The distribution of this supply uses the same medium as that used for data exchange.	 TSX SUP A02 TSX SUP A05
The connecting and branching accessories It is possible to connect to AS-i bus because of the T-connections which were planned for connections to AS-i flat cable or to flat/round cable branches.	 T for ribbon cable Branch ribbon / round cable

**Example of an
AS-i bus
topology from a
TSX 37 PLC**

Illustration:



Main characteristics of AS-i bus

General

AS-i is a system in which exchange management is guaranteed by a single master who calls in succession each slave (by scanning the bus) that has been detected and awaits a response.

Vehicle series communication frame:

- 4 bits of data (D0 to D3), which are the image of the inputs or outputs according to the nature of the interface,
- 4 bits of parametering (P0 to P3), which allow the operating modes of the interface to be defined.

The P0 to P3 bits are used for "intelligent" devices, including asic AS-i, operation can be modified during runtime.

The address of the slave concerned is coded in 5 bits.

At the request of the AS-i master, the outputs are set and the inputs of the AS-i devices are given in the slave's response.

Table of main characteristics

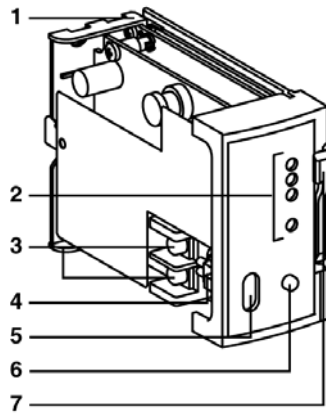
The following table provides the main characteristics of the AS-i bus:

Characteristics	Description
Slave addressing	Each slave connected to the AS-i bus must have an address between 1 and 31 (coding on 5 bits). The slaves delivered from the factory have the address 0 (the address of the slave is memorized in a non-volatile way). The programming of the address is achieved using a XZMC11 terminal, specifically for addressing.
Slave identification	All slave devices connected to the AS-i bus are identified by: ● an I/O Code (input/output distribution code), ● an identification code, which completes the functional identification of the slave. These identifications allow the AS-i master to recognize the configuration which is present on the bus. These different profiles have been developed by the AS-i association, they make it possible to distinguish the following modules – inputs, outputs, mixed modules, "intelligent" device families, etc.
Maximum number of inputs/ outputs	An AS-i bus can support a maximum of 31 slaves. Each slave having a maximum of 4 inputs and/or outputs. This makes it possible to manage a maximum of 124 inputs + 124 outputs, that is to say 248 discrete inputs/outputs, if all the active devices have 4 inputs and 4 outputs.
AS-i cable	The AS-i cable is a two-wire link on which the communication and supply of the connected devices are transmitted. The link does not need to be shielded or twisted, the section of wires can be from $2 \times 0.75\text{mm}^2$ to $2 \times 1.5\text{mm}^2$ or $2 \times 2.5\text{mm}^2$, according to the current used by the devices.
Topology and maximum length of AS-i bus	The topology of the AS-i bus is free, it can be perfectly adapted to meet the users' needs (point to point, on line, tree topology). In every case, the cumulative length of all the branches of the bus must not exceed 100 meters without a relay.
AS-i bus cycle time (slave <-> TSX SAZ 10)	The AS-i system always transmits information, which is identical in length to each slave on the bus. The AS-i cycle time depends on the number of slaves connected to the bus (in the presence of 31 functioning slaves, this period of time will be a maximum of 5 ms).
Reliability, flexibility	The transmission process used (Manchester current and coding modulation) guarantees reliable operation. The master monitors the supply voltage from the line and data, which have been transmitted. It detects the transmission errors as well as slave failure and transmits the information to the PLC. Exchanging or connecting a new slave during operation does not disturb communication with other slaves.

Description of the TSX SAZ 10 module

Illustration

TSX SAZ 10 supply



Number table

The TSX SAZ 10 module comes in the form of a half size module and is made up of the following elements:

Number	Description
1	Body of module.
2	Module, communication and diagnostics LEDs on the AS-i bus.
3	Screw terminal block for connecting the AS-i cable.
4	Clip for blocking the AS-i cable on the module to offer a retention guarantee.
5	Polarized orifice for AS-i cable to pass through.
6	Push button for displaying AS-i at the level of the centralized display block located on the front of the TSX 37 PLC.
7	Lock enabling: ● locking of the module in its slot, ● unlocking and extraction of the module.

Installation/mounting of the TSX SAZ 10 module

General

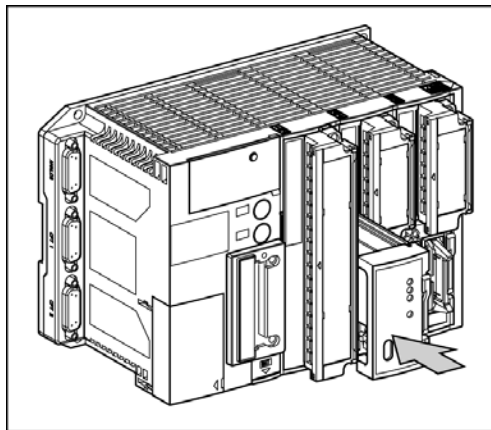
The TSX SAZ 10 module **must be mounted in position 4** on a TSX 37 10/ 37 21/ 37 22 PLC, version V $\geq$ 2.0.

The module is inserted and extracted in accordance with the general procedure for inserting and extracting modules on TSX 37 PLCs 37 (see *TSX 37 PLC: installation*, p. 99).

Note: The module must be mounted and removed with both the PLC and the AS-i bus supplies switched off.

Illustration

Mounting a TSX SAZ 10 module in a TSX 37 2• PLC bus



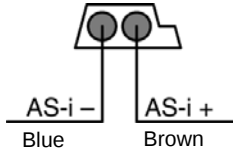
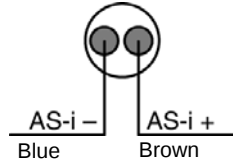
Note: A TSX 37 10/21/22 PLC station only accepts a single TSX SAZ 10 module. The TSX 37 05 and TSX 08 PLCs only accept TSX SAZ 10 modules. When a TSX SAZ 10 module is installed (position 4), the position can only receive an analog or counting half-size module, the half-size discrete inputs/outputs are no longer managed in this position.

Connecting the TSX SAZ 10 modules

AS-i bus cable

These cables carry the signals and provide a 30 VDC power supply to the sensors and actuators connected to the bus.

Different cable types:

Description	Illustration
Polarized AS-i flat cable: yellow, with 1.5 mm ² cross-section wires.	
Standard, round cable with 1.5 mm ² or 2.5 mm ² cross-section wires. Recommended cable: reference H05VV-F2x1.5, conforms to the DIN VDE 0281 standard. Wire cross-section is 1.5 in ² .	

Cable path:

The AS-i cable must be separated from power cables, which carry high levels of energy.

Connecting the module to the AS-i bus cable

No accessories or specific tools are needed to connect to the AS-i bus.

Cables are secured to the terminals with the aid of a screwdriver.

Electrical connections are made to the terminals located inside the module.

Polarity labels are screen-printed on the printed circuit:

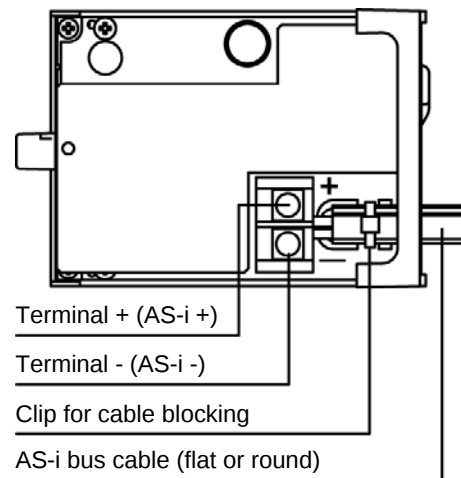
- pole +: AS-i + connection,
- pole -: AS-i - connection.

The module must be out of the rack when connection work is being carried out.

It is recommended that a tip be put on each wire.

Fix the cable to the module with the aid of the cable clip.

Illustration:



Module status display

General

It is carried out via of the 4 LED's which are located on the RUN, ERR, COM, AS-i module and which by means of their status (LED off, blinking or on) provide information on the operating mode of the module:

Status LED	Lit 	Blinking 	Off 
RUN (Green)	Module operating normally.	Selftest module (1).	faulty module, or module switched off.
ERR (Red)	Serious internal fault, module has broken down.	Selftest module (1). Fault: system OK but ● application fault or, ● AS-i bus error	No internal fault.
COM (Yellow)	-	Selftest module (1). Communication on AS-i bus.	No communication on AS-i bus.
AS-i (Red)	No AS-i supply module	Selftest module (1). Fault on an AS-i bus slave.	No faults on AS-i bus.

(1) simultaneous blinking of the 4 LEDs in the selftests when the module is switched on.

Technical characteristics of the TSX SAZ 10 module and the AS-i Bus

Table of characteristics

The following table describes the technical characteristics of the TSX SAZ 10 module:

AS-i bus	Maximum cycle time of AS-i bus.	5 ms
	Maximum number of slaves on the AS-i bus.	31
	Maximum length of AS-i bus (including all branches and without repeater).	328 ft 4 in
	Maximum number of inputs/outputs.	124 inputs + 124 outputs
	Nominal supply voltage for AS-i bus.	30 VDC
Module TSX SAZ 10	Response time with 31 slaves (1) for a PLC cycle time of 10ms.	typically 20ms 35 ms maximum
	Calculation of AS-i scanning time for n slaves (normal operation).	156 micro seconds x (n+2) if n<31 156 micro seconds x (n+1) if n=31
	Current used on the 5V PLC.	typically 100mA/150mA max.
	Current consumed on the 30V AS-i.	typically 50mA/100mA max.
	Protection from polarity reversion on AS-i bus inputs.	Yes
	Degree of protection	IP20
	Operating temperature.	0 to 60°C
	AS-i master profile.	M2
	Standards and service conditions.	Conforming to those of TSX 37 PLCs.

(1) Logical response time = time between an AS-i input activated on the bus, processed in the PLC application and applied to an AS-i output.

Personnel safety

General

To guarantee personal safety, it is imperative:

- that the PLC ground terminal is connected to the ground,
- that an AS-i VLSV (very low safety voltage) supply module, nominal voltage 30 VDC is used,
- for PLCs which are connected to an alternating current network, a differential circuit breaker must be placed upstream of this network and this will cut off the PLC supply source if ground leakage is detected,
- for PLCs which are connected to a direct current supply source, you must ensure that the supply placed upstream of the PLC is VLSV,
- that certified AS-i products are used on the bus.

Because of its technology and connection, the AS-i TSX SAZ 10 module only receives 5VCC and its "zero electrical volt" is linked to the ground of the PLC. Be

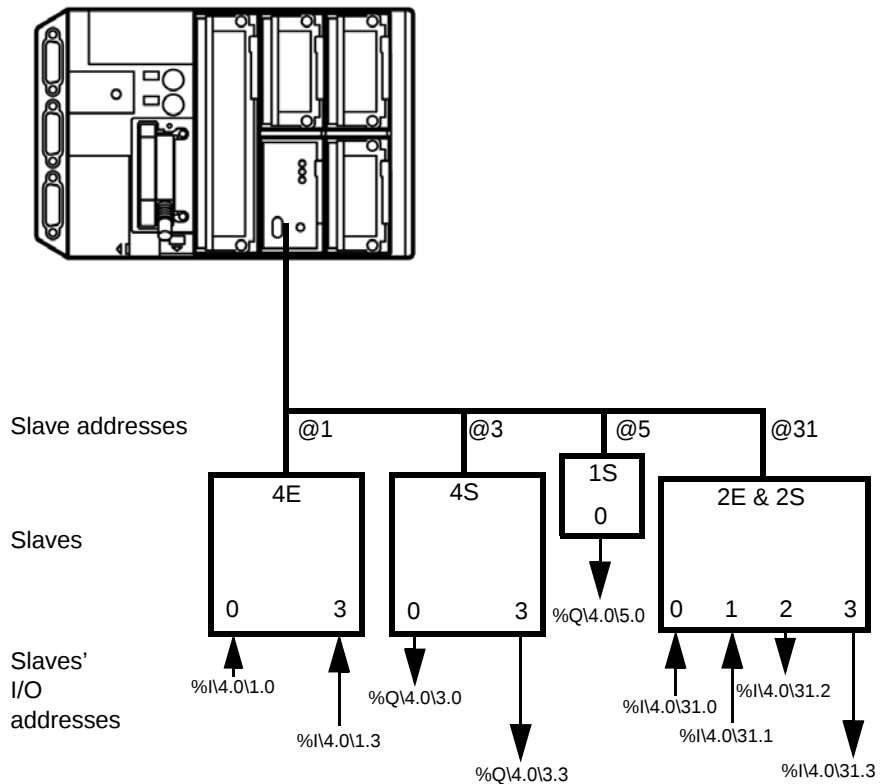
Addressing input/output objects

General

The AS-i bus is managed by channel 0 of the TSX SAZ 10 module which is always in position 4 of a TSX 37 PLC database. The syntax of the input/output data is as follows:

Inputs `%I4.0\ n.rank` n = number of the slave on the AS-i bus (1 to 31).

Outputs `%Q4.0\ n.rank` n = number of the slave's input or output bit (0 to 3).

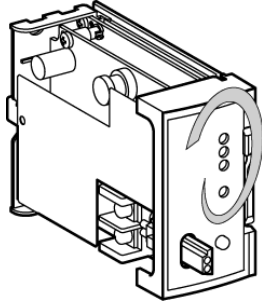


Diagnostics for TSX SAZ 10 module and AS-i bus

Diagnostics using the module's LED indicators

The module is fitted with LEDs which provide the user with information on the operating status of the module and bus.

Illustration:



LED status displays

Diagnostics table:

RUN	ERR	COM	AS-i	Meanings	Corrective actions
				Module switched off.	Switch the device on.
				Module self tests in progress.	-
				Operating in protected mode (operating normally).	-
				Error on AS-i bus (self-programming possible).	Replace the faulty slave with an identical new slave.
				Error on AS-i bus (self-programming impossible).	Connect the terminal.
				AS-i power supply fault or no slave on AS-i bus.	Check the AS-i power supply and the continuity of the AS-i bus cable.
 LED lit  LED off  LED blinking					

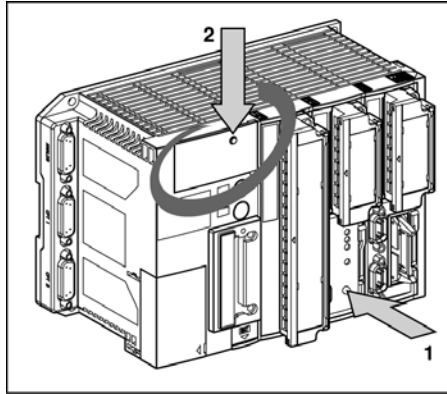
Diagnostics using the PLC display panel

The PLC display panel can be used for the following:

- displaying the presence of each slave on the AS-i bus (R I/O - DIAG mode),
- displaying the status of the input/output bits of each slave present on the bus (R I/O mode).

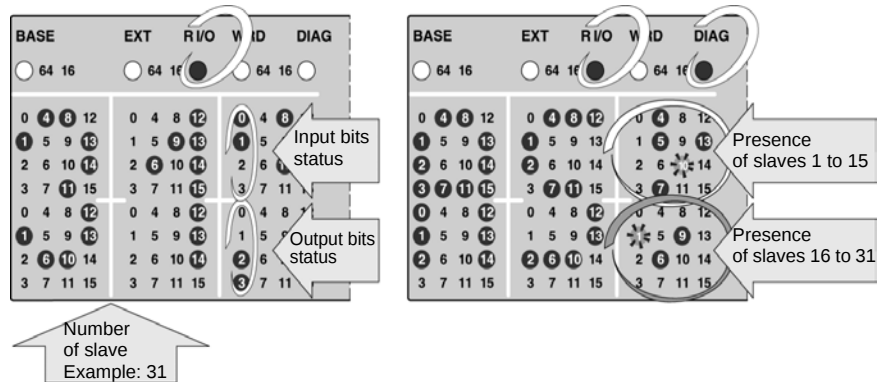
These modes can be accessed by a combination of actions on the push buttons of (1) the TSX SAZ 10 module and (2) the PLC display panel.

Illustration:



Displaying the status of the input/output bits of each slave

Illustration:



Display of the state of the I/O bits for each slave (R I/O mode)

Display of the presence of each AS-i bus slave (mode R I/O - DIAG)

Display of the presence of each slave on the AS-i bus (R I/O – DIAG mode)

Introduction

This mode makes it possible to display:

- the slaves, which have been installed and detected (LED permanently lit),
- slaves, which have not been installed or detected (LEDs off),
- slaves, which have been installed but not detected or not installed but detected (LEDs lit and blinking).

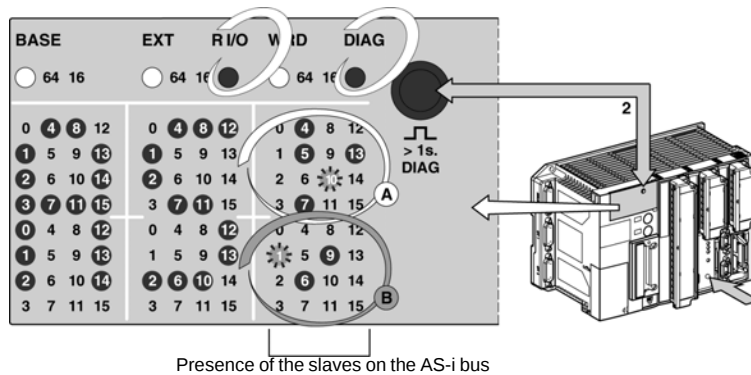
Procedure for access

Carry out the following steps:

Step	Action
1	Initial status of display panel: local input/output display mode (Base or EXT LEDs lit).
2	If you press the push button (1) briefly, the TSX SAZ 10 module changes to R I/O mode.
3	If you press the push button (2) on the PLC display block for a long time, it changes to diagnostics mode (R I/O LED lit). The image of the AS-i network is therefore displayed on the right-hand panel, with each LED representing an address of an AS-i bus slave. All the A LEDs represent the addresses of slaves 0 to 15, all the B LEDs represent addresses 16 to 31 (add + 16 to the figure displayed to get the exact address of the slave).
4	To return to the initial status: • a long press on the push button (2) on the display panel (to exit the AS-i bus diagnostics module), • a short press on the push button (1) on the TSX SAZ 10 module (to return to local input/output display mode).

Example

Illustration:



In the above example:

- the slaves with the addresses 4, 5, 7, 13, 22(6+16) and 25 (9+16) are operating normally (LEDs permanently lit),
- the slaves with addresses 10 and 17 (1+16) are faulty (blinking LED's),
- the LEDs which are not lit represent the empty addresses.

Displaying the status of the input/output bits of each slave (R I/O mode)

Introduction

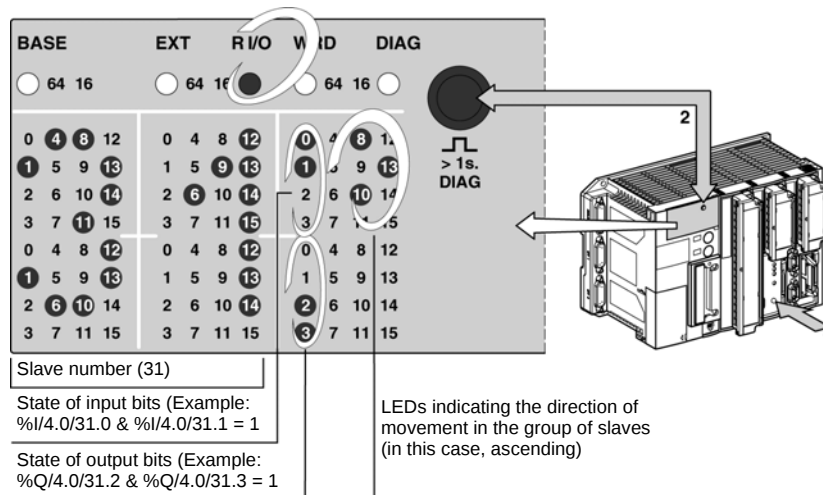
The PLC display panel enables the status of the input/output bits of each slave present on the bus to be displayed.

Procedure for access

Carry out the following steps:

Step	Action
1	Initial status of display block: local input/output display panel (Base or EXT LED's on).
2	A short press on the push button (1) on the TSX SAZ 10 module changes to R I/O mode and displays: - the address of a slave (1 to 31) on the two panels on the left-hand side (numerical display), - the status of the input/output bits relative to the slave displayed, on the panel on the right-hand side (LED lit = status 1 bit, LED off = status 0 bit or no input and output). The LEDs (0 to 3) at the top show the status of the input bits of the slave (maximum of 4 input bits per slave); the LEDs (0 to 3) at the bottom show the status of the output bits of the slave (maximum of 4 output bits per slave), - the direction of movement in all the slaves, indicated by three LEDs: if LED's 8, 13 and 10 are on, movement in the group of slaves takes place in ascending order, and if LED's 12, 9 and 14 are on, movement takes place in descending order.
3	Pressing briefly several times in succession on the push button (2) of the centralized display makes it possible to change to ascending order (1 -> 31) or descending order (31 -> 1) of slave number according to the direction of movement. Changing direction (ascending or descending) is achieved with a long press on the push button (1) on the TSX SAZ 10 module.
4	Returning to the initial status of the display panel is achieved by a short press of the push button (1) of the TSX SAZ 10 module.

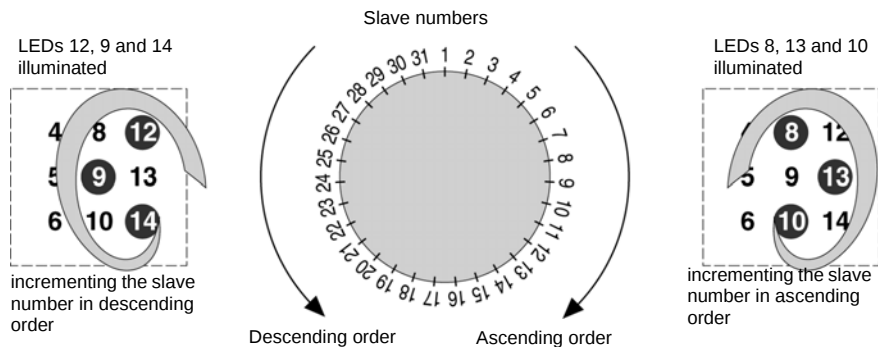
Illustration:



Incrementing the slave number in ascending or descending order.

When the PLC display block is in R I/O mode (display of input/output bits of each slave), the user can scan the slaves in ascending (1->31) or descending (31->1) order. The direction is shown by 3 LEDs on the level of the display panel (as indicated below) being lit. The direction can be changed by a long press of the push button (1) on the TSX SAZ 10 module.

Illustration:



Usage precautions

Fallback position	The fallback mode is defined in the configuration screen (general parameters) and can be read in the %KW4.0.19 word (%KW4.0.19.X0=1: fallback to 0, %KW4.0.19.X0=0: maintain state). The fallback mode is not guaranteed if the AS-i bus cuts out or if the AS-i supply is lost. If this occurs, and if the maintenance mode has been chosen, it is up to you to set the outputs to the desired status when the fault has disappeared. To do this, the following language objects must be used: • %MW4.0.2:X0 (1 = no slave present), • %MW4.0.3:X6 (1 = loss of AS-i supply). On changing from the AS-i channel to STOP: • with option to reset to 0: the outputs are forced to 0, then communication stops on the medium, • with maintenance option: the output states are maintained, then communication stops on the medium,
24V auxiliary supply	Disappearance of the 24V auxiliary supply is not handled by the TSX SAZ 10 module. Information on the disappearance of this supply can be produced with the aid of a 24V input.
Multiple addressing	When one or more slaves are connected, make sure that you do not assign an address which is already being used by a slave on the bus. There is no information to indicate an addressing error.

Commissioning/Diagnostics/ Maintenance

VI

At a Glance

Aim of this Part This part deals with commissioning, diagnostics and maintenance.

What's in this Part? This part contains the following chapters:

Chapter	Chapter Name	Page
39	Display panel	501
40	Display of language objects	517
41	Commissioning	533
42	Maintenance	537

At a Glance

Aim of this Chapter

This chapter deals with the display panel for the Micro PLCs.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Introduction	502
PLC status display	503
Local input/output status display	504
64 channel modules display	506
Sequencing of the displays	507
Display of faulty local inputs/outputs	508
Display of remote inputs/outputs on the AS-i bus	510
Display of the presence of each slave on the AS-i bus (R I/O mode - DIAG)	511
Display of the status of the input/output bits for each slave (R I/O mode)	513
Incrementation of the slave number in ascending or descending order	515

Introduction

Introduction

The display panel offers a centralized array of services essential to PLC installation, use, diagnostics and maintenance, for all the modules positioned in the base rack or in the mini extension rack and the remote discrete inputs/outputs on the nano PLC or AS-i bus:

- PLC status display,
- Local or remote input/output status display,
- discrete input/output wiring test, in the absence of the application program,
- Input/output and module diagnostics,
- Display of the program internal data (bits, words, remote input/output bits, etc.).

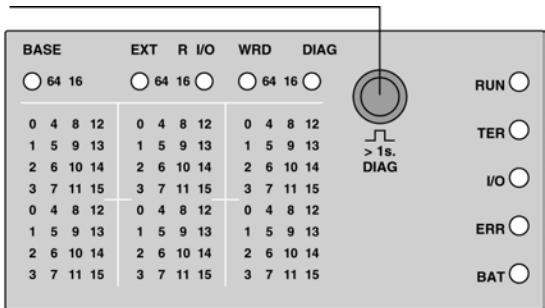
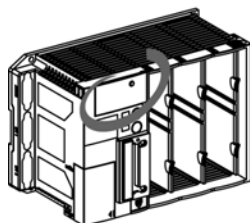
Description

The display panel offers:

- on the right, 5 status LEDs, which display the functioning of the PLC (RUN, TER, I/O, ERR, BAT),
- above, 5 status LEDs, which show the current display mode:
 - BASE LED: base input/output display mode,
 - EXT LED: mini extension rack input/output display mode,
 - R I/O LED: inputs/outputs on the AS-i bus display mode,
 - WRD LED: language objects display mode,
 - DIAG LED: diagnostic mode,
- 3 panels of 32 LEDs, which give information about the modules in the PLC or the extension: discrete inputs/outputs status, faulty channels or modules. Further, each panel is completed by 2 slot LEDs ("64" and "16"), which allow a double display of the 64 channel modules (16 first input channels and 16 first output channels, then 16 following input/output channels),
- a push button, which allows the display of the rest of the information and/or the alteration of the display mode (input/output or diagnostic display mode). In WORD mode, this push button allows the choice of the displayed objects table.

Illustration

Display mode on the Micro:
Push button



PLC status display

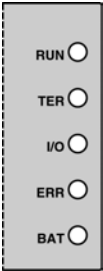
Introduction The display uses the 5 LEDs RUN, TER, I/O, ERR and BAT, which by means of their status (LED off, blinking or on) provide information on the operating mode of the PLC:

Description this table describes the PLC status for each of the LEDs:

Display LED	Status
RUN	this LED (green) is lit to indicate that the PLC is in RUN mode, and flashes to indicate that it is in STOP mode. This LED is off when there is no valid application in the PLC or when there is a fault.
TER	this LED (yellow) is lit to show that information is being exchanged by the terminal link. Traffic via the terminal port may appear to make this LED flash.
I/O	this LED (red) is lit to show a fault relating to the inputs/outputs: ● supply fault or at least one channel tripped, ● module missing, not configured or out of service. For more information on the errors shown by the I/O LED (faulty channel or module), the push button must be depressed for more than one second to go to diagnostics mode (see <i>Display of remote inputs/outputs on the AS-i bus</i> , p. 510).
ERR	this LED (red) is lit to show a PLC "CPU fault": This LED flashes when there is no valid application in the PLC or if there is a "blocking fault (see <i>Researching the errors from PLC status monitors.</i> , p. 538)" in the application program.
BAT	this LED (red) is lit to show that the battery is defective or missing (optional). This battery, which is used to back up the RAM, must be changed in accordance with the proper procedure (see <i>Inserting/changing the battery</i> , p. 113). If the %S66 bit system is at 1, the lighting of this LED is inhibited.

Summary

Illustration:



- Start/stop PLC
- Traffic on the terminal
- Inputs/outputs error (channel or
- Processor or application error
- Absence or error of the

Local input/output status display

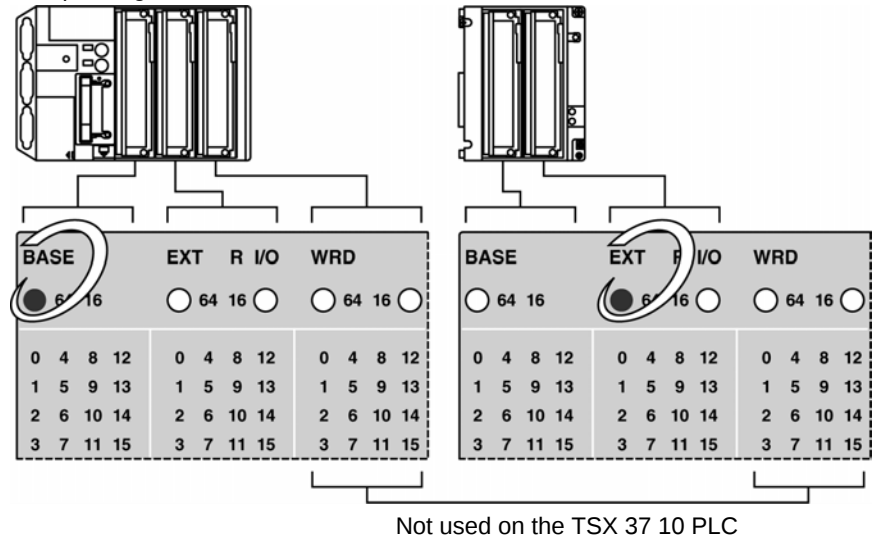
General

The display comes from the 2 panels of 32 LEDs on TSX 37-05/10 and 3 panels of 32 LEDs on TSX 37-08/21/22, which allows the simultaneous display of the input/output status of 2 or 3 modules. These modules are positioned in the 2 or 3 base slots or in the two slots in the mini extension rack. A short press of the push button selects the group displayed: base (the BASE LED is lit) or the mini extension rack (the EXT LED is lit).

Only the discrete module channels present in the configuration are displayed. The discrete inputs/outputs of the application specific function (if they exist) and the remote discrete inputs/outputs (TSX 07 module) are not displayed.

Illustration

Principle diagram:



Panel description

The 3 panels of 32 LEDs indicate the status of each of the channels of the modules displayed.

If the channel is at the status 1, the LED corresponding to the position is lit, if this is not the case, it remains off.

Supposing for example that the PLC is equipped with the following modules:

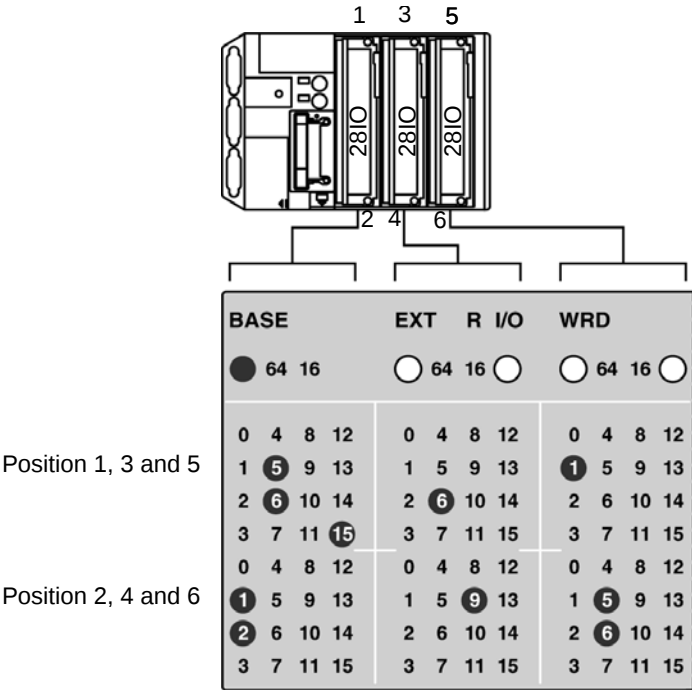
- 1 module 28 inputs/outputs in positions 1 and 2,
- 1 module 28 inputs/outputs in positions 3 and 4,
- 1 module 8 inputs in position 5,
- 1 module 8 inputs in position 6,

In the example below, the following inputs and outputs are at the status 1:

- %I1.5, %I1.6, %I1.15, %Q2.1 and %Q2.2,
- %I3.6 and %Q4.9,
- %I5.1,
- %Q6.5 and %Q6.6.

Example

Illustration:



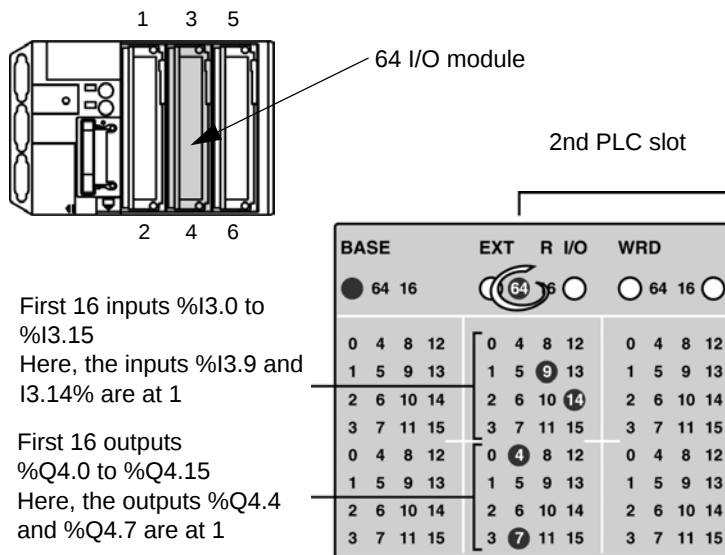
64 channel modules display

General

The 64 channel modules, which cannot be displayed together are shown by slot level (the "64" LED is lit). A short press on the push button displays either the first 16 inputs and the first 16 outputs (only the "64" LED is lit), or the following 16 inputs and the following 16 outputs (the "64" and "16" LEDs are lit).

Example

Supposing that the second PLC slot (position 3 and 4) is equipped with a 64 channel module:



First 16 inputs %I3.0 to %I3.15
Here, the inputs %I3.9 and I3.14% are at 1

First 16 outputs
%Q4.0 to %Q4.15
Here, the outputs %Q4.4
and %Q4.7 are at 1

Pressing the push button

Next 16 inputs
%l3.16 to %l3.31
Here, the inputs %l3.17
(16+1) and %l3.22 (16+6)
are at 1

Next 16 outputs
%Q4.16 to %Q4.31
Here the outputs %Q4.23
(16+7)
and %Q4.29 (16+13) are at
1

BASE	EXT	R I/O	WRD
● 64 16	○ 64 16	○ 64 16	○ 64 16
0 4 8 12 1 5 9 13	0 4 8 12 1 5 9 13	0 4 8 12 1 5 9 13	0 4 8 12 1 5 9 13
2 6 10 14 3 7 11 15	2 6 10 14 3 7 11 15	2 6 10 14 3 7 11 15	2 6 10 14 3 7 11 15
0 4 8 12 1 5 9 13	0 4 8 12 1 5 9 13	0 4 8 12 1 5 9 13	0 4 8 12 1 5 9 13
2 6 10 14 3 7 11 15	2 6 10 14 3 7 11 15	2 6 10 14 3 7 11 15	2 6 10 14 3 7 11 15

Sequencing of the displays

General

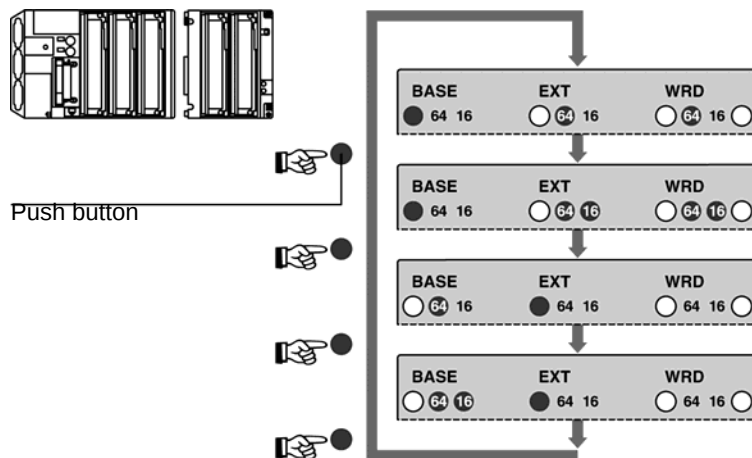
Since the display of all the discrete inputs/outputs (base+PLC) is performed by short presses on the push button, the sequencing of the displayed channels therefore depends on the configuration (presence of modules in the mini extension rack, presence of 64 input/output modules). Several possible cases can be identified:

- **PLC only (base), without 64 I/O module**
The push button has no effect (except for entering diagnostic mode),
- **PLC only, with 64 I/O module(s)**
Base (1st 32 I/O) --> Base (following 32 I/O) --> Base (32 1st I/O) --> etc,
- **PLC with extension, without 64 I/O module**
Base --> Extension --> Base --> Extension --> etc,
- **PLC with extension, with 64 I/O module(s) in the base**
Base (1st 32 I/O) --> Base (following 32 I/O) --> Extension --> Base (1st 32 I/O) --> Base (following 32 I/O) --> etc,
- **PLC with extension, with 64 I/O module(s) in the extension**
Base --> Extension (1st 32 I/O) --> Extension (following 32 I/O) --> Base --> Extension (1st 32 I/O) --> etc,
- **PLC with extension, with 64 I/O module(s) in the base and the extension**
Base (1st 32 I/O) --> Base (following 32 I/O) --> Extension (1st 32 I/O) --> Extension (following 32 I/O) --> Base (1st 32 I/O) --> etc.

Example

Supposing for example that a TSX 37-21 PLC is equipped with a 64 input/output module in positions 3/4, 5/6 and 7/8. The display sequence, therefore, the LEDs BASE, EXT, 64 and 16 will follow when the push button is pressed briefly.

Illustration:



Display of faulty local inputs/outputs

General

The faults are displayed in diagnostic mode, accessed by a long press on the push button (more than 1 second). The DIAG LED, which signals this mode, is therefore lit.

Principle

The faulty inputs/outputs and/or modules are displayed by 3 panels of 32 LEDs:

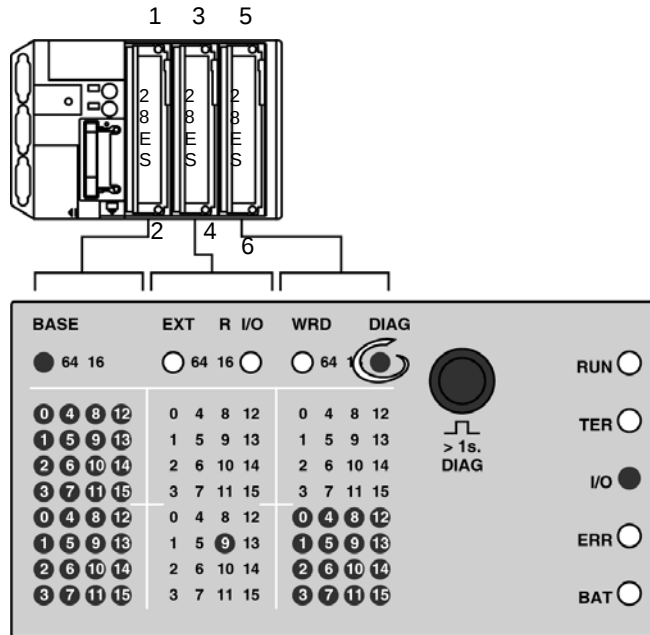
- if an input or output is faulty (defective power supply, output tripped, etc.), the associated LED flashes rapidly,
- if a module is faulty (absent module, module not configured properly, module out of service, etc.), all the corresponding LEDs flash slowly:
 - 16 LEDs for a half-size module (top or bottom of a display panel),
 - 32 LEDs for a standard size module with 28 inputs/outputs (entire display zone of the module),
 - 64 LEDs for a standard size module with 64 inputs/outputs (entire display zone of the module with the 64 only or 64 and 16 LEDs).

All the input/output faults are displayed by short presses on the push button, with the same sequences as with the input/output status display mode. A long press of the push button returns to the input/output status display.

Note: Contrary to the input/output status display mode, which is only accessible for the discrete modules, the diagnostic mode displays the faulty channels associated with the analog and counting modules. For example, if a PLC contains a TSX CTZ 2A module in position 3, a fault with the counting channel 0 is signaled by a rapid blinking of LED 0 on the upper part of the corresponding zone.

Example

Illustration:



This example illustrates a fault in the 28 I/O and 8 O modules, positioned respectively in 1/2 and 6 (the LEDs corresponding to the module slot flash slowly). The %Q4.9 output is also faulty (the corresponding LED flashes rapidly).

Display of remote inputs/outputs on the AS-i bus

At a Glance

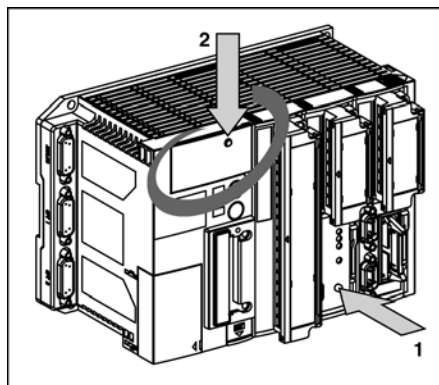
The PLC display panel allows:

- the presence of each slave on the AS-i bus, (DIAG mode), to be displayed,
- the status of the input/output bits of each slave present on the bus (R I/O mode - DIAG) to be displayed.

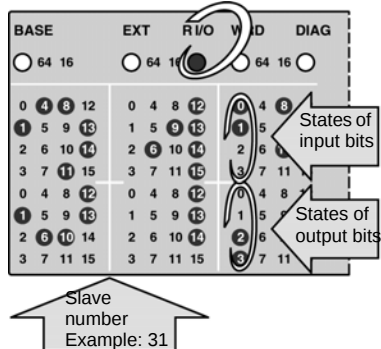
These modes can be accessed by a combination of actions on the push buttons **(1)** of the TSX SAZ10 module and **(2)** on the PLC display block.

Illustration

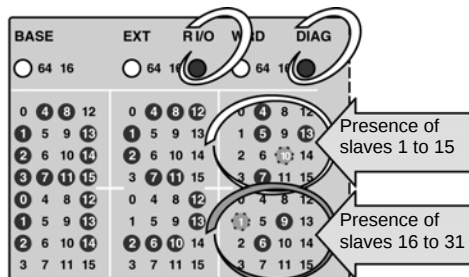
highlighting the display screen:



Display of the state of the bits of inputs/outputs of each slave (mode R I/O)



Display of the presence of each bus AS-i bus slave (mode R I/O - DIAG)



Display of the presence of each slave on the AS-i bus (R I/O mode - DIAG)

Introduction

This mode makes it possible to display:

- the slaves which have been installed and detected (LEDs permanently on),
- slaves which have not been installed or detected (LEDs off),
- slaves which have been installed but not detected or not installed but detected (LEDs on and blinking).

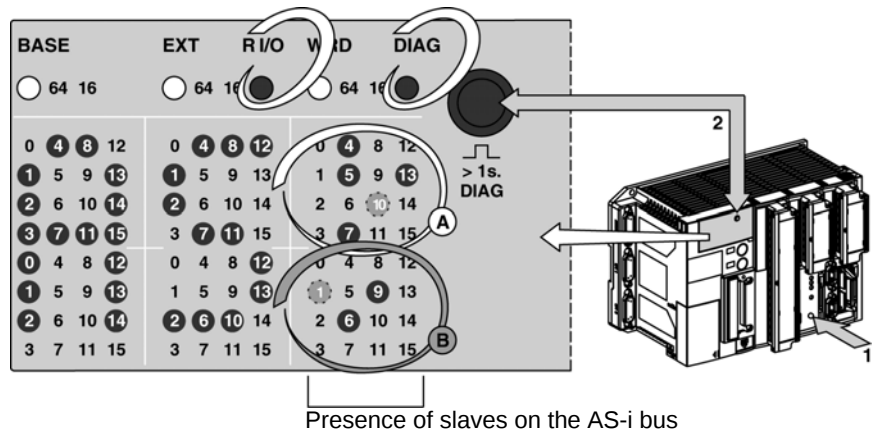
Procedure for access

Carry out the following steps:

Step	Action
1	Initial status of display block: local input/output display mode (Base or EXT LEDs on).
2	A short press on the push button (1), of the TSX SAZ module allows the switch to R I/O mode.
3	A long press on the push button (2) on the PLC display block allows the switch to diagnostics mode. The image of the AS-i network is then displayed on the right-hand block, with each LED representing an address of an AS-i bus slave. All of the A LEDs represent the addresses of the slaves 0 to 15, all the B LEDs represent the addresses 16 to 31 (add + 16 to the figure displayed to get the exact address of the slave).
4	To return to the initial status: • A long press on the push button (2) on the display block (to exit the AS-i bus diagnostics mode), • A short press on the push button (1) on the TSX SAZ module (to return to local input/output display mode).

Example

Illustration:



In the example below:

- the slaves with the addresses 4, 5, 7, 13, 22(6+16) and 25 (9+16) are operating normally (LEDs permanently on),
- the slaves with addresses 10 and 17 (1+16) are faulty (blinking LEDs),
- the LEDs which are not on represent the empty addresses.

Display of the status of the input/output bits for each slave (R I/O mode)

Introduction

The PLC display panel enables the status of the input/output bits of each slave on the bus to be displayed.

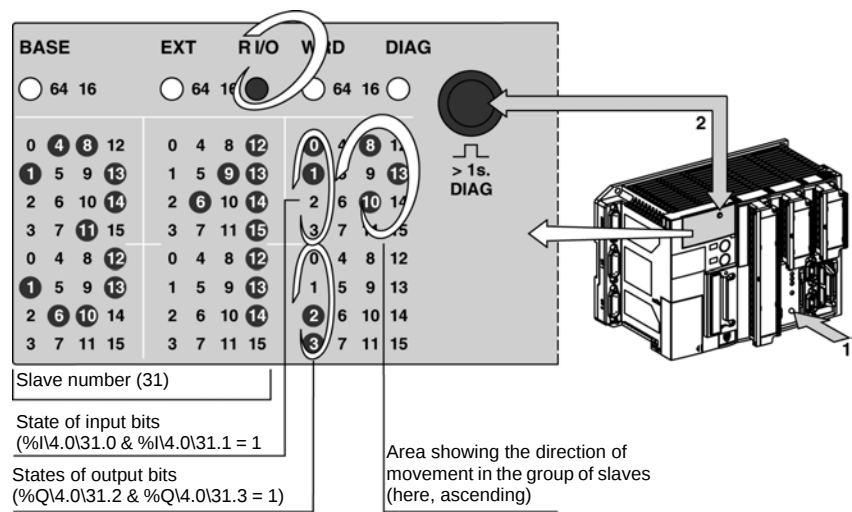
Procedure for access

Carry out the following steps:

Step	Action
1	Initial status of display panel: local input/output display mode (Base or EXT LEDs on).
2	A short press on the push button (1) on the TSX SAZ 10 module switches to R I/O mode with display: - of an address of a slave (1 to 31) on the two panels on the left-hand side (numerical display), - of the status of the input/output bits relating to the slave displayed, on the panel on the right-hand side (LED on = bit set to 1, LED off = bit set to 0 or no inputs / outputs). The LEDs (0 to 3) at the top show the status of the input bits of the slave (maximum of 4 input bits per slave); the LEDs (0 to 3) at the bottom show the status of the output bits of the slave (maximum of 4 output bits per slave), - of the direction of movement in all the slaves, shown by three LEDs being lit (see <i>Incrementation of the slave number in ascending or descending order</i>, p. 515): if LEDs 8,13 and 10 are on, movement in the group of slaves takes place in ascending order; if LEDs 12, 9 and 14 are on, movement takes place in descending order.
3	Pressing briefly several times in succession on the push button (2) of the centralized display makes it possible to change the number of the slave in ascending order (1 -> 31) or descending order (31 -> 1) depending on the direction of movement. Changing direction (ascending or descending) is achieved by a long press on the push button (1) on the TSX SAZ 10 module.
4	Returning to the initial status of the display panel is achieved by a short press on the push button (1) on the TSX SAZ 10 module.

Illustration

input/output bits of each slave:

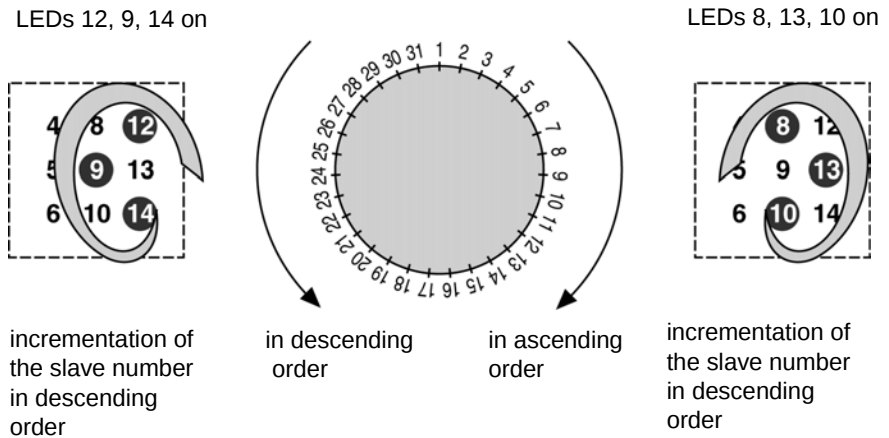


Incrementation of the slave number in ascending or descending order

General points

When the PLC display block is in R I/O mode (display of input/output bits of each slave), the user can scan the slaves in ascending (1->31) or descending (31->1) order. The direction is shown by 3 lit LEDs at display panel level, as indicated on the following diagram. The direction can be changed with **along press** on the push button of the TSX SAZ 10 module.

Principle Diagram



Display of language objects

40

At a Glance

Aim of this Chapter

This chapter deals with the display of language objects.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
WORD mode	518
Word of order and status : %SW67	519
Index word : %SW68	521
Word %SW69	523
Example : word display in hexadecimal mode	524
Example : word display in binary mode	526
Example : display of the internal bit status	529
Example: Display of remote inputs/outputs on TSX 07	531

WORD mode

General

The Display of language objects comes from the 3 panels of 32 LEDs, which allow the display of the value of 256 bits or 16 words max., when the WORD mode is activated. The display of the words can be binary, which allows 4 consecutive words or hexadecimal alphanumerics to be displayed. In this case, one single word is displayed with most/least significant alternation.

It is possible to display the %M, %Si or %Xi bits, the %MWi, %SWi or %KW_i words and the remote discrete inputs/outputs delivered by TSX 07 PLCs.

Principle

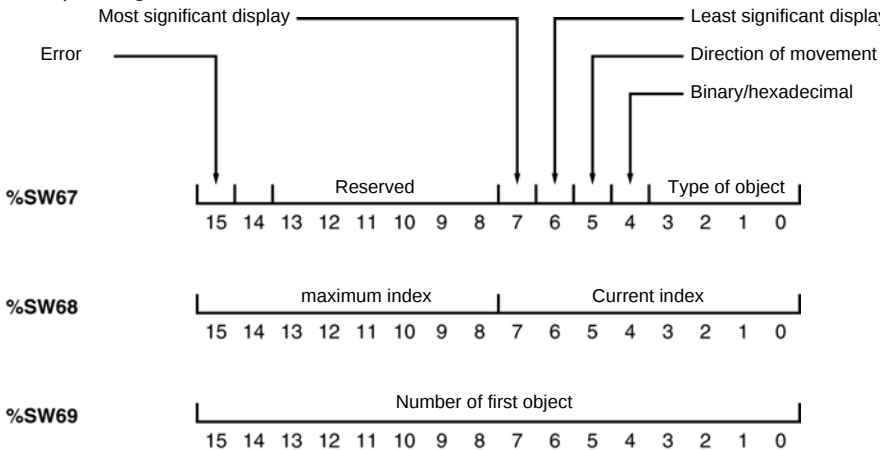
The WORD mode is activated by setting the %S69 bit system to 1, which is signaled by the WRD LED being lit. In this mode, the push button will scroll the value displayed (most/least significant in the hexadecimal base) or the values displayed (4 words then 4 following words etc. in the binary base).

The installation of the display is performed by the 3 system words %SW67, %SW68 and %SW69, which define respectively :

- the order information and the mode status (type of objects displayed, display base etc.),
- the current index of the displayed objects (64 bit group number or word order in the table defined by the maximum index and the word %SW69) and the maximum index (number of words in the word table),
- the number of the first word in the word table.

Illustration

Principle diagram:



Word of order and status : %SW67

Type of objects (0 to 3 bits)

These 4 bits configure the type of objects to be displayed:

- 0 : %MWi (default),
 - 1 : %SWi,
 - 2 : %kWi,
 - 8 : %Mi,
 - 9 : %Si,
 - A : %Xi,
 - B : %I and %Q of the TSX 07 PLCs.
-

Binary/ Hexadecimal (bit 4)

This bit configures the display base of the word objects:

- 0 : Binary,
 - 1 : Hexadecimal (default),
-

Direction of movement (bit 5)

This bit configures the direction of movement in the word table or in the bit group: the movement is caused by pressing the push button:

- 0 : positive direction, i.e. ascending direction of index (default),
 - 1 : negative direction, i.e. descending direction of index.
-

Most/least significant display (bits 6 and 7)

These bits configure the way of displaying a word in hexadecimal mode:

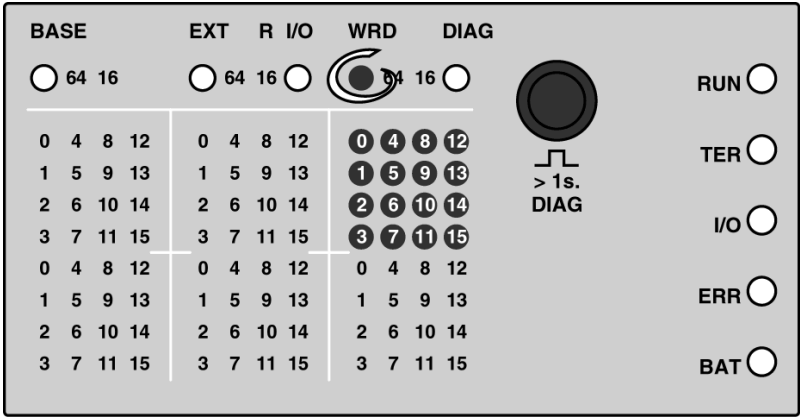
Most significant display (bit 7)	Least significant display (bit 6)	Meaning
0	0	Combination prohibited! Causes error bit to be set at 1 (bit 15).
0	1	Permanent display of the least significant byte.
1	0	Permanent display of the most significant byte.
1	1	Alternating display of the least significant byte (2s duration) and the most significant byte (2s duration). Default combination.

Error (bit 15)

This bit is positioned at state 1 when the parameter configuration is inconsistent:

- word number outside terminals in relation to the software configuration,
- hexadecimal display configured for the bit objects,
- Most/least significant parameter display positioned at 0.

When this bit is at 1, the first 16 LEDs in the first display panel are lit.



Index word : %SW68

**Word objects
(%MWi, %SWi
and KW_i)**

Words that can be displayed are handled in the form of a table (16 words max. with the same table), of which the first object has a 0 index and the last one the last maximum index (15 max.). In hexadecimal display, the current index is the index of the only word being displayed.

Supposing, for example, that a table has 8 internal words from %MW12 to %MW19. The current index can take a value from 0 to 7, which determines the word displayed: 0 displays the content of the word %MW12, 1 displays that of %MW13, etc. and 7 that of %MW19.

In binary display, the current index is that of the first 4 words displayed (word displayed by the first 16 LEDs in the first display panel).

Supposing, for example, that the same table has 8 internal words from %MW12 to %MW19.

The current index can take a value from 0 to 7, which determines the 4 consecutive words displayed:

Current index	Words displayed
0	%MW12, %MW13, %MW14 and %MW15
1	%MW13, %MW14, %MW15 and %MW16
2	%MW14, %MW15, %MW16 and %MW17
3	%MW15, %MW16, %MW17 and %MW18
4	%MW16, %MW17, %MW18 and %MW19
5	%MW17, %MW18, %MW19 and %MW12
6	%MW18, %MW19, %MW12 and %MW13
7	%MW19, %MW12, %MW13 and %MW14

Bit objects (%Mi, %Si and %Xi) the bits are always displayed in groups of 64, therefore the maximum index is not used for these types of objects. The current index indicates the group number during display.

bit table and corresponding index:

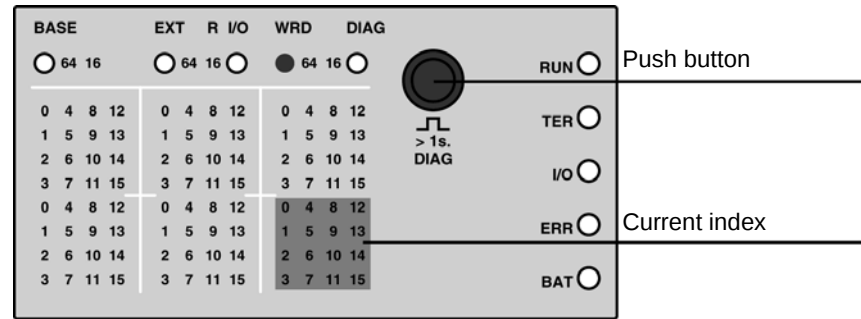
Bits	Index
For the 256 internal bits %Mi	● current index 0 corresponds to %M0 to %M63 bits, ● current index 1 corresponds to %M64 to %M127 bits, ● current index 2 corresponds to %M128 to %M191 bits, ● current index 3 corresponds to %M192 to %M255 bits,
For the 128 system bits %Si	● current index 0 corresponds to %S0 to %S63 bits, ● current index 1 corresponds to %S64 to %S127 bits,
For the 128 Grafcet step bits (96 for the TSX 37-10)	● current index 0 corresponds to %X0 to %X63 bits, ● current index 1 corresponds to the %X64 to %X127 bits (to %X95 for the TSX 37-10)

Remote input/output bit objects (%I and %Q)

The inputs/outputs of 2 consecutive TSX 07 PLCs on the offset input/output bus are displayed in the first 2 display panels. The inputs are displayed by 16 LEDs located in the upper part of the panels and the outputs by the 16 LEDs located in the lower part. For these types of objects, the current index corresponds to the TSX 07 link address, displayed in the first display panel.

Whatever the type of displayed object, the current index is displayed by the 16 LEDs located in the lower part of the third display panel. Each press on the push button increases or decreases this index, according to the configured direction of movement (bit 5 of the system word %SW67).

Illustration:



Word %SW69

General points

Contains the number of the first word of the table, i.e. the number of the first word to be displayed. Remember that a maximum of 16 words can be displayed, with 4 words displayed simultaneously in binary mode and one single word displayed in hexadecimal mode. To facilitate identification of the word(s) currently being displayed, you are advised to choose a first word, whose address is 0 or a multiple of 10.

The first word currently being displayed is defined by the current index (see *Index word : %SW68*, p. 521).

The word %SW69 is not used with bit objects.

Value of the system words %SW67 to %SW69 upon activating WORD mode

- **following a prior mode deactivation (setting %S69 bit to 0)**
Deactivation of WORD mode does not alter the content of the 3 system words. Upon reactivation (setting %S69 to 1), the system words %SW67 to %SW69 revert to their value at the time of the last mode deactivation. You are however advised to reinitialize the current index each time you enter the mode, in order to avoid uncertainty caused by an accidental press on the push button.
- **after a warm start**
The 3 system words revert to their value at the time of the power failure.
- **after a cold start**
The 3 system words are initialized to the following values:
 - %SW67 = H'xxD0' -> display of the internal words %MW in hexadecimal mode, alternating between the most and least significant. Movement in the table is performed via incrementation,
 - %SW68 = H'0F00' -> display of the index word 0 and movement to index word 15, by pressing the push button,
 - %SW69 = H'0000' -> the first word in the table has the number 0 (%MW0).

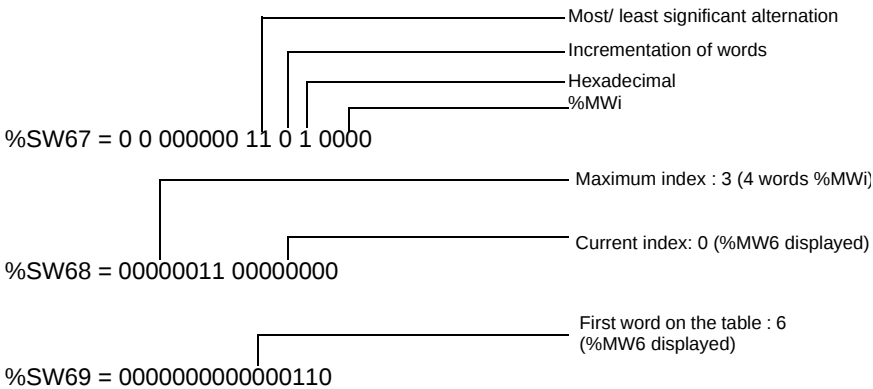
by default and without any special programming, it is possible to display the content of the internal words %MW0 to %MW15.

Example : word display in hexadecimal mode

Text display

The content of the 4 internal words %MW6 to %MW9 can be displayed in alphanumeric hexadecimal mode. The values of these words are H'1234', H'5678', H'9ABC' and H'DEF0', respectively.

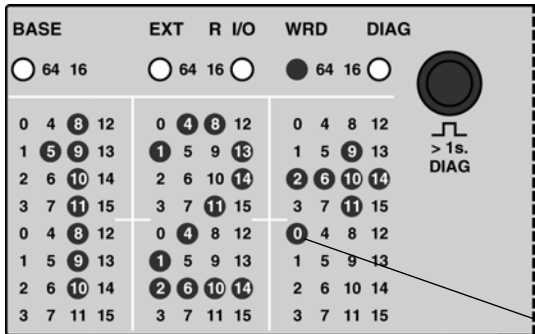
To do this, the content of the system words %SW67 to %SW69 is as follows:



Display on the PLC

Current index = 0, the first two panels alternately display the most/least significant content of the first word in the table (%MW6); namely "12" and "34". The arrows -> or <- indicate that the right part of the word (least significant) or the left part of the word (most significant), respectively, will be displayed at the next alternation (every 2s).

Illustration:

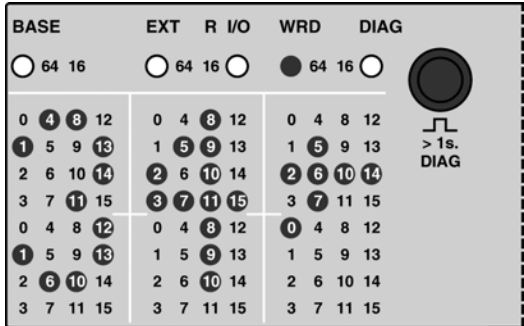


Current index

A short press on the push button increases the current index, which becomes equal to 1 (the 1 LED is therefore lit and the 0 LED is off). The content of the next word in the table (%MW7) is displayed with the most and least significant alternating, namely "56" and "78".

Successive presses on the push button will display all the words in the following sequence: %MW6 -> %MW7 ->%MW8 ->%MW9 -> %MW6 -> etc...

Illustration:

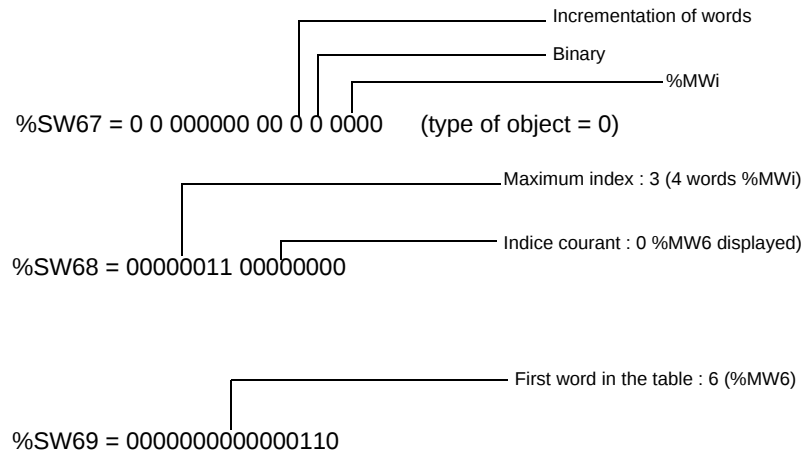


Example : word display in binary mode

Text display

The content of the 4 internal words %MW6 to %MW9 can be displayed in binary mode. The values of these words are H'1234', H'5678', H'9ABC' and H'DEFO', respectively.

The content of the system words is as follows:

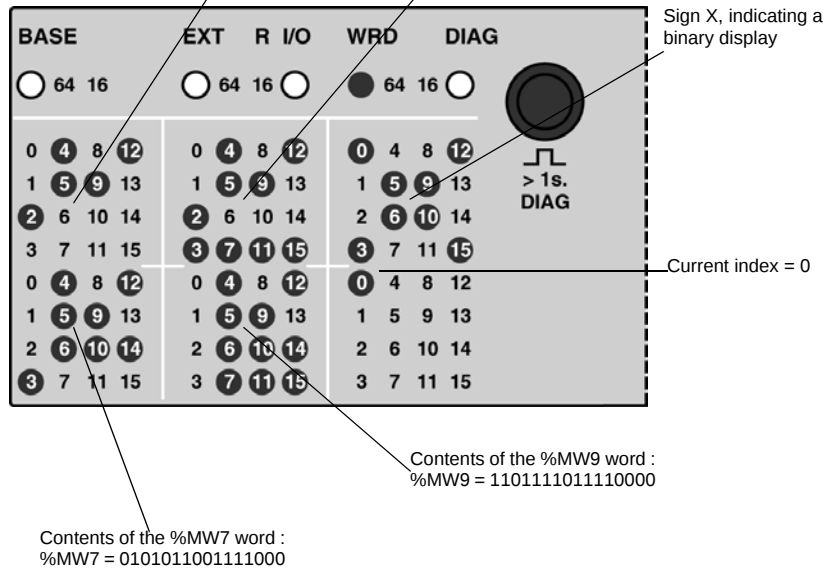


Display on the PLC

Illustration:

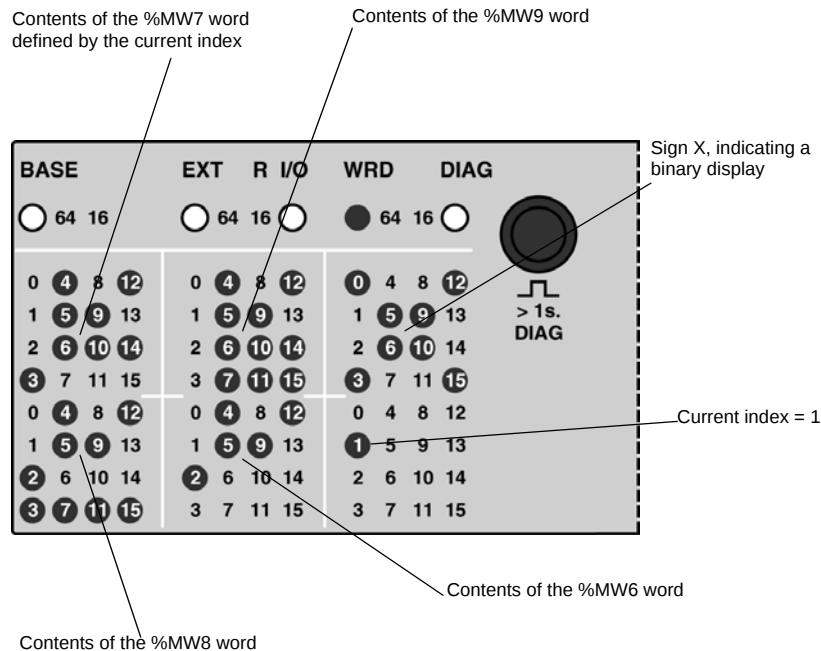
Contents of the %MW6 word defined by the current index (first word in the table) :
%MW6 = 0001001000110100

Contents of the %MW8 word :
%MW8 = 10011010101111100



A short press on the push button increases the current index, which takes the value 1. The upper part of the first panel displays the content of the index word 1 in the table (%MW7), the lower part of the first panel displays the content of %MW8, the upper part of the second panel displays the content of %MW9 etc.

Illustration:



Successive presses on the push button display all the words, by shifting a 4-word window among the maximum possible 16 (limited to 4 in the example above). The index of the word displayed in the upper part of the first panel is defined by the current index (lower part of the third panel).

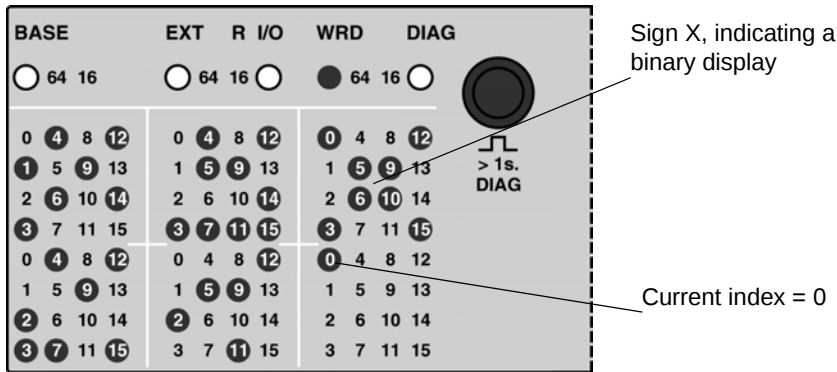
Example : display of the internal bit status

Text display

The status of the 256 internal bits in the TSX 37 PLC can be displayed (%M0 to M255). Upon WORD mode activation and if the current index is 0, the status of the first 64 internal bits is displayed (%M0 to M63).

Display on the PLC

Illustration:



State of the %M0 to %M63 bits

A short press on the push button increases the current index (value 1), which displays the status of the next 64 internal bits (%M64 to %M127) and then from %M192 to %M255; the current index adopts the values 0, 1, 2 and 3 successively.

LED table:

Index	LEDs				
	0	1	4	8	15
0	%M0	%M1	%M4	%M8	%M15
1	%M64	%M65	%M68	%M72	%M79
2	%M128	%M129	%M132	%M136	%M143
3	%M192	%M193	%M196	%M200	%M207
a					
0	%M32	%M33	%M36	%M40	%M47
1	%M96	%M97	%M100	%M104	%M111
2	%M160	%M161	%M164	%M168	%M175
3	%M224	%M225	%M228	%M232	%M239
b					
0	%M48	%M49	%M52	%M56	%M63
1	%M112	%M113	%M116	%M120	%M127
2	%M176	%M177	%M180	%M184	%M191
3	%M240	%M241	%M244	%M248	%M255
c					
0	%M16	%M17	%M20	%M24	%M31
1	%M80	%M81	%M84	%M88	%M95
2	%M144	%M145	%M148	%M152	%M159
3	%M208	%M209	%M212	%M216	%M223
d					

Illustration:

BASE				EXT				R	I/O
☐	64	16		☐	64	16	☐		
0	4	8	12	0	4	8	12	a	
1	5	9	13	1	5	9	13		
2	6	10	14	2	6	10	14		
3	7	11	15	3	7	11	15		
0	4	8	12	0	4	8	12	b	
1	5	9	13	1	5	9	13		
2	6	10	14	2	6	10	14		
3	7	11	15	3	7	11	15		
0	4	8	12	0	4	8	12	c	
1	5	9	13	1	5	9	13		
2	6	10	14	2	6	10	14		
3	7	11	15	3	7	11	15		
0	4	8	12	0	4	8	12	d	
1	5	9	13	1	5	9	13		
2	6	10	14	2	6	10	14		
3	7	11	15	3	7	11	15		

Note: The display of the system bits and the Grafcet step bits is identical, the current index only adopts the value 0 or 1.

Example: Display of remote inputs/outputs on TSX 07

Text display

The remote 4 TSX 07 PLC inputs/outputs can be displayed, connected to the remote input/output bus. By activating the mode and if the current index is worth 1, the first block displays the address 1 PLC inputs/outputs and the second block displays those of the address 2 PLC. By pressing the push button the current index is increased, which displays in the first block the address 2 PLC inputs/outputs and in the second block those of the address 3 PLC, etc. Continuous pressing on the push button allow all the remote inputs/outputs to be displayed.

Display on the PLC

Illustration:

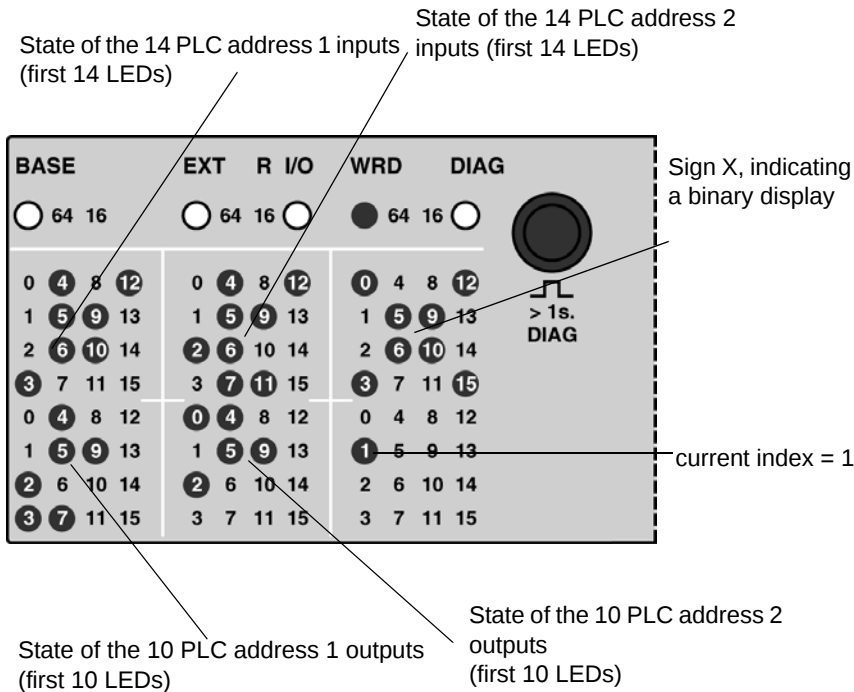
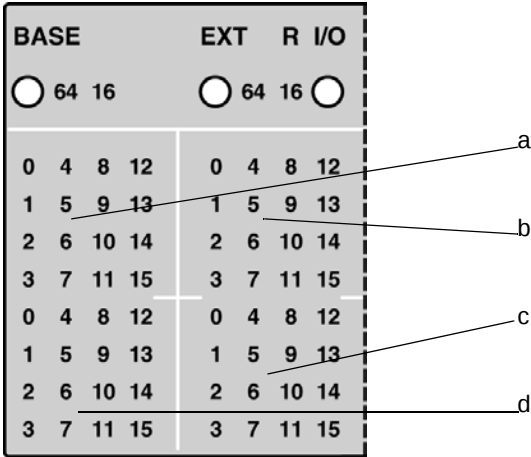


Table of inputs/outputs:

Index	TSX 07	Inputs/Outputs
1	Address 1	%\4.0\1.0 à %\4.0\1.13
2	Address 2	%\4.0\2.0 à %\4.0\2.13
3	Address 3	%\4.0\3.0 à %\4.0\3.13
4	a Address 4	%\4.0\4.0 à %\4.0\4.13
1	Address 2	%\4.0\2.0 à %\4.0\2.13
2	Address 3	%\4.0\3.0 à %\4.0\3.13
3	Address 4	%\4.0\4.0 à %\4.0\4.13
4	b Address 1	%\4.0\1.0 à %\4.0\1.13
1	Address 2	%\4.0\2.0 à %\4.0\2.9
2	Address 3	%\4.0\3.0 à %\4.0\3.9
3	Address 4	%\4.0\4.0 à %\4.0\4.9
4	c Address 1	%\4.0\1.0 à %\4.0\1.9
1	Address 1	%\4.0\1.0 à %\4.0\1.9
2	Address 2	%\4.0\2.0 à %\4.0\2.9
3	Address 3	%\4.0\3.0 à %\4.0\3.9
4	Address 4	%\4.0\4.0 à %\4.0\4.9
d		

Illustration:



At a Glance

Aim of this Chapter

This chapter is about the commissioning of the TSX 37 PLCs.

What's in this Chapter?

This chapter contains the following topics:

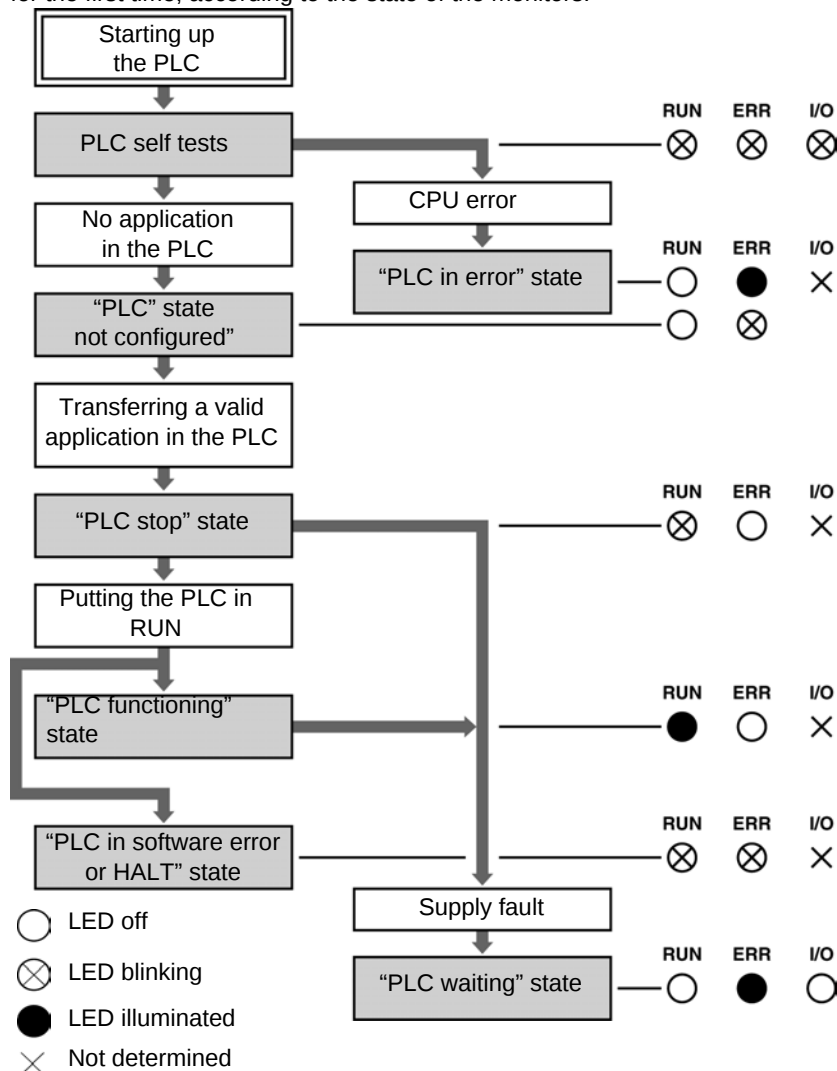
Topic	Page
First power-up	534
Description of PLC states	535

First power-up

Principle

When switched on, the PLC carries out its self-tests then places itself on hold for an application transfer. The different states of the PLC are signaled at the level of the display block by the RUN, ERR, I/O LEDs. .

The diagram below shows the procedure that must be followed when switching on for the first time, according to the state of the monitors:



Description of PLC states

General

Table of PLC states and their description:

State	Description
PLC self tests	The PLC processor carries out its self-tests internally. The PLC does not control the process and cannot communicate via its terminal port (or networks). This state is signaled by the 3 monitors RUN, ERR et I/O blinking.
"PLC in error" state	The PLC stops following a material breakdown or an error within the system. The process is no longer controlled, communication becomes impossible and only a cold-start is possible (by activating the RESET button, using the gripper, etc.) This state is signaled by the monitors RUN, which is switched off and ERR, which is switched on.
"non-configured" PLC state.	The PLC started but does not possess any valid applications. It does not control the process but can communicate by its terminal point (or its network). This state is signaled by the monitors RUN, which is switched off and ERR, which flashes.
"PLC in software error or HALT" state	The PLC application went to "overrun" or executed an unresolved jump, a HALT instruction or a non-implemented "floating" instruction. This state is signaled by the monitors RUN and ERR blinking.
"PLC stop" state	The PLC possesses a valid application, which is stationary (the application is in a initial state, the tasks are stopped at the end of the cycle) and the commands of the process are in a state of fallback. This state is signaled by the RUN monitor blinking.
"PLC functioning" state	The PLC application runs as normal in order to control the process. A non-blocking fault for the application (input/output error or software error) can also exist. This state is signaled by the monitor RUN, which is switched on (and the I/O module is switched on if there are input/output errors).
"PLC waiting" state	The PLC has detected a supply failure. It is in a backup state while waiting for the supply to return (attempt at restarting warm). The process is no longer controlled and communication is possible. As long as the supply allows it, this status is signaled by the RUN monitor, which is off and the ERR monitor, which is on.

Note: When the PLC is in the "non-configured" state (without valid application), it is possible to carry out a discrete input/output wiring test. To do this, put the bit system %S8 to 0 and exploit the image memory (in read and/or write) from an adjustment terminal.
The TSX DMZ 64 DTK modules can only be used for the first 16 inputs and the first 16 outputs.

At a Glance

Aim of this Chapter

This chapter is about researching and analyzing the errors.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Researching the errors from PLC status monitors.	538
Non-blocking faults	539
Blocking faults	541
Central processing unit (CPU) faults	543

Researching the errors from PLC status monitors.

General

The status monitors in the display block inform the user on the operating mode of the PLC but also on its possible faults. The errors detected by the PLC concern:

- the PLC component circuits and/or its modules: internal errors,
- the process controlled by the PLC or the process wiring: external errors,
- the operating of the application carried out by the PLC: internal or external errors.

Errors are detected at start-up (self-tests) or during operation; as is the case with the majority of hardware errors, during the exchanges with the modules or during the execution of an instruction program. With certain "serious" errors, the PLC must be restarted; others are the responsibility of the user who decides on the course of action according to the desired application level.

There are three types of error:

- non-blocking errors,
 - blocking errors
 - and central unit errors.
-

Non-blocking faults

Anomaly caused by an input/output error or by the execution of an instruction

The anomaly can be processed by the user program and does not modify the state of the PLC.

This type of anomaly is signaled by:

- the I/O status LED,
- the LEDs of channels accessible in diagnostics mode (see *Display of remote inputs/outputs on the AS-i bus*, p. 510),
- the error bits and words associated with the module and channel: %Ix.MOD.ERR, %IX.i.ERR, %MWx.MOD.2, etc.
- the system bits %S10 and %S16 (see reference manual, volume 3).

LED status table:

RUN	ERR	I/O	DIAG	System bits	Faults
				%S10 %S16	Channel supply fault. Tripped channel.
			 		Module missing. Module does not conform to the configuration. Module failure (*)
			 		Module supply fault.

Legend:

-  LED off
-  LED on
-  LED blinking rapidly
-  State not determined
-  LED blinking slowly
-  DIAG: channel LED
-   DIAG: all the module LEDs

(*) While operating a PLC with a VL < 2.0 rating, any modification to the physical configuration, **which must be made when the power is off**, needs a **cold start to be carried out by pressing the RESET** button after power up in order to take effect.

**Anomaly caused
by a faulty RAM-
type PCMCIA
memory card
backup battery**

When an application is stored on the PLC, a PCMCIA card backup battery error is indicated by:

- the ERR LED blinking, and the RUN LED lighting up if the PLC is in RUN mode,
- the ERR and RUN LEDs blinking simultaneously if the PLC is in stop mode.

LED status table:

PLC state	RUN	ERR	System bits	Faults
RUN			%SW67 = 1	PCMCIA RAM backup battery error with PLC in RUN
STOP				PCMCIA RAM backup battery error with PLC in RUN. The RUN and ERR LEDs blink simultaneously.

Legend

 LED blinking rapidly

 LED on

Blocking faults

General points

These faults, caused by the application program, make it impossible to continue execution but do not lead to a system fault. If such a fault occurs, the application stops immediately (all tasks on the current instruction are stopped). There are two possibilities for restarting the application:

- with INIT or by setting the %S0 bit to 1. The application is thus in a preliminary state: the data have their initial values, the tasks are stopped at the end of the cycle, the view of the inputs is refreshed and the outputs are placed into a fallback position,
 - by STOP, which brings the tasks to the end of the cycle without reinitializing the data, then by RUN, which makes a restart possible.
-

Indicating a blocking fault

A blocking fault is indicated by:

- the status LEDs (ERR and RUN),
- the system bits %S15 to %S20 (the system bits %S15, %S18 and %S20 are only blocking in application monitoring mode),
- the system word %SW125 containing the cause of the fault,
- the diagnostics program tool of the PL7 Micro which clearly communicates the cause and origin of the switch to fault status: watchdog overrun, division by zero, index overflow, etc.

LED status table:

RUN	ERR	I/O	Bits	%SW125	Faults
			%S11	H'DEB0'	Watchdog overrun.
				H'2258'	Execution of the HALT instruction.
				H'DEF8'	Execution of an unresolved JUMP.
				H'2xxx'	Execution of an unknown NPCALL.
				H'0xxx'	Execution of an unknown primitive OF/IOB.
				H'DEF7'	Grafcet fault: step not programmed or active step table overrun.
				H'DEFF'	Non-implemented floating point.
			%S18	H'DEF0'	Division by zero.
			%S15	H'DEF1'	Character string manipulation error.
			%S18	H'DEF2'	Capacity overflow.
			%S20	H'DEF3'	Index overflow.

Legend:

 LED flashing

 State not determined

Central processing unit (CPU) faults

General points

These severe faults (hardware or software) mean that correct system operation can no longer be guaranteed. They lead to a stop in the PLC, and require a cold start. Where possible, the fault type is memorized in the %SW124 system word; this can be reread after the cold start.

The next cold start is forced to stop to prevent a PLC error from recurring.

LED status table:

RUN	ERR	I/O	%SW124	Faults
			H'30'	System code fault.
			H'60' to H'64'	Stack overflow.
			H'90'	Interruption system fault: Unforeseen IT.
			H'53'	Time-out fault during I/O exchange.

Legend:

 LED off

 LED on

 State not determined

Note: All LEDs (RUN, TER, I/O, ERR) are lit if the handle is missing on a TSX 37 2*.

Process and AS-i supply



At a Glance

Aim of this Part This Part describes Process and AS-i supply and their installation.

What's in this Part? This part contains the following chapters:

Chapter	Chapter Name	Page
43	Process and AS-i supply: introduction	547
44	Process and AS-i suppliers: installation	563
45	Process supply modules: connections	571
46	Connecting AS-i supply modules	579
47	Process and AS-i supply module characteristics	587

Process and AS-i supply: introduction

43

At a Glance

Aim of this Chapter

This Chapter introduces Process and AS-i supply.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
General introduction to Process and AS-i power supply modules	548
Physical description of TBX SUP 10 supply block	549
Physical description of the TSX SUP 1011 supply module	550
Physical description of TSX 1021/1051 supply modules	552
Physical description of the TSX SUP A02 supply module	553
Description of TSX SUP 1101/A05 supply blocks	554
Physical description of the support board	555
Catalog of 24 VDC process supply	557
Process supply: auxiliary functions	559
Catalog of AS-i supply modules	561
AS-i supply module: dedicated features	562

General introduction to Process and AS-i power supply modules

General

A wide range of power supply units and modules is offered to meet your needs in the best possible way:

- TBX SUP 10 and TSX SUP 1..1 process power supply units and modules, designed to supply 24 VDC to a PLC system periphery, and driven by PLCs (TSX Micro and Premium). This periphery being composed of sensors, pre-actuators, encoders, operator dialog terminals, regulators, LEDs, push-buttons, pneumatic actuators, etc. . This 24 V power supply can be delivered using a 100/240 V, 50/60 Hz AC network.
The power supply modules TBX SUP 10 and TSX SUP 1011 can also be connected to a 125 VDC network.
- The AS-i power supply units and modules TSX SUP A02 and A05 designed to supply 30 VDC to the components connected to an AS-i field bus. This power supply is distributed over the same wires as those used for data exchange.

The attachment mode for these products has been specially designed to respond to the specific mounting distances and specifications of TSX Micro and TSX Premium PLCs, and TBX products.

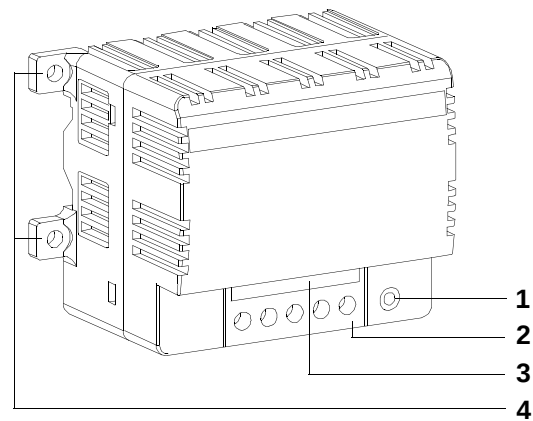
All the products are mounted:

- on a Telequick AM1-PA mounting plate,
 - on a central DIN rail AM1-DP200/DE200, except for the high-power power supply blocks TSX SUP 1101 and TSX SUP A05.
-

Physical description of TBX SUP 10 supply block

Illustration

Diagram and numbers:



Number table

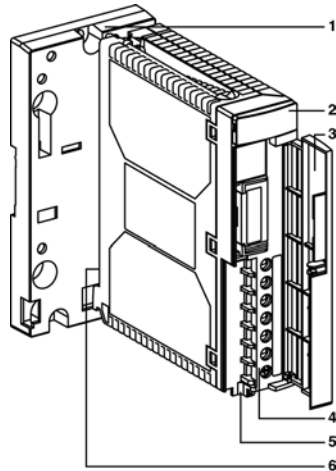
The following table shows the numbers and their corresponding descriptions from the diagram above:

Numbers	Description
1	LED showing power-up of module.
2	Screw terminal block for supply voltage wiring.
3	Identification label for the wire terminals.
4	Wings for fixing the module.

Physical description of the TSX SUP 1011 supply module

Illustration

Diagram and numbers:



Number table

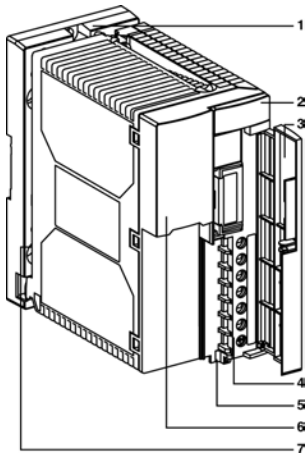
The following table shows the numbers and their corresponding descriptions from the diagram above:

Numbers	Description
1	Support board for fixing the supply module directly onto the AM1-DE200 / DP200 DIN mounting track or the AM1-PA Telequick perforated board.
2	Display block with: ● a 24 V LED (green): lit if the established internal and output voltages are correct, ● a LSH LED (orange) "power optimization mode": lit if the power supply is running in parallelization mode with power optimization.
3	Flap for protecting the terminal block.
4	Screw terminal block for connection: ● to the AC/DC supply network, ● to 24 VDC output.
5	Hole for the cable-tightening clip to go through.
6	"NOR/LSH" switch placed at the back of the module to control the power optimization system. ● NOR position: normal operation without power optimization (default position), ● LSH position: operation with power optimization with supply running in parallel.

Physical description of TSX 1021/1051 supply modules

Illustration

Diagram and numbers:



Number table

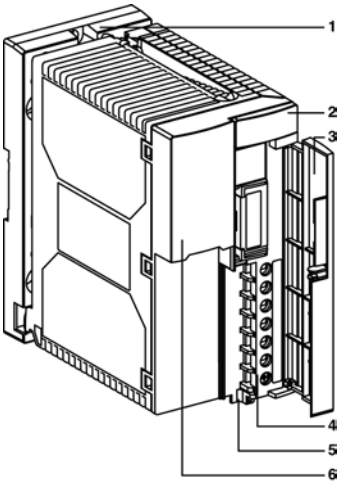
The following table shows the numbers and their corresponding descriptions from the diagram above:

Numbers	Description
1	Support board for fixing the supply module directly onto the AM1-DE200 / DP200 DIN mounting track or the AM1-PA Telequick perforated board.
2	Display block with: ● a 24 V LED (green): lit if the established internal and output voltages are correct, ● a LSH LED (orange) only on TSX SUP 1021 "power optimization mode": lit if the power supply is running in parallelization mode with power optimization.
3	Flap for protecting the terminal block.
4	Screw terminal block for connection: ● to the AC/DC supply network, ● to 24 VDC output.
5	Hole for the cable-tightening clip to go through.
6	110/220 V voltage selector. On delivery, the selector is set at 220.
7	"NOR/LSH" switch placed at the back of the module to control the power optimization system. This switch is only present on the TSX SUP 1021 module. ● NOR position: normal operation without power optimization (default position), ● LSH position: operation with power optimization with supply running in parallel.

Physical description of the TSX SUP A02 supply module

Illustration

Diagram and numbers:



Number table

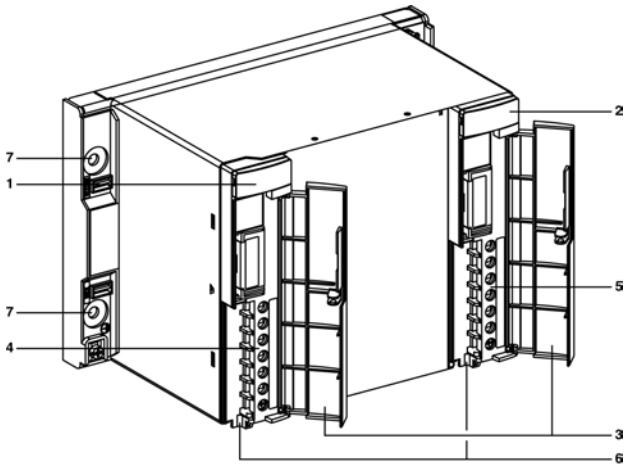
The following table shows the numbers and their corresponding descriptions from the diagram above:

Numbers	Description
1	Support board for mounting the supply module directly onto the AM1-DE200 / DP200 DIN mounting rail or the AM1-PA Telequick board.
2	Display block with: ● an AS-i LED (green): lit if the internal and output voltages are correct,
3	Flap for protecting the terminal block.
4	Screw terminal block for connection: ● to an alternating supply network, ● from AS-i 30 VDC output.
5	Hole for the cable-tightening clip to go through.
6	110/220 V voltage selector. On delivery, the selector is set at 220.

Description of TSX SUP 1101/A05 supply blocks

Illustration

Diagram and numbers:



Number table

The following table shows the numbers and their corresponding descriptions from the diagram above:

Numbers	Description
1	Display block with an ON LED (orange): lit if power supply is running.
2	Display block with: • a 24 V LED (green): lit if 24 VDC output voltage is present and correct, • an AS-i LED (green): lit if the AS-i 30 VDC output voltage is present and correct. This LED is only present on the TSX SUP A05.
3	Flap for protecting terminal blocks.
4	Screw terminal block for connection to alternating supply network.
5	Screw terminal block for connecting AS-i 24 VDC and 30 VDC output voltage to TSX SUP A05.
6	Holes for the cable-tightening clip to go through.
7	Four mounting holes for M6 screws.

Physical description of the support board

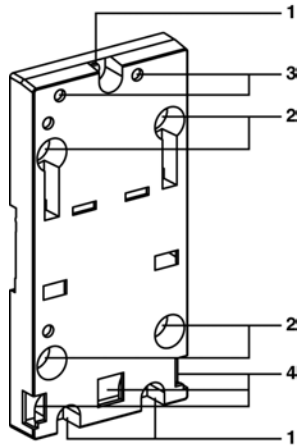
Introduction

Each TSX SUP 10.1 and TSX SUP A02 supply module is delivered mounted on a support board. This is used to fix the supply module: the DIN AM1-DE200 or AM1-DP200 profile, or to a Telequick AM1-PA perforated mounting plate.

Each support board can take: either a TSX SUP 1021, TSX SUP 1051 or TSX SUP 02 module, or one or two TSX SUP 1011 modules.

Illustration

Diagram and numbers:



**Information
Table**

The following table shows the numbers and their corresponding descriptions from the diagram above:

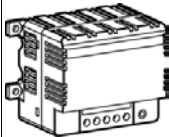
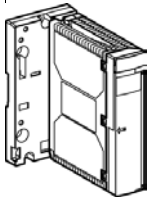
Number	Description
1	Three 5.5 mm diameter holes for mounting the board onto a panel or an AM1-PA perforated board with a mounting distance of 140 mm (mounting distance for TSX 37 PLCs).
2	Four 6.5 mm diameter holes for mounting the board onto a panel or an AM1-PA perforated board with a mounting distance of 88.9 mm (mounting distance for TSX 57 PLCs).
3	Two M4 holes for mounting TSX SUP 1011/1021/1051/A02 supply module(s).
4	Windows designed to ink pins situated at the bottom and at the back of the module.

Note:

- each of these supply modules can also be mounted on a TSX RKY... rack in place of another module, except in position PS. This must only be used by a TSX PSY... supply module for supplying rack modules.
 - the following operations require the module to be removed from the support board:
 - positioning the "NOR/LSH" switch onto "LSH",
 - mounting the board onto a panel or AM1-PA perforated board,
 - mounting the module onto a TSX RKY... rack.
-

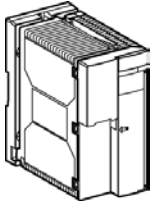
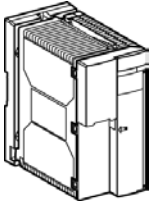
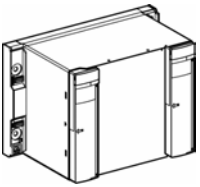
Catalog of 24 VDC process supply

Selection table The following table provides the main characteristics of the 24 VDC process supply:

References	TBX SUP 10	TSX SUP 1011
		
Input characteristics		
Nominal voltage	100...240 VAC or 125 VDC	
Thresholds	90..264 VAC or 88..156 VDC	85..264 VAC or 105..150 VDC
Frequency limit	47..63Hz	47..63Hz or 360..440Hz
Nominal input current	0.4A	0.4A
Output characteristics		
Output	24W	26W
Output voltage (direct)	24 VDC	
Nominal current	1 A	1.1 A
Auxiliary functions		
Very Low Safety Voltage (1)	No	Yes
Parallelization (2)	No	Yes with power optimization (3)
Redundancy (4)	No	Yes

Selection table
(continued)

The following table provides the main characteristics of the 24 VDC process supply:

References	TSX SUP 1021	TSX SUP 1051	TSX SUP 1101
			
Input characteristics			
Nominal voltage	100...120 VAC or 200...240 VAC		
Thresholds	85...132VAC or 170...264VDC		
Frequency limit	47...63Hz or 360...440Hz		
Nominal input current	0.8A	2.4A	5A
Output characteristics			
Output	53W	120W	240W
Output voltage (direct)	24 VDC		
Nominal current	2.2A	5A	10A
Auxiliary functions			
Very Low Safety Voltage (1)	Yes		
Parallelization (2)	Yes with power optimization (3)		
Redundancy (4)	Yes	No	

(1) Construction characteristics according to IEC 950, IEC 1131-2 standards, guaranteeing user-safety during 24V output, in terms of insulation between primary and secondary, maximum overload on output wires, and protection via the grounding circuit.

(2) Possibility of parallelizing 2 supply module outputs of the same type, to provide an output current greater than the maximum allowed by a single supply module.

(3) For 2 modules providing a total current of 100%, each module provides 50% of the total current. This extends the length of the product life.

(4) Parallelization of 2 supply module outputs of the same type, to provide a current less than the maximum allowed by a single supply module, but guaranteeing output voltage availability even if one of the modules becomes faulty.

Process supply: auxiliary functions

Parallelization mode with power optimization

The aim of parallelization is to use **two modules with the same product reference** in order to provide an output current which is greater than the maximum allowed by a single supply. The total current is the sum of the currents provided by all the supplies put together.

Power optimization is a system within the supply which is designed to distribute currents equally between parallel supplies. The resulting advantage is that the life of products is significantly extended, linked with distributed power consumption.

Dedicated supply features:

TSX SUP 1011/1021 supply	Power optimization mode is obtained by positioning the NOR/LSH switch at the rear of the modules onto LSH. To access the switch, the support board must be removed. When the orange LED (LSH) is lit, the mode is in operation. The current provided by two parallel supplies is limited to: ● 2A with 2 TSX SU 1011 supplies, ● 4A with 2 TSX SUP 1021 supplies. Using this mode means output voltage can vary slightly: 24V + or - 5% instead 24 V + or - 3% in normal mode. When sharing loads, the power imbalance can reach a maximum of 25%.
TSX SUP 1051/1101 supply	Power optimization mode does not require a switch on these supply modules. A specific connection is required for these types of modules. The maximum current provided by two parallel supplies is limited to: ● 10A with 2 TSX SUP 1051 suppliers, ● 20A with 2 TSX SUP 1101 suppliers. Using this mode will lead to no loss of output voltage: When sharing loads, the power imbalance can reach a maximum of 15%.

**Redundancy/
Safety on
TSX SUP 1011/
1021 suppliers**

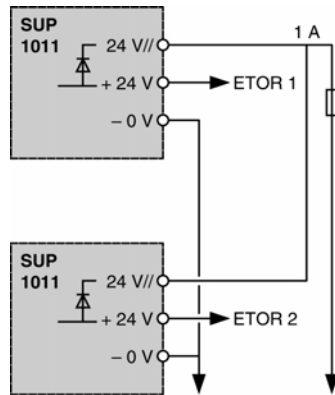
Principle:

Ensure that the currents required for the application are available, even in the event of failure of one of the suppliers.

To do this, the two suppliers are run in parallel by setting up specific connections.

The suppliers are configured in power optimization mode.

Example: provide 1A with redundancy from 2 TSX SUP 1011 suppliers.

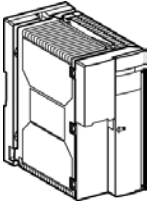
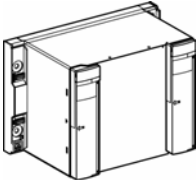


Note: TSX SUP 1051 and 1101 suppliers are not equipped with a serial diode, which is required for the redundancy function.

Catalog of AS-i supply modules

Selection table

The following table provides the main characteristics of AS-i supply modules:

References	TSX SUP A02	TSX SUP A05	
			
Input characteristics			
Nominal voltage	100...120 VAC or 200...240 VAC		
Thresholds	85..132 VAC or 170..264 VCD		
Frequency limit	47..63Hz or 360..440Hz		
Nominal input current	1.3A	5A	
Output characteristics			
Output	72W	230W	
Output voltage (direct)	AS-i 30 VDC	AS-i 30 VDC	24VDC
Nominal current	2.4A	5A(1)	7A(1)
Auxiliary functions			
Very Low Safety Voltage (2)	Yes		
Parallelization (3)	No		
Redundancy (4)	No		

- (1) Maximum current for each output; total power is limited to 230 W.
- (2) Construction characteristics according to IEC 950, IEC 1131-2 standards, guaranteeing user-safety during 24 V output, in terms of insulation between primary and secondary, maximum overload on output wires, and protection via the grounding circuit.
- (3) Possibility of parallelizing 2 supply module outputs of the same type, to provide an output current greater than the maximum allowed by a single supply module.
- (4) Parallelization of 2 supply module outputs of the same type, to provide a current less than the maximum allowed by a single supply module, but guaranteeing output voltage availability even if one of the modules becomes faulty.

AS-i supply module: dedicated features

General

The simultaneous transmission of information and power down the same cable means that data transmission needs to be filtered in relation to supply.

This is why AS-i supply module has a built-in decoupling filter which supports the maximum direct current provided by the power supply. A standardized impedance is introduced into the power supply in relation to the frequency of information transmission.

Process and AS-i suppliers: installation

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At a Glance

Aim of this Chapter

This Chapter deals with the installation of Process and AS-i supply modules.

What's in this Chapter?

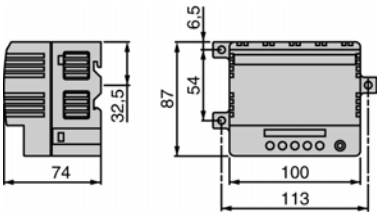
This chapter contains the following topics:

Topic	Page
TBX SUP 10 dimensions/mounting/connections	564
Dimensions/mounting Process and AS-i supply modules	565
TSX SUP 1101/A05 supply block dimensions/mounting	568
Summary of mounting methods	570

TBX SUP 10 dimensions/mounting/connections

Dimensions/ mounting

Illustration:

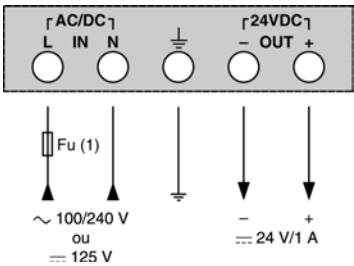


The TBX SUP 10 supply block must be mounted in an upright position to allow for the best possible natural air convection within the block.

It can be mounted on a panel, an AM1-PA Telequick perforated board or AM1-DE200 / DP200 mounting rail.

Connections

Illustration:



(1) External protection fuse on phase: 1A time delay 250V if single supply block.

Note: Primary: if the module is supplied with a 100/240V alternating current, the phase and the neutral wire must be taken into account when wiring. On the other hand, if the module is supplied with a 125 V direct current, polarities do not need to be taken into account.
Secondary: the terminal, with 0V potential, must be connected to the ground as soon as the supply module starts to provide output.

	DANGER
	HAZARDOUS VOLTAGE
	The module ground terminal must be connected to the protective ground with a green/yellow wire. Failure to follow these instructions will result in death or serious injury.

Dimensions/mounting Process and AS-i supply modules

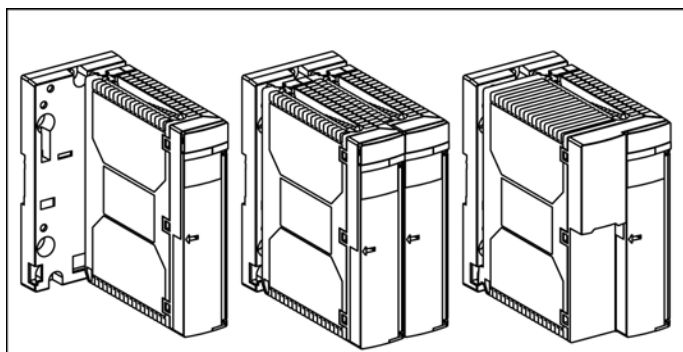
At a Glance

Each supply module is already provided with a support enabling it to be fixed directly onto a DIN mounting rail (AM1-D****) or TELEQUICK board (AM1-PA).

Either support option can take any of the following:

- one or two TSX SUP 1011 power supply modules,
- one TSX SUP 1021/1051/A02 power supply module.

Note: In the case of a TELEQUICK board, the module has to be removed.



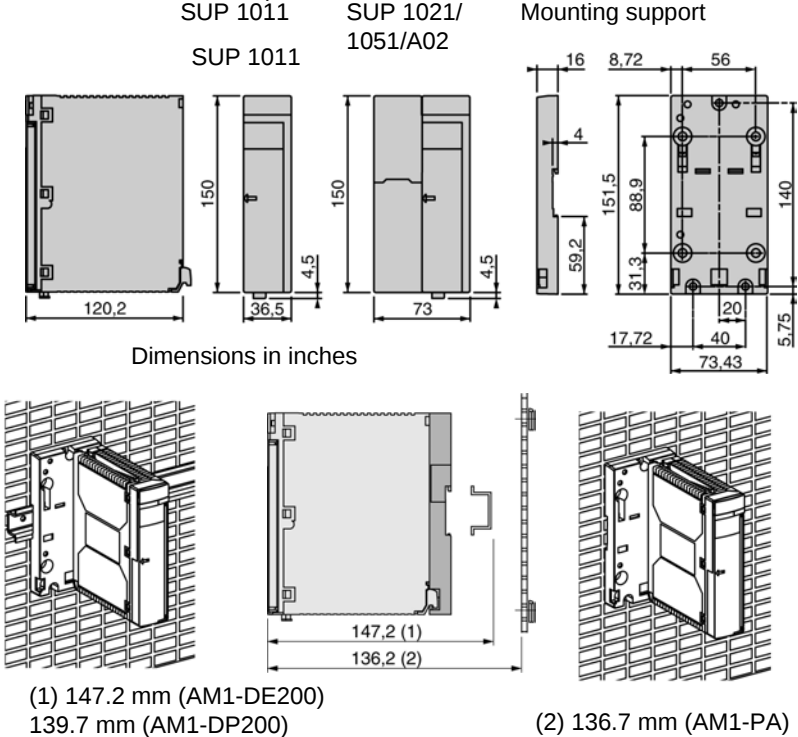
1 module
TSX SUP 1011

2 modules
TSX SUP 1011

1 module
TSX SUP 1021/1051/A02

Dimensions

The illustration below shows the dimensions of the modules and support, as well as the dimensions which depend on the connection method.



Mounting on an AM1-D mounting rail

Carry out the following steps:

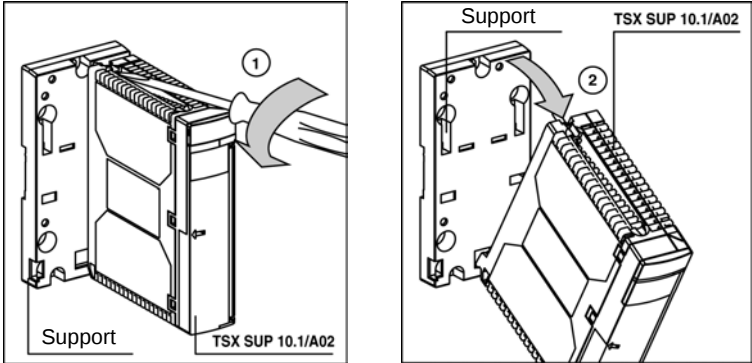
Step	Action
1	Check that the module is fixed to the support.
2	Fix the module + support assembly onto the mounting rail.

Removing the module

Carry out the following steps:

Step	Action
1	Undo the screw at the top of the module to loosen it from the support.
2	Rotate the module to release its lower pins from the support.

Illustration:



Mounting on an AM1-PA board

Carry out the following steps:

Step	Action
1	Remove the module from its support.
2	Mount the support onto the AM1-PA board.
3	Mount the module onto its support.

Mounting on an AM1-ED... mounting rail

Carry out the following steps:

Step	Action
1	Remove the module from its support.
2	Use the three M6x25 screws to mount the support onto the AM1-ED... mounting rails equipped with AF1-CF56 quarter-turn sliding nuts.
3	Mount the module onto its support.

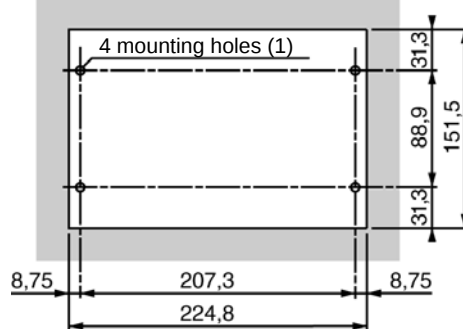
TSX SUP 1101/A05 supply block dimensions/mounting

Introduction

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

Mounting on a panel

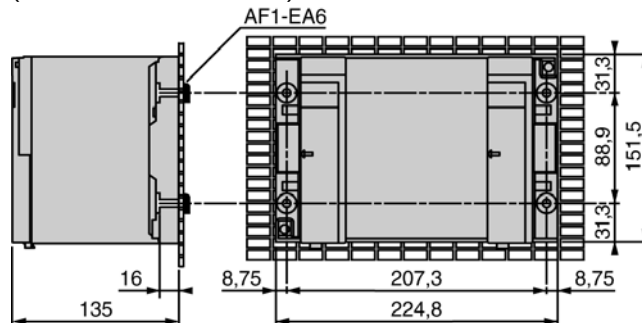
Screw-hole layout (dimensions in millimeters):



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

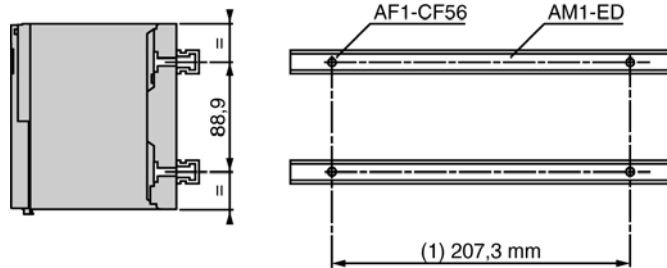
Mounting on an AM1-PA Telequick mounting grid

Fix the supply block with 4 M6 x 25 screws + washers and AF1-EA6 clips nuts (dimensions in millimeters):



**Mounting on 35
mm wide DIN
mounting rail**

Fix the supply block using 4 M6 x 25 screws + washers and AF1-CF6 $\frac{1}{4}$ turn sliding nuts (dimensions in millimeters):



Summary of mounting methods

**Summary table
of mounting
methods**

The following table lists a summary of the different methods available for mounting Process and AS-i supply modules:

Supply module product reference	TBX SUP 10	TSX SUP 1011	TSX SUP 1021	TSX SUP 1051	TSX SUP 1101	TSX SUP A02	TSX SUP A05
AM1-PA Telequick board	X	X	X	X	X	X	X
AM1-DE200/DP200 central DIN rail	X	X	X	X		X	
AM1-ED DIN rail with 5.51 in spacing		X	X	X		X	

Process supply modules: connections

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At a Glance

Aim of this Chapter

This Chapter deals with the connection of Process supply modules.

What's in this Chapter?

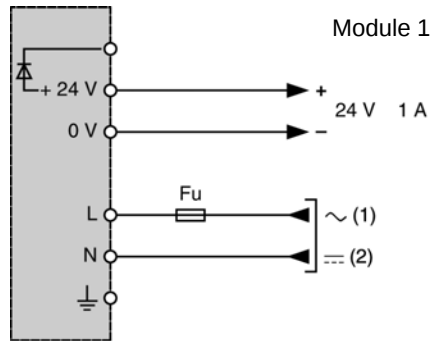
This chapter contains the following topics:

Topic	Page
Connection of TSX SUP 1011/1021 power supplies	572
Connection of TSX SUP 1051 power supplies	574
Connection of TSX SUP 1101 power supplies	576

Connection of TSX SUP 1011/1021 power supplies

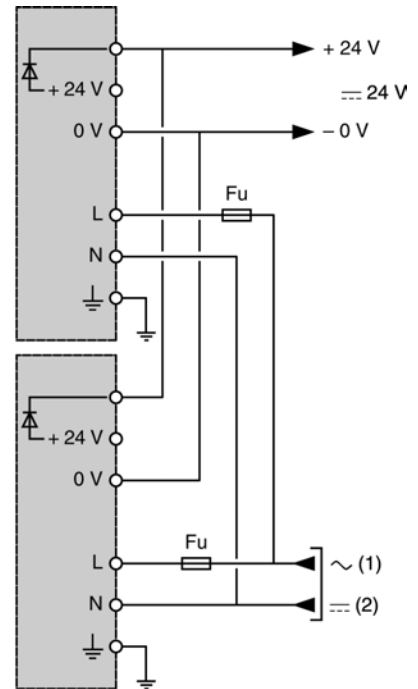
Illustration

Connection diagram:
Normal connection



Module 1

Parallelization



Module 2

Fu=External fuse
on phase (Fu): 250 V 4 A time delay.

(1) 100...240 VAC on TSX SUP 1011
100...120/200...240 VAC on TSX SUP 1021

(2) 125 VDC, only on TSX SUP 1011.

Connection rules **Primary:** if the module is supplied with a 100/240 VAC power supply, it is necessary to observe wiring requirements for the phase and neutral when connecting the module. However, if the module is powered by a 125 VDC supply, it is not necessary to respect the polarities.

- an operating voltage ≥ 600 VAC with a cross-section of 1.5 mm^2 (14 AWG) for connection to the mains,

	DANGER
	HAZARDOUS VOLTAGE
	The ground terminal of the module must be connected to the protective earth using a green/yellow wire. Failure to follow these instructions will result in death or serious injury.

The power supply terminal is protected by a flap which allows access to the wiring terminals. The wires come vertically out of the power supply at its base. These wires can be kept in place with a cable-clip.

Secondary: to comply with isolation requirements (EN 60950) for a 24 V SELV isolated voltage, the following wiring is used:

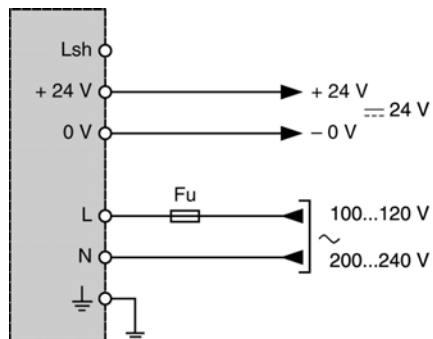
- an operating voltage ≥ 300 VAC with a cross-section of 2.5 mm^2 (12 AWG) for the 24 V outputs and the ground.

Connection of TSX SUP 1051 power supplies

Illustration

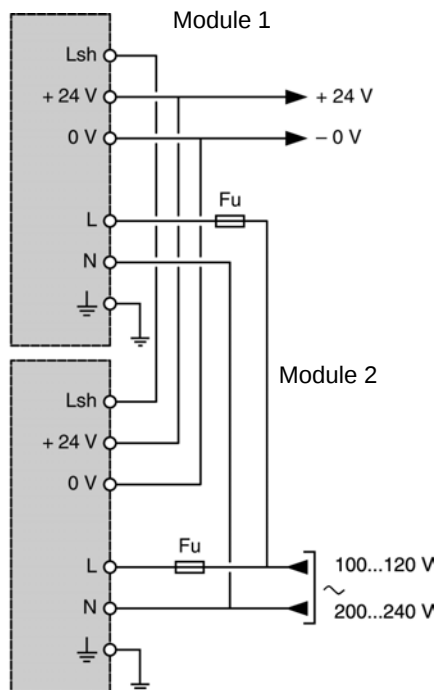
Connection diagram:

Normal connection



Fu=External safety fuse on phase
(Fu): 250 V 4 A time delay

Parallelization



Connection rules **Primary:** observe the rules concerning phase and neutral when wiring.

- an operating voltage ≥ 600 VAC with a cross-section of 1.5 mm^2 (14 AWG) for connection to the mains,

	DANGER
	HAZARDOUS VOLTAGE
	The ground terminal of the module must be connected to the protective earth using a green/yellow wire. Failure to follow these instructions will result in death or serious injury.

The power supply terminal is protected by a flap which allows access to the wiring terminals. The wires come vertically out of the power supply at its base. These wires can be kept in place with a cable-clip.

Secondary: to comply with isolation requirements (EN 60950) for a 24 V SELV isolated voltage, the following wiring is used:

- an operating voltage ≥ 300 VAC with a cross-section of 2.5 mm^2 (12 AWG) for the 24 V outputs and the ground.

Connection of TSX SUP 1101 power supplies

Illustration 1

Normal connection diagram:

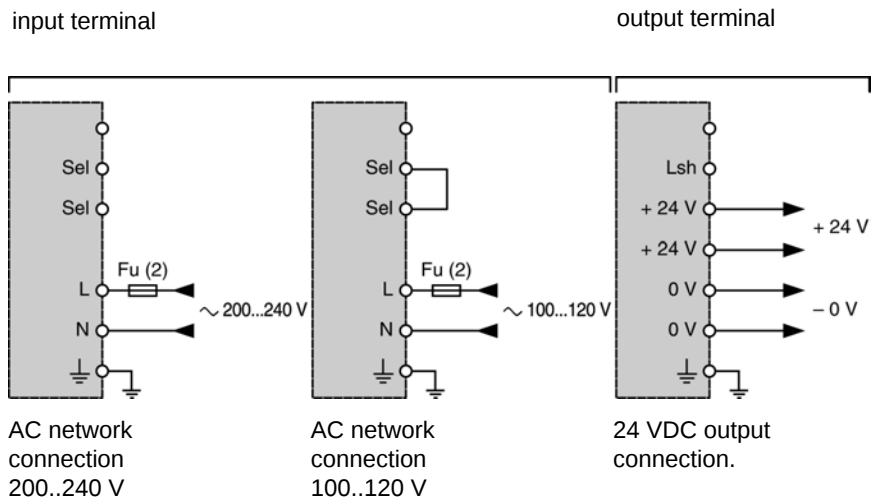
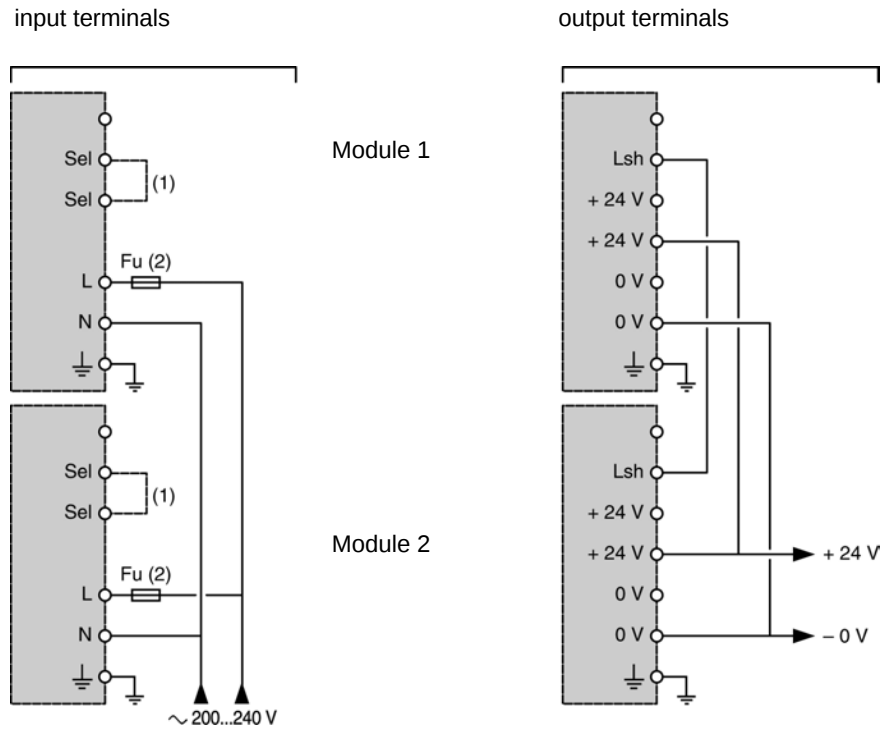


Illustration 2 Parallel connection diagram (parallelization):

(1) Connection for a 100...120 VAC power supply.

(2) External fuse on phase (Fu): 250 V 6.3 A time delay.

Connection rules **Primary:** Observe the rules concerning phase and neutral when wiring.

- an operating voltage ≥ 600 VAC with a cross-section of 1.5 mm^2 (14 AWG) or 2.5 mm^2 (12 AWG) for connection to the mains,

	DANGER
	HAZARDOUS VOLTAGE The ground terminal of the module must be connected to the protective earth using a green/yellow wire. Failure to follow these instructions will result in death or serious injury.

The power supply terminal is protected by a flap which allows access to the wiring terminals. The wires come vertically out of the power supply at its base. These wires can be kept in place with a cable-clip.

Secondary: To comply with isolation requirements (EN 60950) for a 24 V SELV isolated voltage, the following wiring is used:

- an operating voltage ≥ 300 VAC with a cross-section of 2.5 mm^2 (12 AWG) for the 24 V outputs and the ground.
- Wire the two 24 V terminals in parallel, or distribute the load over the two 24 V outputs when the total current to be supplied is greater than 5 A.

Connecting AS-i supply modules

46

At a Glance

Aim of this Chapter

This Chapter deals with the connection of AS-i supply modules.

What's in this Chapter?

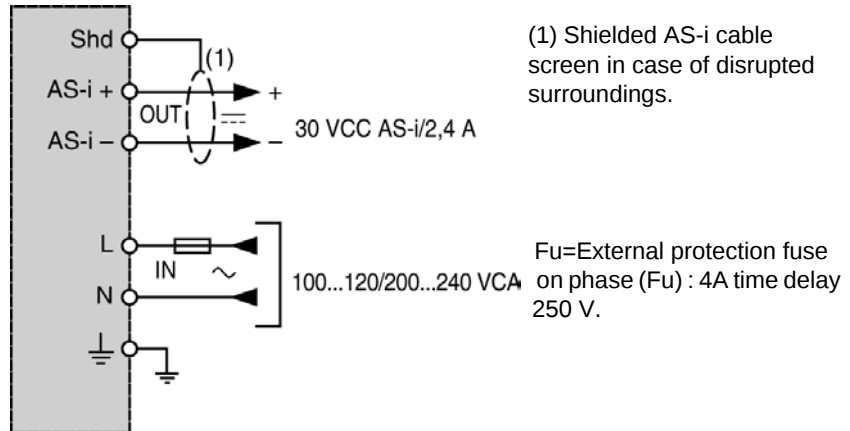
This chapter contains the following topics:

Topic	Page
Connecting TSX SUP A02 supply modules	580
Connecting TSX SUP A05 supply modules	582
General precautions	585

Connecting TSX SUP A02 supply modules

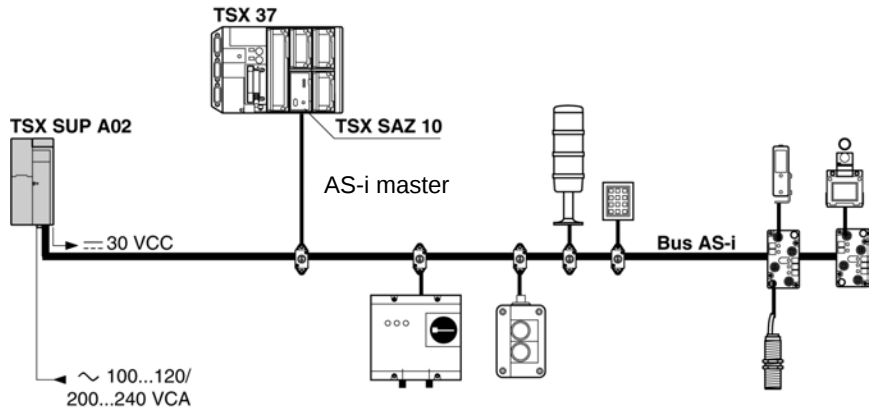
Illustration

Connection diagram:



Connection overview

The TSX SUP A02 supply module is designed to supply the AS-i bus, as well as the slaves which are connected to it (30 VDC/2.4Aoutput).



Rules of connection

Primary: Take the phase and the neutral into account when wiring.

	DANGER
	Personnel safety
	For personnel safety, the module ground terminal must be connected to the protective ground with a green/yellow wire. Failure to follow these instructions will result in death or serious injury.

The supply terminal block is protected by a flap which allows access to the wiring terminals. Wire output passes vertically to the bottom. Wiring can be maintained in position by a cable tightening clip.

To ensure insulation guaranteeing 24 V Very Low Safety Voltage, wires with the following properties are used:

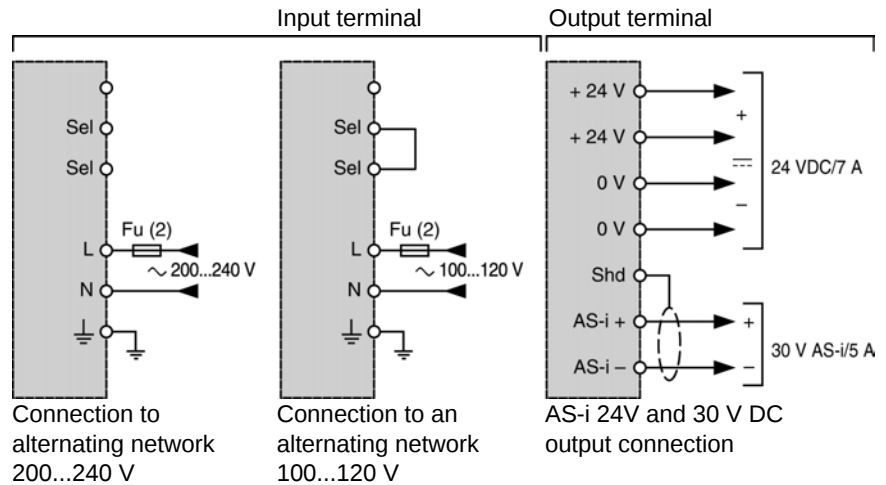
- a service voltage ≥ 600 VAC, with a cross-section of 1.5 mm^2 for connecting up to the power supply,
- a service voltage ≥ 300 VAC with a cross-section of 2.5 mm^2 for 24 V outputs and grounding.

Using a shielded cable for the AS-i bus is only necessary if the installation is overly disrupted in terms of EMC (Electro Magnetic Compatibility).

Connecting TSX SUP A05 supply modules

Illustration

Connection diagram:



- (1) Connection if supply is from 100/120V alternating current network.
- (2) External protection fuse on phase (Fu): 6.3A time delay 250 V.
- (3) Shielded AS-i cable screen in case of disrupted surroundings.

Secondary:

To ensure insulation guaranteeing 24 V Very Low Safety Voltage, wires with the following properties are used:

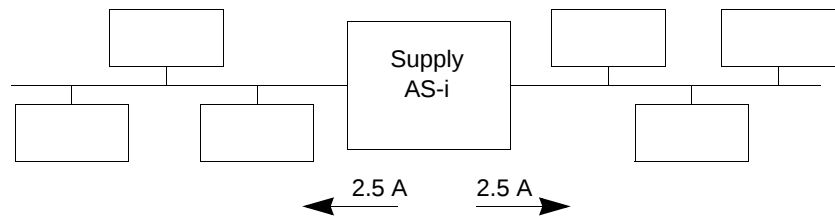
- a service voltage ≥ 300 VAC, with a cross-section of 1.5 mm^2 or 2.5 mm^2 for connecting up to the power supply,
- a service voltage ≥ 300 VAC with a cross-section of 2.5 mm^2 for 24 V outputs and grounding,
- connect the two 24V terminals in parallel, or distribute the load over the two 24V outputs when the total current to be provided is greater than 5A.

Using a shielded cable for the AS-i bus is only necessary if the installation is overly disrupted in terms of EMC (Electro Magnetic Compatibility).

Given the large current that this supply module provides, its position on the bus is very important.

If the supply module is placed at one of the ends of the bus, it will provide a nominal current (e.g. 5A) for the whole bus. The fall in voltage at the end of the bus is therefore proportional to the 5A.

If it is placed in the middle of the bus, the fall in voltage at the end of the bus is only proportional to 2.5A, assuming there is equal power consumption on both sections of the bus.



If there is no slave which consumes large amounts of power, it would be better to place the supply module in the middle of the installation. Conversely, if the installation has one or several large power consumers, it would be wise to place the supply module close to them.

Note: Where there are large power consumer actuators (contact, solenoid coils etc.) the TSX SUP A05 supply module can provide the auxiliary 24 VDC, insulated from the AS-i line.

General precautions

Introduction

While installing the yellow AS-i cable, it is essential to place it in a cable track which is separate from the power cables. It is also advisable to place it flat and not twisted. This will help make the two AS-i cable wires as symmetrical as possible.

Installing the AS-i cable on a surface connected to the electric potential of the machine (for example, the housing) complies with the requirements of the EMC (Electro Magnetic Compatibility) directive.

The end of the cable, or the ends in the case of a bus with a star-formation, must be protected either:

- by connecting it (them) to a T-derivation,
 - by not allowing them to come out of their last connection point.
-

Important

It is important to distribute power effectively on the AS-i bus, so that each device on the bus is supplied with sufficient voltage to enable it to operate properly. To do this, certain rules must be followed.

Rule 1

Select the capacity of the supply module adapted to the total consumption of the AS-i segment. Available capacities are 2.4 A (TSX SUP A02) and 5 A (TSX SUP A05).

A capacity of 2.4 A is generally sufficient based on an average consumption of 65mA per slave for a segment made up of a maximum of 31 slaves.

Rule 2

To minimize the effect of voltage drops and reduce the cost of the cable, you must determine the best position of the supply module on the bus, as well as the minimum size of cable appropriate for distributing power.

The voltage drop between the master and the last slave on the bus must not exceed 3 V. For that purpose, the table below gives the essential points for selecting the cross-sectional measurement of the AS-i cable.

Table of characteristics:

Cross-section measurement of AS-i cable	0.75 mm ² (28 AWG)	1.5 mm ² (14 AWG)	2.5 mm ² (12 AWG)
Linear resistance	52 milli Ohms/ meter	27 milli Ohms/ meter	16 milli Ohms/ meter
Voltage drop for 1 A over 100 meters (328 feet)	5.2 V	2.7 V	1.6 V

The cable which can be used for most applications is the cable with a cross-section of 1.5 mm² (14 AWG). This is the standard AS-i bus model (the cable is offered in the SCHNEIDER catalog).

Smaller cables can be used when sensors consume very little power.

Note: The maximum length of all the segments making up the AS-i bus without a relay is 100 meters (328 feet). The lengths of cables which link a slave to a passive distribution box must be taken into account.

Process and AS-i supply module characteristics

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At a Glance

Aim of this Chapter This Chapter presents the different electrical characteristics of Process and AS-i supply modules in a table.

What's in this Chapter? This chapter contains the following topics:

Topic	Page
Electrical characteristics of process supply modules: TBX SUP 10 and TSX SUP 1011	588
Electrical characteristics of process supply modules: TSX SUP 1021/1051/1101	590
Electrical characteristics of AS-i supply modules: TSX SUP A02/A05	592
Physical environmental characteristics	595

Electrical characteristics of process supply modules:
TBX SUP 10 and TSX SUP 1011

Table of
characteristics

The following table describes the electrical characteristics of supply modules: TBX SUP 10 and TSX SUP 1011:

Process supply module			TBX SUP 10 24V/1A	TSX SUP 1011 24V/1A
Primary				
Nominal input voltage		V	alternating 100...240 direct 125	alternating 100...240 direct 125
Input limit voltage		V	alternating 90...264 direct 88...156	
Network frequency		Hz	47...63	47...63/360...440
Nominal input current (U=100V)		A	0,4	0,4
Maximum call current (1)	to 100 V	A	3	37
	to 240 V	A	30	75
maximum it on trigger (1)	to 100 V	As	0,03	0,034
	to 240 V	As	0,07	0,067
maximum i ² t on trigger (1)	to 100 V	A ² s	2	0,63
	to 240 V	A ² s	2	2,6
Power factor			0,6	0,6
Harmonic (3)			10% (Phi=0°and 180°)	10% (Phi=0°and 180°)
Full load efficiency		%	>75	>75

Process supply module			TBX SUP 10 24V/1A	TSX SUP 1011 24V/1A
Secondary				
Output (2)		W	24	26(30)
Nominal output current (2)		A	1	1,1
Output voltage/accuracy at 25°C		V	24+/-5%	24+/-3%
Residual ripple (peak to peak) Maximum HF noise (peak to peak)		mV	240	150
		mV	240	240
Length of micro-power outages accepted (3)		ms	<= 10 alternating current <= 1 direct current	<= 10 alternating voltage <= 1 direct voltage
Protection against	Short circuits and overloads		continuous automatic reset	fallback to 0 and automatic reset after fault has disappeared
	Over-voltages	V	cuts off at U>36	cuts off at U>36
Parallelization			no	yes with power optimization
Serialization			no	yes
Dissipated power		W	8	9

(1) Values on initial power-up at 25°C. These elements are to be taken into account on start-up for the dimensioning of protection devices.

(2) Output power and current for an ambient temperature of 60°C. Input value ()=output in a ventilated cabinet or within a temperature range of 0...+40°C.

(3) A nominal voltage for a repetition period of 1Hz.

Electrical characteristics of process supply modules: TSX SUP 1021/1051/1101

Table of characteristics

The following table describes the electrical characteristics of supply modules: TSX SUP 1021/1051/1101:

Process supply module			TSX SUP 1021 24V/ 2A	TSX SUP 1051 24V/ 5A	TSX SUP 1101 24V/ 10A
Primary					
Nominal input voltage		V	alternating 100...120/200...240		
Input limit voltage		V	alternating 85...132/170...264		
Network frequency		Hz	47...63/360...440		
Nominal input current (U=100V)		A	0,8	2,4	5
Maximum call current (1)	to 100 V	A	<30	51	75
	to 240 V	A	<30	51	51
maximum it on trigger (1)	to 100 V	As	0,06	0,17	0,17
	to 240 V	As	0,03	0,17	0,17
maximum i²t on trigger (1)	to 100 V	A²s	4	8,6	8,5
	to 240 V	A²s	4	8,6	8,5
Power factor			0,6	0,52	0,5
Harmonic 3			10% (Phi=0°and 180°)		
Full load efficiency		%	>75	>80	
Secondary					
Output (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	
Maximum HF noise (peak to peak) mV		mV	240	240	
Accepted length of micro-power outages (3)		ms	<=10		

Process supply module			TSX SUP 1021 24V/ 2A	TSX SUP 1051 24V/ 5A	TSX SUP 1101 24V/ 10A
Start-up time on resisting load		s	<1		
Protection against	Short circuits and overloads		fallback to 0 and automatic reset after fault has disappeared	current limit	
	Over-voltages	V	cuts off at U>36	cuts off at U>32	
Parallelization			yes with power optimization		
Serialization			yes		
Dissipated power		W	18	30	60

(1) Values on initial power-up at 25°C. These elements are to be taken into account on start-up for the dimensioning of protection devices.

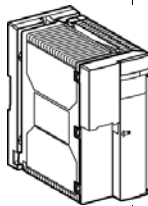
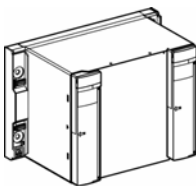
(2) Output power and current for an ambient temperature of 60°C. Input value () = output in a ventilated cabinet or within a temperature range of 0...+40°C.

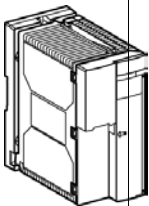
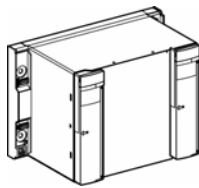
(3) A nominal voltage for a repetition period of 1Hz.

Electrical characteristics of AS-i supply modules: TSX SUP A02/A05

Table of Characteristics

The following table describes the electrical characteristics of supply modules: TSX SUP A02/A05:

References			TSX SUP A02 30V AS-i / 2.4A		TSX SUP A05 24V/7 AS-i & 30V AS-i/5A	
						
Primary						
Nominal input voltage		V	alternating 100..0.120/ 200..0.240		alternating 100..0.120/200..0.240	
Input limit voltage		V	alternating 85...132/ 170...264		alternating 85...132/170...264	
Network frequency		Hz	47...63/360...440		47...63/360...440	
Nominal input current (U=100V)		On	1.3		5	
Maximum call current (1)	to 100 V	On	30		50	
	to 240 V	On	30		50	
Maximum It on trigger (1)	to 100 V	As	0.06		0.17	
	to 240 V	As	0.03		0.17	
Maximum I²t on trigger (1)	to 100 V	A²s	4		8.5	
	to 240 V	A²s	4		8.5	
Power factor			0.6		0.51	
Harmonic 3			10% (Phi=0°and 180°)		10% (Phi=0°and 180°)	
Full load efficiency		%	>75		>80	
Secondary						
Output		W	72(84) (2)		230 (3)	
Peak nominal current	30 V AS-i output	On	2.4(2.8) (2)		5 (3)(4)	
	24 V output	On	-		7 (3)(4)	
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

References		TSX SUP A02 30V AS-i / 2.4A		TSX SUP A05 24V/7 AS-i & 30V AS-i/5A	
					
Ripple (from 10 to 500 kHz)	mV	50	200	50	
Ripple (from 0 to 10 kHz)	mV	300	240	300	
Start-up time on resisting load	s	<2 (where C=15000 micro Farads)		<2 (where C= 15000 micro Farads)	
Length of micro power outages (5)		ms	≤10		
Protection against	Short circuits and overloads		fallback to 0 and automatic reset after fault has disappeared	current limit on each output	
	Over-voltages	V	cuts off at U>36		cuts off at U>36
Power dissipation		W	24	60	

(1) Values on initial power-up at 25°C. These elements are to be taken into account on start-up for the dimensioning of protection devices.

(2) Output and output current for an ambient temperature of 60°C. Input value () = surge output.

(3) Output and output current for a maximum ambient temperature of 55°C, if product index II = 01 (60°C if product index II > 01).

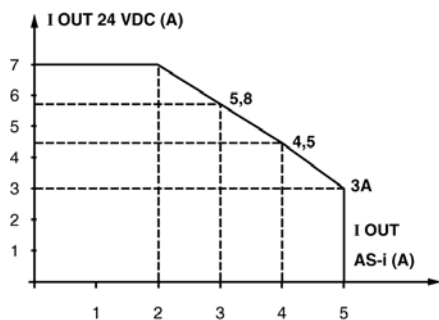
(4) distribution of current for each output (see *Chart of available currents on 30 V AS-i and 24 V output from the TSX SUP A05 supply block.*, p. 594).

(5) Acceptable period at nominal voltage for a repetition period of 1 Hz.

Chart of available currents on 30 V AS-i and 24 V output from the TSX SUP A05 supply block.

The maximum power which can be delivered by the supply block is 230 W. If consumption is 5 A on the 30 V AS-i, possible flow on 24 V output is no greater than 3 A (see chart below).

Chart:



Physical environmental characteristics

Table of characteristics

The following table describes the electrical characteristics of Process and AS-i supply modules:

Process and AS-i supply blocks/modules		TBX SUP 10	TSX SUP 1011/1021 TSX SUP 1051/1101 TSX SUP A02/A05
Connection to screw terminals		1 terminal per output	1011/1021/1051/A02: 1 output terminal 1101 : 2 terminals/output
maximum capacity per terminal	mm ²	1 x 2.5 (12 AWG)	A05: 2 terminals/output (24 VDC) 1 terminal/output (30 VDC AS-i) 2 x 1.5 (14 AWG) with adapter or 1 x 2.5 (12 AWG)
Temperature:			
Storage	°C	-25 to +70	-25 to +70
Operating	°C	+5 to +55	0 to +60 (TSX SUP 1011/1021/1051/1101) -10 to +60 (TSX SUP A02/A05) (1)
Relative humidity	%	5-95	
Cooling	%	By natural convection	
Reference standard		-	Very Low Voltage Safety (EN 60950 and IEC 1131-2)
Dielectric strength:		50/60 Hz-1 mm	
Primary/secondary	V eff	1500	3500
Primary/ground	V eff	1500	2200
Secondary/ground	V eff	500	500
Insulation resistance			
Primary/secondary	MΩ	≥ 100	
Primary/ground	MΩ	≥ 100	
Leakage current		I _{le} ≤ 3.5 mA (EN 60950)	
Electrostatic uploading immunity		6 kV per contact/8 kV in the air (complies with IEC 1000-4-2)	
Fast electric surge		2 kV (serial mode and common mode on input and output)	
Electromagnetic field influence		10 V/m (80 MHz to 1 GHz)	
Rejected electromagnetic disturbances		(comply with FCC 15-A et EN 55022 class A Test conditions: nominal U and I, resisting load, cable: 1 meter horizontally, 0.8 meters vertically)	
Shock wave		Input: 4 kV MC, 2 kV MS Outputs: 2 kV MF, 0.5 kV MS (complies with IEC 1000-4-5)	
Vibration (2)		1 mm 3 Hz to 13.2 Hz 1g 57 Hz to 150 Hz (2g TSX SUP A02/A05) (complies with IEC 68-2-6, FC test)	
Degree of protection		IP 20.5	IP 20.5, terminal IP 21.5

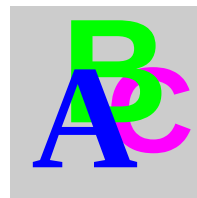
Process and AS-i supply blocks/modules		TBX SUP 10	TSX SUP 1011/1021 TSX SUP 1051/1101 TSX SUP A02/A05
MTBF at 40°C	H	100 000	
Length of life at 50°C	H	30 000 (at nominal voltage and 80 % of nominal power)	

(1) -10°C +55°C for TSX SUP A05 supply module with product index II=01.

-10°C +60°C for TSX SUP A05 supply module with product index II > 01.

(2) complies with IEC 68-2-6, FC test with module or block mounted on a board or panel.

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