Modicon Micro PLCs

TSX 3705/ 3708/ 3710/ 3720

Implementation manual - volume 2

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Document Set

At a Glance

This documentation comprises three volumes.

- Volume 1,
  - Processors,
  - Commissioning/Diagnostics/Maintenance,
  - Integrated analog,
  - Built-in counting,
  - Integrated communication,
- Volume 2,
  - Discrete input/output modules,
  - Discrete input/output offset module,
  - Process and AS-i suppliers.
- Volume 3,
  - Analog input/output modules,
  - Counting module,
  - Communication via PCMCIA card.

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About the Book

At a Glance

Document Scope

This manual describes TSX Micro PLC implementation.

User Comments

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Discrete input/output modules for Micro

I

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:

General introduction to Discrete input/output modules

1

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 Maps:

General description

General

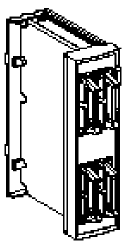
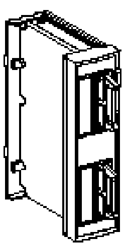
Input modules: they receive signals from the sensors and carry out acquisition functions, adaptation functions, galvanic insulation functions, filtering functions and functions protecting against parasitic signals.
Output modules: they carry out latch functions on the orders given by the processor to enable pre-actuator control through decoupling circuits and amplification circuits.

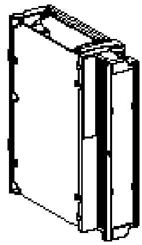
The range of discrete input and output modules meets the demands with regard to the:

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

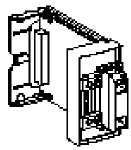
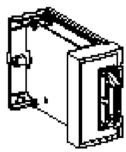
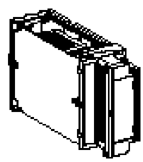
Overview

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

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

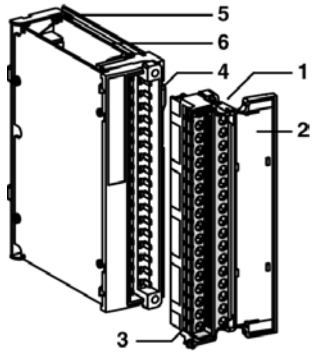
Half-size input/output mixed modules:

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

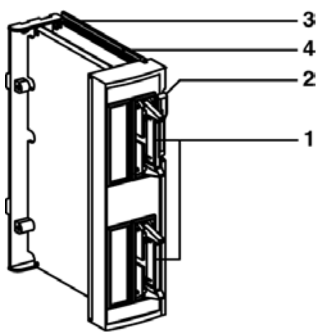
Each module is made up of the following elements:

<table>
<tr><td>Illustration

</td><td>

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).</td></tr>
</table>

Module connection by HE10 connector

Each module is made up of the following elements:

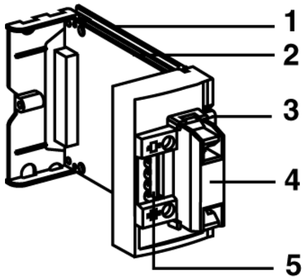
<table>
<tr><td>Illustration

</td><td>

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)</td></tr>
</table>

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

Module with casing terminal block connection

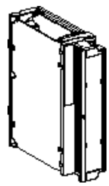
Each module is made up of the following elements:

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

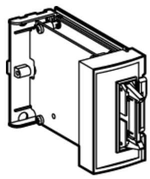
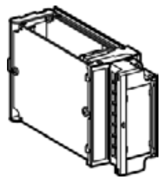
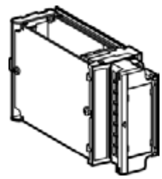
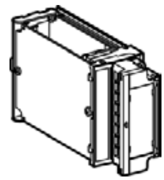
Catalog of full size input modules

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

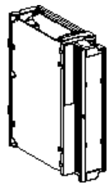
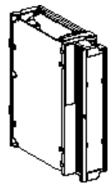
The following table describes the main characteristics of half size input modules:

				
Modularity	12 inputs		8 inputs	
Type/Voltage	Inputs: 24 VDC		Inputs: 100120 VAC	Inputs: 200240 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 *Compatibility of sensors with inputs, p. 66*			
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

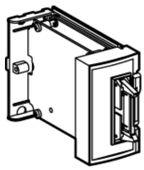
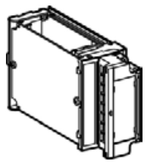
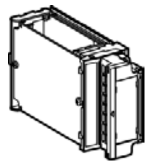
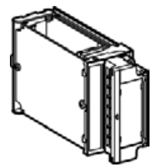
Catalog of full size output modules

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 Ith = 2 A performance according to load (see *Characteristics of the TSX DSZ 32R5 module, p. 145*)
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, p. 50*)	-
Connections	Screw terminal block	
References	**TSX DSZ 32T2**	**TSX DSZ 32R5**

Catalog of half size output modules

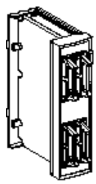
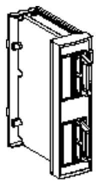
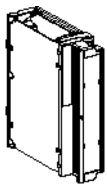
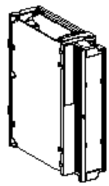
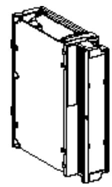
The following table describes the main characteristics of half size output modules:

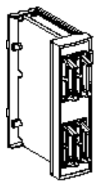
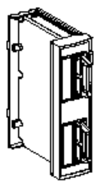
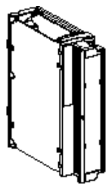
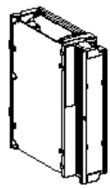
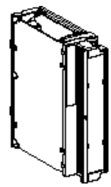
				
Modularity	8 outputs		4 outputs	8 outputs
Type/Voltage	Static outputs 24 VDC			Relay outputs: 24240 VAC 24 VDC
Insulation	Isolated outputs			
Allowable current/ power	0.5 A		2 A	1 "F" contact per channel Ith = 3 A Performance according to load (see *Characteristics of the TSX DSZ 08R5 module, p. 196*
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, p. 50*)			-
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

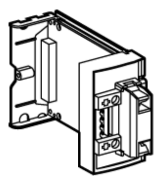
The following table describes the main characteristics of full size input/output mixed modules:

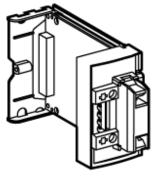
					
Modularity	32 inputs 32 outputs	16 inputs 12 outputs			
Type/Voltage	Inputs: 24 VDC Static outputs: 24 VDC			Inputs: 24 VDC Relay outputs: 24240 VAC 24 VDC	Inputs: 110 VDC Relay outputs: 24240 VAC 24 VDC
Inputs:					
Insulation	Isolated inputs				
Compliance IEC 1131-2	Type 1			Type 1, in positive logic	Type 2
Logic	Positive			Positive or negative	Positive
PD compatibility	2 wire DC PD (see *Compatibility of sensors with inputs, p. 66*) 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 Ith = 3 A performance according to load (see characteristics of output modules concerned)	
Compliance IEC 1131-2	Yes				
Product reference	**TSX DMZ 64DTK**	**TSX DMZ 28DTK**	**TSX DMZ 28DT**	**TSX DMZ 28DR**	**TSX DMZ 28AR**

					
Protection	Outputs protected against overloads and short-circuits by a fast electromagnet demagnetization circuit			Outputs are not protected	
Logic	Positive			-	
Output parallelization	3 outputs (see *24 VDC static output parallelization, p. 50*)	2 outputs (see *24 VDC static output parallelization, p. 50*)		-	
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

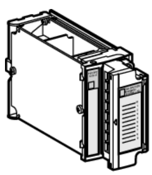
The following table describes the main characteristics of the half size input/output mixed module:

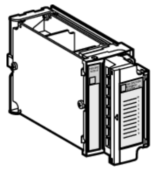
	
Modularity	8 inputs 8 outputs
Type/Voltage	24 VDC input 24 VDC static output
Inputs:	
Insulation	Isolated inputs
Compliance IEC 1131-2	Type 1
Logic	Positive
PD compatibility	2 wire PD (see *Compatibility of sensors with inputs, p. 66*) 3 wire DC PD (PNP with positive logic input)
Product reference	**TSX DMZ 16DTK**

	
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, p. 50*)
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. 215*) which monitors the emergency stop:

	
Modularity	8 discrete outputs (emergency stop), 1 discrete input (confirmation) 2 safety relay outputs
Type/Voltage	24 VDC input 24240 ACV or 24 VDC relay outputs
Product reference	**TSX DPZ 10D2A**

	
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 *Electrical characteristics of the emergency stop monitoring module, p. 242*)
Protection	Outputs are not protected
Connection	Screw terminal block
Product reference	**TSX DPZ 10D2A**

Discrete I/O functionalities

2

At a Glance

Aim of this Chapter

This chapter is an overview of the various functionalities related to discrete inputs/outputs.

What's in this Chapter?

This chapter contains the following sections:

2.1 Programmable filtering on inputs

Programmable filtering on inputs

Introduction

Input filtering time can be modified by configuring the software (see (Installation manual TSX Micro Volume 1)).

24 VDC inputs

All direct current inputs are provided with filtering which can be configured in groups of 4 consecutive inputs.

Input filtering uses:

- a preset analog filter which provides typical immunity of 0.1 ms for line interference filtering,
- a digital filter which can be configured in increments of 0.5 ms. This filtering can be modified in configuration mode via the terminal.

Configurable filtering times (in ms)															
0.1		1		2		3		4		5		6		7	
	0.6		1.5		2.5		3.5		4.5		5.5		6.5		7.5

The default filtering time is configured as 4 ms.

Note: to prevent bounces being acknowledged when mechanical contacts close, it is advisable to use filtering times greater than 3 ms.
In order to comply with standard CEI1131-2 and ensure consistency between input status and monitoring of the sensor supply, the configured value for filtering time must be equal to or greater than 3.5 ms

100•••120 VAC and 200•••240 VAC inputs

These inputs have preset filtering which can be adapted to the frequency of the 50 or 60 Hz network.

By default, inputs are set up for a 50 Hz network.

Note: the default setting for a 50 Hz network is also suitable for a 60 Hz network but does not provide the optimum response time.

2.2 Input-specific functionalities

At a Glance

Aim of this section

This sub-section describes functionalities that are specific to inputs.

What's in this Section?

This section contains the following topics:

General

Introduction

The first four inputs on a discrete I/O module or standard format input module, located at position 1 of a TSX 05/08 PLC, on a TSX 37 10 or TSX 37 21/37 22 PLC base, can be configured separately and regardless of their type:

- as normal discrete inputs (default configuration),
- as latching inputs,
- as event-driven inputs,
- as up counting, down counting or up/down counting inputs.

Note: it is not possible to configure the filtering time of these four inputs separately. For this reason, if one of these inputs is used in a way which necessitates a filtering time of less than 3 ms, the sensors used on the other three inputs must be of a type which does not give rise to bounces (static output sensors).

Latching (%I1.0 to %I1.3)

Introduction

To enable very short duration pulses of less than one PLC cycle time to be taken into account, you need to use the latching function.

Principle

This function acknowledges the pulse and processes it in the next cycle within the master task (MAST) or the fast task (FAST) without interrupting the PLC cycle.

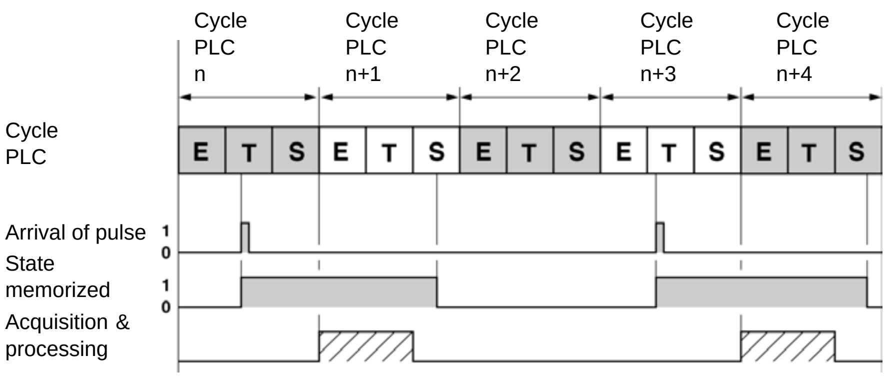
The pulse is taken into account when the input changes its state, which may be:

- a change of state from 0 to 1,
- a change of state from 1 to 0.

> **Note:** the time gap between the arrival of two pulses at the same input must be equal to or greater than two PLC cycle times.
> The minimum pulse duration must be greater than the chosen filtering time.

Example 1

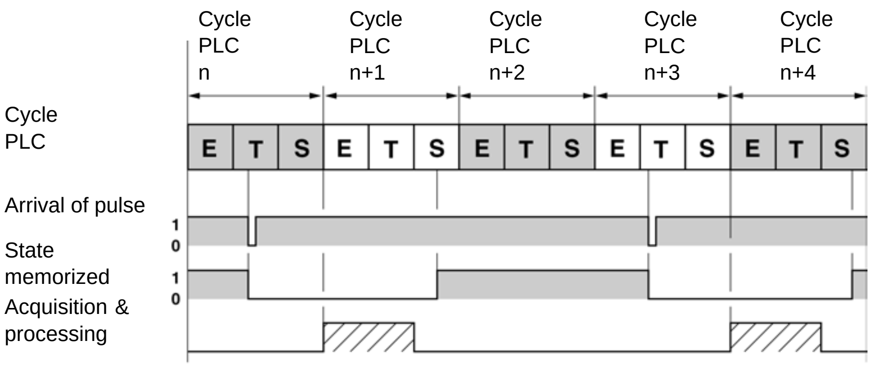
This example shows the processing mechanism for latching on a pulse of 0 -> 1



Key
E = acquiring inputs, T = processing program, S = updating outputs

Example 2

This example shows the processing mechanism for latching on a pulse of 1 -> 0



Key
E = acquiring inputs, T = processing program, S = updating outputs

Event management (%I1.0 to %I1.3)

Principle

To enable events to be taken into account and ensure that they are processed at once (processing on interrupt), not only TSX3705/08 PLCs but also TSX3710 and TSX 37 21/22 PLC bases offer four event inputs.

These inputs %I1.0 to %I.3 are associated with event tasks (Evti) defined in configuration mode (I = 1 to 8 for the TSX 37 05/08/10 and 0 to 15 for the TSX 37 21 22).

The associated memory objects are not implicitly updated.

For example, when an event configured on a rising edge occurs, this means that the associated physical input has gone to 1, but the memory object is regarded as 0.

Event processing can be triggered by a rising edge (0 -> 1) or falling edge (1-> 0) on the associated input.

The %SW48 event counter is incremented even on STOP PLC.

Note: for further information on event management, see (Reference manual Volume 1).

Counting in the case of discrete inputs (%I1.0 to %I1.3)

Principle

These four inputs can be used to produce two counting channels (channel 0 and channel 1). For each channel there is a choice of three possible functions:

- up counting function,
- down counting function,
- up/down counting function with or without operating direction discriminator.

The maximum count frequency is limited to 500 Hz with DC inputs at the minimum filtering time.

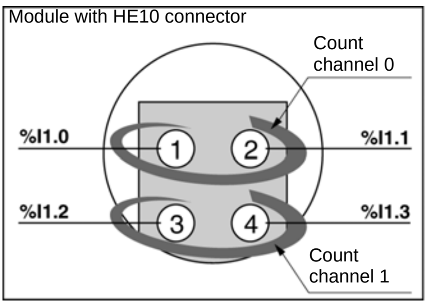
Depending on the chosen input type, these inputs can receive pulses generated by any incremental encoder with 24 VDC outputs of the following types:

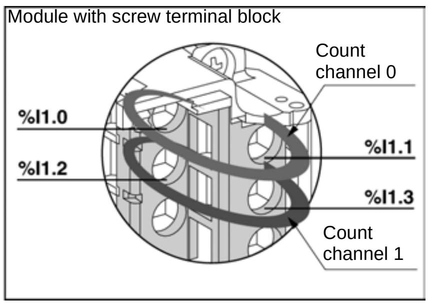
- NPN with open collector,
- PNP with open collector,
- totem pole.

> **Note:** option to perform the various count functions on the basis of 110/120 VAC inputs. In this event the count frequency will be limited to 20 Hz.
> For further information on implementing the various count functions involving discrete inputs, see (Installation manual TSX Micro Volume 1).

Illustration

The illustration below shows the physical location of inputs %I1.0 to %I1.3.





RUN/STOP function (%I1.8)

Introduction

Use the RUN/STOP function to start the application program (RUN) or to stop it (STOP).

Principle

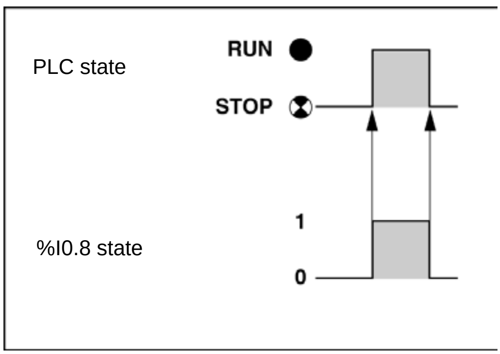
This function can be associated with input %I1.8 by using the PL7 configuration screen.

A STOP command imposed by physical input %I1.8 takes priority over a RUN command from a terminal or network.

The transition to RUN is triggered by a rising edge on the RUN/STOP input.

The STOP command is triggered by a 0 state on the RUN/STOP input.

Illustration



RAM > FLASH EPROM internal transfer function (%I1.9)

Introduction

This function is used to transfer the application program and internal words %MW from the internal RAM to the internal FLASH EPROM.

Principle

Discrete input %I1.9 can be configured as an external input for requesting a transfer RAM FLASH -> internal EPROM.

The transfer will be executed on a rising edge of the input.

2.3 Output-specific functionalities

Alarm function (%Q2.0)

Principle

With the alarm function configured and the PLC on RUN, the output %Q2.0 associated with the alarm function is in state 1.

This output goes to state 0 when:

- a "blocking fault" appears,
- the PLC is no longer in normal operating mode (STOP, stopped on breakpoint, etc.).

This function can be associated with output %Q2.0 by using the PL7 configuration screen.

This positive operating mode makes it possible to use this output in external safety circuits such as:

- actuator power supply feedback control,
- the return of information.

2.4 Protection and monitoring measures

At a Glance

Aim of this section

This section introduces the devices for protecting and monitoring discrete I/O modules.

What's in this Section?

This section contains the following topics:

Monitoring on inputs

Sensor voltage monitoring

All input modules include a sensor voltage monitoring device covering all the channels on the module. This device checks that the level of the sensor supply voltage in the module is sufficient to keep the input channels in the module operating correctly (see the characteristics of the modules).

If the sensor voltage is equal to or less than the defined threshold, this is indicated by the following:

- the I/O LED is lit (I/O fault),
- the channel fault bit %Ix.i.ERR =1,
- fault information is present in the module status word (%MWx.MOD.2:X9).

Note: the sensor supply must be protected by a 0.5 A fast-blow fuse.

Note: sensor voltage monitoring can be disabled from an input module's configuration screen or by means of a software routine using the function WRITE_CMD (see (Application-specific functions Setup manual TSX Micro Volume 1)).

Protection and monitoring measures on outputs

Actuator voltage check

All 24 VDC static output modules include an actuator voltage monitoring device covering all the channels on the module.

This device checks that the level of the actuator supply voltage in the module is sufficient to keep the output channels in the module operating correctly.

This voltage must be higher than 18 volts for modules with static DC outputs. If the actuator voltage is equal to or less than this threshold, outputs go to the 0 state and the fault is indicated by the following:

- the I/O LED is lit (I/O fault),
- the channel fault bit %Ix.i.ERR =1,
- fault information is present in the module status word (%MWx.MOD.2:X9).

> **Note:** for relay output modules, these bits are not significant (always 0).

Protection on each channel against short-circuits and overloads

All channels incorporate an electrical and thermal protection device enabling them to be protected against faults of this type.

If a channel is tripped, this is indicated by the following:

- the I/O LED is lit (I/O fault),
- the channel LED on the centralized display flashes (in diagnostic mode),
- the channel fault bit %Ix.i.ERR =1,
- fault information is present in the module status word (%MWx.MOD.2:X8).

> **Note:** for static output modules, these bits indicate that the module has been tripped or has a power supply fault.

> **Note:** actuator voltage monitoring can be disabled from an output module's configuration screen or by means of a software routine using the function WRITE_CMD (see (Application-specific functions Setup manual TSX Micro Volume 1)).

Protection against polarity inversions

Modules are fitted with a device which not only short-circuits the power supply in the event of polarity inversion, but does so without damaging the module.

For this protection to operate in optimum conditions, it is vital to place a fast-blow fuse on the power supply upstream of the actuators.

As a general rule it is advisable to fit one fuse per output channel group on each module

The table below shows the fuse rating according to the module type:

Protection in amperes	Module type
2	TSX DMZ 64DTK
6.3	TSX DMZ 28DT/DTK TSX DMZ 16DTK TSX DSZ 08T2/T2K
10	TSX DSZ 32T2 TSX DSZ 04T22

Protection against inductive over-voltages

Each output is individually protected against inductive over-voltages and has a circuit for rapidly demagnetizing solenoids by means of a Zener diode, making it possible to reduce the mechanical cycle time on certain fast machines.

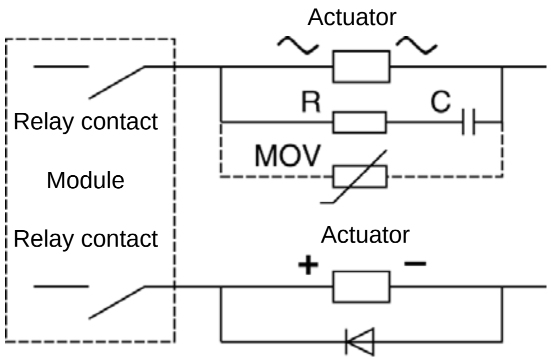
Protection of output relay contacts

Output relay contacts do not incorporate any protection device in order to permit control of the following:

- low-energy isolated inputs which necessitate an absence of leakage currents,
- power circuits, by preventing inductive over-voltages at source.

For this reason it is mandatory to fit actuator coil terminals with the following:

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



Note: a relay output that is used on an AC load must not subsequently be used on a DC load and vice versa.

Resetting 24 VDC static outputs

If a fault has tripped an output, it can be reset provided there is no longer a fault on its terminals.

The reset command is defined during configuration. It can be automatic or program-driven:

- **automatic reset command**
  This command is executed by the module approximately every 10 seconds while the fault persists.
- **programmed reset command** (default configuration)
  This command is executed by the application program. An internal device limits these reset commands to a maximum of once every 10 seconds in order to prevent defective outputs from overheating.

The reset command applies to every channel exhibiting a fault on the module.

Output fallback

In the event of a malfunction in the application program or in the transition of a task to STOP, the outputs can be placed in a state which is not prejudicial to the application.

This state, called the fallback position, is defined for each module when the outputs are being configured.

Configuration offers a choice between:

- **Fallback to 0** (default mode): outputs will be set to state 0,
- **Maintain state**: output will be held in the state that existed prior to the malfunction.

2.5 24 VDC static output parallelization

24 VDC static output parallelization

24 VDC / 0.1 A static outputs

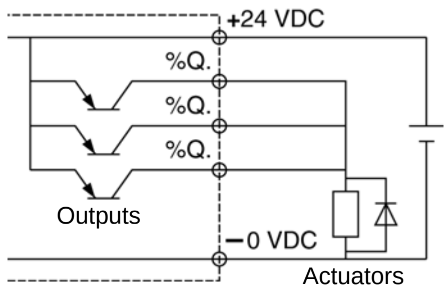
A maximum of three outputs per module can be parallelized.

The maximum current flow is then 0.3 A.

Note: in this connection method, a discharge diode must be fitted to the actuator's terminals.

Illustration

The illustration below shows the wiring of three 24 VDC / 0.1 A outputs



24 VDC / 0.5 A and 2 A static outputs

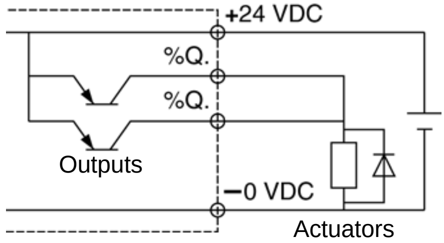
A maximum of two outputs per module can be parallelized.

The maximum current flow is then 1 A or 4 A depending on the module type.

Note: in this connection method, a discharge diode must be fitted to the actuator's terminals.

Illustration

The illustration below shows the wiring of the two 24 VDC / 0.5 A or 2 A outputs



General implementation rules for Discrete input/output modules

3

At a Glance

Aim of this Chapter

This chapter introduces the general installation rules for Discrete input/output modules.

What's in this Chapter?

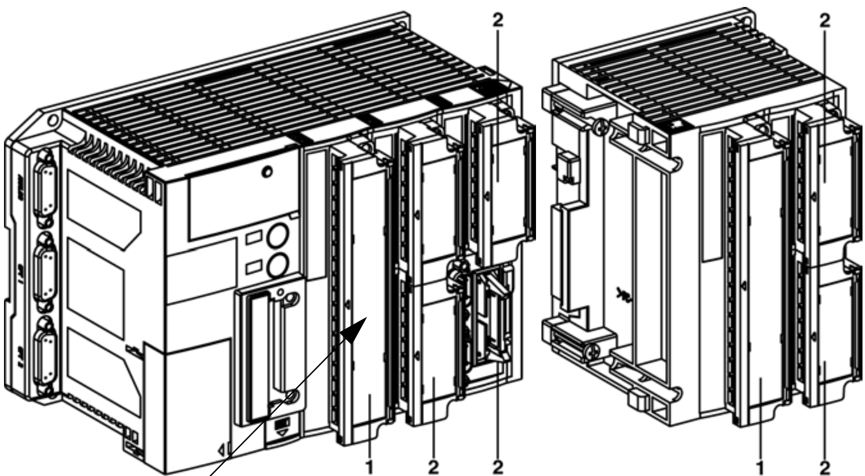
This chapter contains the following topics:

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:



Module only in standard size

1 : Module in standard size

2 : Half size module

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.

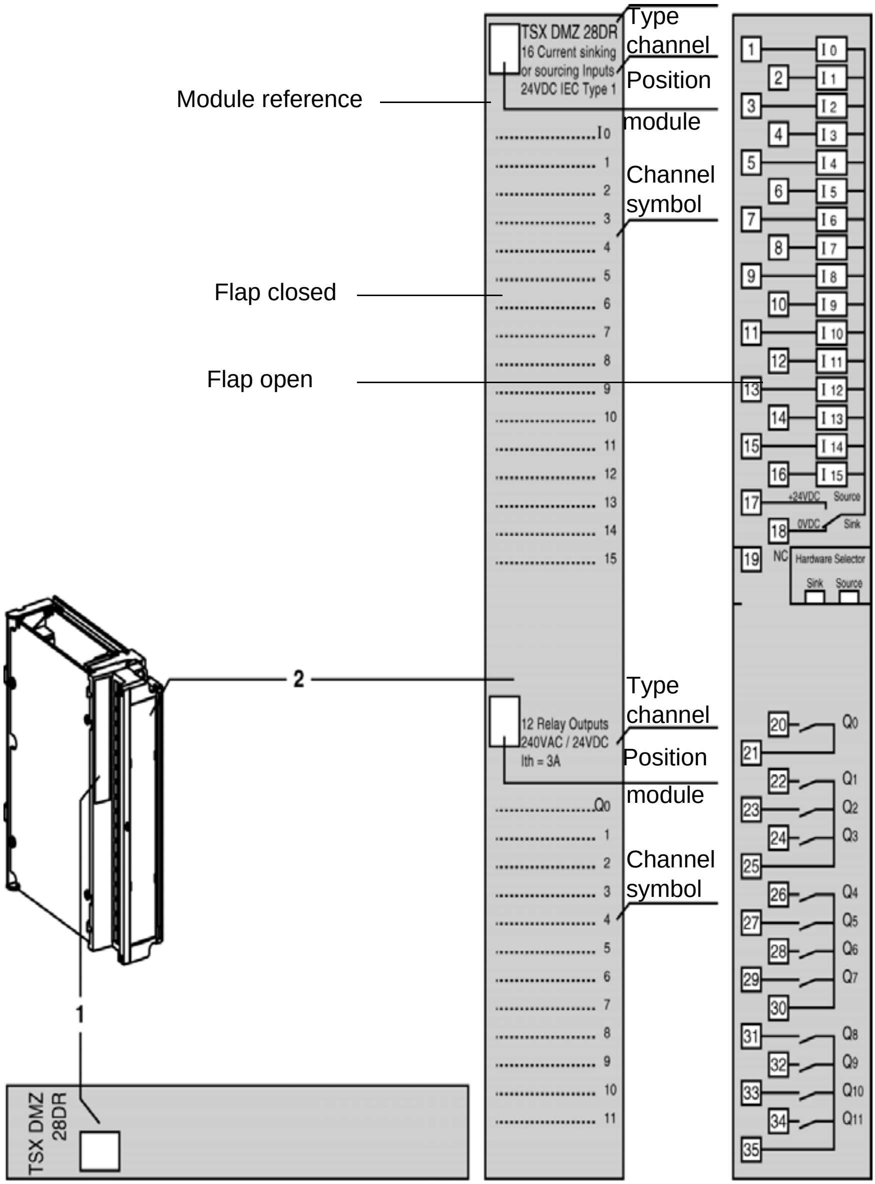
Terminal block description

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

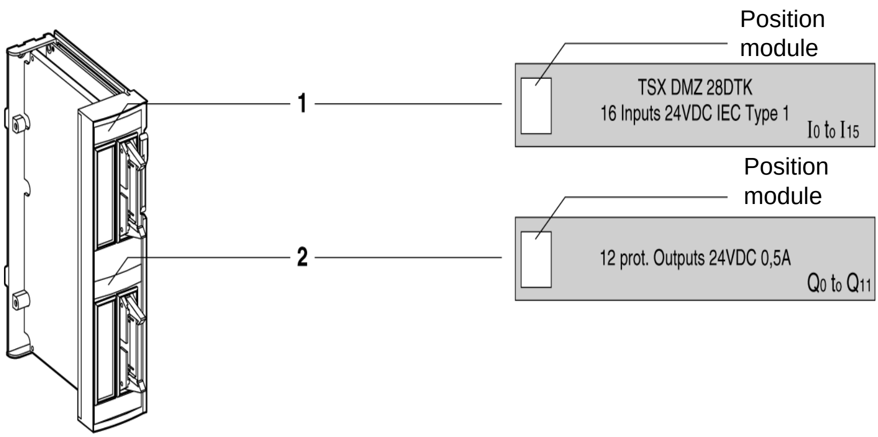
Description

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:



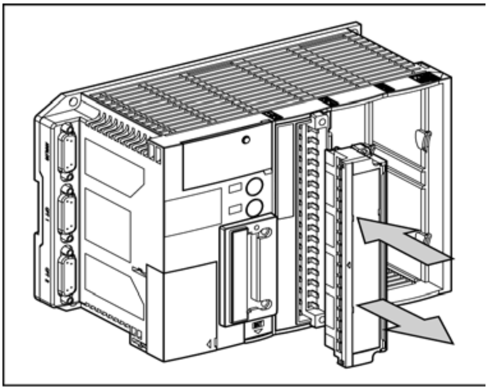
Note:

Half size modules only have label 1.

Precautions of use

Wiring/Unwiring screw terminal blocks or HE10 connectors

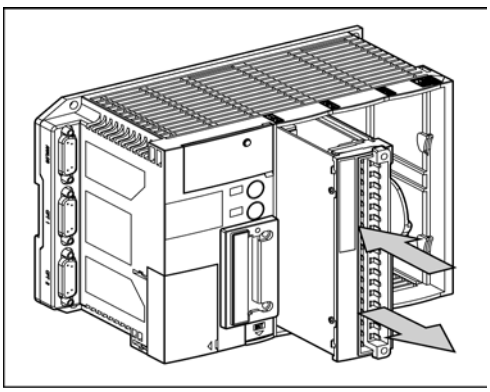
HE10 connectors or screw terminal blocks must be wired or unwired with sensor and pre-actuator power supplies disconnected.



Mounting and removing modules

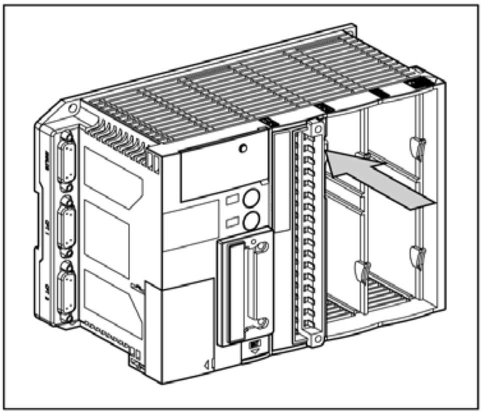
Modules must be mounted and removed with:

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



Locking modules into their slots

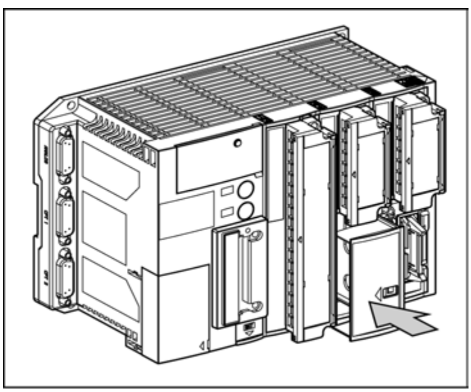
The module fixing latch must be completely engaged so that electrical contacts and ground connections are fully established.



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

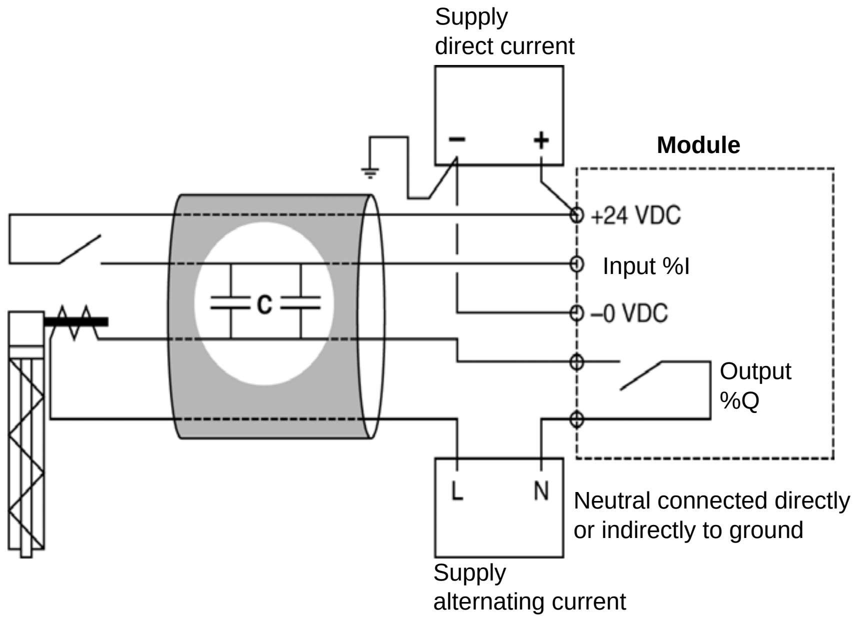
Recommendations of use:

- 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:

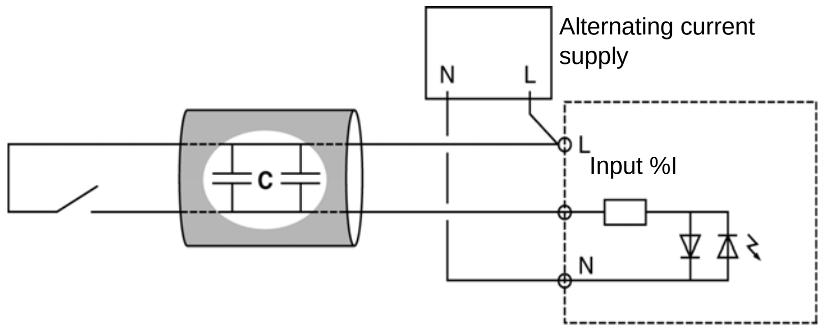
$$\text{Capacity allowed} \quad \frac{\text{Capacity (line 240 VCA) x 240}}{\text{Linevoltage}}$$

> **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

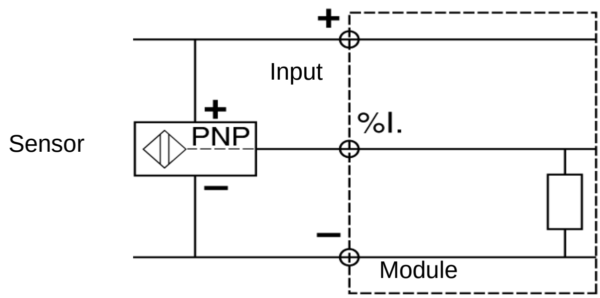
- Inside and outside the device:
  to limit AC coupling, the power circuit cables (supply modules, power switches etc.) must be separate from the input (sensors) and output (actuators) cables.
- Outside the device:
  Input/output cables must be placed in conduits separate from those holding high-power 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

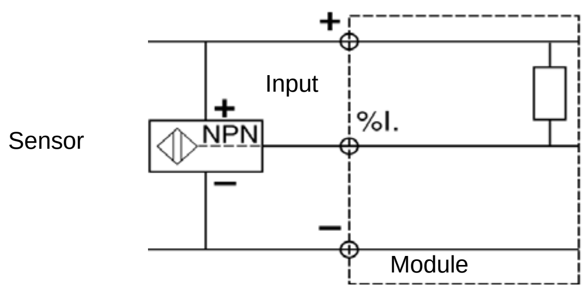
3-wire sensors and positive logic inputs (sink) IEC 1131-2 type 1 and type 2

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

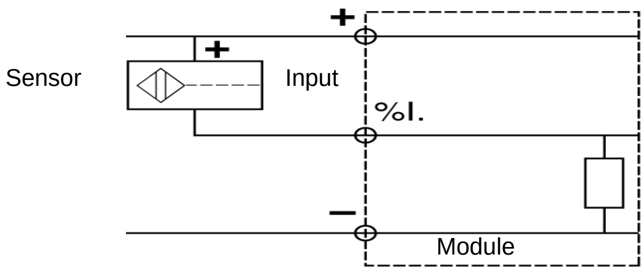
2-wire sensors and positive logic inputs (sink) IEC 1131-2 type 1

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: ≤ 7V.

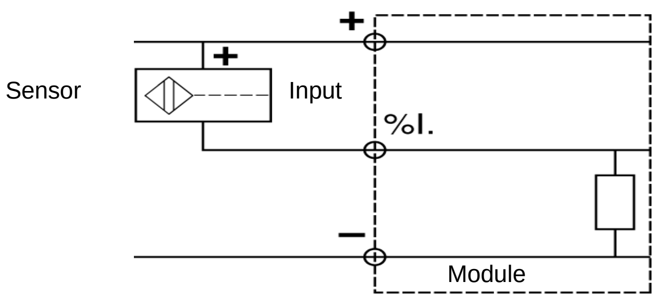
Minimum switched current: ≤ 2.5mA.

Residual current when open: ≤ 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.



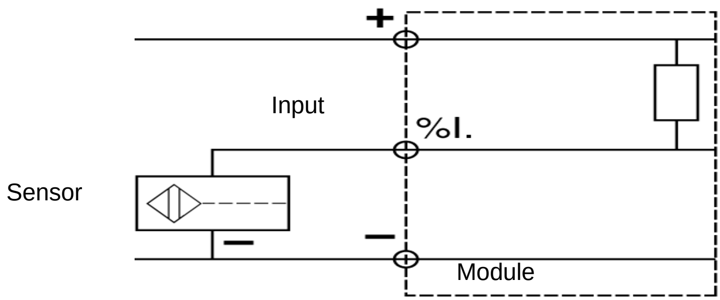
2-wire sensor and negative logic inputs (source)

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: ≤ 7V.

Minimum switched current: ≤ 2.5mA.

Residual current when open: ≤ 1.5mA.



Compatibility of 2-wire sensors with 100120 VAC or 200240 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 Teleméchanique make or other with the following characteristics: **Voltage drop when closed ≤ 7V** **Minimum switched current ≤ 2.5mA** **Residual current when open ≤ 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:

$$0,1 \times \mathrm{Inominal} \geq 5 \times \mathrm{Ifuite}$$

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.

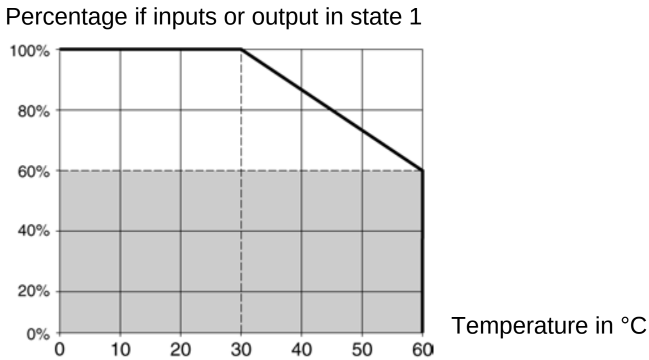
Temperature related performance

General

All characteristics of the various modules and the corresponding discrete inputs/outputs are given for a load rate of 60% of inputs and 60% of outputs simultaneously in state 1.

When used with a load rate exceeding 60%

The illustration below depicts the deterioration curve for a load rate other than 60%.



At the outputs level, temperature deterioration is effected on the maximum current carried by the active outputs.

Example 1: Assume a module with 12 static 24 VDC/0.5 A outputs each carrying 0.5 A.

At 60°C, the maximum current permitted at the outputs level will be:

12 x 0.5 x 60% = 3.6 A, which corresponds to 7 outputs active simultaneously.

Example 2: Assume the same module (12 static 24 VDC/0.5 A outputs) each carrying 0.3 A.

At 60°C, the maximum current permitted at the outputs level will be:

12 x 0.5 x 60% = 3.6 A, which corresponds to 12 outputs active simultaneously.

In this case, there is no deterioration at the outputs level. The maximum current permitted at module level is not being exceeded.

Connection to modules with screw terminal blocks

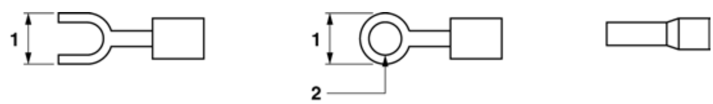
General

Each terminal can receive bare wires or wires fitted with ferrules, open contacts or closed contacts.

The capacity of each terminal is:

- A minimum of: 1 x 0.28 mm^2 wire without end ferrule,
- A maximum of:
  - 2 x 0.00155 in^2 wires with end ferrule or,
  - 1 x 1.5 mm^2 wire without end ferrule or,
  - 1 open or closed contact for wire of 0.00155 in^2.

Type of contact



1 5.5 mm maximum

2 Ø 3.2 mm minimum

The bracket screws have a groove which accepts screwdrivers of the following types:

- Pozidriv N°1 cross-head,
- 0.20 in diameter flat-head

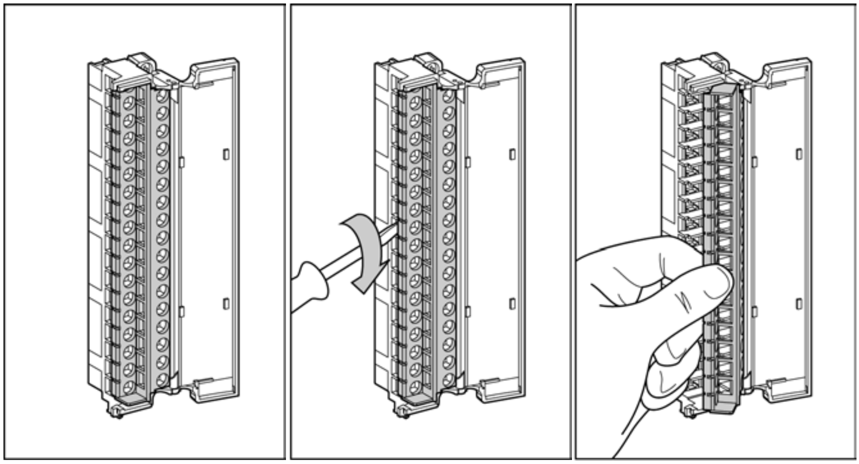
Maximum tightening torque on screws in the connection terminal block: 0.8 N.m

Terminal cover

Screw connection terminal blocks are fitted with a removable cover which ensures:

- that screws cannot be lost,
- that personnel are protected.

The illustration below shows the procedure for removing a screw cover.



1 Opening the flap **2 Opening the cover** **3 Dismounting the**

Note: when closed contacts are used, the cover must be removed in order to extract the contact fitting screw. The cover will not be refitted so that the wires can pass through.

Connection to modules with HE10 connectors: Ready-wired lead of 20 wires, 22 gage (0.324 mm^2).

Introduction

It is designed to allow the inputs/outputs on modules with HE10 connectors to be connected easily and directly to sensors, actuators or terminals wire-by-wire.

This ready-wired lead consists of:

- at one end, a sheathed HE10 connector from which emerge 20 sheathed wires each with a 0.324 mm 2 cross-section,
- at the other end, free wires color-coded to DIN 47100.

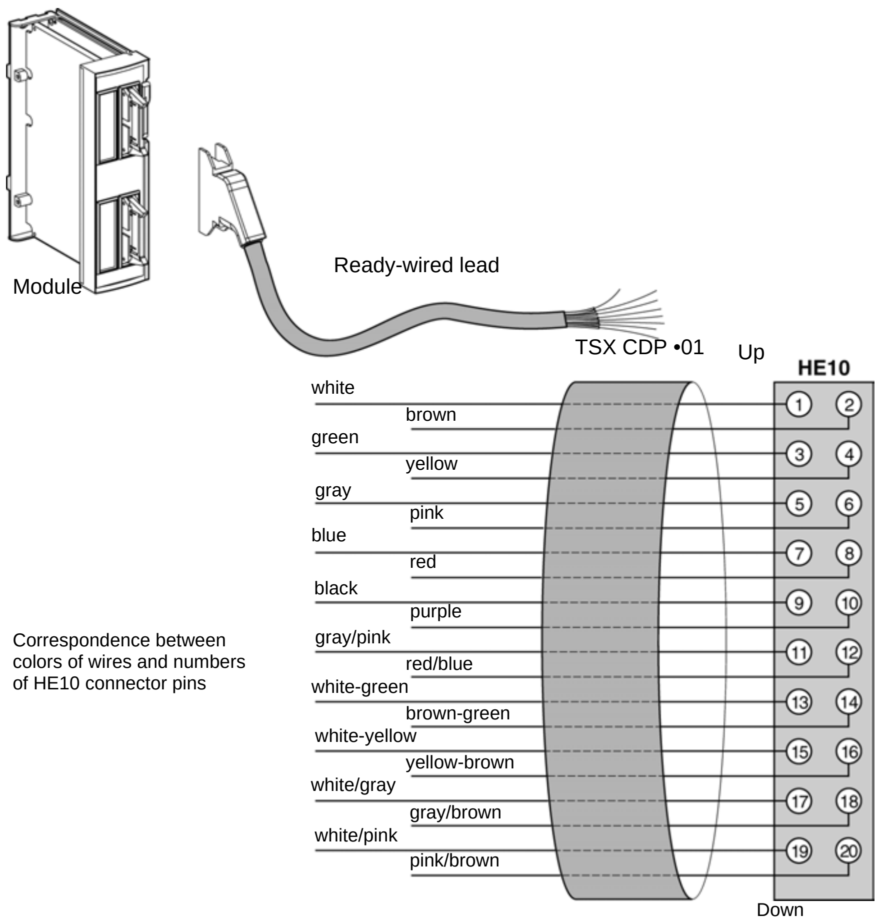
Note: a nylon strand incorporated into the cable can be used to cut the sheath easily.

Two product references are recommended:

- TSX CDP 301: 9 ft 10 in length,
- TSX CDP 501: 16 ft 5 in length.

Illustration

The illustration below shows the physical appearance of the cable.



Connection to modules with HE10 connectors: 28 gage multi-stranded sheathed cable (0.08 mm^2)

Introduction

For connecting the inputs/outputs on modules with HE10 connectors to interfaces for fast connection and adaptation in the TELEFAST 2 range.

This cable is made up of two HE10 connectors and a multi-stranded sheathed ribbon cable in which each wire has a cross-section of 0.08 mm 2.

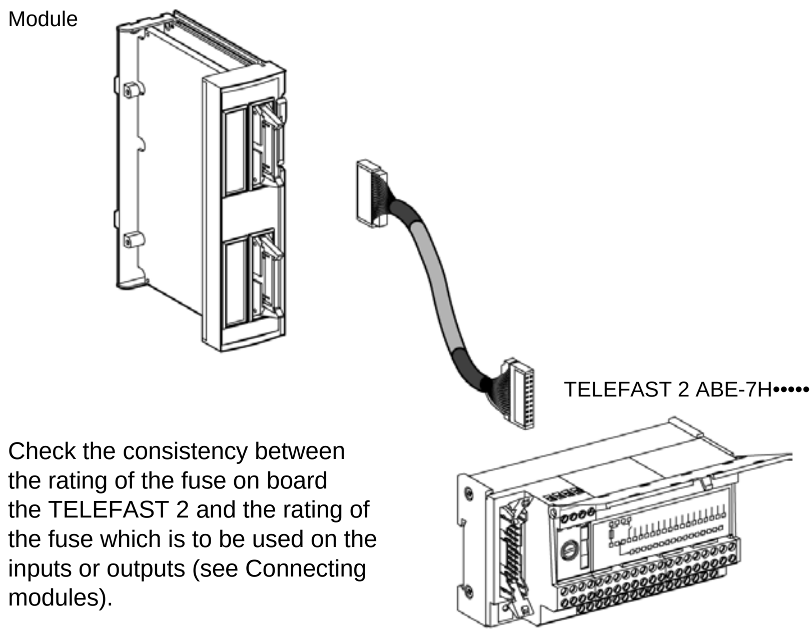
> **Note:** given the small cross-section of each of the wires, you are advised only to use it for low current inputs or outputs (< 100 mA per input or output).

Three product references are recommended:

- TSX CDP 102: 3 ft 3.4 in length,
- TSX CDP 202: 6 ft 6.8 in length,
- TSX CDP 302: 9 ft 10.2 in length.

Illustration

The illustration below shows the physical appearance of the cable.



Check the consistency between the rating of the fuse on board the TELEFAST 2 and the rating of the fuse which is to be used on the inputs or outputs (see Connecting modules).

Connection to modules with HE10 connectors: 22 gage connection cable ($0.324\ mm^2$).

Introduction

For connecting the inputs/outputs on modules with HE10 connectors to interfaces for fast connection and adaptation in the TELEFAST 2 range.

Also used for connecting to installation Help systems for dialog components or motor-starters (TSX DMZ 16DTK only).

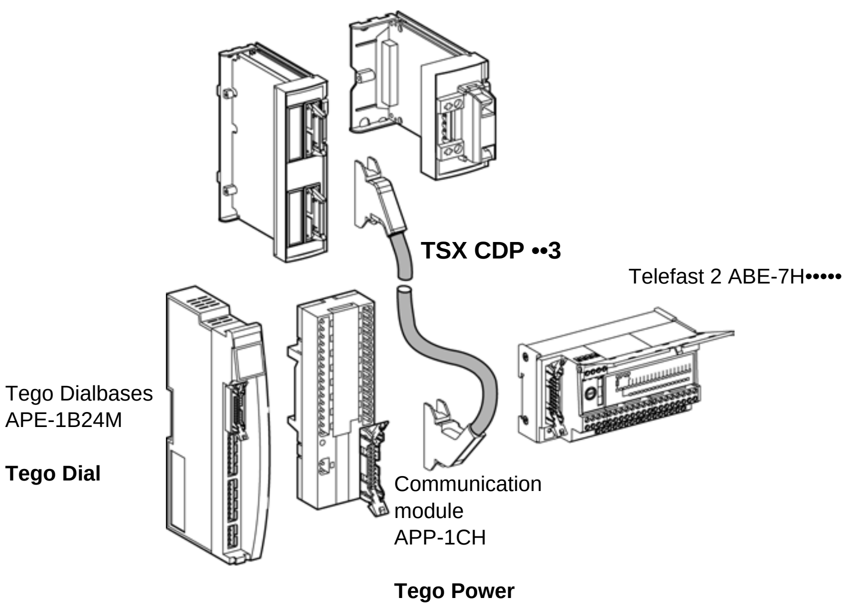
This cable is made up of 2 sheathed HE10 connectors, and a cable with wires that have a cross-section of 0.324 mm 2, which can take higher currents (for example, 0.5 A outputs).

Five product references are recommended:

- TSX CDP 053: 0.50 meter length,
- TSX CDP 103: 3 ft 3.4 in length,
- TSX CDP 203: 6 ft 6.8 in length,
- TSX CDP 303: 9 ft 10 in length,
- TSX CDP 503: 16 ft 5 in length.

Illustration

The illustration below shows the physical appearance of the cable.



Handling of Discrete input/output module faults

4

Discrete input/output diagnostics and display

At a Glance

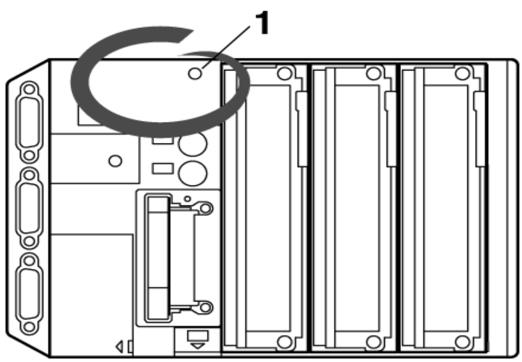
Discrete input/output diagnostics and display is carried out from:

- 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 (Installation manual TSX Micro Volume 1) .

Illustration

See the picture below:



The Discrete input/output mixed module TSX DMZ 64DTK

5

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 Maps:

Introduction to the TSX DMZ 64DTK module

At a Glance

The TSX DMZ 64TK 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:

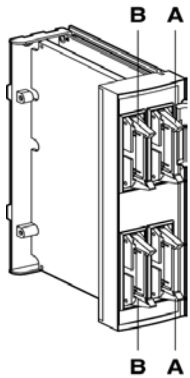
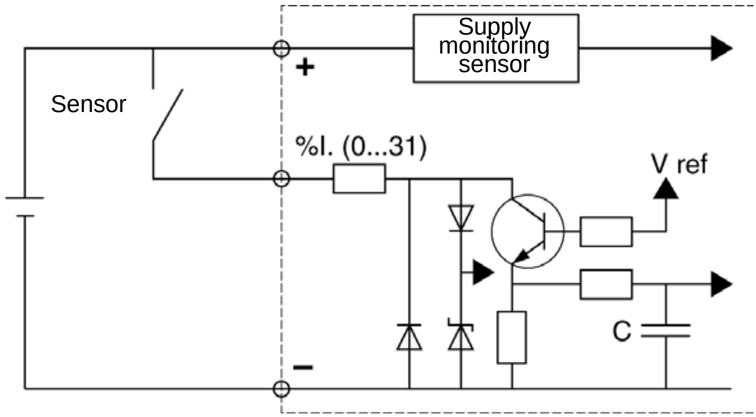
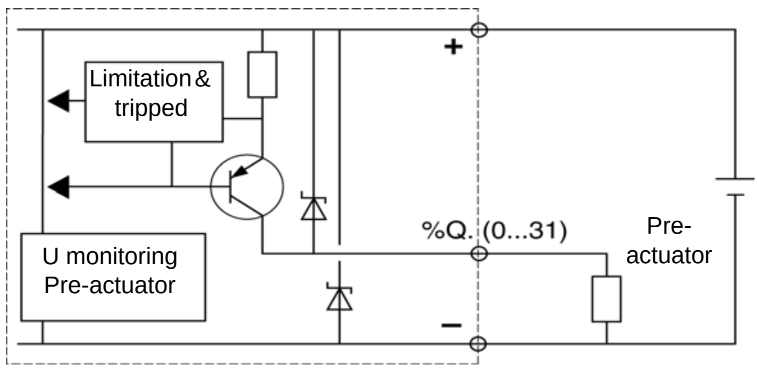


Diagram showing the principle of Inputs/Outputs

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 *Compatibility of 2-wire sensors with 24 VDC inputs, p. 67*
DDP 3 wire compatibility			Yes
Reference input			To + on the supply

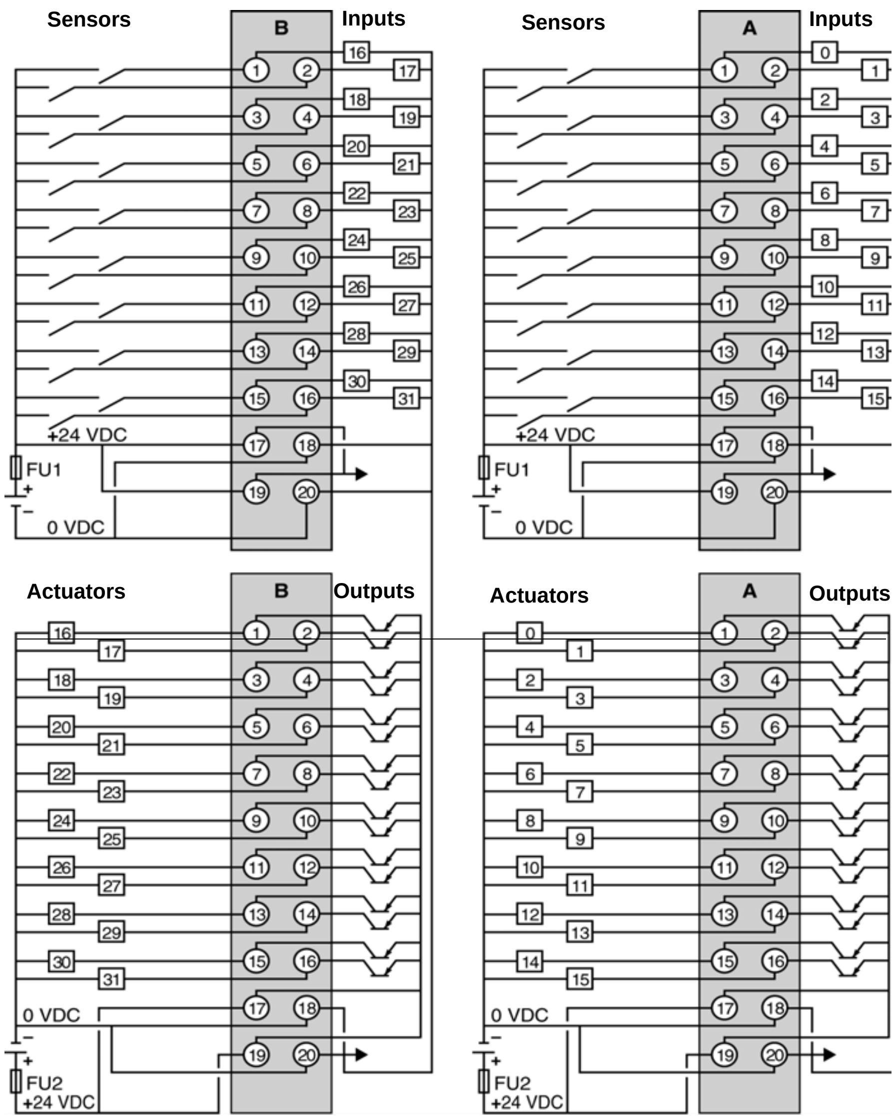
Characteristics of the 24VDC/ 0.1A static outputs

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 µs
	Transition state 1 to 0	< 250 µs
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<=1d<=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

Connection terminals	Wire colors actuator side
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

6

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 Maps:

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.

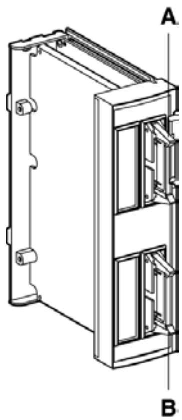
The module is equipped with 2 male HE10 connectors:
- connector A to connect inputs,
- connector B to connect outputs,

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).

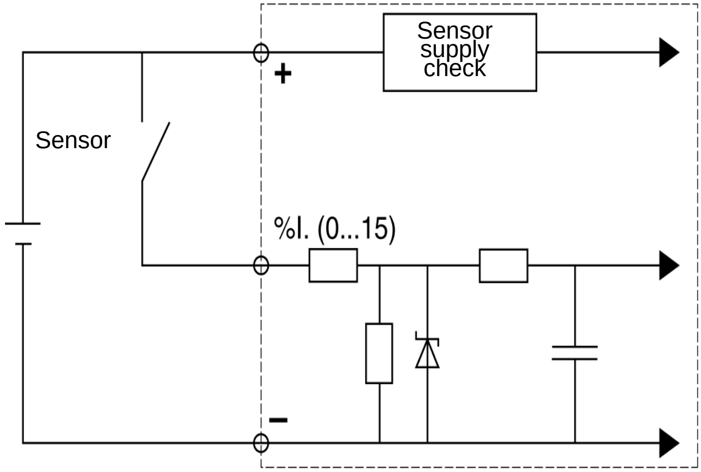
Illustration

Module:

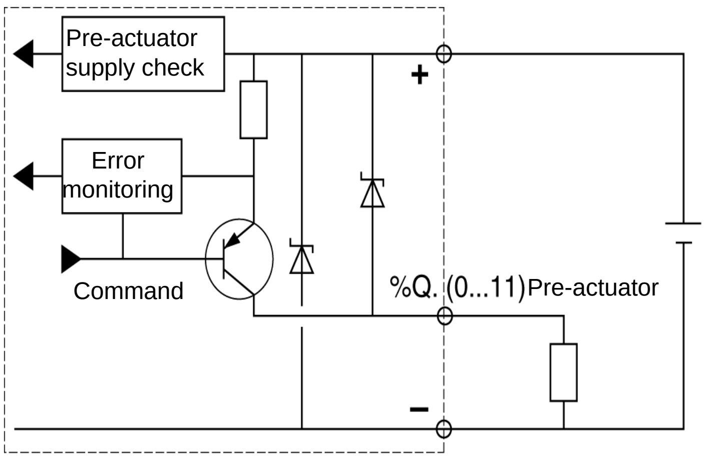


Process diagrams for inputs/outputs

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 *Compatibility of 2-wire sensors with 24 VDC inputs, p. 67*
DDP 3 wire compatibility			Yes
Reference input			To + on the supply

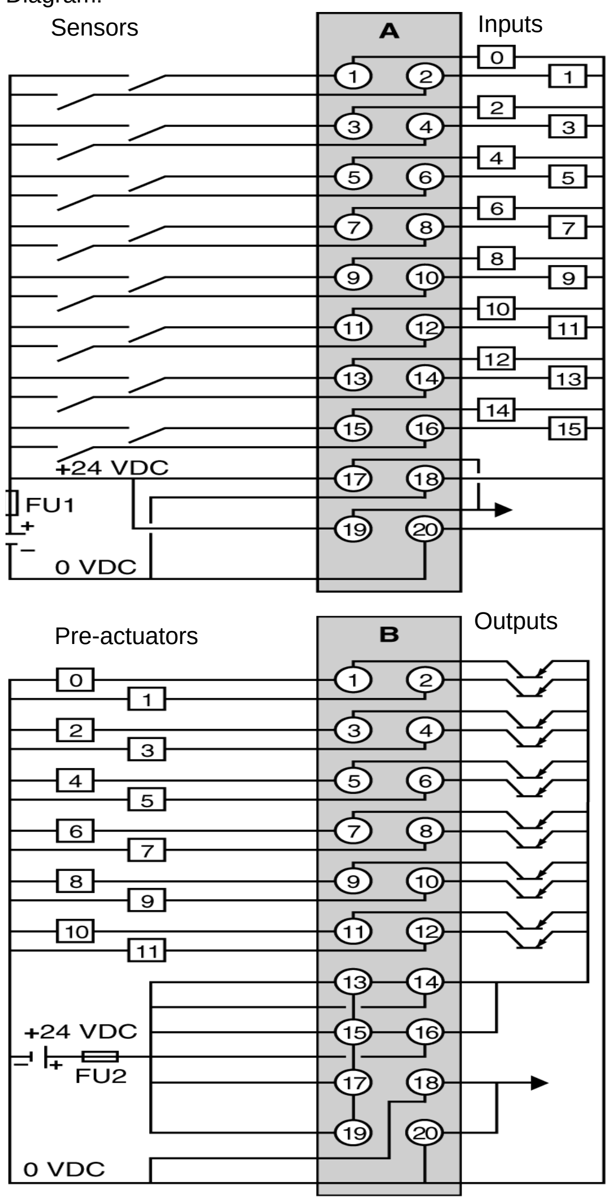
Characteristics of the 24VDC/ 0.5A static outputs

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 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<=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

Connector terminals	Pre-actuator colored wire
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

7

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 Maps:

Module TSX DMZ 28DT

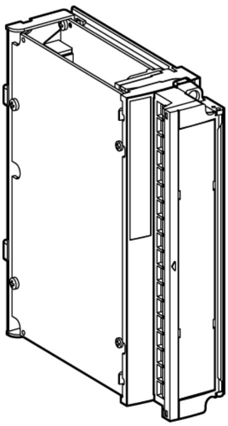
At a Glance

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:

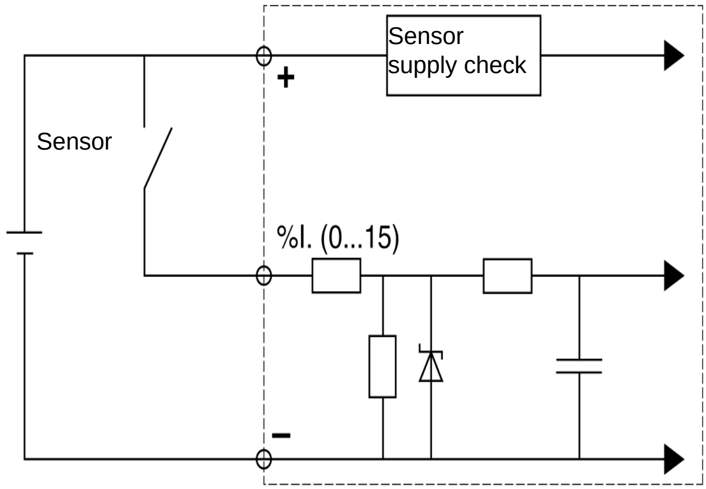
Illustration

Module:

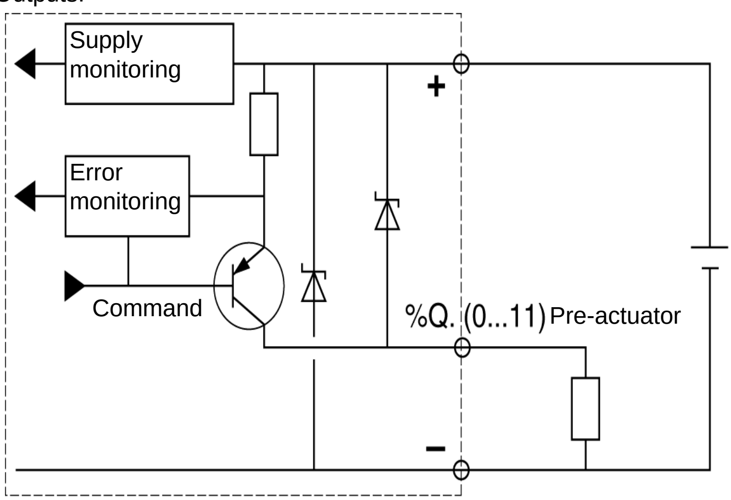


Process diagrams of inputs/outputs

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 *Compatibility of 2-wire sensors with 24 VDC inputs, p. 67*
DDP 3 wire compatibility			Yes
Reference input			To + on the supply

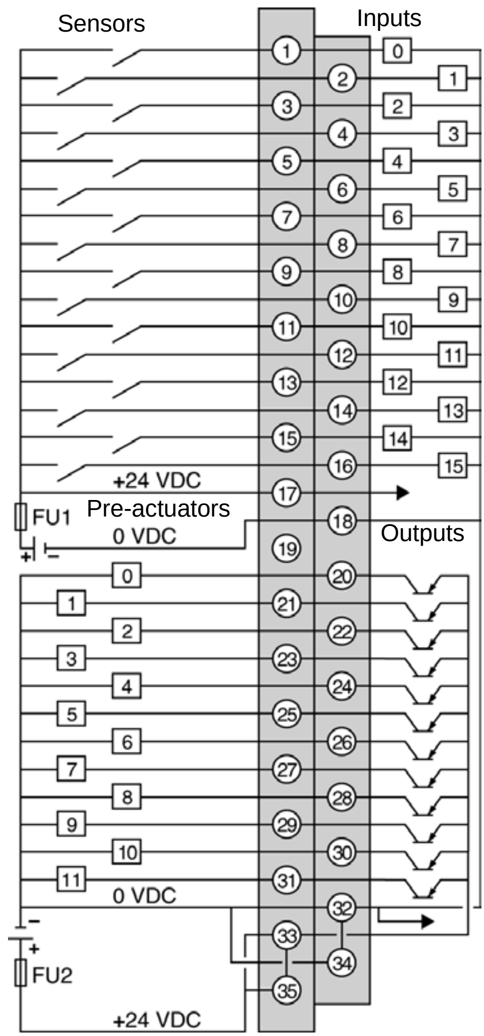
Characteristics of the 24VDC/ 0.5A static outputs

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 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<=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.		

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

8

At a Glance

Aim of this Chapter

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

What's in this Chapter?

This Chapter contains the following Maps:

Module TSX DMZ 28DR

At a Glance

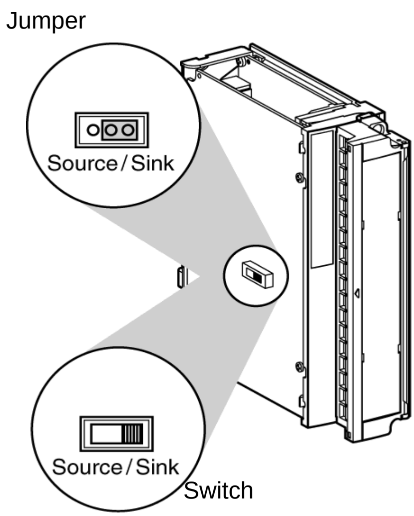
Module TSX DMZ 28DR comprises 28 inputs/outputs distributed as follows:
- 16 24VDC inputs, positive logic type 1, or negative logic,
- 12 relay outputs.

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.

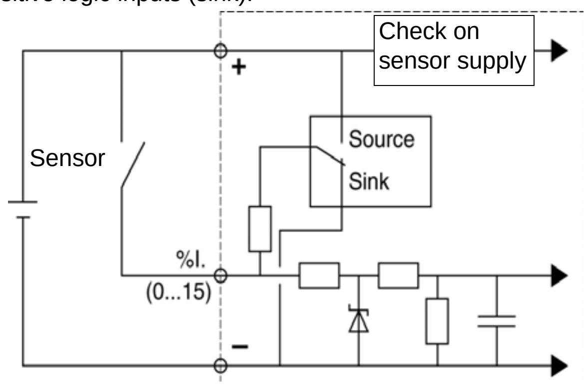
The choice is made by:
- positioning a switch or jumper on the module to enable physical adaptation. By default, the material configuration is sink (positive logic),
- software configuration to adapt the signals to the logical direction.

Illustration

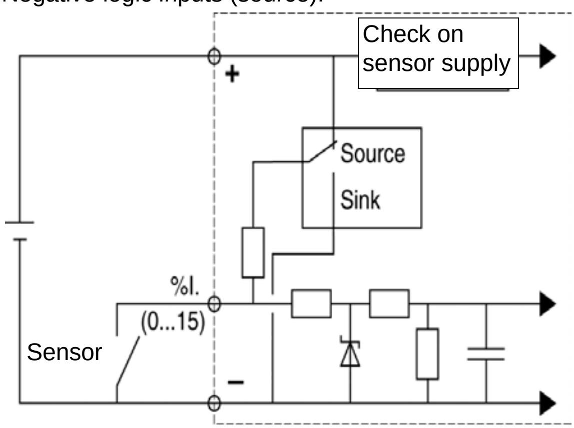


Process diagrams of inputs/outputs

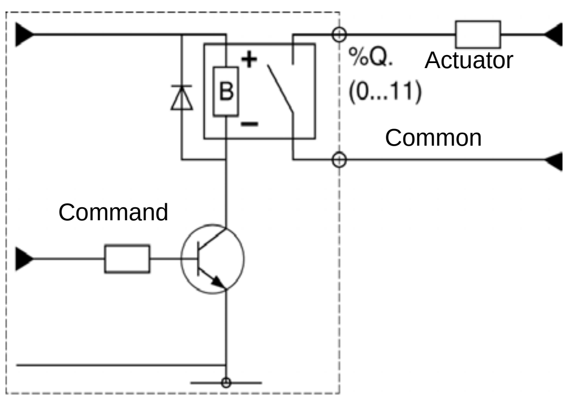
Positive logic inputs (sink):



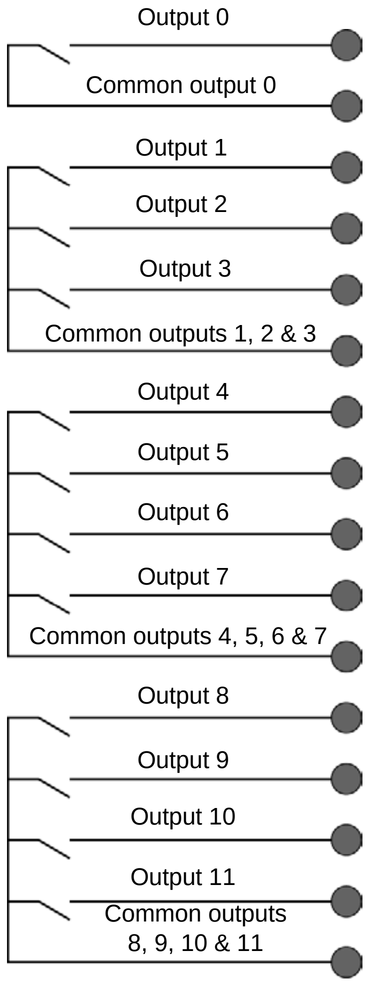
Negative logic inputs (source):



Outputs:



Modularity (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

<table>
<tr><td colspan="3">Logic</td><td>Positive or negative</td></tr>
<tr><td rowspan="3">Nominal input values</td><td colspan="2">Voltage</td><td>24V</td></tr>
<tr><td rowspan="2">Current</td><td>Positive logic</td><td>9mA</td></tr>
<tr><td>Negative logic</td><td>-6mA</td></tr>
<tr><td rowspan="7">Input threshold</td><td rowspan="3">In state 1</td><td>Voltage (positive logic)</td><td>≥ 11 V</td></tr>
<tr><td>Voltage (negative logic)</td><td>≤ 8 V</td></tr>
<tr><td>Current for U = 11V</td><td>> |2.5| mA</td></tr>
<tr><td rowspan="3">In state 0</td><td>Voltage (positive logic)</td><td>< 5 V</td></tr>
<tr><td>Voltage (negative logic)</td><td>> Ual - 5 V</td></tr>
<tr><td>Current</td><td>< |1.5| mA</td></tr>
<tr><td colspan="2">Sensor supply (including ripple)</td><td>19V to 30V (possible up to 34V, limited to 1 hour per 24 hours)</td></tr>
<tr><td colspan="2" rowspan="2">Input impedance</td><td>Positive logic</td><td>2.4KΩ</td></tr>
<tr><td>Negative logic</td><td>4KΩ</td></tr>
<tr><td colspan="2" rowspan="2">Configurable response time</td><td>State 0 to 1</td><td>0.1...7.5ms</td></tr>
<tr><td>State 1 to 0</td><td>0.1...7.5ms</td></tr>
<tr><td colspan="2" rowspan="2">Sensor voltage check threshold</td><td>OK</td><td>> 18V</td></tr>
<tr><td>Fault</td><td>< 14V</td></tr>
<tr><td rowspan="2">Sensor voltage check response time</td><td colspan="2">When 24V disappears</td><td>1ms<t<3ms</td></tr>
<tr><td colspan="2">When 24V appears</td><td>8ms<t<30ms</td></tr>
<tr><td colspan="3">Type of inputs</td><td>Resistive.</td></tr>
<tr><td rowspan="2">Compliance with IEC 1131-2 type 1</td><td colspan="2">Positive logic input</td><td>Type 1</td></tr>
<tr><td colspan="2">Negative logic input</td><td>Not specified in the standard</td></tr>
<tr><td colspan="2">DDP 2 wire compatibility</td><td colspan="2">See Compatibility of 2-wire sensors with 24 VDC inputs, p. 67</td></tr>
<tr><td colspan="3">DDP 3 wire compatibility</td><td>Yes</td></tr>
<tr><td colspan="2" rowspan="2">Reference input (selected by switch located on the module and by software)</td><td>Positive logic</td><td>To + on the supply</td></tr>
<tr><td>Negative logic</td><td>To - on the supply</td></tr>
</table>

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): 0.1x10^6operations **(2): 0.15 x 10^6 operations** **(3): 0.3 x 10^6 operations** **(4): 0.5 x 10^6 operations**		**(5): 0.7x10^6operations** **(6): 1x10^6operations** **(7): 1.5x10^6operations** **(8): 2x10^6 operations**		**(9): 3x10^6 operations** **(10): 5x10^6operations** **(11): 10x10^6operations**		

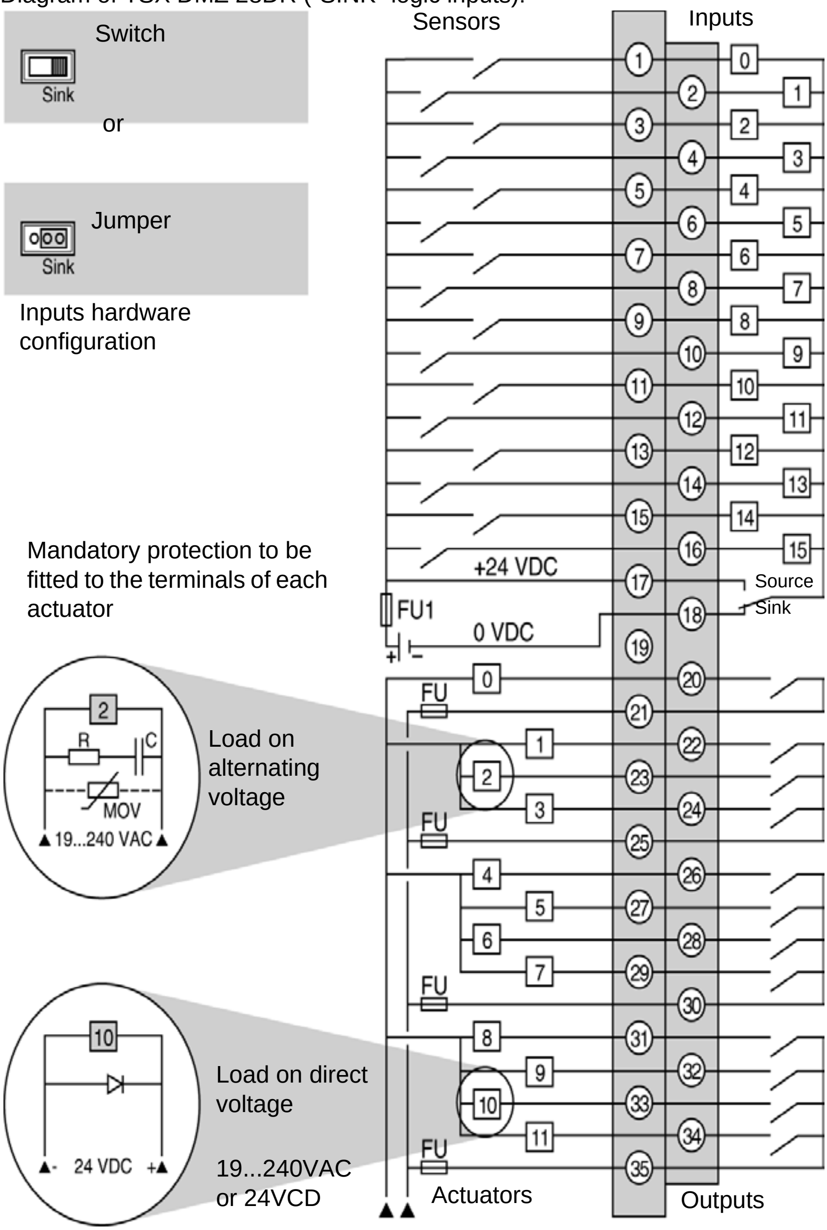
Built-in protection measures	Against overloads and short-circuits	None It is mandatory to fit a fast-blow fuse per channel or group of channels
	Against alternating current inductive overload	None An RC circuit or MOV (ZNO) suppressor appropriate to the voltage must be mounted parallel to the terminals 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**

Connections of the TSX DMZ 28DR module

Wiring for Sensors/Inputs and Actuators/ Outputs

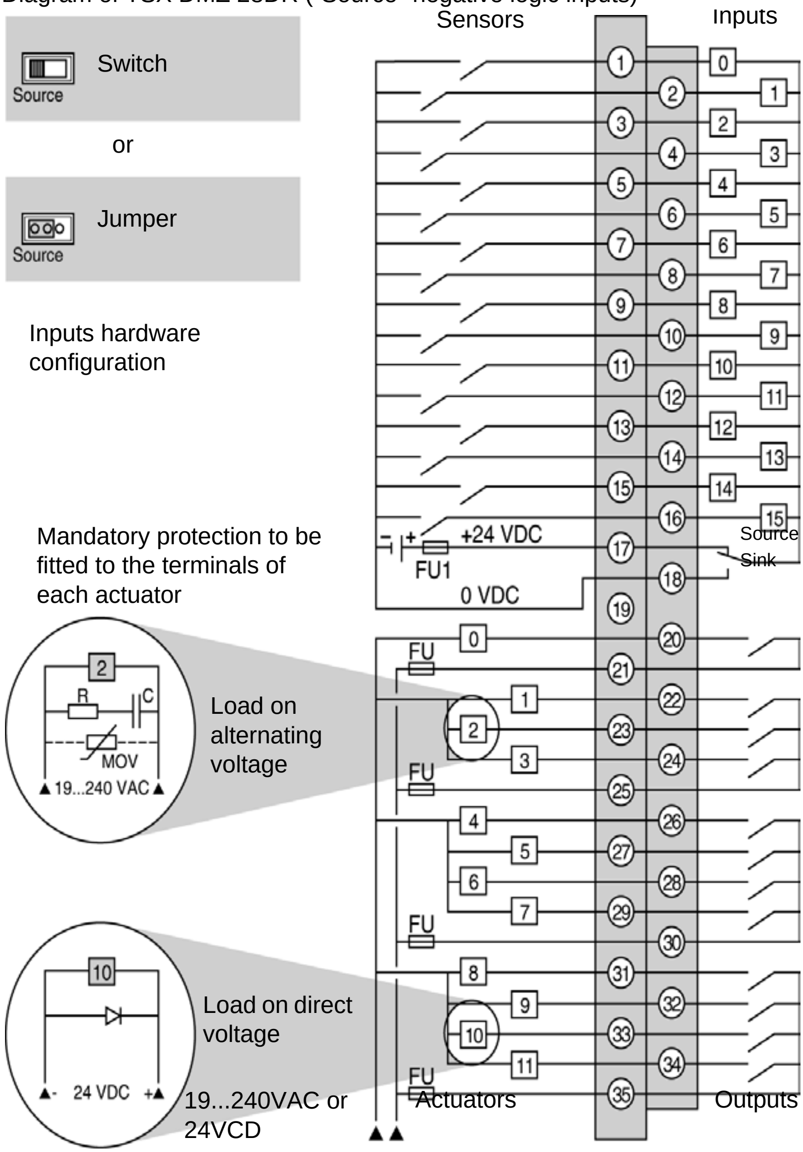
Diagram of TSX DMZ 28DR ("SINK" logic inputs):



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

9

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 Maps:

Module TSX DMZ 28AR

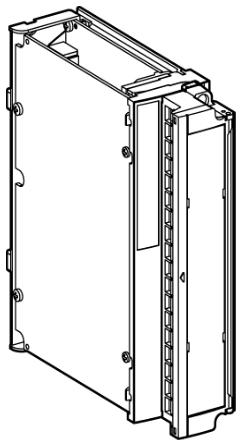
At a Glance

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.

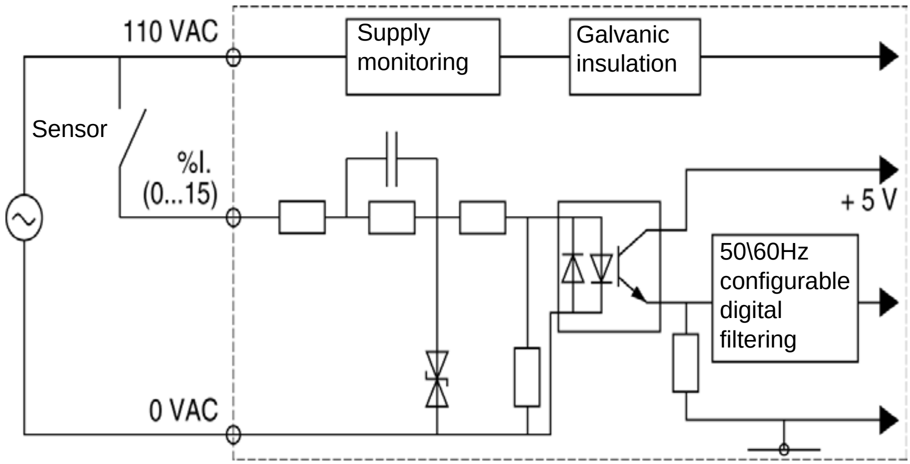
Illustration

Module:

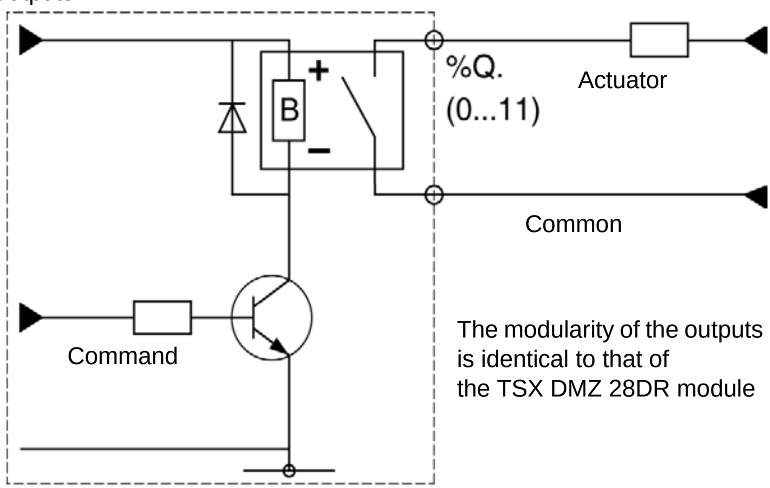


Process diagrams of inputs/outputs

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 *Compatibility of 2-wire sensors with 24 VDC inputs, p. 67*
(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			

(1): 0.7x10^{6}operations	**(5): 0.7x10^{6}operations**	**(9): 3x10^{6} operations**
(2): 0.15 x 10^{6} operations	**(6): 1x10^{6}operations**	**(10): 5x10^{6}operations**
(3): 0.3 x 10^{6} operations	**(7): 1.5x10^{6}operations**	**(11): 10x10^{6}operations**
(4): 0.5 x 10^{6} operations	**(8): 2x10^{6} operations**	

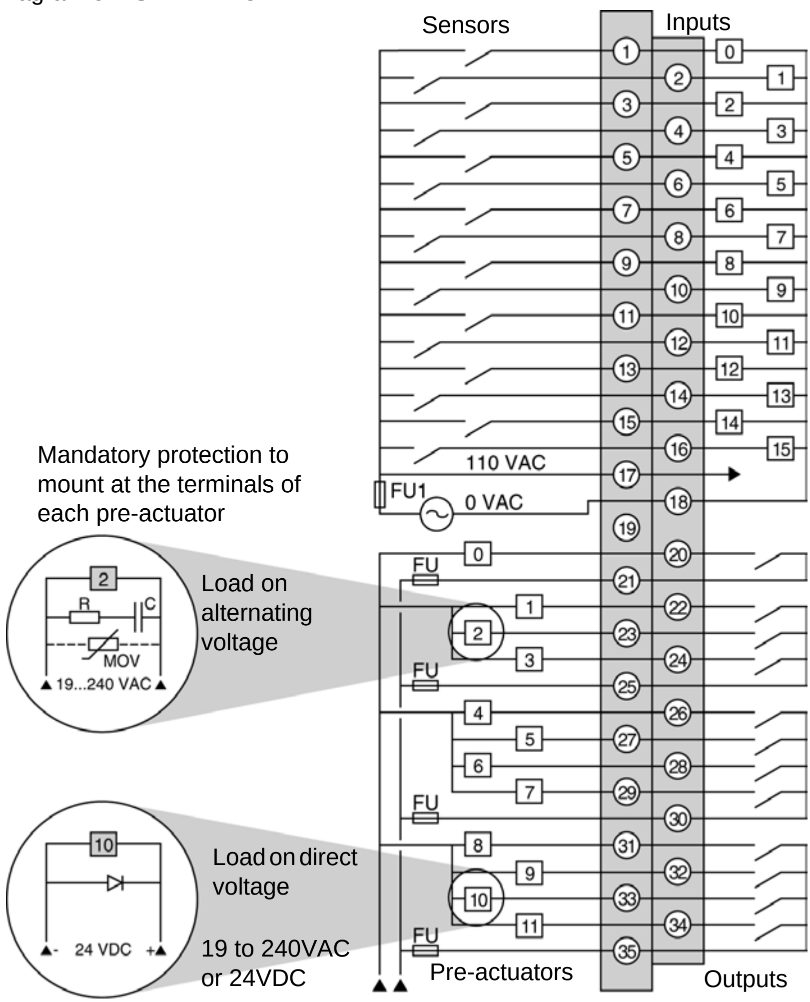
Built-in protection measures	Against overloads and short-circuits	None It is mandatory to fit a fast-blow fuse per channel or group of channels
	Against alternating current inductive overload	None An RC circuit or MOV (ZNO) suppressor appropriate to the voltage must be mounted parallel to the terminals of each actuator.
	Against direct current inductive overload	None A discharge diode must be mounted on the terminals of each actuator

(1): 0.7x10^6operations **(2): 0.15 x 10^6 operations** **(3): 0.3 x 10^6 operations** **(4): 0.5 x 10^6 operations**	**(5): 0.7x10^6operations** **(6): 1x10^6operations** **(7): 1.5x10^6operations** **(8): 2x10^6 operations**	**(9): 3x10^6 operations** **(10): 5x10^6operations** **(11): 10x10^6operations**

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

10

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 Maps:

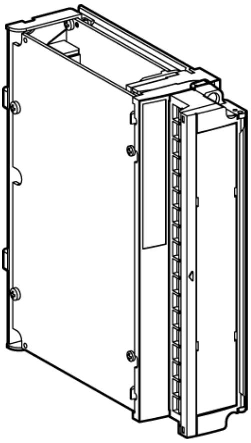
Module TSX DEZ 32D2

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.

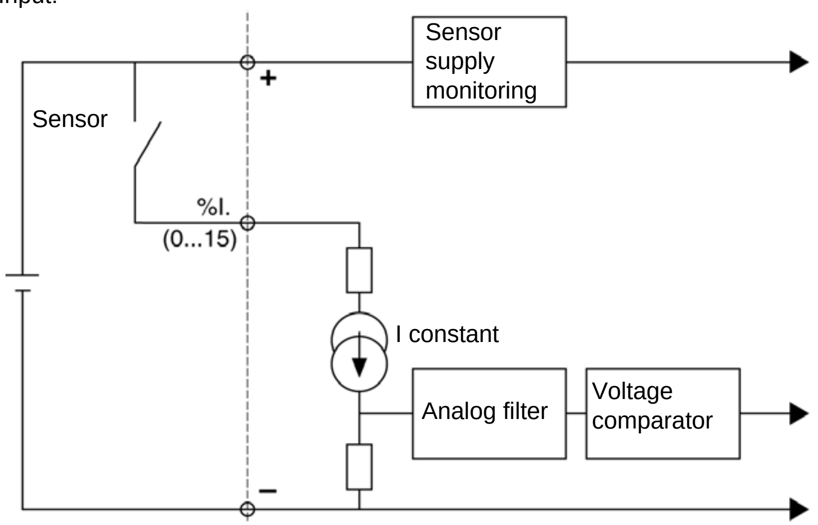
Illustration

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.

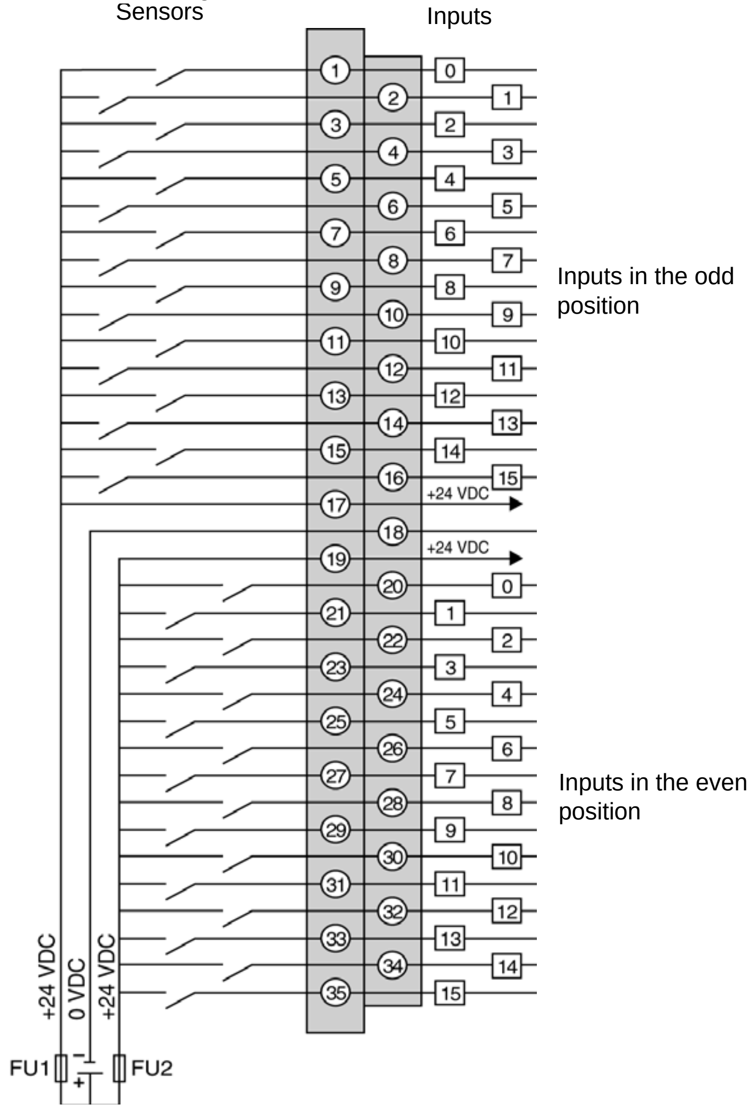
Characteristics of the 24VDC inputs

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

11

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 Maps:

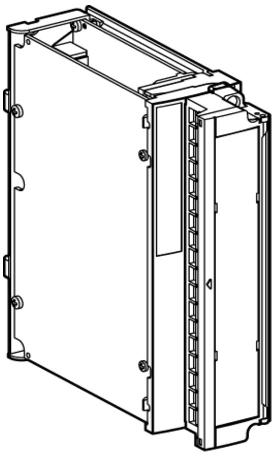
Module TSX DSZ 32T2

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.

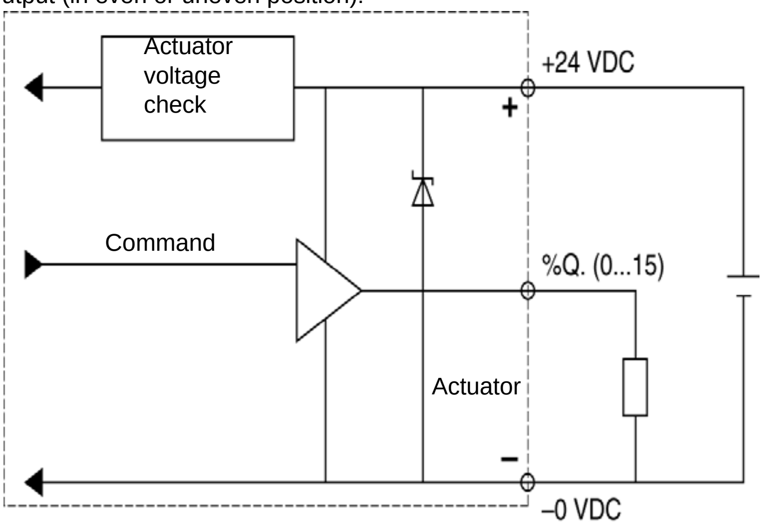
Illustration

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.

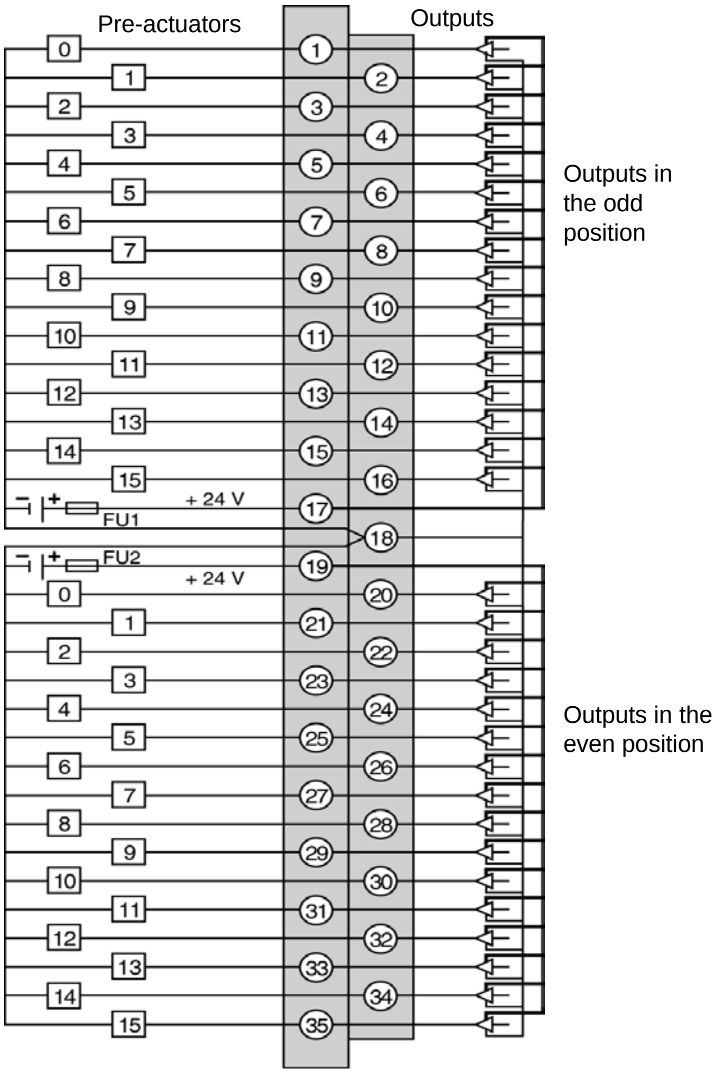
Characteristics of the 24VDC/ 0.5A static outputs

Logic		Positive emitted current
Nominal values	Voltage/Current	24V/0.5A
Threshold values ($U \leq 30$ 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	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 $0.75A \leq Id \leq 2A$
	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 (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

12

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.

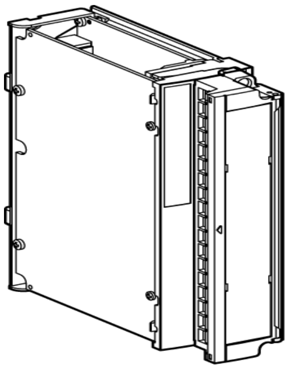
What's in this Chapter?

This Chapter contains the following Maps:

Module TSX DSZ 32R5

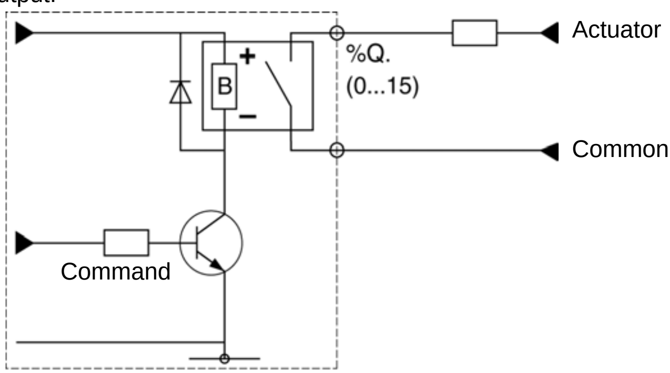
At a Glance

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:



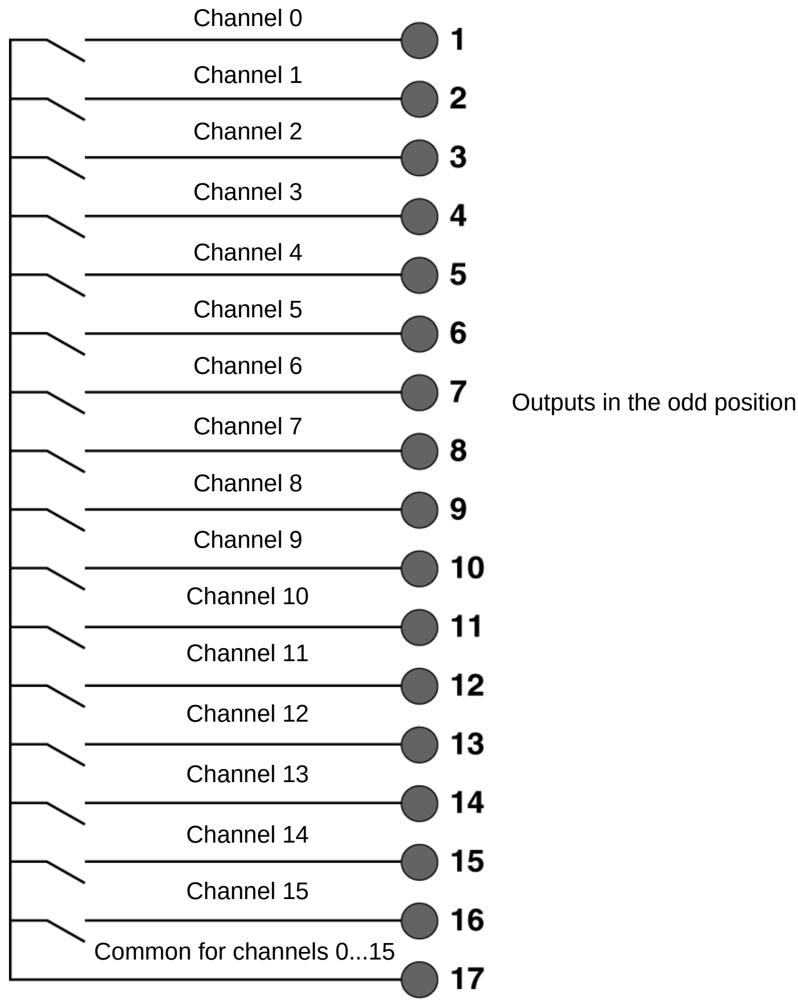
Process diagram for an output

Output:

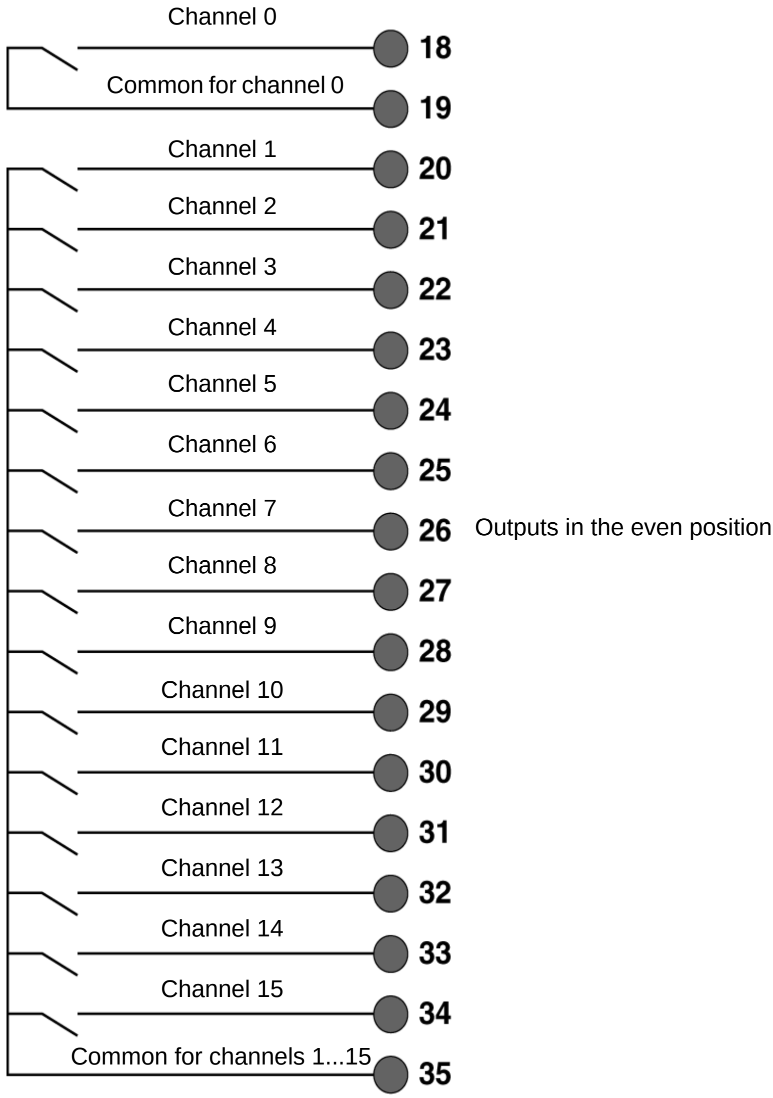


> **Note:** To ensure the service reliability of the relay contact, it is mandatory to fit the following to the actuators' terminals:
> - an RC circuit or MOV (ZNO) suppressor for use with alternating current,
> - a discharge diode for use with direct current.

Modularity


Channel 0
1
Channel 1
2
Channel 2
3
Channel 3
4
Channel 4
5
Channel 5
6
Channel 6
7
Channel 7
8
Channel 8
9
Channel 9
10
Channel 10
11
Channel 11
12
Channel 12
13
Channel 13
14
Channel 14
15
Channel 15
16
Common for channels 0...15
17
Outputs in the odd position

Modularity



Channel 0
18
Common for channel 0
19
Channel 1
20
Channel 2
21
Channel 3
22
Channel 4
23
Channel 5
24
Channel 6
25
Channel 7
26
Outputs in the even position
Channel 8
27
Channel 9
28
Channel 10
29
Channel 11
30
Channel 12
31
Channel 13
32
Channel 14
33
Channel 15
34
Common for channels 1...15
35

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			
(1): $0.1x10^6$operations **(2): 0.15×10^6 operations** **(3): 0.2×10^6 operations**		**(4): 0.25×10^6 operations** **(5): $0.3x10^6$operations** **(6): $0.8x10^6$operations**			**(7): $1.2x10^6$operations**	

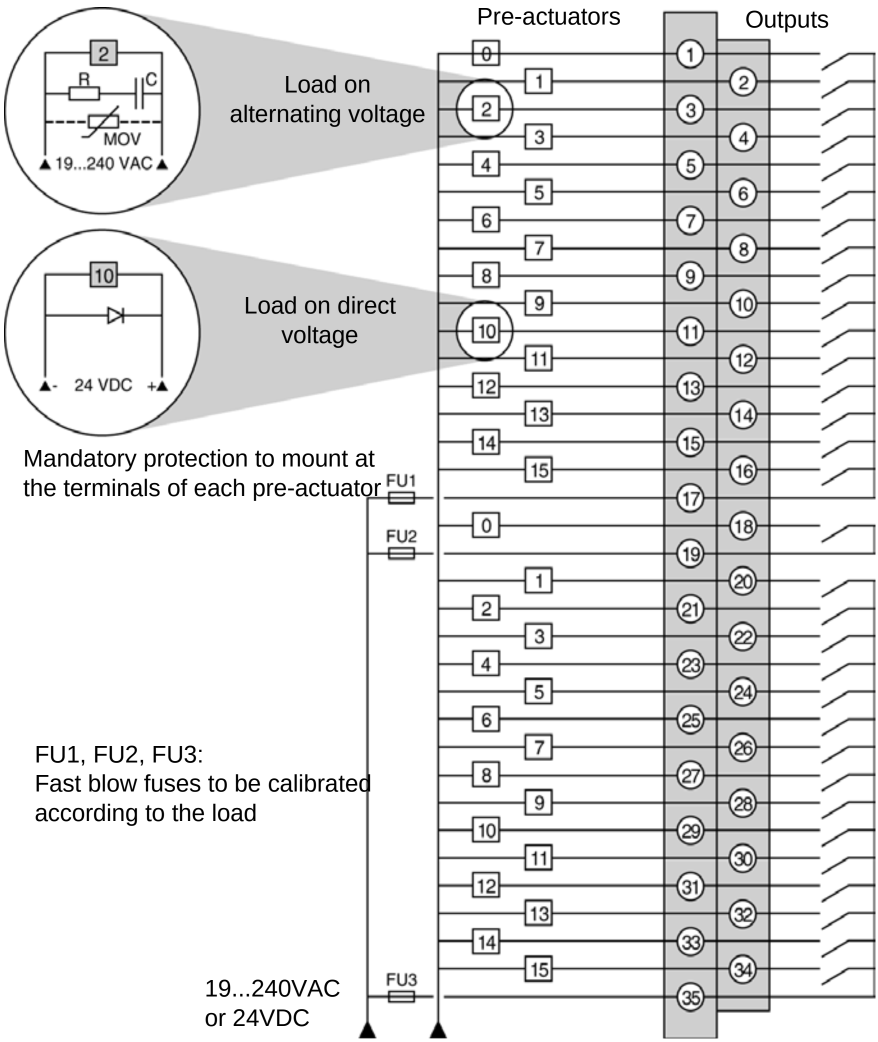
Built-in protection measures	Against overloads and short-circuits	None It is mandatory to fit a fast-blow fuse per channel or group of channels
	Against alternating current inductive overload	None An RC circuit or MOV (ZNO) suppressor appropriate to the voltage must be mounted parallel to the terminals of each actuator.
	Against direct current inductive overload	None A discharge diode must be mounted on the terminals of each actuator

(1): $0.1x10^6$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

13

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 Maps:

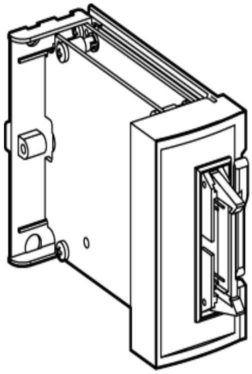
Module TSX DEZ 12D2K

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:

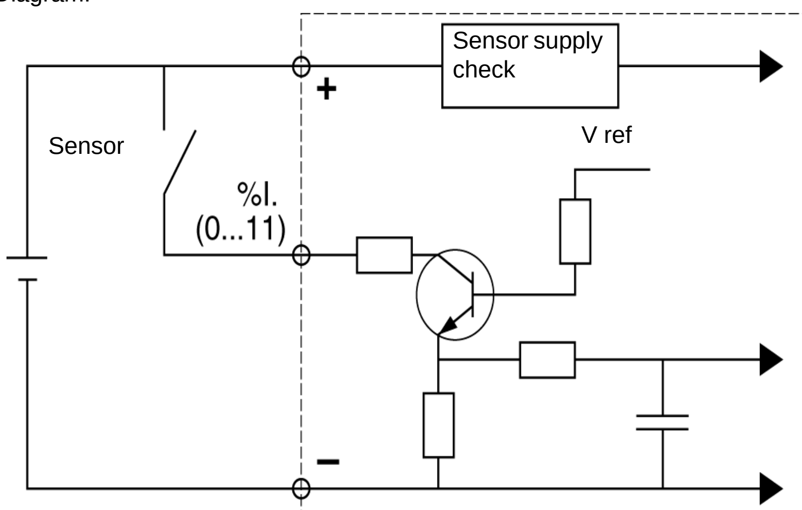
- either TSX CDP •01 pre-wired spiral for direct connection onto the post or sensor,
- either a TSX CDP•02 cable or a TSX CDP••03 cable to allow connection to the interface of the TELEFAST 2 cable.

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 Sink inputs	20mA+7mA per output 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	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.

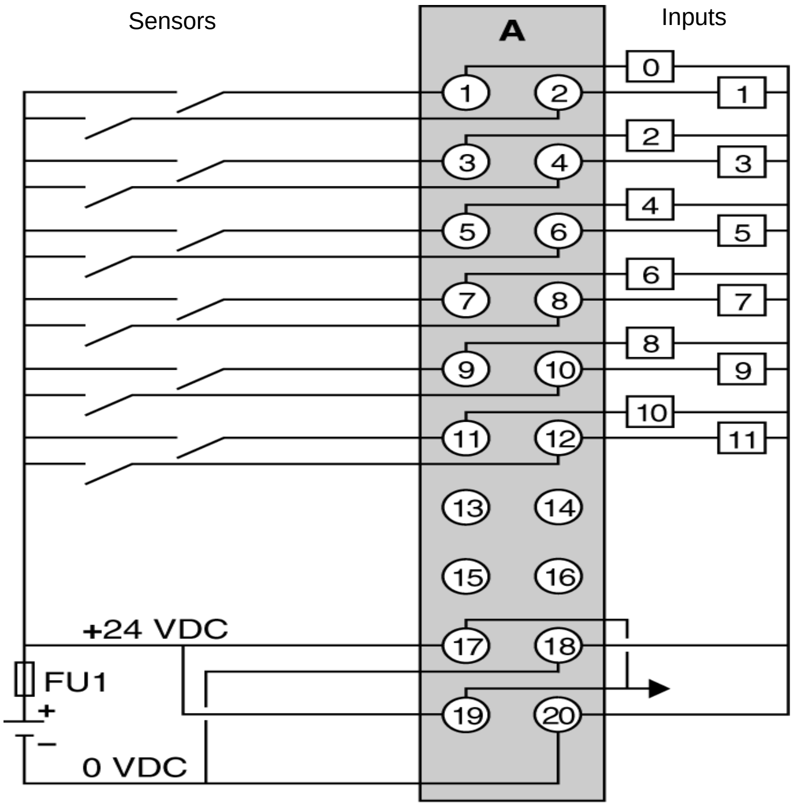
Characteristics of the 24VDC inputs

Logic			Positive
Nominal input values		Voltage	24V
		Current	7mA
Input threshold	In state 1	Voltage	≥ 11 V
		Current for U = 11V	> 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

14

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 Maps:

Module TSX DEZ 12D2

At a Glance

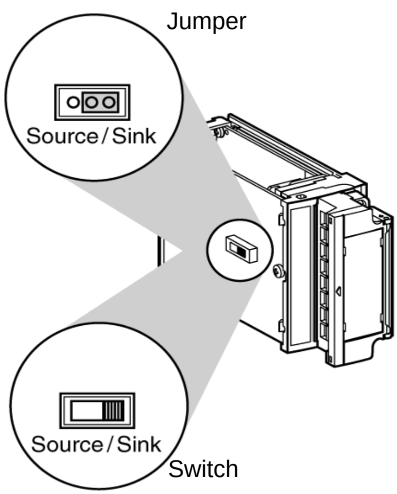
The module TSX DEZ 12D2 consists of 12 24VDC positive logic inputs, type 1 or negative logic.
The module is equipped with a removable 15 post screwed connection terminal block, allowing inputs to be connected:
The inputs can be:

- 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:

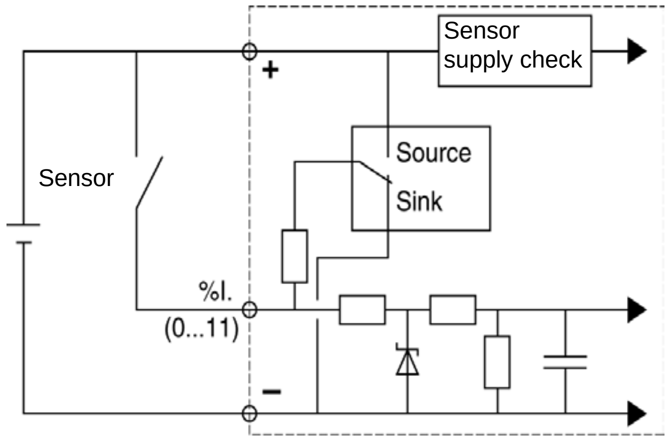
- positioning a switch or jumper on the module to enable physical adaptation. By default, the material configuration is sink (positive logic),
- and by software configuration to adapt the signals to the logical direction.

Module:

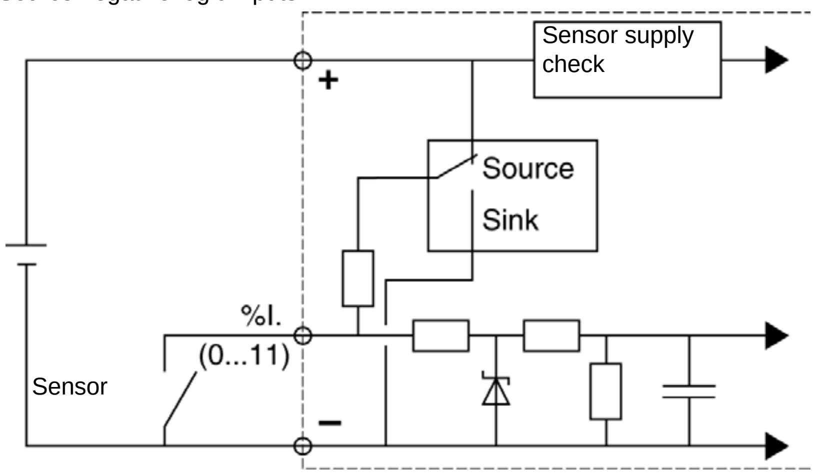


Process diagrams of inputs

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.

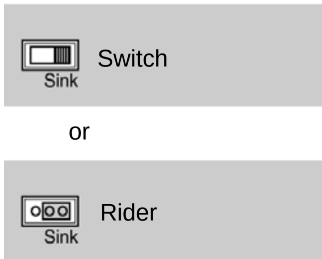
Characteristics of the 24VDC inputs

<table>
<tr><td colspan="3">Logic</td><td>Positive or negative</td></tr>
<tr><td rowspan="3">Nominal input values</td><td colspan="2">Voltage</td><td>24V</td></tr>
<tr><td rowspan="2">Current</td><td>Positive logic</td><td>9mA</td></tr>
<tr><td>Negative logic</td><td>-6mA</td></tr>
<tr><td rowspan="7">Input threshold</td><td rowspan="3">In state 1</td><td>Voltage (positive logic)</td><td>≥ 11 V</td></tr>
<tr><td>Voltage (negative logic)</td><td>≤ 8 V</td></tr>
<tr><td>Current for U = 11V</td><td>> |2.5| mA</td></tr>
<tr><td rowspan="3">In state 0</td><td>Voltage (positive logic)</td><td>< 5 V</td></tr>
<tr><td>Voltage (negative logic)</td><td>> Ual - 5 V</td></tr>
<tr><td>Current</td><td>< |1.5| mA</td></tr>
<tr><td colspan="2">Sensor supply (including ripple)</td><td>19V to 30V (possible up to 34V, limited to 1 hour per 24 hours)</td></tr>
<tr><td colspan="2" rowspan="2">Input impedance</td><td>Positive logic</td><td>2.4KΩ</td></tr>
<tr><td>Negative logic</td><td>4KΩ</td></tr>
<tr><td colspan="2" rowspan="2">Configurable response time</td><td>State 0 to 1</td><td>0.1...7.5ms</td></tr>
<tr><td>State 1 to 0</td><td>0.1...7.5ms</td></tr>
<tr><td colspan="2" rowspan="2">Sensor voltage check threshold</td><td>OK</td><td>> 18V</td></tr>
<tr><td>Fault</td><td>< 14V</td></tr>
<tr><td rowspan="2">Sensor voltage check response time</td><td colspan="2">When 24V disappears</td><td>1ms<t<3ms</td></tr>
<tr><td colspan="2">When 24V appears</td><td>8ms<t<30ms</td></tr>
<tr><td colspan="3">Type of inputs</td><td>Resistive.</td></tr>
<tr><td rowspan="2">Compliance with IEC 1131-2 type 1</td><td colspan="2">Positive logic input</td><td>Type 1</td></tr>
<tr><td colspan="2">Negative logic input</td><td>Not specified in the standard</td></tr>
<tr><td colspan="2">DDP 2 wire compatibility</td><td colspan="2">See Compatibility of 2-wire sensors with 24 VDC inputs, p. 67</td></tr>
<tr><td colspan="3">DDP 3 wire compatibility</td><td>Yes</td></tr>
<tr><td colspan="2" rowspan="2">Reference input (selected by switch located on the module and by software)</td><td>Positive logic</td><td>To + on the supply</td></tr>
<tr><td>Negative logic</td><td>To - on the supply</td></tr>
</table>

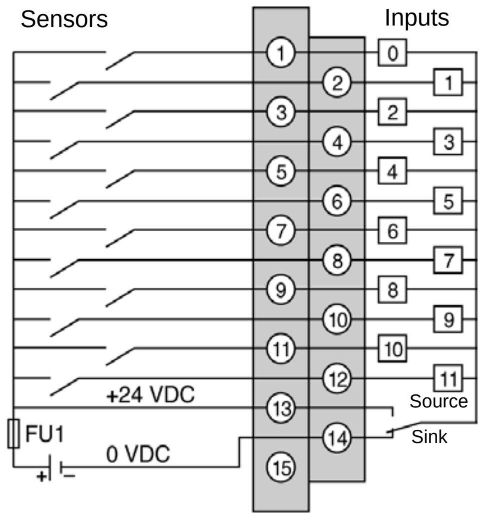
links of the TSX DEZ 12D2 module

Sensor/input connections

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

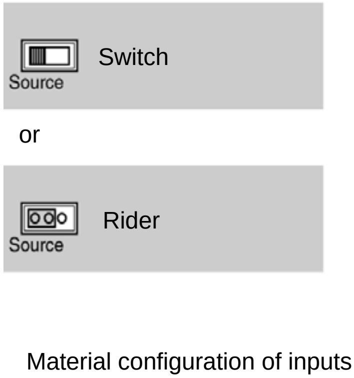


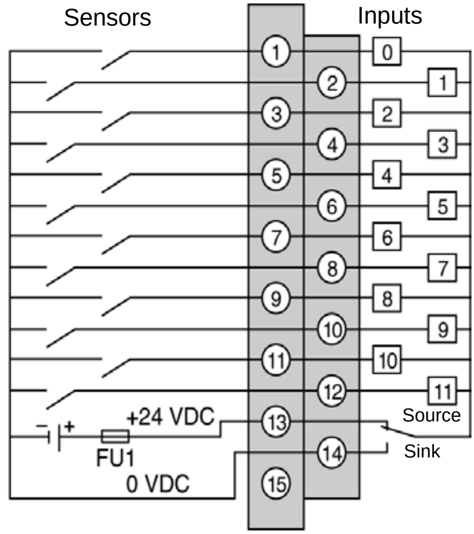
Material configuration of inputs



FU1 = 0.5A fuse with rapid fusion.

Diagrams of TSX DEZ12D2 (Source negative logic input):





FU1 = 0.5A fuse with rapid fusion.

Discrete input module TSX DEZ 08A4

15

At a Glance

Aim of this Chapter

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

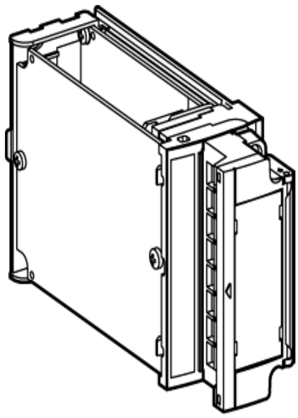
What's in this Chapter?

This Chapter contains the following Maps:

Module TSX DEZ 08A4

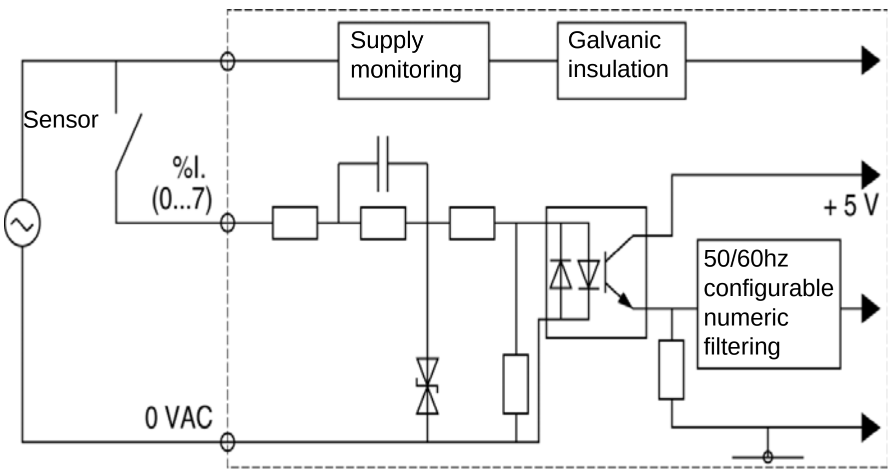
At a Glance

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	>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.

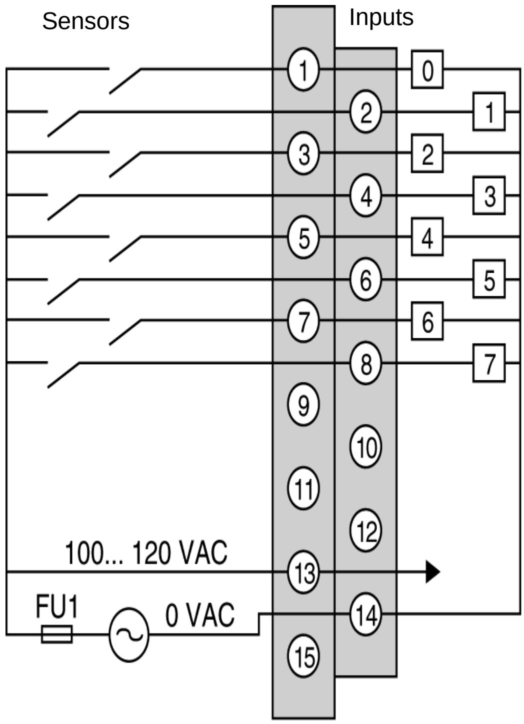
Characteristics of the 100..120VAC inputs

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 *Compatibility of 2-wire sensors with 24 VDC inputs, p. 67*
(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

16

At a Glance

Aim of this Chapter

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

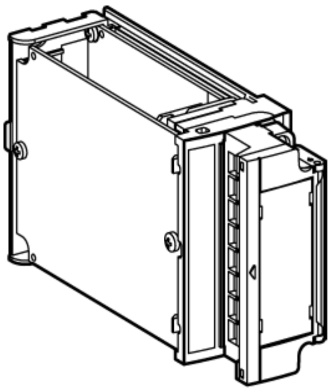
What's in this Chapter?

This Chapter contains the following Maps:

Module TSX DEZ 08A5

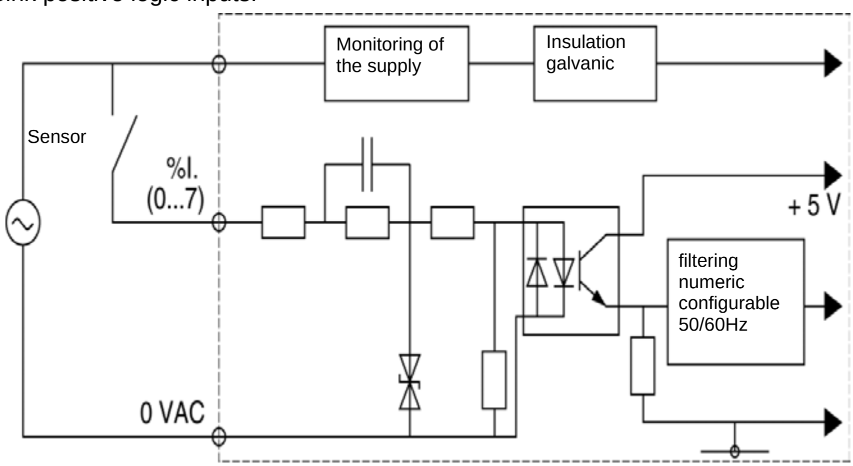
At a Glance

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	>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.

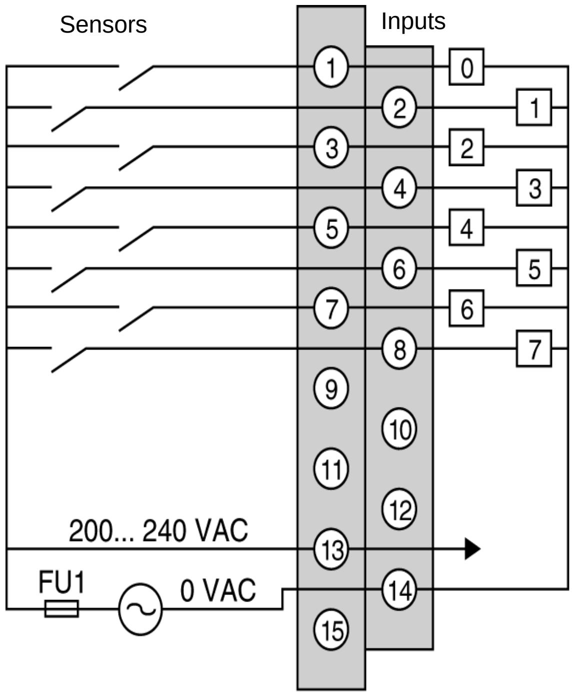
Characteristics of the 200..240VAC inputs

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 *Compatibility of 2-wire sensors with 24 VDC inputs, p. 67*
(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

17

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.

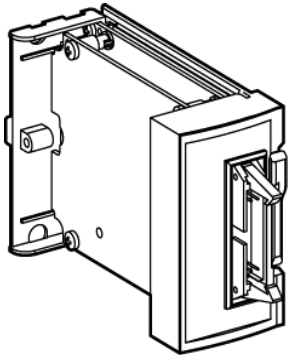
What's in this Chapter?

This Chapter contains the following Maps:

Module TSX DSZ 08T2K

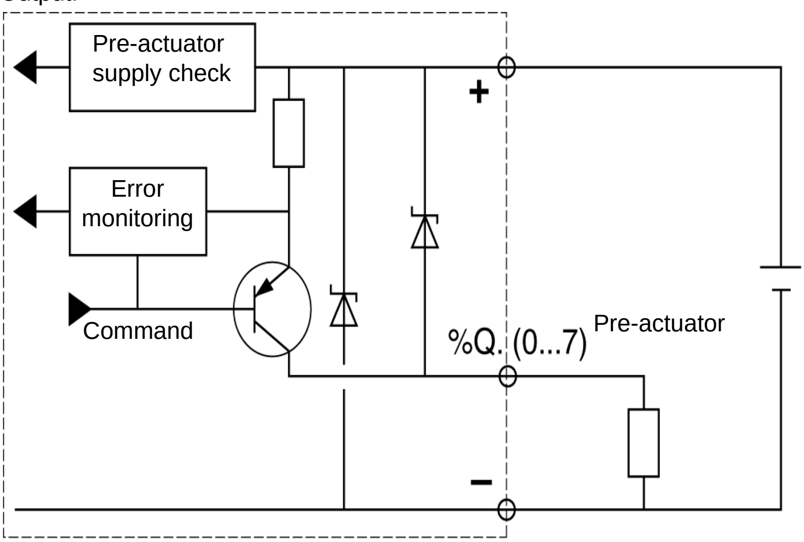
At a Glance

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	>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.

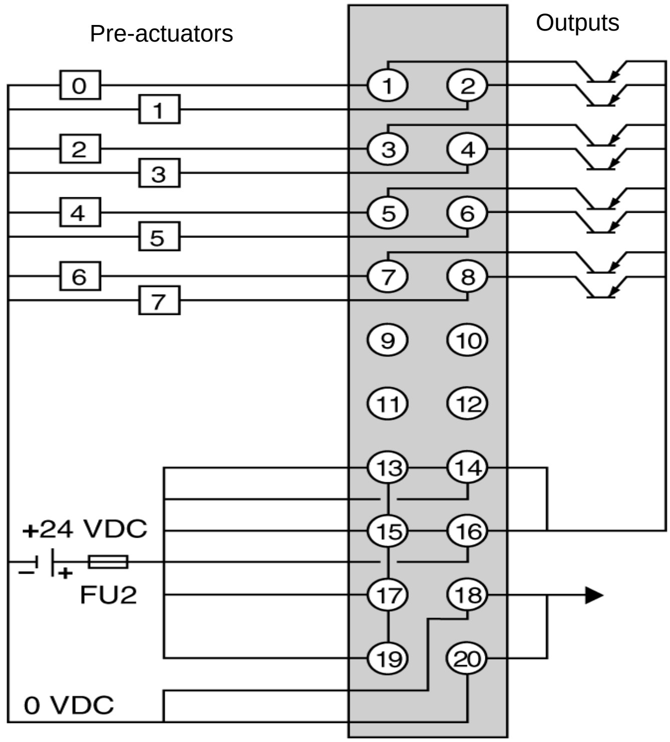
Characteristics of the 24VDC/ 0.5A static outputs

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 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

18

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.

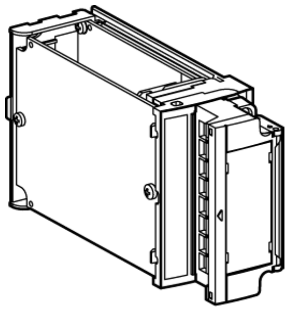
What's in this Chapter?

This Chapter contains the following Maps:

Module TSX DSZ 08T2

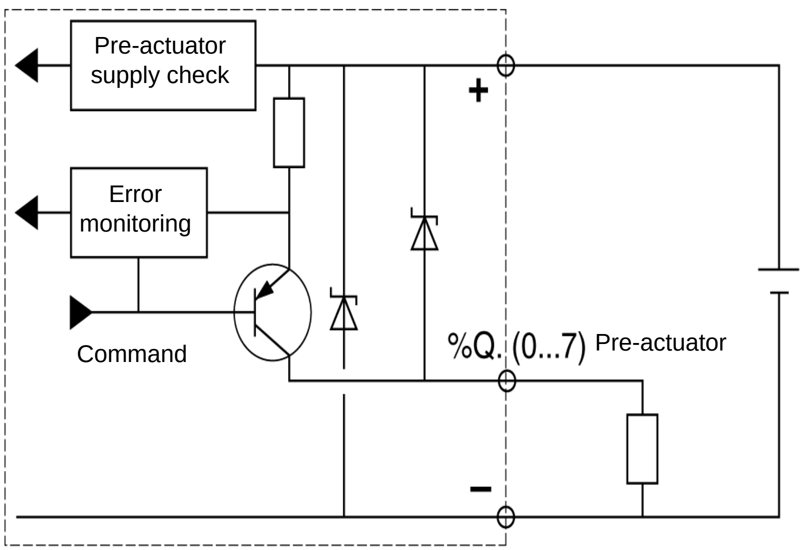
At a Glance

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	>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.

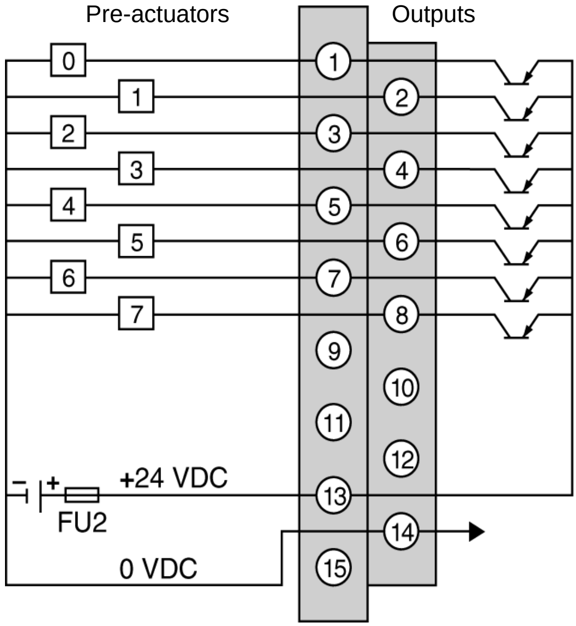
Characteristics of the 24VDC/ 0.5A static outputs

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

Diagram:



FU2 = 6.3A fuse with rapid fusion.

Discrete output module TSX DSZ 04T22

19

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.

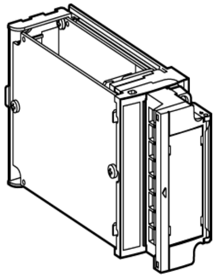
What's in this Chapter?

This Chapter contains the following Maps:

Module TSX DSZ 04T22

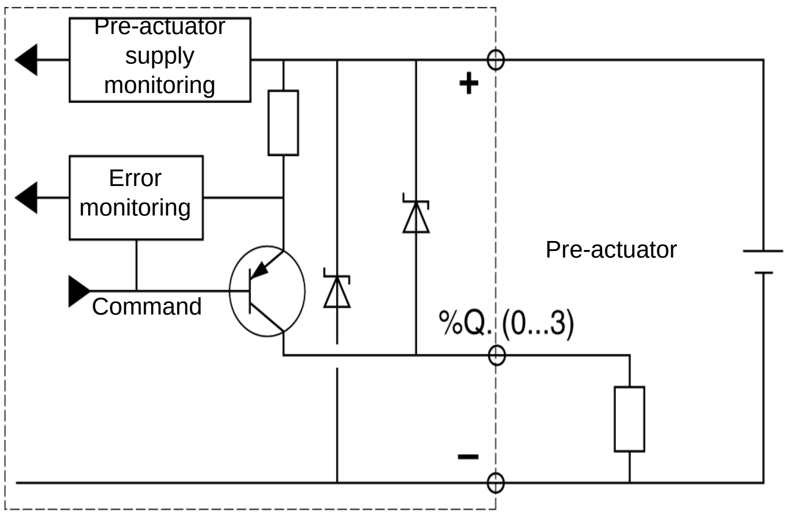
At a Glance

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.

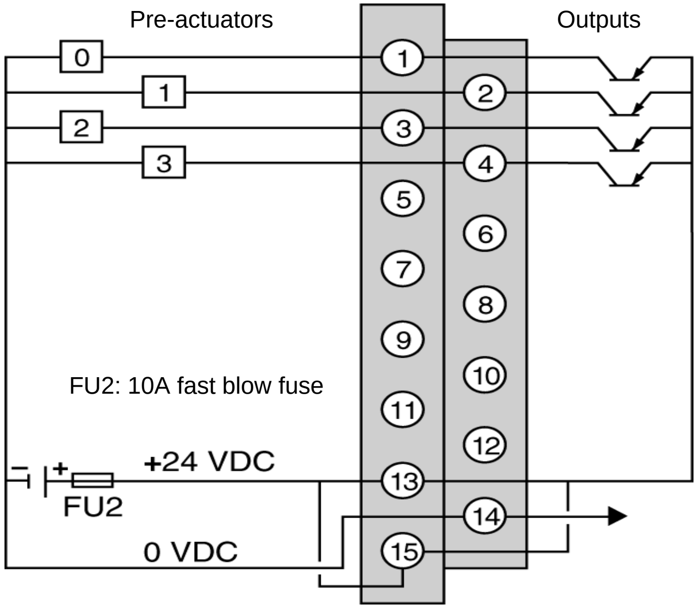
Characteristics of the 24VDC/2A static outputs

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 KΩ
Common of loads		To - on the supply
Built-in protection measures	Against overloads and short-circuits	By current limiter and electronic circuit breaker $2.6A \leq Id \leq 5A$
	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	> 10MΩ 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

Diagram:



Discrete output module TSX DSZ 08R5

20

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.

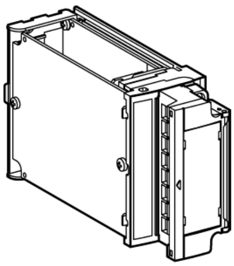
What's in this Chapter?

This Chapter contains the following Maps:

Module TSX DSZ 08R5

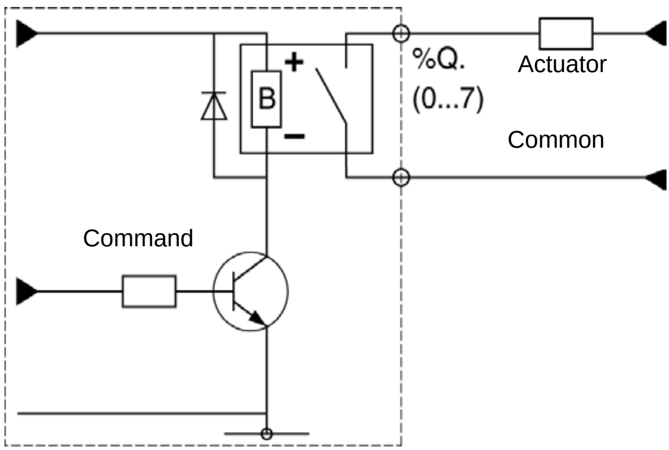
At a Glance

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:

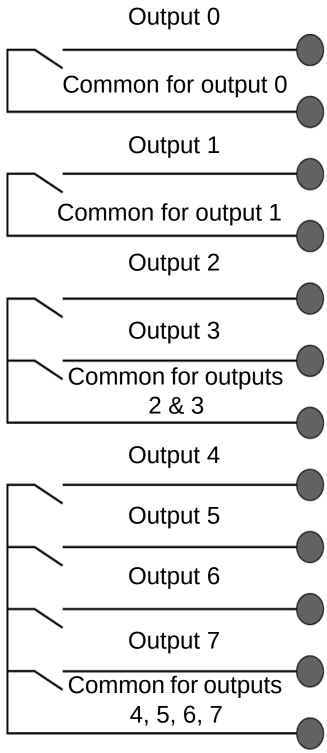


Process diagram for an output

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			
(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**		

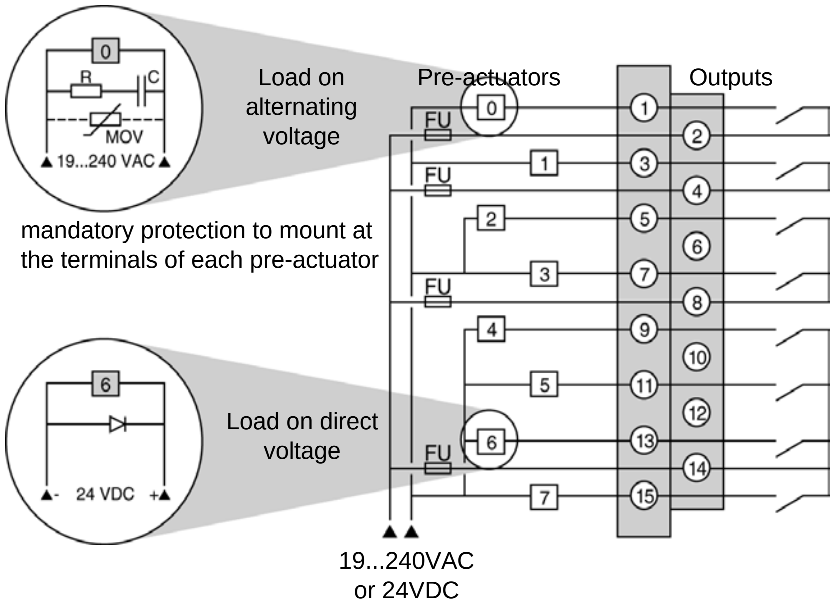
Built-in protection measures	Against overloads and short-circuits	None It is mandatory to fit a fast-blow fuse per channel or group of channels
	Against alternating current inductive overload	None An RC circuit or MOV (ZNO) suppressor appropriate to the voltage must be mounted parallel to the terminals of each actuator.
	Against direct current inductive overload	None A discharge diode must be mounted on the terminals of each actuator

(1): 0.1x10^{6}operations	**(5): 0.7x10^{6}operations**	**(9): 3x10^{6} operations**
(2): 0.15 x 10^{6} operations	**(6): 1x10^{6}operations**	**(10): 5x10^{6}operations**
(3): 0.3 x 10^{6} operations	**(7): 1.5x10^{6}operations**	**(11): 10x10^{6}operations**
(4): 0.5 x 10^{6} operations	**(8): 2x10^{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

21

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 Maps:

Module TSX DMZ 16DTK

At a Glance

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

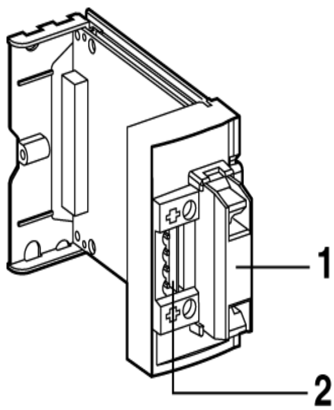
- 8 24VDC inputs, positive logic type 1,
- 8 static outputs 24VDC/0.5A.

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.

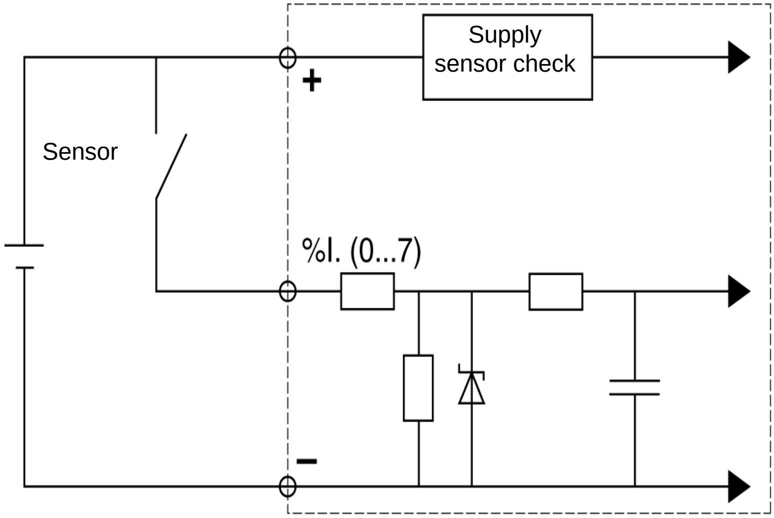
> **Note:** If the consumption of the sensors and pre-actuators is <= 0.7A, the power supply can be cabled from the HE10 connector.

Module:



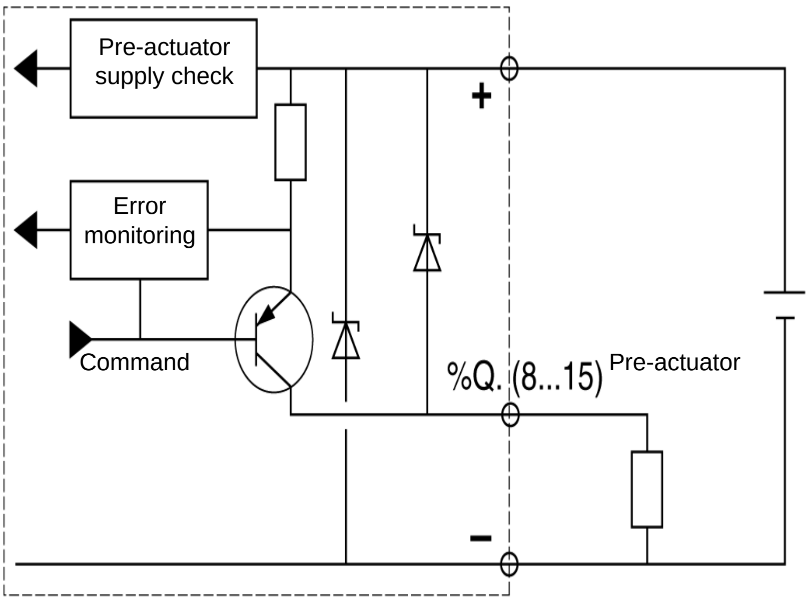
Process diagrams for an input

Input:



Process diagram for an output

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 *Compatibility of 2-wire sensors with 24 VDC inputs, p. 67*
DDP 3 wire compatibility			Yes
Reference input			To + on the supply

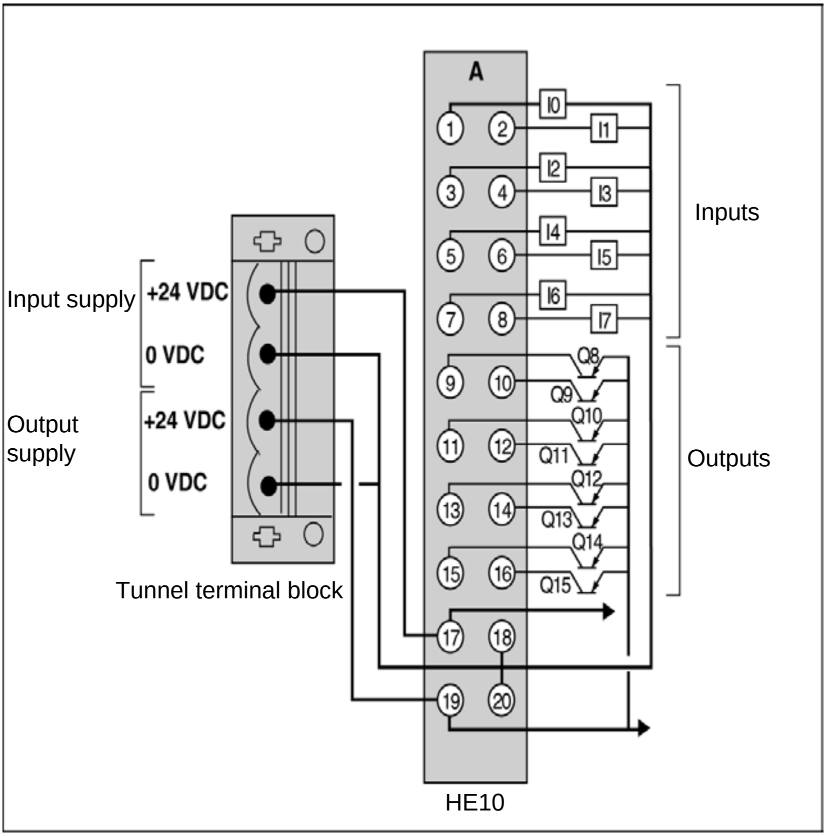
Characteristics of the 24VDC/ 0.5A static outputs

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 KΩ
Common of loads		To - on the supply
Built-in protection measures	Against overloads and short-circuits	By current limiter and thermal circuit breaker $0.75A \leq Id \leq 2A$
	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:



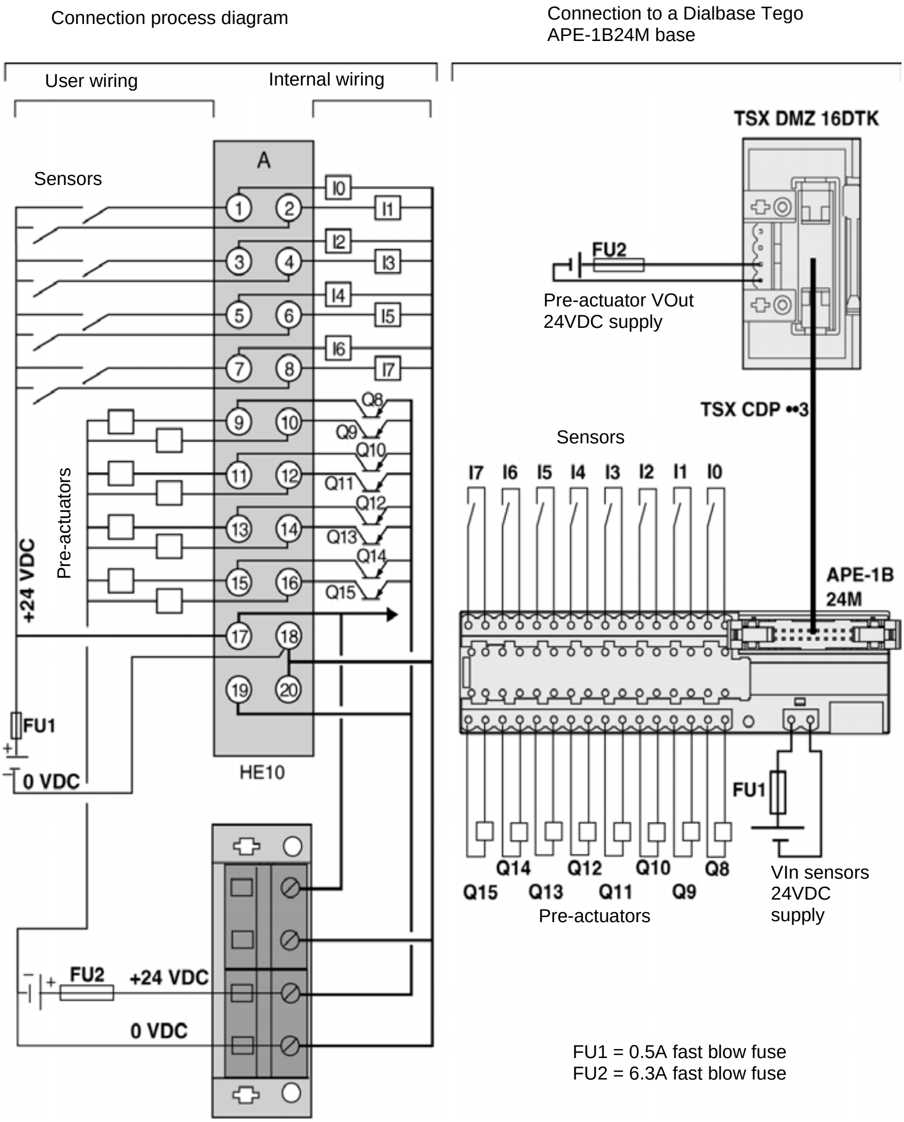
Connections of the TSX DMZ 16DTK module to the Dialbase Tego base

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.

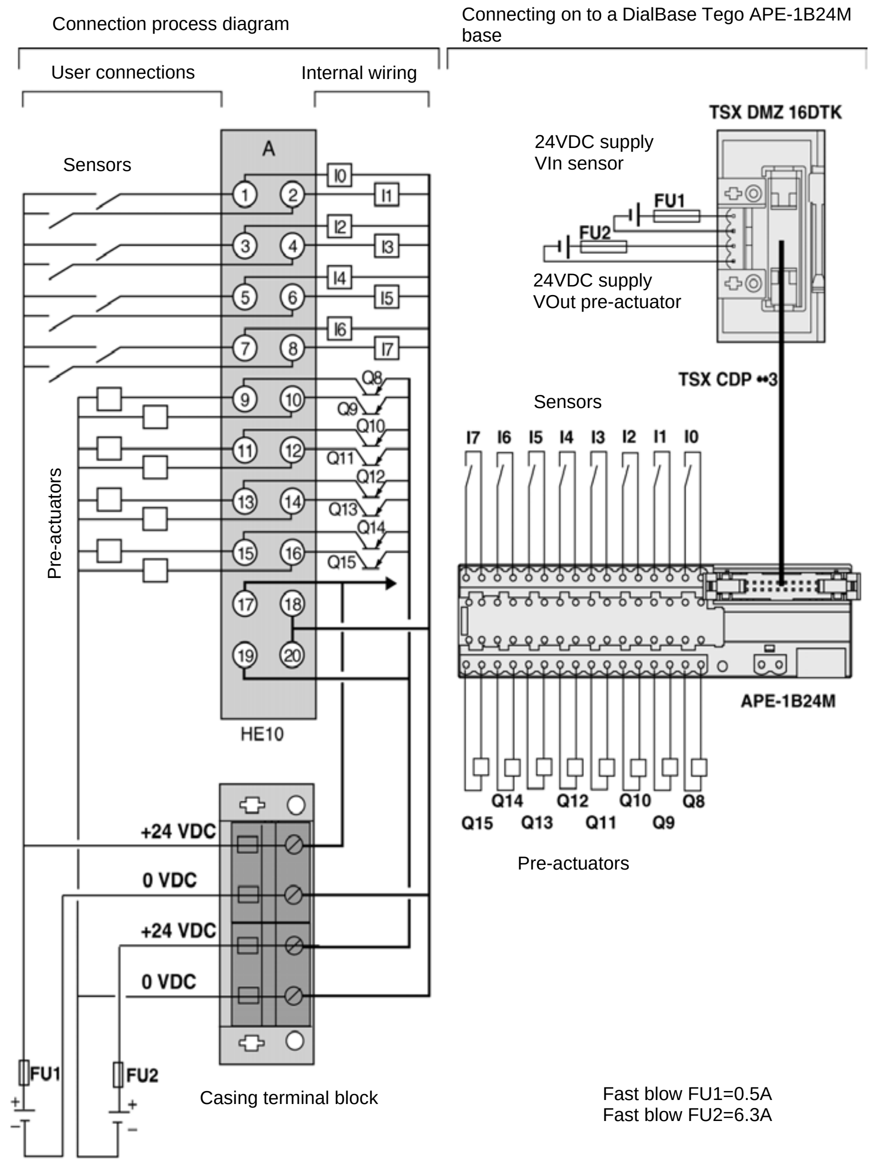
Diagra



Casing terminal block

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

Diagram:



Connection process diagram
Connecting on to a DialBase Tego APE-1B24M base
User connections
Internal wiring
Sensors
A
I0
I1
I2
I3
I4
I5
I6
I7
Q8
Q9
Q10
Q11
Q12
Q13
Q14
Q15
Pre-actuators
HE10
+24 VDC
0 VDC
+24 VDC
0 VDC
FU1
FU2
Casing terminal block
TSX DMZ 16DTK
24VDC supply
VIn sensor
24VDC supply
VOut pre-actuator
TSX CDP ••3
Sensors
I7 I6 I5 I4 I3 I2 I1 I0
APE-1B24M
Q14 Q12 Q10 Q8
Q15 Q13 Q11 Q9
Pre-actuators
Fast blow FU1=0.5A
Fast blow FU2=6.3A

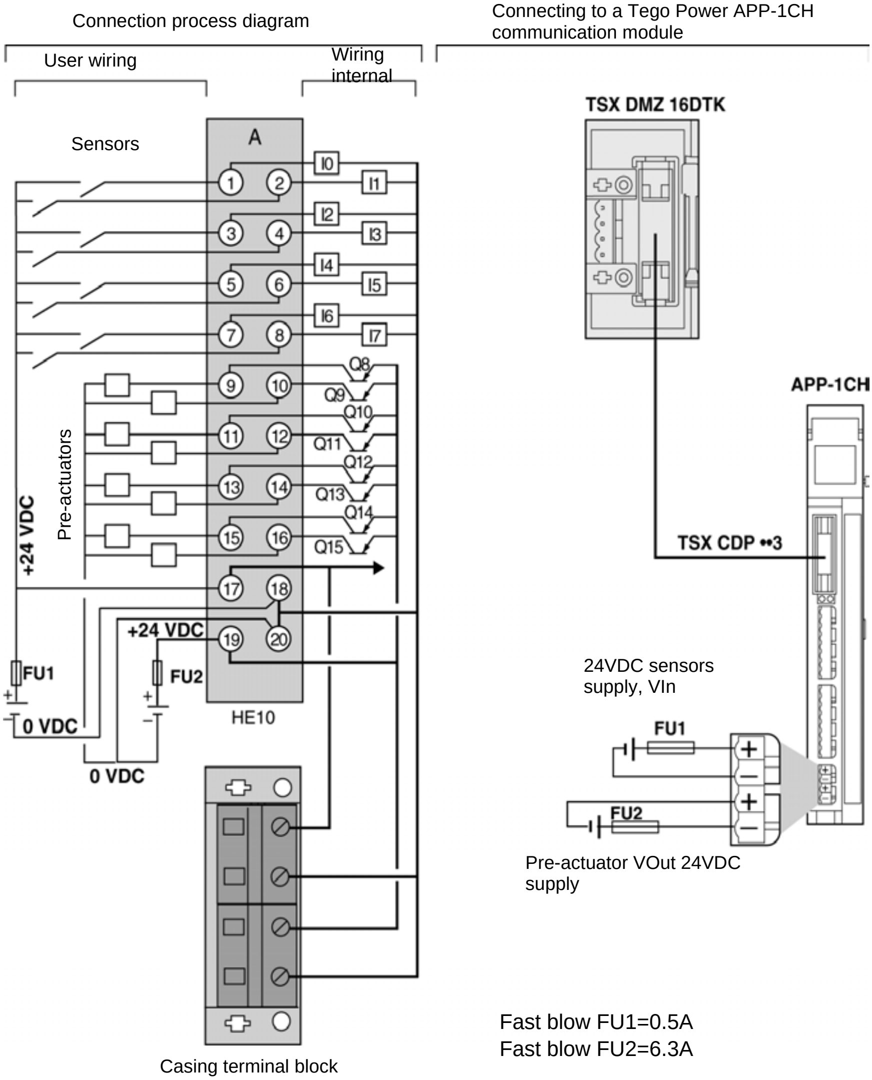
TSX DMZ 16 DTK module connections to (Tego Power) communication module

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 <=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 >=0.7A.

Diagram

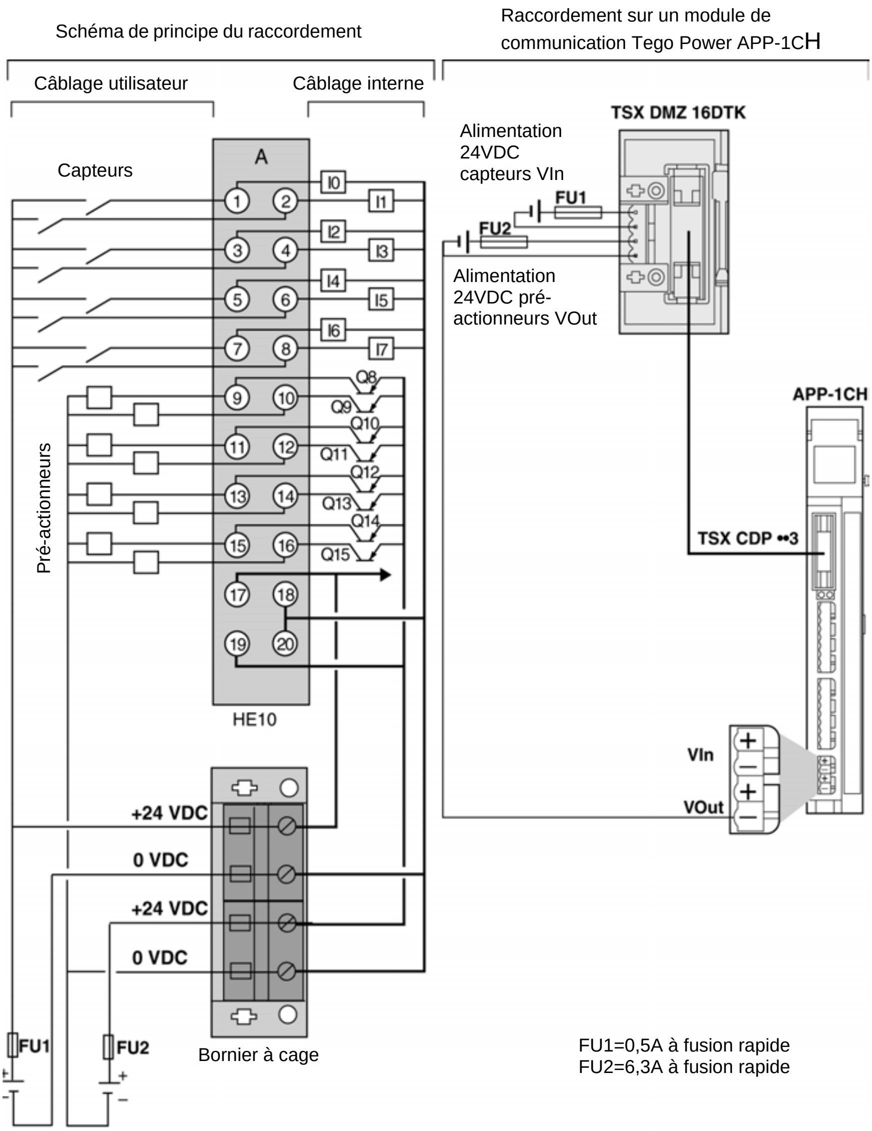


Schéma de principe du raccordement
Raccordement sur un module de communication Tego Power APP-1CH
Câblage utilisateur
Câblage interne
TSX DMZ 16DTK
Alimentation 24VDC capteurs VIn
Capteurs
A
I0
I1
I2
I3
I4
I5
I6
I7
FU1
FU2
Alimentation 24VDC pré-actionneurs VOut
Q8
Q9
Q10
Q11
Q12
Q13
Q14
Q15
APP-1CH
Pré-actionneurs
TSX CDP ••3
HE10
VIn
VOut
+24 VDC
0 VDC
+24 VDC
0 VDC
FU1
FU2
Bornier à cage
FU1=0,5A à fusion rapide
FU2=6,3A à fusion rapide

Emergency stop monitoring module

22

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:

22.1 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, p. 34*).

Symbolization

The following symbolization is used:

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

22.2 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.

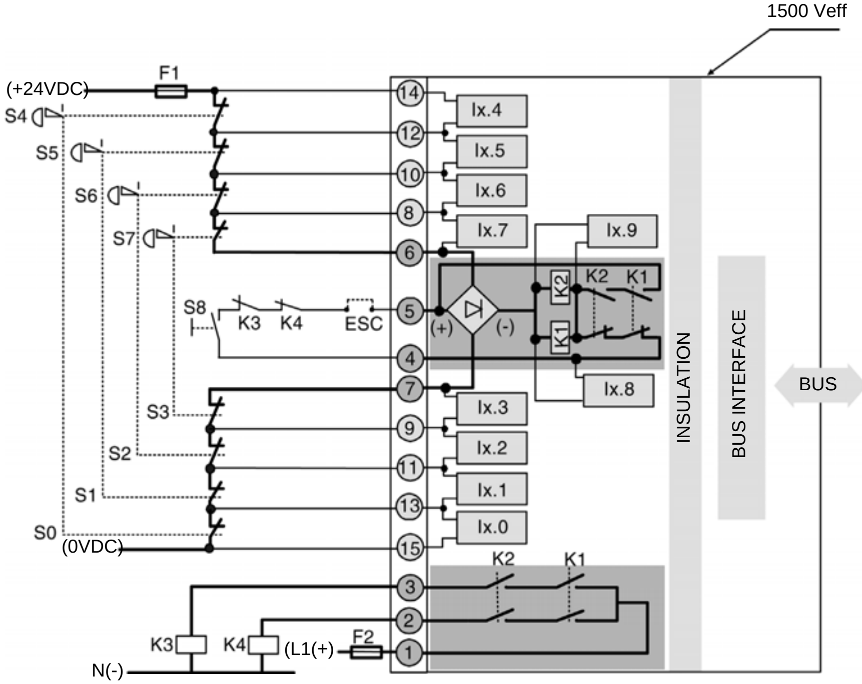
What's in this Section?

This section contains the following topics:

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 x n in the functional diagram (see *Security function, p. 219*)).
- 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**.

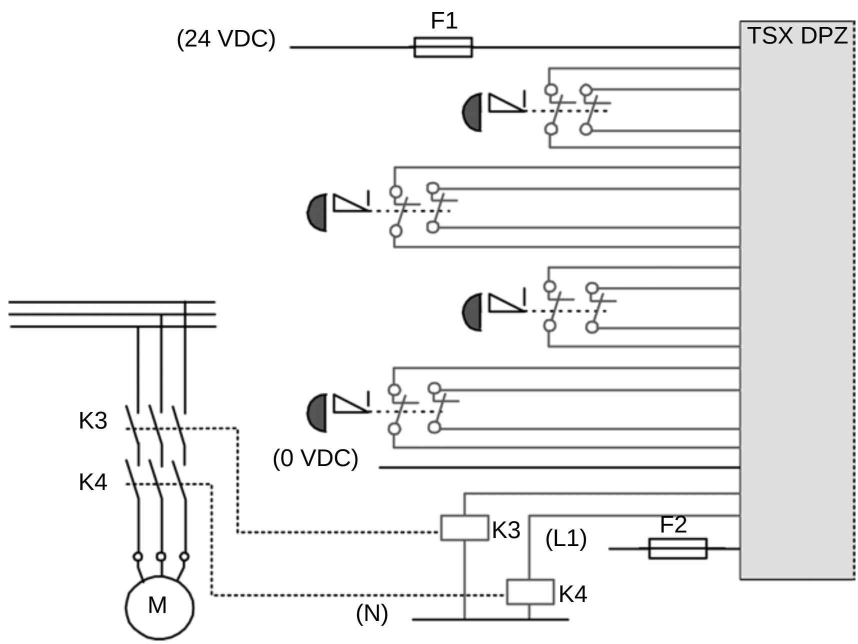
An external supply cut or pressing one of the emergency stop buttons causes the security output circuits to open immediately.

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.

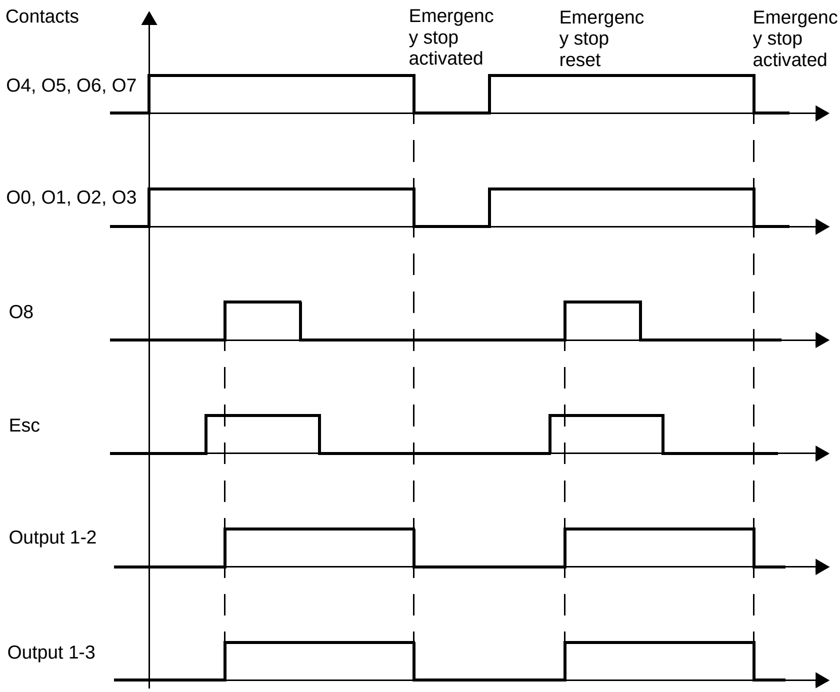
Interface block with the PLC bus

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.

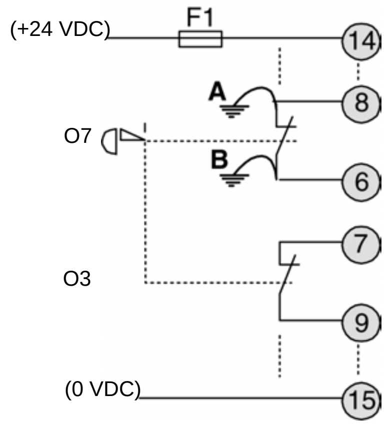
If a module with an external 24 VDC supply, which is insulated from the ground, is used, the **first ground fault**does not affect the operation of the module, on the other hand, the **second ground fault**causes:

- 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

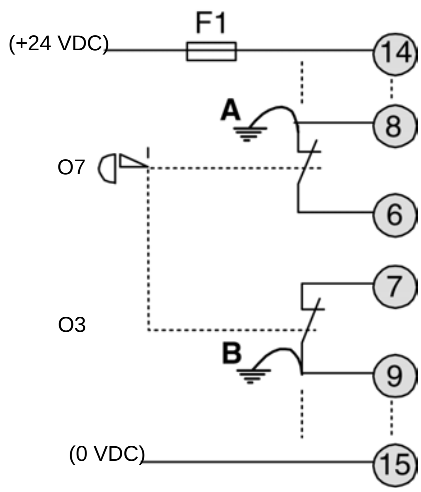
Short-circuiting of one or several PB ES or PI:

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

22.3 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:

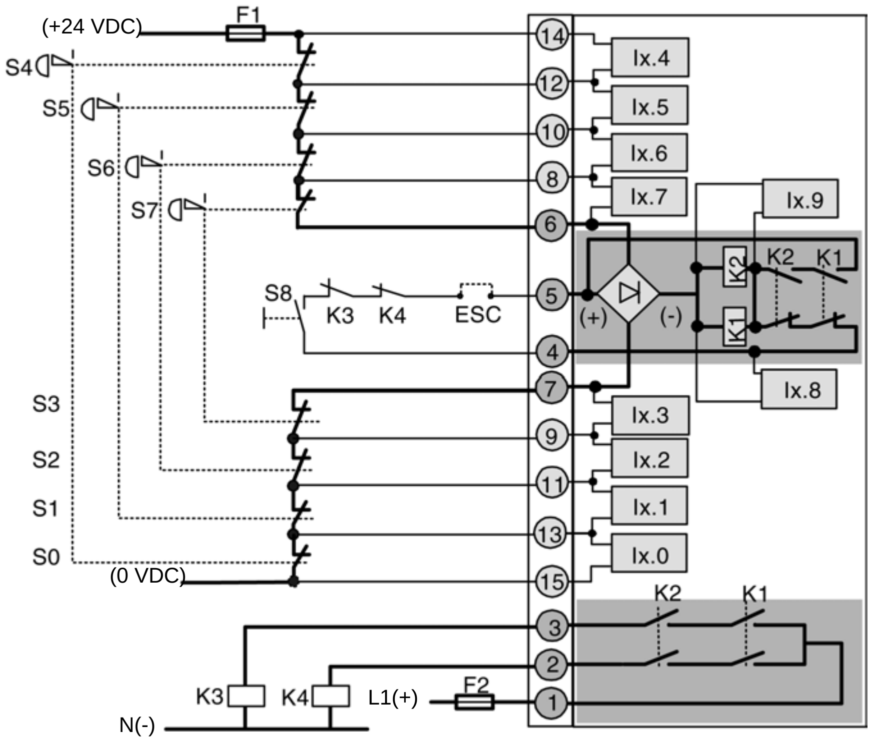
Connecting an emergency stop PB or PI with 2 open contacts

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.

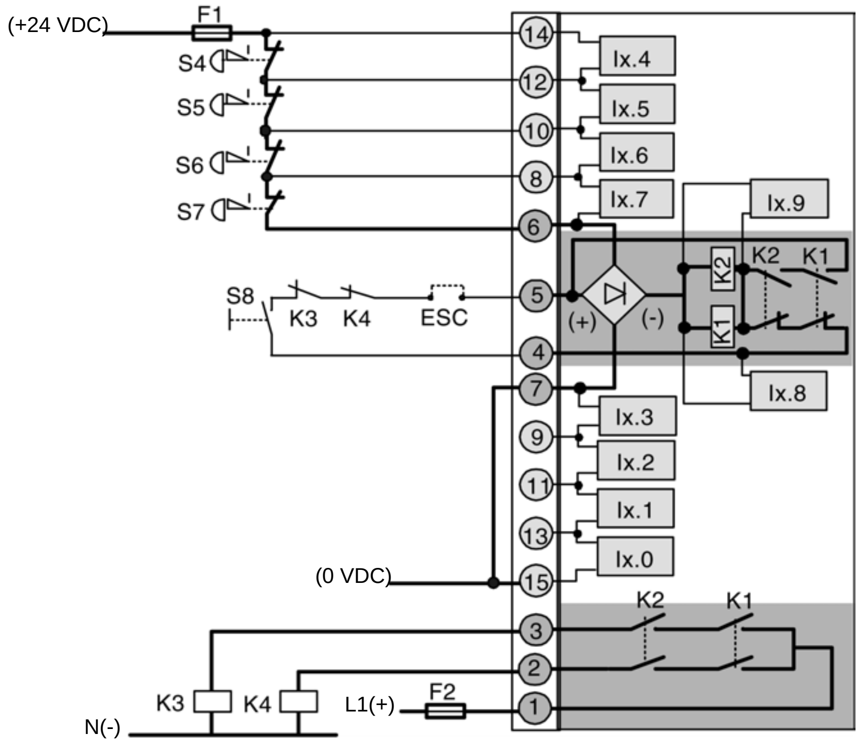
Connecting an emergency stop PB or PI to one single open contact

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.

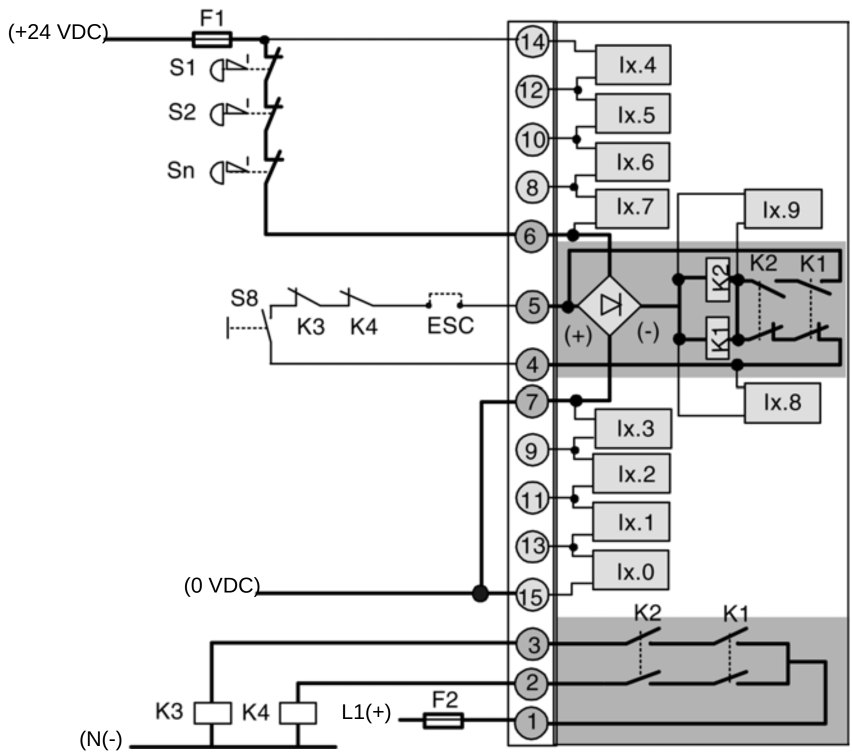
Undetected faults

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:

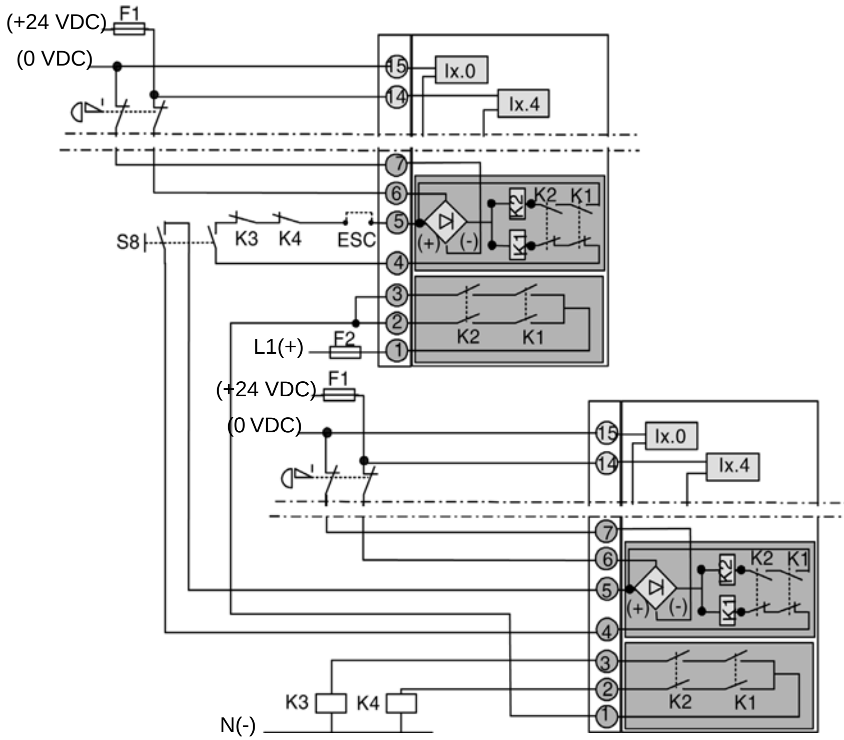
- Serialized security output modules.
- An S8 validation contact via serialized module (electrically insulated contact).

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.

22.4 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.

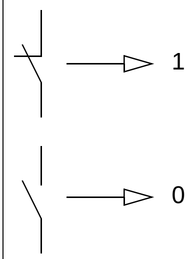
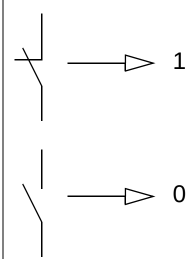
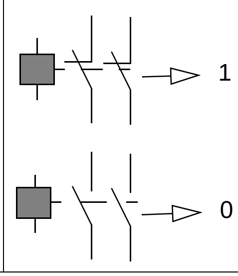
What's in this Section?

This section contains the following topics:

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		
9 - 11	2	%Ix.2		
7 - 9	3	%Ix.3		
14 - 12	4	%Ix.4		
12 - 10	5	%Ix 5		
10 - 8	6	%Ix.6		
8 - 6	7	%Ix.7		
5 - 4	8	%Ix.8	Validation input	1 contact 
/	9	%Ix.9	Status of the output command	2 contacts 

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.

22.5 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:

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
	More relay commands	Read %Ix.9
	Destruction of F2 fuse	Check the status and the characteristics of the fuse
Start up not possible	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
	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
Automatic start up	Permanent validation of PB	%Ix8 = 1 whatever the status of PB
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.

22.6 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:

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
Safety outputs			

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.

22.7 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:

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. 61*).

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 mm^2 wire without end ferrule.
- A maximum of: 2 x 0.000434 in^2 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 the 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 (Installation manual TSX Micro Volume 1)).

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. 58*.

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

23

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:

23.1 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:

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 discrete input and output modules to be quickly connected to operational components. It replaces screw terminal blocks, thus doing away with single wire connections.

The TELEFAST 2 system, which consists of connection bases for interfaces and linking cables, can only be connected to modules which are fitted with HE10 connectors.

Several base types can be identified:

- connection interface bases for discrete inputs/outputs, 8/12/16 channels;
- bases for connection and adaptation interfaces relating to inputs, 16 isolated channels;
- bases for connection and adaptation interfaces relating to static outputs, 8 and 16 channels;
- bases for connection and adaptation interfaces relating to relay outputs, 8 and 16 channels;
- bases for an adapter splitting 16 channels into 2 x 8 channels;
- bases for connection and adaptation interfaces relating to outputs, with or without removable electromechanical or static relays, 16 channels;
- input bases for 12.5mm-wide static relays.

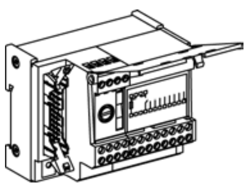
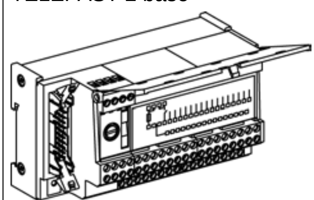
Catalogue of TELEFAST 2 connection bases

At a Glance

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

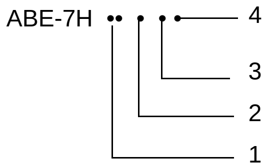
Catalog

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

Reference ABE-7H••	**08R10 08R11 08R21**	**08S21**	**12R50 16R50**	**12R10 12R20 12R21**	**16R10 16R11 16R20 16R21 16R23 16R30 16R31**	**12S21 16S21**	**16S43 (1) 16F43 (2)**
Base types	**Connection interface bases for discrete I/Os, 8/12/16 channels.**						
Sub groups	8-channel bases		Compact 12 and 16 channel bases	12 and 16 channel bases			
Illustration	TELEFAST 2 base 			TELEFAST 2 base 			
Description	-	with 1 isolator/ channel	-	-		with 1 isolator/ channel	with 1 fuse + 1 isolator/ channel
Key							
(1)	For inputs.						
(2)	For outputs.						

Illustration

The principle for identifying the connection interface bases for discrete I/Os, 8/12/16 channels is as follows:



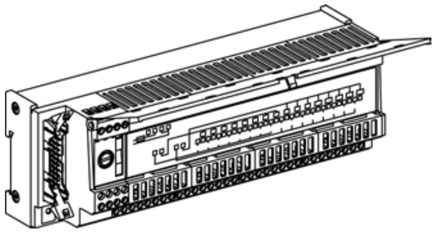
Description

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

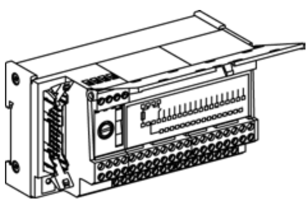
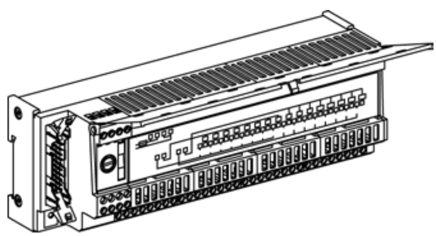
Number	Description
1	**08** = 8-channel base **12** = 12-channel base **16** = 16-channel base
2	Primary function: ● **R** = simple connection; ● **S** = isolator/channel; ● **F** = fuse/channel.
3	**1** = with 1 screw terminal per channel on 1 level **2** = with 2 screw terminals per channel on 2 levels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

Catalog

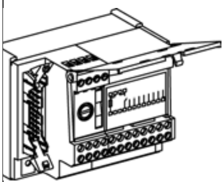
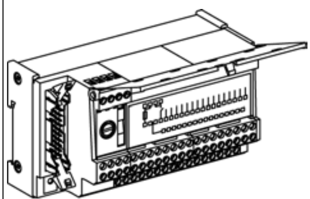
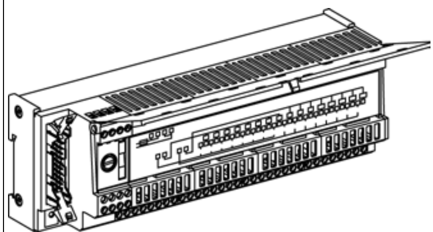
The table below shows the catalog of bases for connection and adaptation interfaces relating to inputs, 16 isolated channels.

ABE-7S•• reference	**16E2B1**	**16E2E1**	**16E2E0**	**16E2F0**	**ABE-7S•• reference**
Illustration	TELEFAST 2 base 				
Description	16 x 24 VDC inputs	16 x 48 VDC inputs	16 x 48 VAC inputs	16 x 110...120 VAC inputs	16 x 220...240 VAC inputs

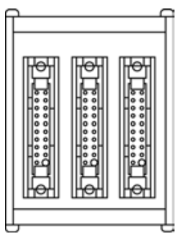
The table below shows the catalog of bases for connection and adaptation interfaces relating to static outputs, 8 and 16 channels.

ABE-7S•• reference	**08S2B0**	**08S2B1**	**16S2B0**	**16S2B2**
Sub groups	**8-channel bases**		**16-channel bases**	
Illustration	TELEFAST 2 base 	TELEFAST 2 base 		
Description	8 static 24 VDC / 0.5A outputs, with error detection transfer to PLC.	8 static 24 VDC / 2A outputs, with error detection transfer to PLC.	16 static 24 VDC / 0.5A outputs, with error detection transfer to PLC.	16 static 24 VDC / 0.5A outputs, without error detection transfer to PLC.

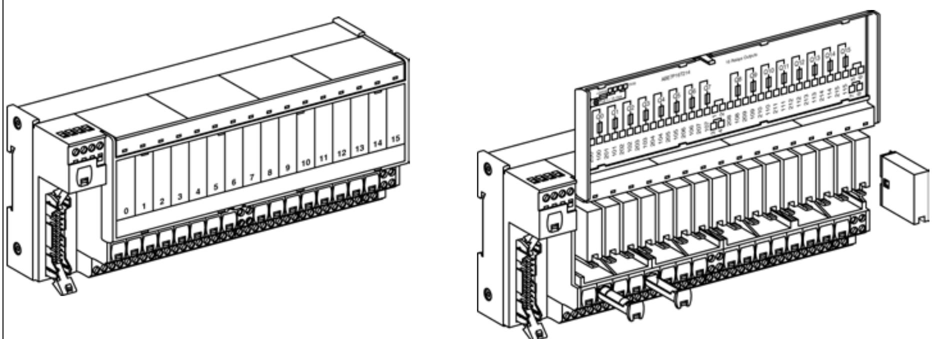
The table below shows the catalog of bases for connection and adaptation interfaces relating to relay outputs, 8 and 16 channels.

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

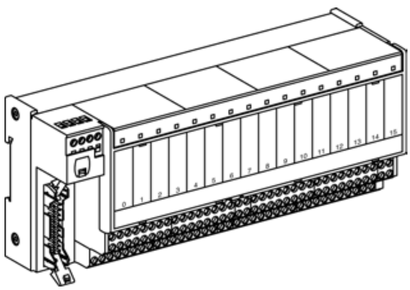
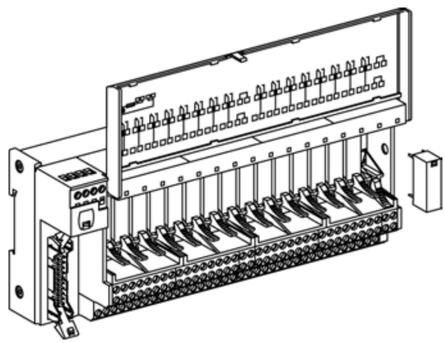
The table below displays the catalog entry showing the connection base for the adapter splitting 16 channels into 2 x 8 channels.

ABE-7A•• reference	**CC02**
Base types	**Bases for adapter splitting 16 channels into 2 x 8 channels.**
Illustration	TELEFAST 2 base 
Description	Allows splitting of: ● 16 channels into two x 8 channels; ● 12 channels into 8 channels + 4 channels.

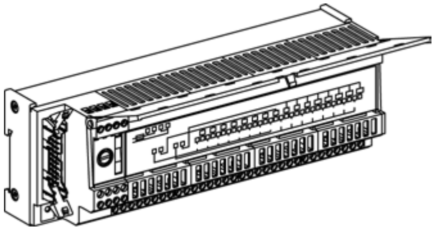
The table below shows the catalog of output adaptation interface bases with or without removable electromechanical or static relays, 16 channels.

ABE-7•• reference	**R16T210**	**P16T210**	**P16T214**	**R16T212**	**P16T212**	**P16T215**	**P16T318**
Base types	**Output adaptation interface bases with or without removable electromechanical or static relays, 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 						
Description	with 0.39 in-wide electromechanical relay.	0.39 in-wide relay, not provided.	0.39 in-wide relay, not provided, 1 fuse/ channel.	with 0.39 in-wide electromechanical relay.	0.39 in-wide relay, not provided.	0.39 in-wide relay, not provided, 1 fuse/ channel.	12.5 mm-wide relay, not provided, 1 fuse + 1 isolator/ channel.

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

ABE-7•• reference	**R16T230**	**R16T330**	**P16T330**	**P16T334**	**R16T231**	**R16T332**	**P16T332**	**R16T370**
Base types	**Output adaptation interface bases with or without removable electromechanical 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  							
Description	with 0.39 in-wide electromechanical relay.	with 12.5 mm-wide electromechanical relay.	12.5 mm-wide relay, not provided.	12.5 mm-wide relay, not provided, 1 fuse/ channel.	with 10 mm-wide electromechanical relay.	with 12.5 mm-wide electromechanical relay.	12.5 in-wide relay, not provided.	with 12.5 mm-wide electromechanical relay.

The table below shows the catalog of input bases for 12.5-mm wide static relays.

ABE-7P•• reference	16F310	16F312
Base types	**Input bases for 12.5 mm-wide static relays**	
Illustration	TELEFAST 2 base 	
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**
BasesTELEFAST 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	-	-

	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**
BasesTELEFAST 2						
ABE-7R16T•••	-	Yes (3)	-	Yes	-	-
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.					

23.2 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:

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 the aid of:

- a 28 gage multi-stranded sheathed cable (0.08 mm^2);
- a 22 gage connection cable (0.34 mm^2).

TSX CDP 102/ 202/302 connection cable

The 28 gage connection cable (0.08 mm^2) comes in three different lengths:

- 3 ft 3.4 in length: TSX CDP 102;
- 6 ft 6.8 in length: TSX CDP 202;
- 9 ft 10.2 in 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 mm^2.

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

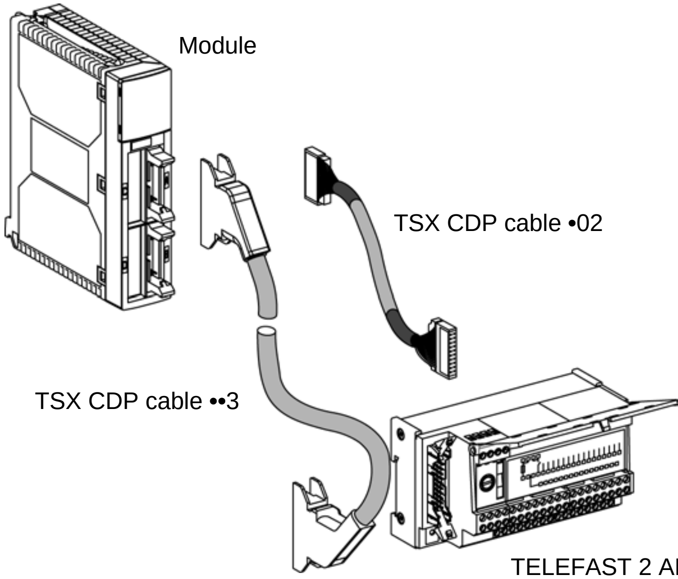
The 22 gage connection cable (0.34 mm^2) comes in five different lengths:

- 1 ft 7.7 in length: TSX CDP 053;
- 3 ft 3.4 in length: TSX CDP 103;
- 6 ft 6.8 in length: TSX CDP 203;
- 9 ft 10.2 in length: TSX CDP 303;
- 16 ft 5 in length: TSX CDP 503.

This cable is made up of 2 sheathed HE10 connectors, and a cable with a cross-section of 0.34 mm^2, 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:** check the consistency between the rating of the fuse on board the TELEFAST 2 and the fuse which is to be used on the inputs/outputs (see Connecting modules).

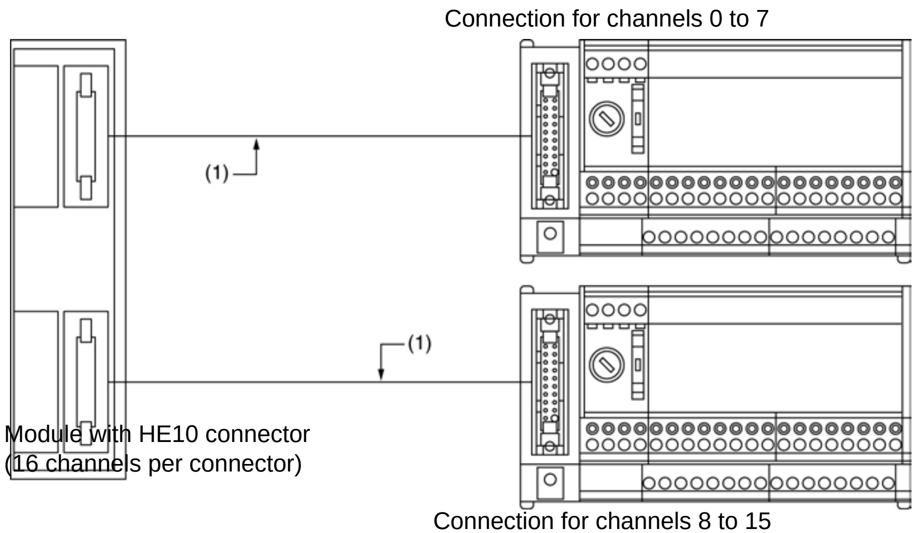
Module/base connection principle

At a Glance

The principle for connecting the discrete input/output module to a TELEFAST 2 interface is shown here.

Illustration

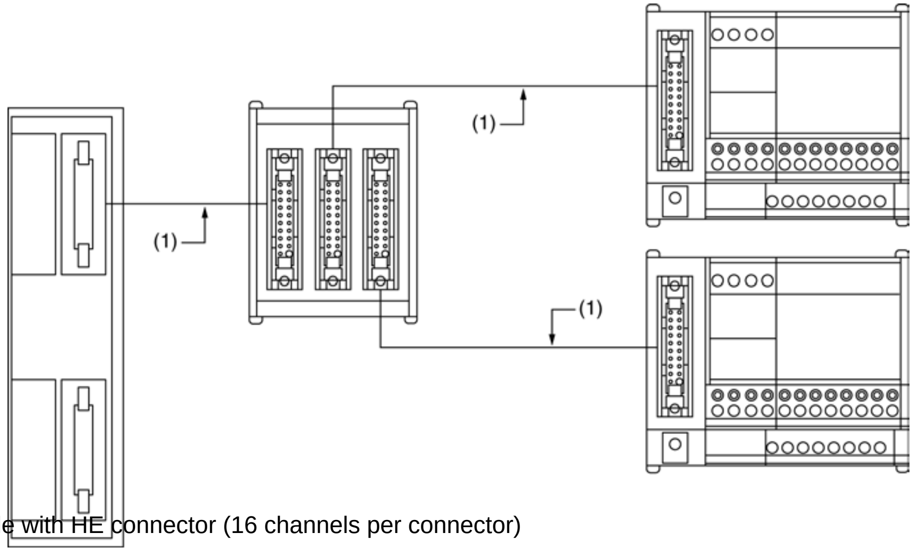
The diagram below shows the connection between a discrete I/O module with an HE10 connector and a TELEFAST 2 base.



(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-7ACC02adapter base.



Module with HE connector (16 channels per connector)

(1) TSX CDP •02 cable or TSX CDP ••3 cable.

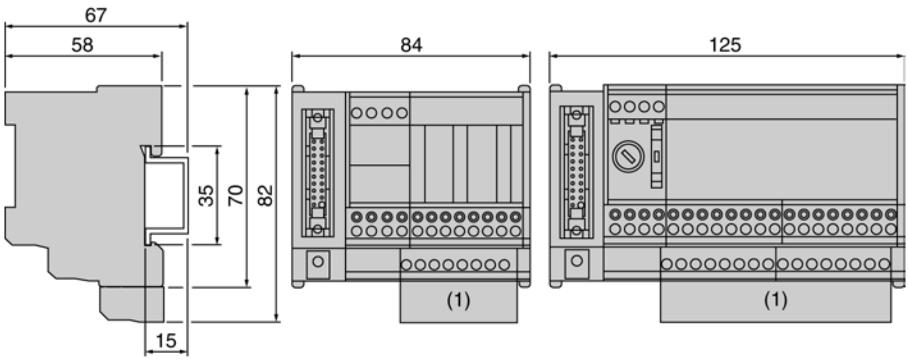
Dimensions and mounting of the TELEFAST 2 connection bases

At a Glance

Here is an overview of the dimensions of different TELEFAST 2 connection products and their mounting methods.

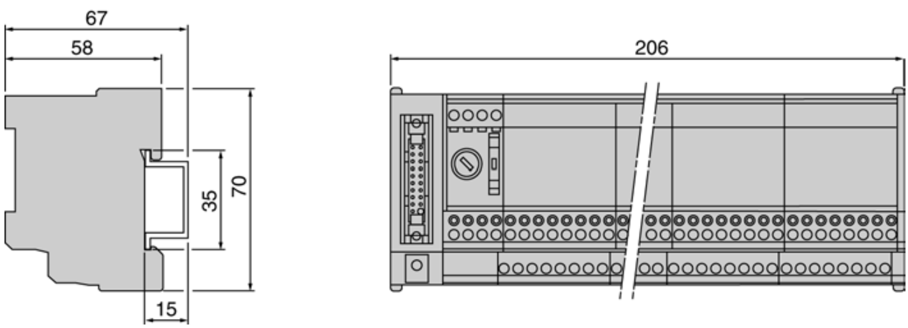
Illustration

The illustration below shows the dimensions of the products: ABE-7H••R1•, ABE-7H••R5•, ABE-7H••R2•, ABE-7H••S21, ABE-7H16R3•, ABE-7S08S2B0, ABE-7R••S1••, ABE-7R08S210.

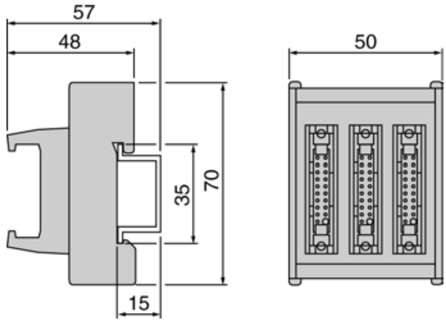


(1) Dimension with additional shunt terminal block ABE-7BV20 or ABE-7BV10.

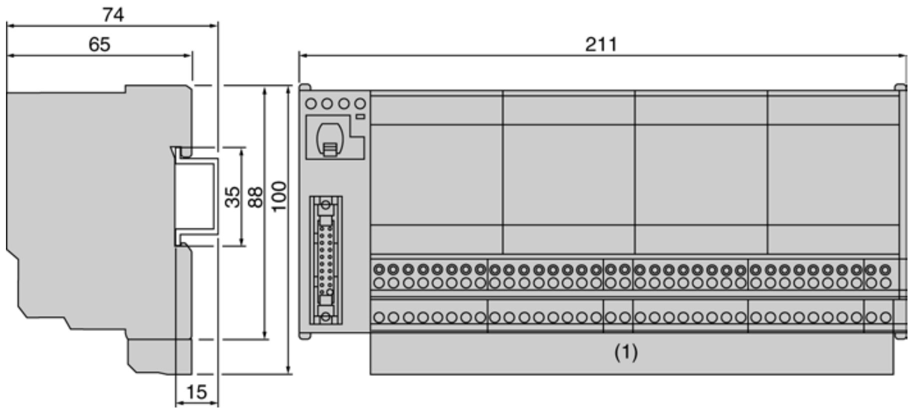
The illustration below shows the dimensions of the products: ABE-7H16S43, ABE-7S16E2••, ABE-7S08S2B1, ABE-7S16S2B•, ABE-7H16F43•, ABE-7R16S21.



The illustration below shows the dimensions of the product ABE-7ACC02



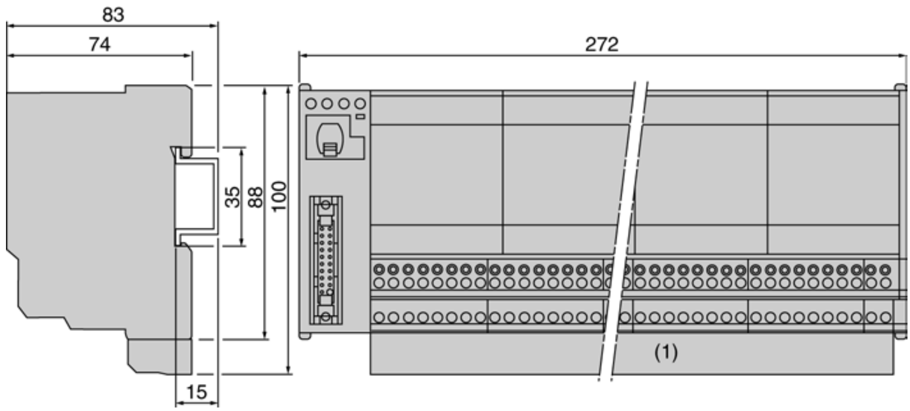
The illustration below shows the dimensions of the products: ABE-7R16T2••, ABE-7P16T2••.



Reference measuring 211 x 88 mm
(product shown has 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 shown has 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 1.38 in-wide DIN mounting rails.

> **Note:** the input adaptation bases ABE-7S16E2E1 and static output adaptation bases ABE-7S••S2B must be mounted vertically and in a horizontal position.

23.3 TELEFAST 2 ABE-7H08R10/08R11 and ABE-7H16R10/16R11 connection bases

Sensor and actuator connections on the ABE-7H08R10/R11 and ABE-7H16R10/R11 bases

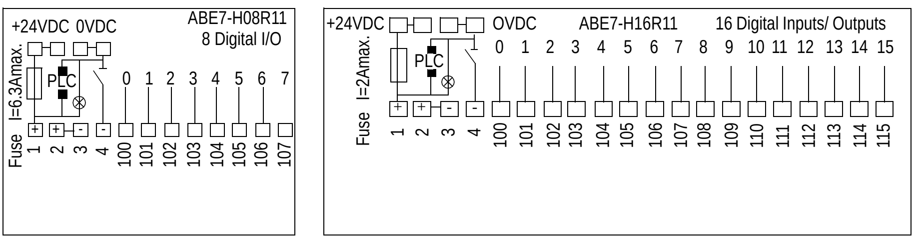
At a Glance

This is an overview of the sensor and actuator connections on TELEFAST 2 bases.

> **Note:** the bases are originally equipped with a general-purpose, fast-blow fuse rated 6.3 A. To guarantee optimum protection, this fuse should be rated according to the application (connection to input or output functions) and the maximum current allowable in the base.
> Type and rating of fuse to be fitted to 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.

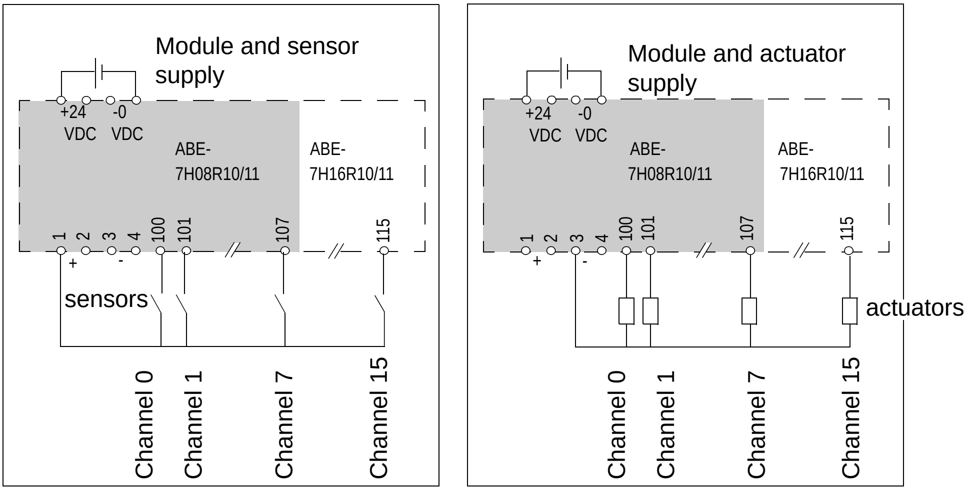
Illustration

Description of the connection terminal blocks.



Illustration

Connections for input and output functions.



Connecting the common for sensors:

- onto terminals 1 or 2: sensors to the '+' of the supply (positive logic inputs).

Connecting the common for actuators:

- onto terminals 3 or 4: actuators to the '-' of the supply (positive logic outputs).

23.4 TELEFAST 2 ABE-7H12R10/12R11 connection bases

Sensor and actuator connections on the ABE-7H12R10/R11 bases

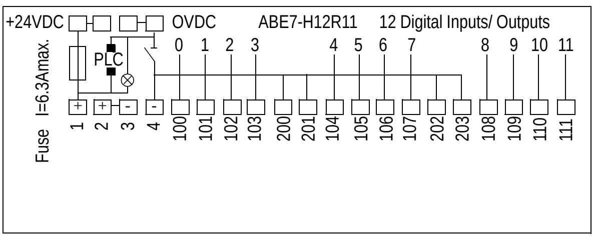
At a Glance

This is an overview of the sensor and actuator connections on TELEFAST 2 bases.

Note: the bases are originally equipped with a general-purpose, fast-blow fuse rated 6.3 A. To guarantee optimum protection, this fuse should be rated according to the application (connection to input or output functions) and the maximum current allowable in the base.
Type and rating of fuse to be fitted to the base:
- input functions: 0.5A fast blow;
- output functions: 6.3A fast blow on the ABE-7H12R•• base.

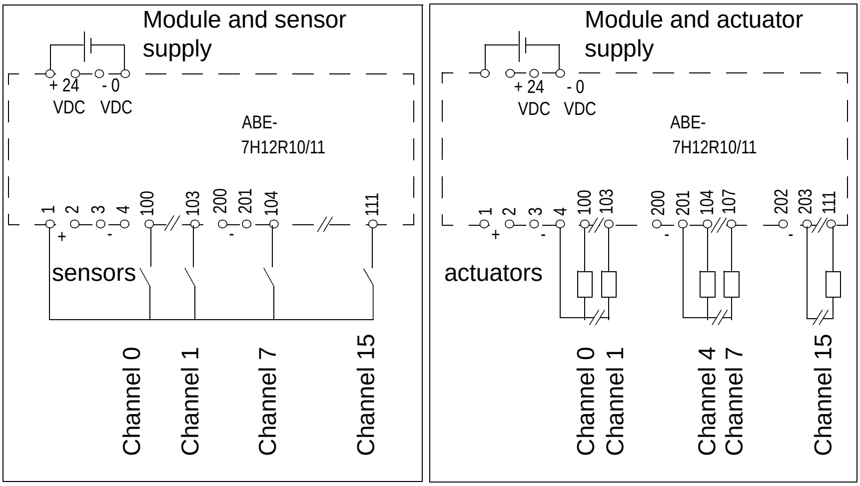
Illustration

Description of the connection terminal blocks.



Illustration

Connections for input and output functions.



Connecting the common for sensors:

- onto terminals 1 or 2: sensors to the ‘+’ of the supply (positive logic inputs).

Connecting the common for 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).

23.5 TELEFAST 2 ABE-7H08R21 and ABE-7H16R20/ 16R21/16R23 connection bases

Sensor and actuator connections on the ABE-7H08R21 and ABE-7H16R20/R21/R23 bases for type 2 inputs

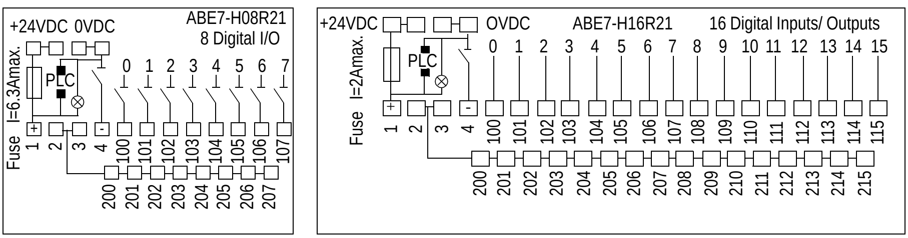
At a Glance

This is an overview of the sensor and actuator connections on TELEFAST 2 bases.

> **Note:** the bases are originally equipped with a general-purpose, fast-blow fuse rated 2 A. To guarantee optimum protection, this fuse should be rated according to the application (connection to input or output functions) and the maximum current allowable in the base.
> Type and rating of fuse to be fitted to 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.

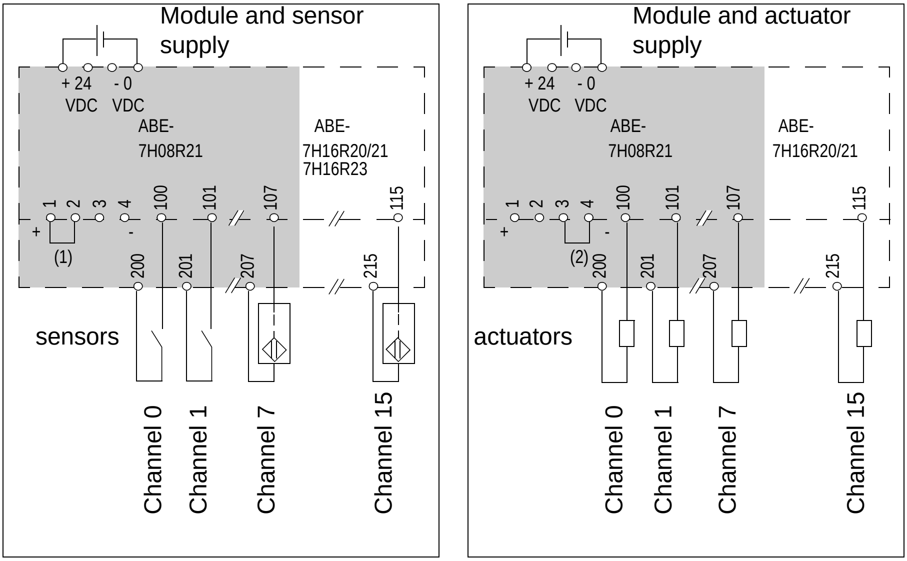
Illustration

Description of the connection terminal blocks.



Illustration

Connections for input and output functions.



Connecting the common for sensors:

- in order to create the shared sensor supply, position the jumper (1) on terminals 1 and 2: terminals 200 to 215 will be on the '+' of the supply (positive logic inputs).

Connecting the common for actuators:

- in order to create the shared supply for the actuators, position the jumper (2) on terminals 3 and 4: terminals 200 to 215 will be on the '-' of the supply (positive logic outputs).

23.6 TELEFAST 2 ABE-7H12R20/12R21 connection bases

Sensor and actuator connections on the ABE-7H12R20/12R21 bases

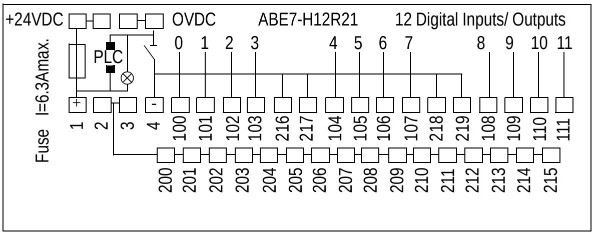
At a Glance

This is an overview of the sensor and actuator connections on TELEFAST 2 bases.

> **Note:** the bases are originally equipped with a general-purpose, fast-blow fuse rated 6.3 A. To guarantee optimum protection, this fuse should be rated according to the application (connection to input or output functions) and the maximum current allowable in the base.
> Type and rating of fuse to be fitted to the base:
> - input functions: 0.5A fast blow;
> - output functions: 6.3A fast blow on the ABE-7H12R•• base.

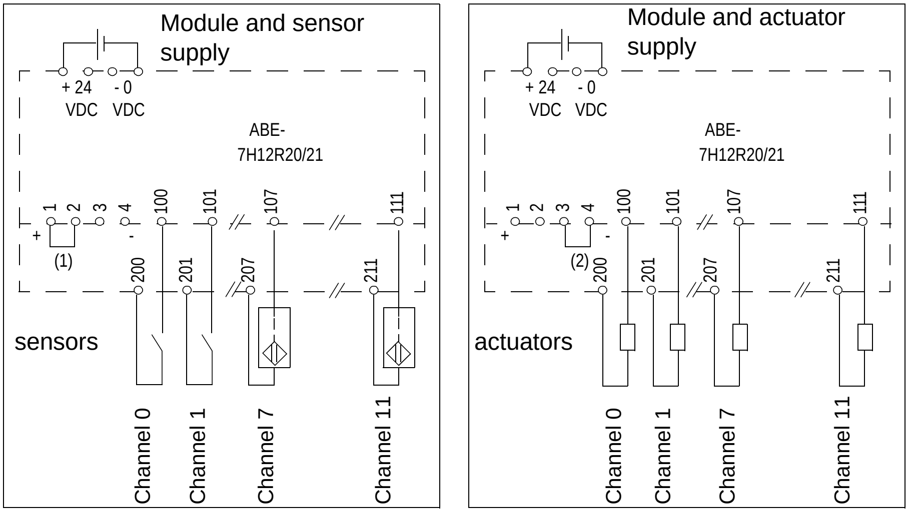
Illustration

Description of the connection terminal blocks.



Illustration

Connections for input and output functions.



Connecting the common for sensors:

- in order to create the shared sensor supply, position the jumper (1) on terminals 1 and 2: terminals 200 to 215 will be on the '+' of the supply (positive logic inputs). Terminals 216, 217, 218 and 219 are linked to the '-' polarity.

Connecting the common for actuators:

- in order to create the shared supply for the actuators, position the jumper (2) on terminals 3 and 4: terminals 200 to 215 will be on the '-' of the supply (positive logic outputs).
  Terminals 216, 217, 218 and 219 are linked to the '-' polarity.

23.7 TELEFAST 2 ABE-7H08S21/16S21 connection bases

Sensor and actuator connections on ABE-7H08S21/16S21 bases with one isolator per channel

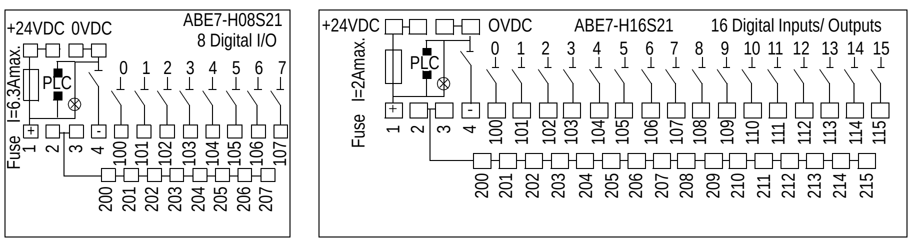
At a Glance

This is an overview of the sensor and actuator connections on TELEFAST 2 bases.

> **Note:** the bases are originally equipped with a general-purpose, fast-blow fuse rated 2 A. To guarantee optimum protection, this fuse should be rated according to the application (connection to input or output functions) and the maximum current allowable in the base.
> Type and rating of fuse to be fitted to 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.

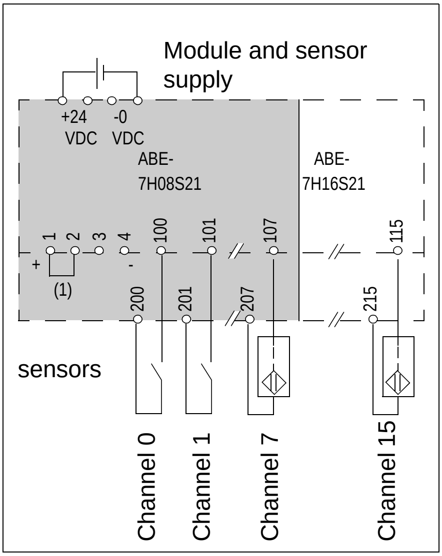
Illustration

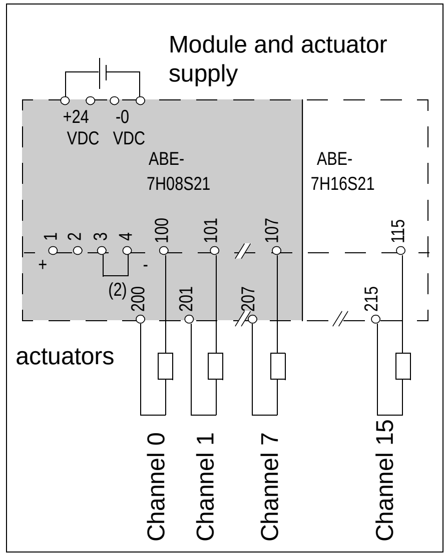
Description of the connection terminal blocks.



Illustration

Connections for input and output functions.





Connecting the common for sensors:

- in order to create the shared sensor supply, position the jumper (1) on terminals 1 and 2: terminals 200 to 215 will be on the '+' of the supply (positive logic inputs).

Connecting the common for actuators:

- in order to generate the shared supply for the actuators, position the jumper (2) on terminals 3 and 4: terminals 200 to 215 will be on the '-' of the supply (positive logic outputs).

23.8 TELEFAST 2 ABE-7H12S21 connection base

Sensor and actuator connections on the ABE-7H12S21 base with 1 isolator per channel

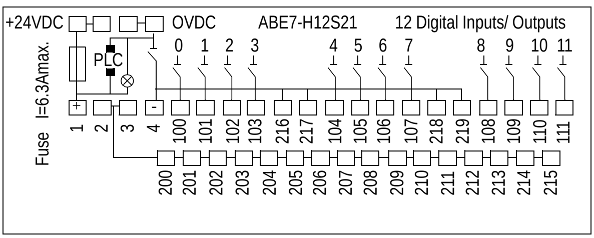
At a Glance

This is an overview of the sensor and actuator connections on the TELEFAST 2 base.

Note: the base is originally equipped with a general-purpose, fast-blow fuse rated 6.3 A. To guarantee optimum protection, this fuse should be rated according to the application (connection to input or output functions) and the maximum current allowable in the base.
Type and rating of fuse to be fitted to the base:
- input functions: 0.5A fast blow;
- output functions: 6.3A fast blow on the ABE-7H12S21 base.

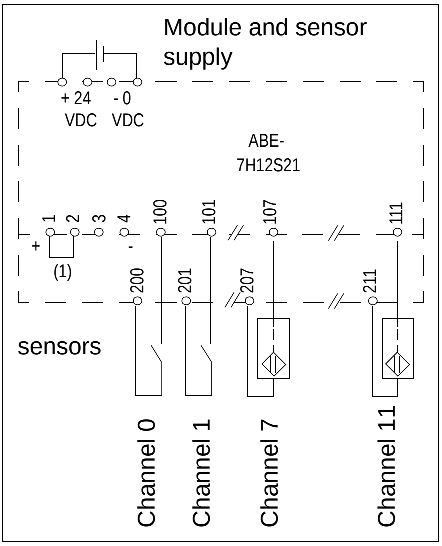
Illustration

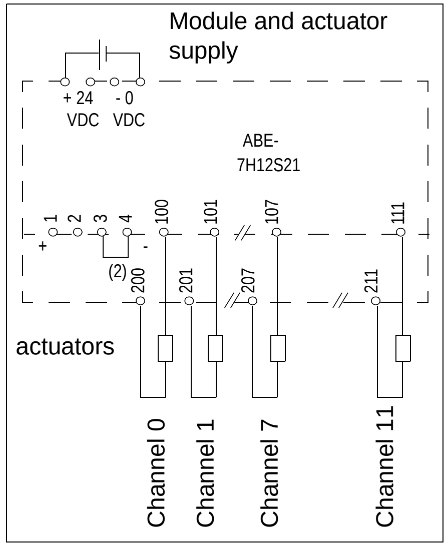
Description of the connection terminal blocks.



Illustration

Connections for input and output functions.





Connecting the common for sensors:

- in order to create the shared sensor supply, position the jumper (1) on terminals 1 and 2: terminals 200 to 215 will be on the '+' of the supply (positive logic inputs). Terminals 216, 217, 218 and 219 are linked to the '-' polarity.

Connecting the common for actuators:

- in order to create the shared supply for the actuators, position the jumper (2) on terminals 3 and 4: terminals 200 to 215 will be on the '-' of the supply (positive logic outputs).
  Terminals 216, 217, 218 and 219 are linked to the '-' polarity.

23.9 TELEFAST 2 ABE-7H16R30/16R31 connection bases

Sensor and actuator connections on the ABE-7H16R30/R31 bases

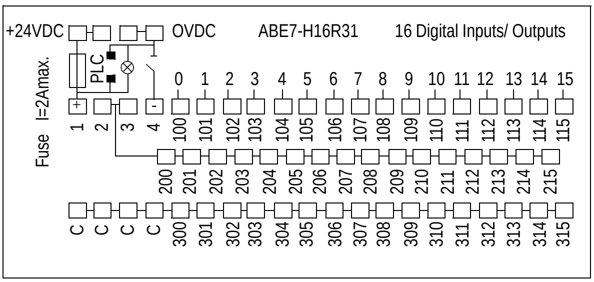
At a Glance

This is an overview of the sensor connections on TELEFAST 2 bases.

Note: the bases are originally equipped with a general-purpose, fast-blow fuse rated 2 A. To guarantee optimum protection, this fuse should be rated according to the application and the maximum current allowable in the base.
Type and rating of fuse to be fitted to the base:
- input functions: 0.5A fast blow.

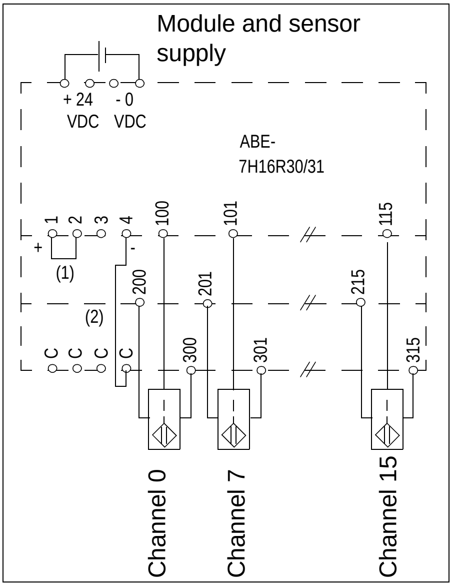
Illustration

Description of the connection terminal blocks.



Illustration

Input function connections.



Connecting the common for 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.

Note: the ABE-7H16R30/R31 base can also be used for connecting actuators.

23.10 TELEFAST 2 ABE-7H12R50 connection base

Sensor and actuator connections on the ABE-7H12R50 bases

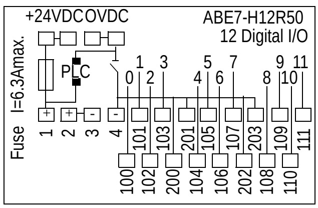
At a Glance

This is an overview of the sensor and actuator connections on the TELEFAST 2 base.

> **Note:** the base is originally equipped with a general-purpose, fast-blow fuse rated 6.3 A. To guarantee optimum protection, this fuse should be rated according to the application (connection to input or output functions) and the maximum current allowable in the base.
> Type and rating of fuse to be fitted to the base:
> - input functions: 0.5A fast blow;
> - output functions: 6.3A fast blow on the ABE-7H12R50 base.

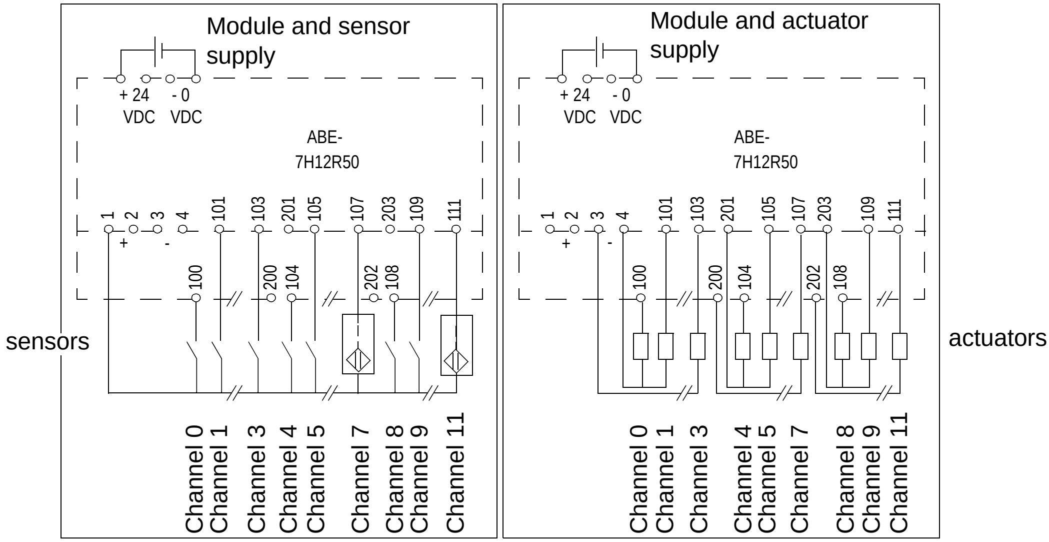
Illustration

Description of the connection terminal blocks.



Illustration

Connections for input and output functions.



Connecting the common for sensors:

- onto terminals 1 or 2: sensors to the ‘+’ of the supply (positive logic inputs). Terminals 200, 201, 202 and 203 are linked to the ‘-‘ polarity.

Connecting the common for actuators:

- several terminals linked to the ‘-‘ polarity (3, 4, 200, 202, and 203) allow sharing in groups of 4 or 2 channels (positive logic outputs).

23.11 TELEFAST 2 ABE-7H16R50 connection base

Sensor and actuator connections on the ABE-7H16R50 base

At a Glance

This is an overview of the sensor and actuator connections on the TELEFAST 2 base.

> **Note:** the base is originally equipped with a general-purpose, fast-blow fuse rated 6.3 A. To guarantee optimum protection, this fuse should be rated according to the application (connection to input or output functions) and the maximum current allowable in the base.
> Type and rating of fuse to be fitted to the base:
> - input functions: 0.5A fast blow;
> - output functions: 2A fast blow on the ABE-7H16R50 base.

Illustration

Description of the connection terminal blocks.

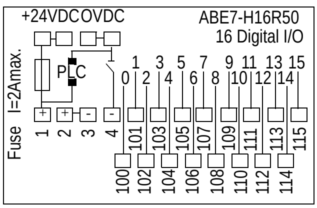
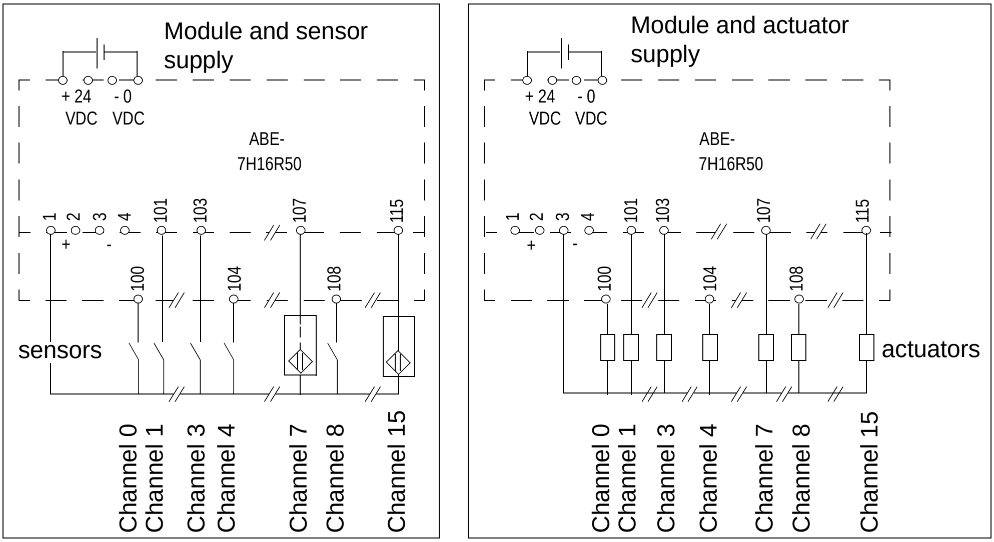


Illustration Connections for input and output functions.



Connecting the common for sensors:

- onto terminals 1 or 2: sensors to the '+' of the supply (positive logic inputs).

Connecting the common for actuators:

- onto terminals 3 or 4: actuators to the '-' of the supply (positive logic outputs).

23.12 TELEFAST 2 ABE-7H16F43 connection base

Actuator connections on ABE-7H16F43 output base with one fuse and one isolator per channel

At a Glance

This is an overview of the actuator connections on TELEFAST 2 bases.

Illustration

Description of the connection terminal blocks.

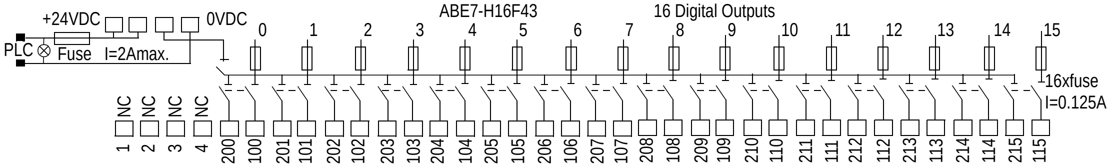
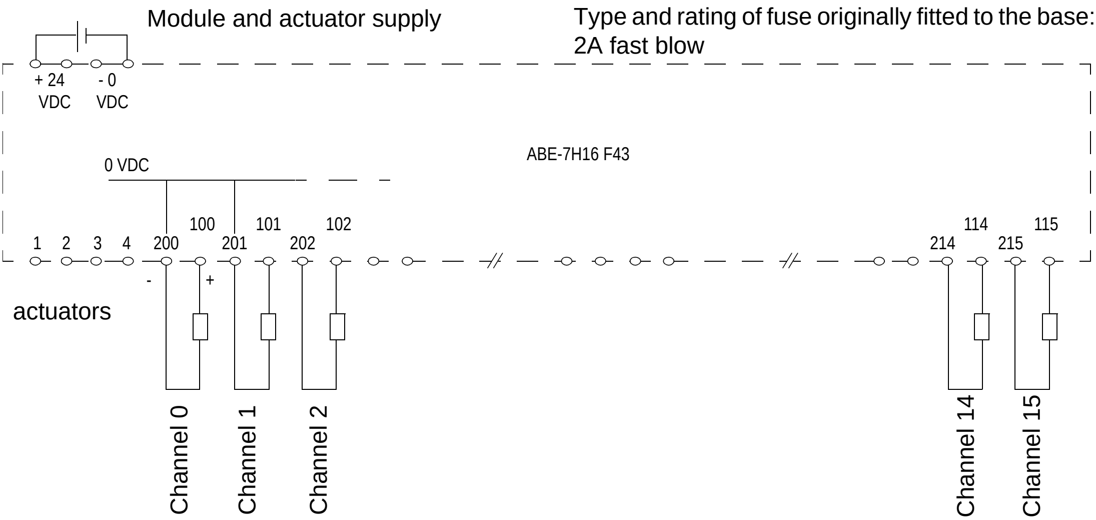


Illustration Output connection functions.



Functionality per channel:

- original fitted 0.125 A fuse;
- isolator cuts the '-' and the channel signal simultaneously.

Note: terminals 200..215 are connected to the '-' polarity of the supply.

23.13 TELEFAST 2 ABE-7H16S43 connection base

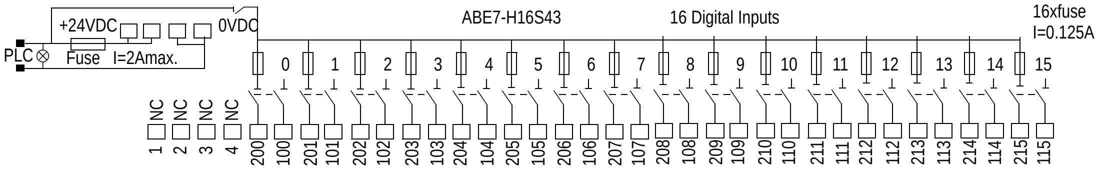
Sensor connections on ABE-7H16S43 output base with one fuse and one isolator per channel

At a Glance

This is an overview of the sensor connections on TELEFAST 2 bases.

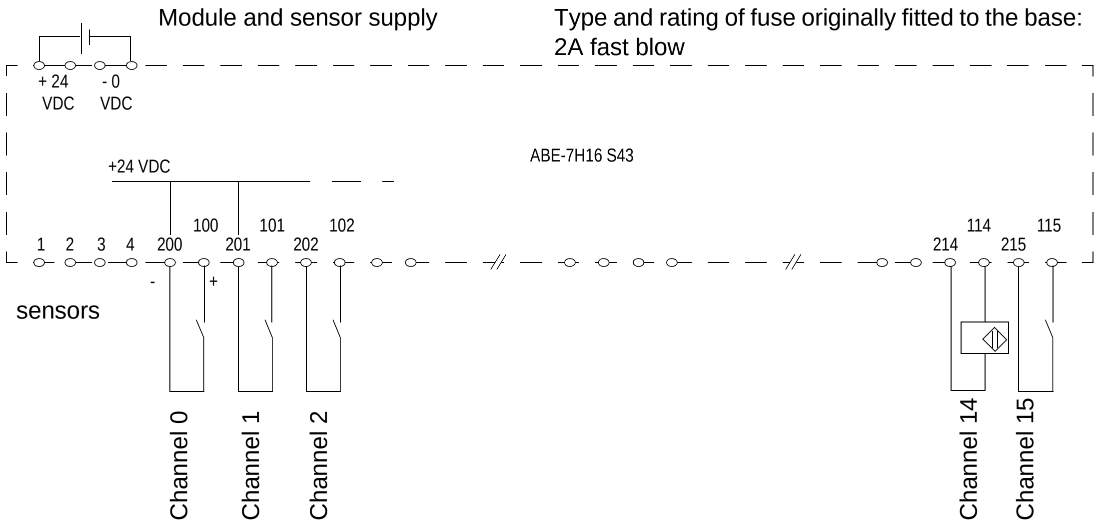
Illustration

Description of the connection terminal blocks.



Illustration

Input function connections.



Functionality per channel:

- original fitted 0.125 A fuse;
- isolator cuts the '+' and the channel signal simultaneously.

Note: terminals 200..215 are connected to the '+' polarity of the supply.

23.14 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:

Actuator connections on non removable relay output adaptation bases ABE-7R08S111/16S111.

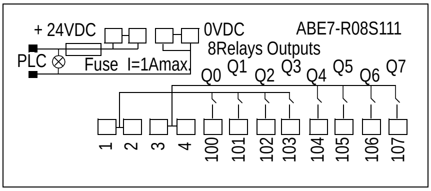
At a Glance

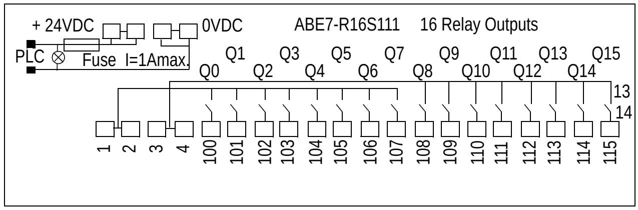
This is a description of the actuator connections on:

- base TELEFAST 2 ABE-7R08S111, 8 relay outputs, 1 F twice , 4 common DC or AC currents;
- base TELEFAST 2 ABE-7R16S111, 16 relay outputs, 1 F twice , 8 common DC or AC currents.

Illustration

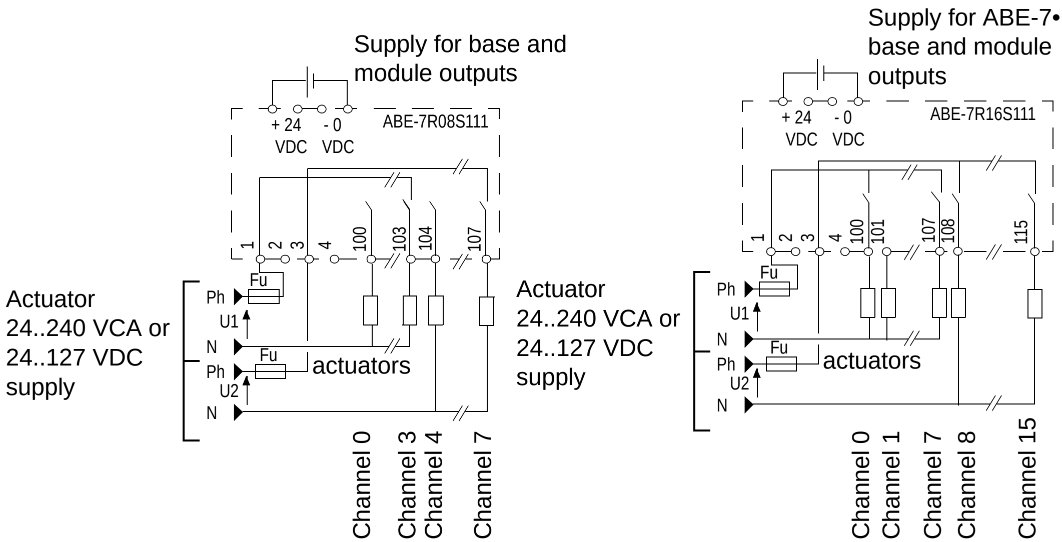
Description of the connection terminal blocks.





Illustration

Output connection functions.



Fu Fuse rating according to the load.

Note: the bases are originally equipped with a general-purpose, fast-blow fuse rated 1 A.
Protection of relay contacts:
- a protection circuit must be mounted onto the terminals of each actuator:
  - RC or MOV circuit in the case of alternating current;
  - discharge diode for direct current.

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

<table>
<tr><td colspan="3">Base types</td><td>ABE-7R08S111</td><td>ABE-7R16S111</td></tr>
<tr><td colspan="3">Channel number</td><td>8</td><td>16</td></tr>
<tr><td colspan="5">Contact characterisitics</td></tr>
<tr><td colspan="2" rowspan="2">Job limit voltage</td><td>Alternating</td><td colspan="2">250 V</td></tr>
<tr><td>Direct</td><td colspan="2">30 V</td></tr>
<tr><td colspan="3">Thermal current</td><td colspan="2">3 A</td></tr>
<tr><td rowspan="4">Alternating current load</td><td rowspan="2">Resistive, load AC12</td><td>Voltage</td><td colspan="2">230 VAC</td></tr>
<tr><td>Current (1)</td><td colspan="2">0.6 A</td></tr>
<tr><td rowspan="2">Inductive, load AC15</td><td>Voltage</td><td colspan="2">230 VAC</td></tr>
<tr><td>Current (1)</td><td colspan="2">0.4 A</td></tr>
<tr><td rowspan="4">Direct current load</td><td rowspan="2">Resistive, load DC12</td><td>Voltage</td><td colspan="2">24 VDC</td></tr>
<tr><td>Current (1)</td><td colspan="2">0.6 A</td></tr>
<tr><td rowspan="2">Inductive, load DC13 (2)</td><td>Voltage</td><td colspan="2">24 VDC</td></tr>
<tr><td>Current (1)</td><td colspan="2">0.2 A</td></tr>
<tr><td colspan="2" rowspan="2">Minimum switching</td><td>Current</td><td colspan="2">1 mA</td></tr>
<tr><td>Voltage</td><td colspan="2">5 V</td></tr>
<tr><td colspan="2" rowspan="2">Response time</td><td>State 0 to 1</td><td colspan="2">10 ms</td></tr>
<tr><td>State 1 to 0</td><td colspan="2">6 ms</td></tr>
<tr><td colspan="3">Maximum speed of function loading</td><td colspan="2">0.5 Hz</td></tr>
<tr><td rowspan="3">Built-in protection measures</td><td colspan="2">Against overloads and short-circuits:</td><td colspan="2">None, provide one rapid fusion fuse per channel or group of channels.</td></tr>
<tr><td colspan="2">Against alternating current inductive overcharging</td><td colspan="2">None, each RC circuit or MOV (ZNO) suppressor, must be mounted on the posts of each pre-actuator appropriate to the voltage.</td></tr>
<tr><td colspan="2">Against direct current inductive overcharging</td><td colspan="2">none, each discharge diode must be mounted on the posts of each pre-actuator.</td></tr>
</table>

Base types			**ABE-7R08S111**	**ABE-7R16S111**
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.			

23.15 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:

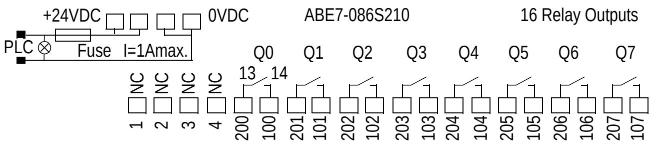
Actuator connections on non removable relay output adaptation bases ABE-7R08S210/16S210.

At a Glance

This is an overview of the actuator connections on TELEFAST 2 ABE-7R08S210/16S210 bases, 8 or 16 relay outputs, 1 F, potential free contact.

Illustration

Description of the connection terminal blocks.



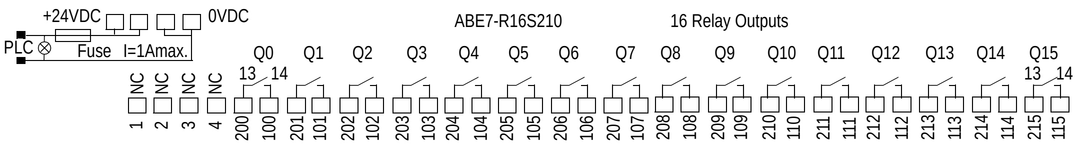
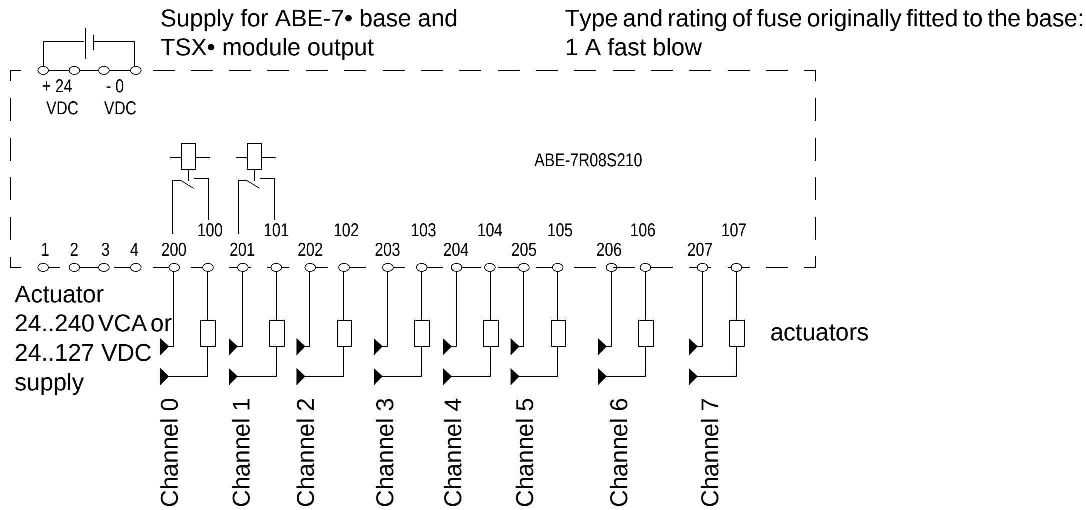
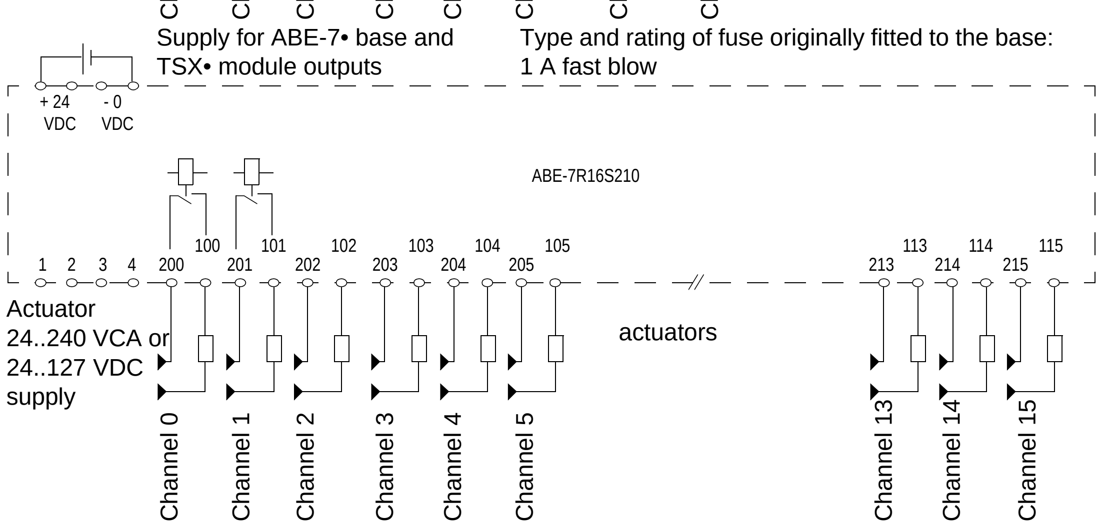


Illustration Output connection functions.





Note: protection of relay contacts:
- a protection circuit must be mounted onto the terminals of each actuator:
  - RC or MOV circuit on alternating current;
  - discharge diode for direct current.

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

<table>
<tr><td colspan="3">Base types</td><td>ABE-7R08S210</td><td>ABE-7R16S210</td></tr>
<tr><td colspan="3">Channel number</td><td>8</td><td>16</td></tr>
<tr><td colspan="5">Contact characteristics</td></tr>
<tr><td colspan="2" rowspan="2">Job limit voltage</td><td>Alternating</td><td colspan="2">250 V</td></tr>
<tr><td>Direct</td><td colspan="2">125 V</td></tr>
<tr><td colspan="3">Thermal current</td><td colspan="2">5 A</td></tr>
<tr><td rowspan="4">Alternating current load</td><td rowspan="2">Resistive, load AC12</td><td>Voltage</td><td colspan="2">230 VAC</td></tr>
<tr><td>Current (1)</td><td colspan="2">1,5 A</td></tr>
<tr><td rowspan="2">Inductive, load AC15</td><td>Voltage</td><td colspan="2">230 VAC</td></tr>
<tr><td>Current (1)</td><td colspan="2">0.9 A</td></tr>
<tr><td rowspan="4">Direct current load</td><td rowspan="2">Resistive, load DC12</td><td>Voltage</td><td colspan="2">24 VDC</td></tr>
<tr><td>Current (1)</td><td colspan="2">1.5 A</td></tr>
<tr><td rowspan="2">Inductive, load DC13 (2)</td><td>Voltage</td><td colspan="2">24 VDC</td></tr>
<tr><td>Current (1)</td><td colspan="2">0.6 A</td></tr>
<tr><td colspan="2" rowspan="2">Minimum switching</td><td>Current</td><td colspan="2">10 mA</td></tr>
<tr><td>Voltage</td><td colspan="2">5 V</td></tr>
<tr><td colspan="2" rowspan="2">Response time</td><td>State 0 to 1</td><td colspan="2">10 ms</td></tr>
<tr><td>State 1 to 0</td><td colspan="2">5 ms</td></tr>
<tr><td colspan="3">Maximum speed of function loading</td><td colspan="2">0.5 Hz</td></tr>
<tr><td rowspan="3">Built-in protection measures</td><td colspan="2">Against overloads and short-circuits:</td><td colspan="2">None, provide one rapid fusion fuse per channel or group of channels.</td></tr>
<tr><td colspan="2">Against alternating current inductive overcharging</td><td colspan="2">None, each RC circuit or MOV (ZNO) suppressor, must be mounted on the posts of each pre-actuator appropriate to the voltage.</td></tr>
<tr><td colspan="2">Against direct current inductive overcharging</td><td colspan="2">None, each discharge diode must be mounted on the posts of each pre-actuator.</td></tr>
<tr><td colspan="2">Voltage assigned to insulation</td><td>Coil/contact</td><td colspan="2">300 V</td></tr>
</table>

Base types			**ABE-7R08S210**	**ABE-7R16S210**
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.			

23.16 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:

Actuator connections on non removable relay output adaptation bases ABE-7R16S212.

At a Glance

This is an overview of the actuator connections for base TELEFAST 2 ABE-7R16S212, 16 relay outputs, 1F, with distribution of the polarities by 8 channel group.

Illustration

Description of the connection terminal blocks.

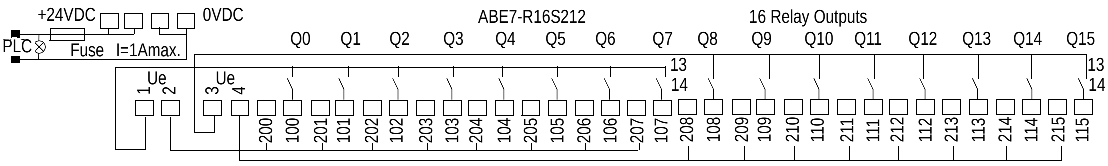
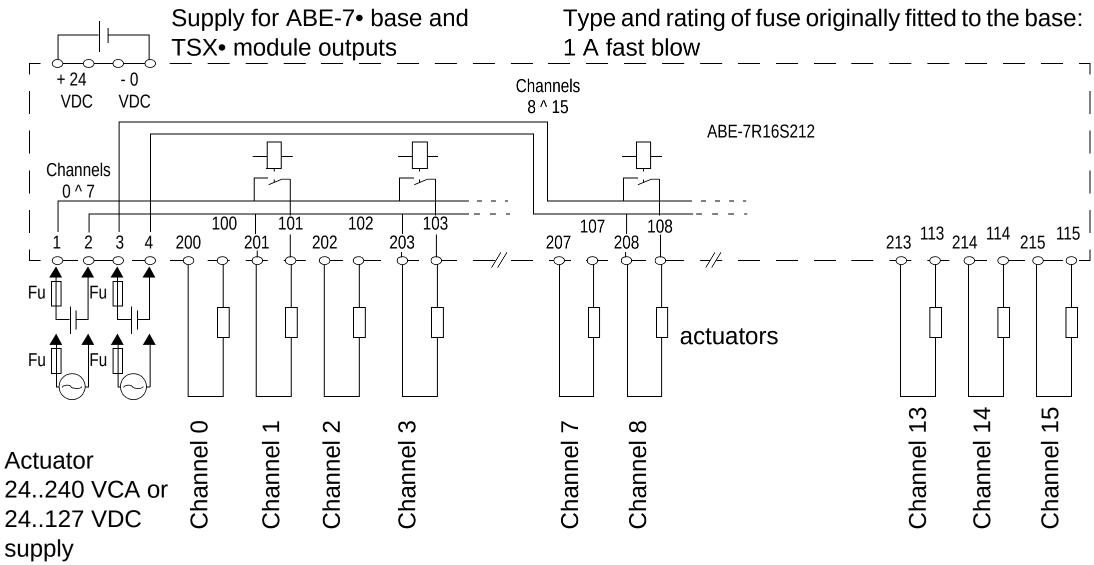


Illustration Output connection functions.



Fu Fuse rating according to the load.

Note: protection of relay contacts:
- a protection circuit must be mounted onto the terminals of each actuator:
  - RC or MOV circuit on alternating current;
  - discharge diode for direct current.

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
Key			
(1)	For 0.5 x 10^6 maneuvers.		
(2)	L/R = 10 ms.		

23.17 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:

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 connection terminal blocks.

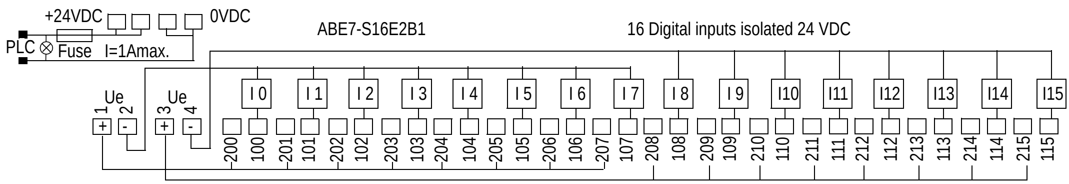
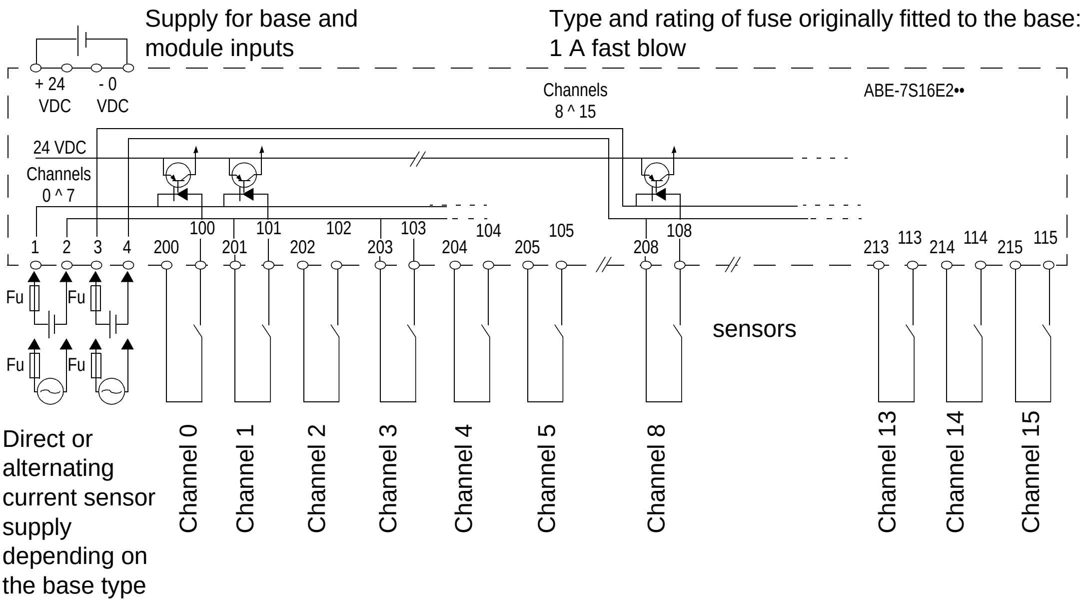


Illustration Input function connections.



Fu Fuse rating according to the load.

Note: input protection by 2 A fast-blow fuse.

Characterisitics 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.						

23.18 TELEFAST 2 ABE-7S16S2BO/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:

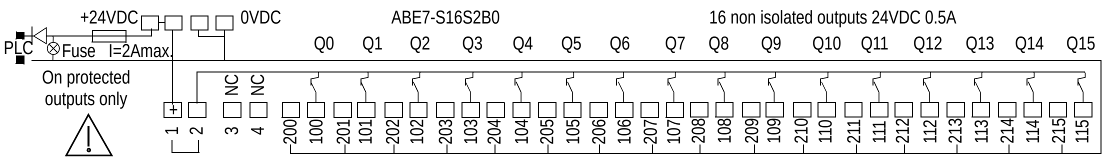
Actuator connections on ABE-7S16S2B0/S2B2 static output adaptation bases

At a Glance

This is an overview of actuator connections on the TELEFAST 2 ABE-7S16S2B0/S2B2 bases, 16 static outputs, 24 VDC, 0.5 A.

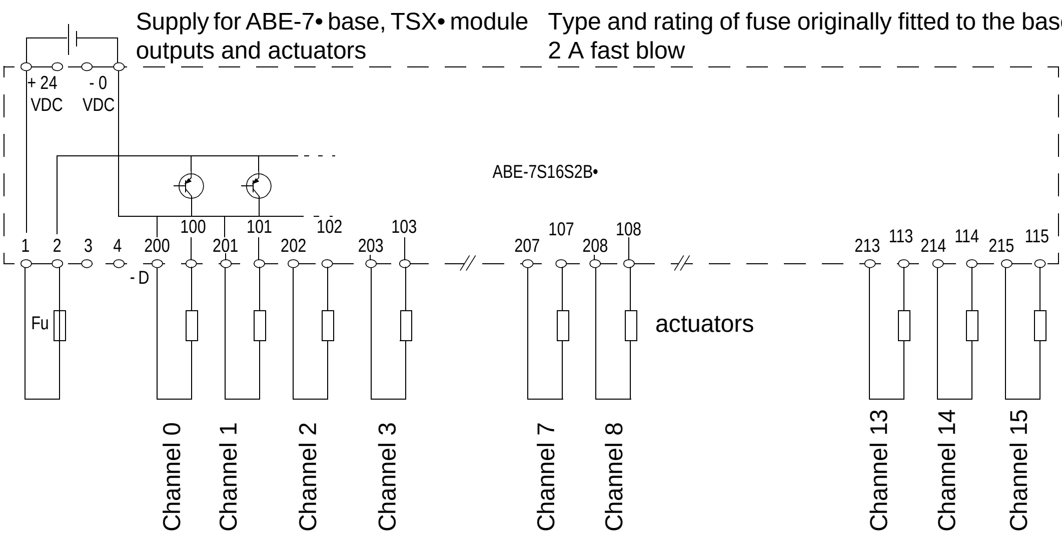
Illustration

Description of the connection terminal blocks.



Illustration

Output connection functions.



Fu Fuse rating according to the load.

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			$< 0.6 LI^2$	
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	

23.19 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:

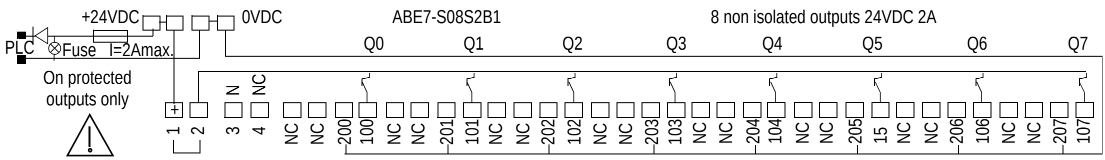
Actuator connections on ABE-7S08S2B1 static output adaptation base

At a Glance

This is an overview of the actuator connections on the TELEFAST 2 ABE-7S08S2B1 base, 8 static outputs, 24 VDC, 2 A.

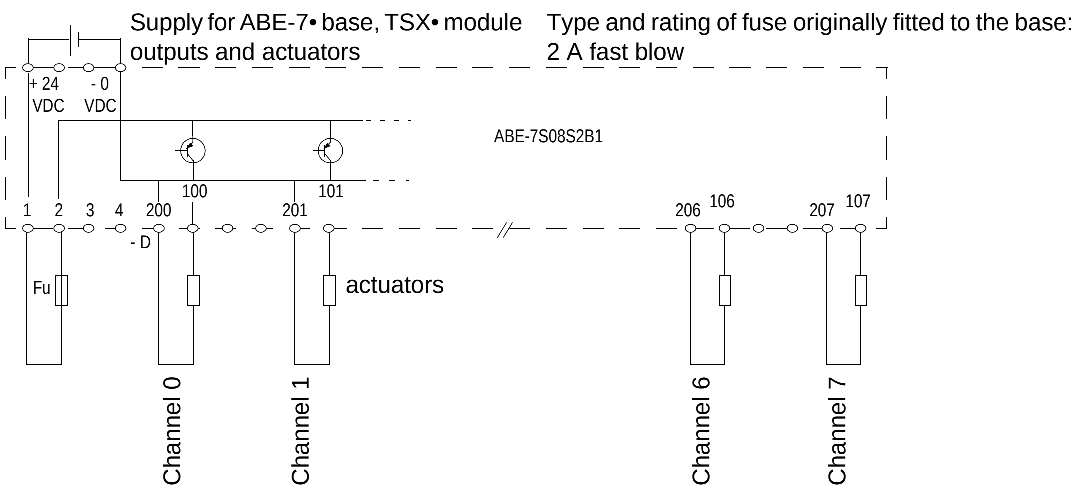
Illustration

Description of the connection terminal blocks.



Illustration

Output connection functions.



Fu Fuse rating according to the load.

Note: do not connect filament lamps.

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		

23.20 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:

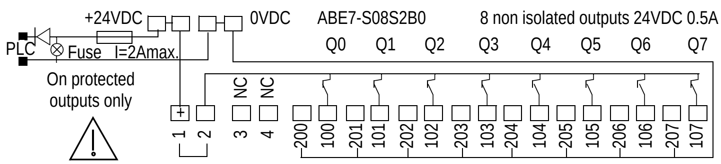
Actuator connections on the ABE-7S08S2B0 static output adaptation base

At a Glance

This is an overview of the actuator connections on TELEFAST 2 ABE-7S08S2B0 bases, 8 static outputs, 24 VDC, 0.5 A.

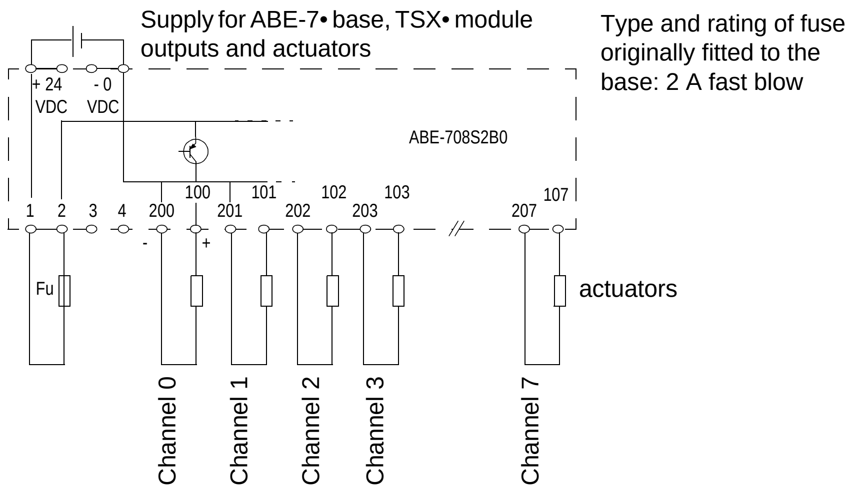
Illustration

Description of the connection terminal blocks.



Illustration

Output connection functions.



Fu Fuse rating according to the load.

Characteristics of the ABE-7S08S2B0 static output adaptation bases

At a Glance

This section describes the general characteristics of the TELEFAST 2 ABE-7S08S2B**0** 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

23.21 TELEFAST 2 ABE-7R16T210/P16T210 connection bases

Actuator connections on ABE-7R16T210/P16T210 electromechanical or static output relay bases (size 10 mm)

At a Glance

This is a description of the actuator connections on:

- TELEFAST 2 ABE-7R16T210 base, 16 relay outputs, 1 F, potential free contact, with electromagnetic relay;
- TELEFAST 2 ABE-7P16T210 base, 16 relay outputs, 1 F, potential free contact, relay not provided.

Illustration

Description of the connection terminal blocks.

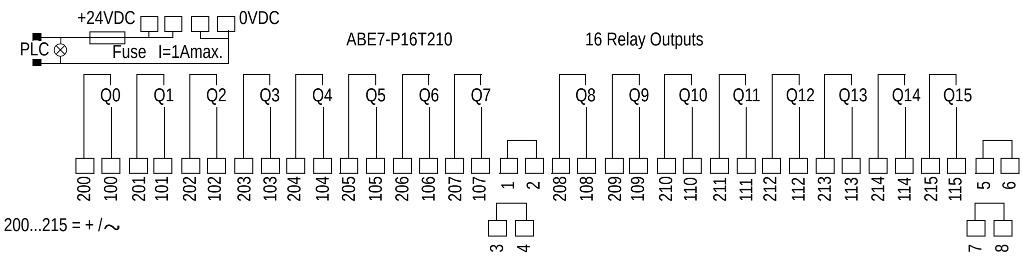
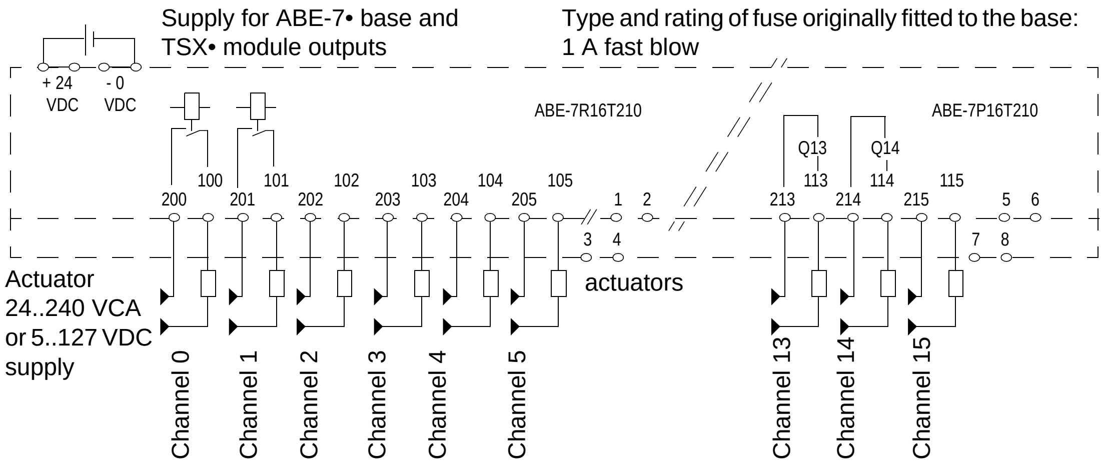


Illustration Output connection functions



Note: provide one protection fuse per actuator or per group if fed from the same voltage.
Protection of relay contacts:
- a protection circuit must be mounted onto the terminals of each actuator:
  - RC or MOV circuit on alternating current;
  - discharge diode for direct current.

23.22 TELEFAST 2 ABE-7R16T212/P16T212 connection bases

Actuator links on ABE-7R16T212/P16T212 electromechanical or static output relay bases (size 10 mm)

At a Glance

This is a description of the actuator connections on:

- TELEFAST 2 ABE-7R16T212 base, 16 relay outputs, 1 F, with distribution of the 2 polarities by 8 channel group, with electromagnetic relay;
- TELEFAST 2 ABE-7P16T212 base, 16 relay outputs, 1 F, distribution of the 2 polarities by 8 channel group, relay not provided.

Illustration

Description of the connection terminal blocks.

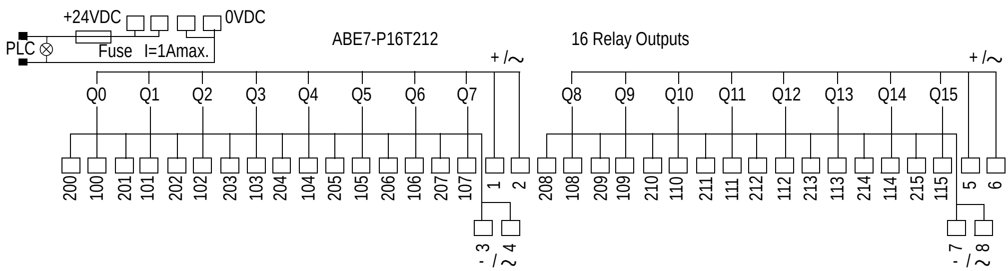
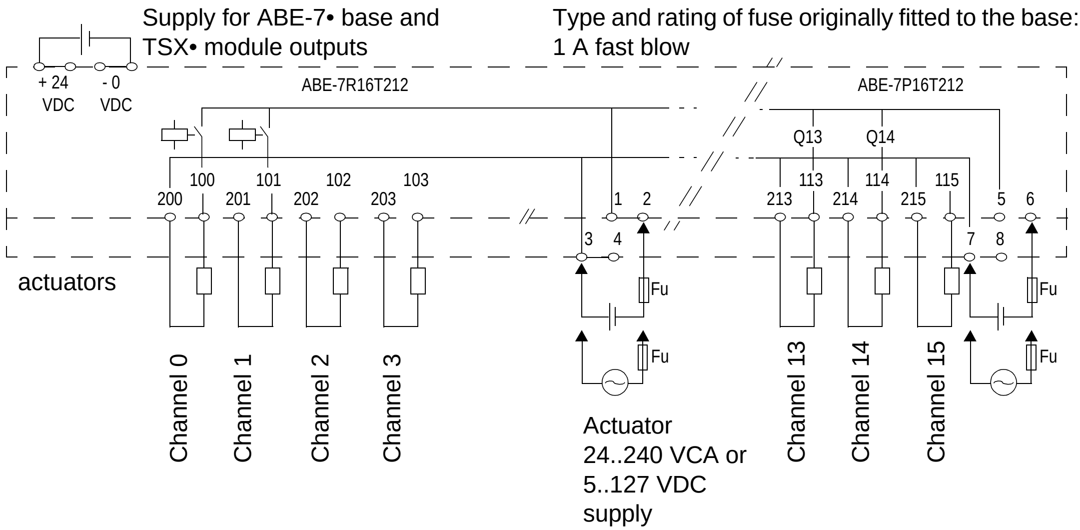


Illustration Output connection functions.



Fu Fuse rating according to the load.

Note: protection of relay contacts:
- a protection circuit must be mounted onto the terminals of each actuator:
  - RC or MOV circuit in the case of alternating current;
  - discharge diode for direct current.

23.23 TELEFAST 2 ABE-7R16T230 connection base

Actuator connections on ABE-7R16T230 electromechanical output relay bases (size 10 mm)

At a Glance

This is an overview of the actuator connections on the TELEFAST 2 ABE-7R16T230 base, with 1 OF electromagnetic relay, potential free contact.

Illustration

Description of the connection terminal blocks.

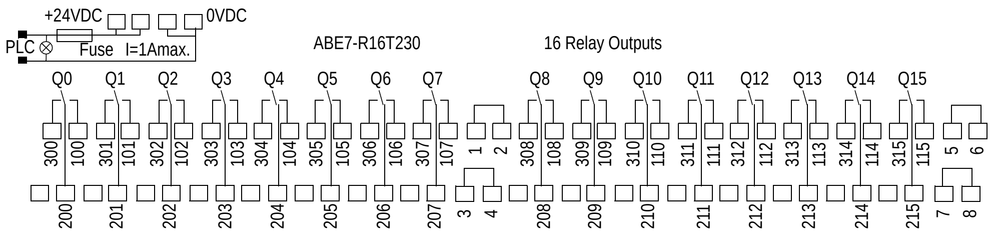
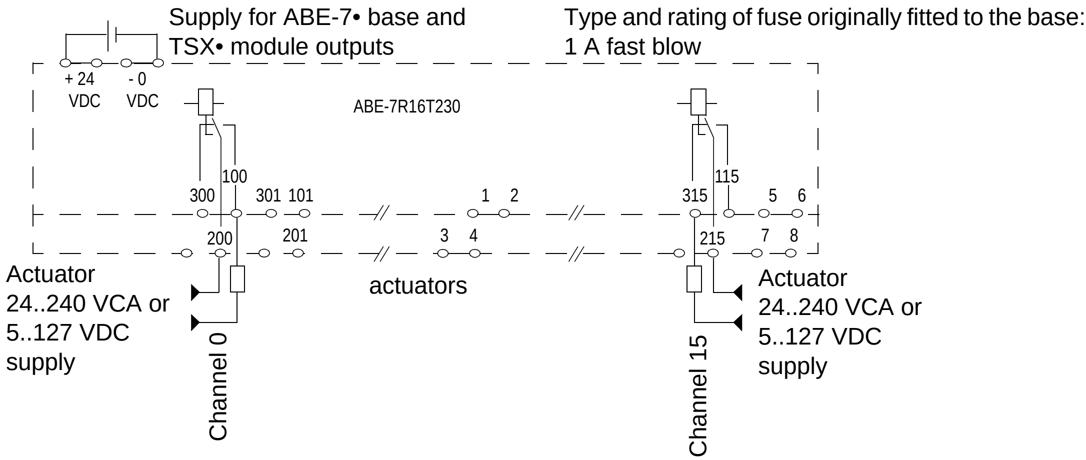


Illustration Output connection functions.



> **Note:** provide one protection fuse per actuator or per group if fed from the same voltage.
> Protection of relay contacts:
> - a protection circuit must be mounted onto the terminals of each actuator:
>   - RC or MOV circuit in the case of alternating current;
>   - discharge diode for direct current.

23.24 TELEFAST 2 ABE-7R16T231 connection base

Actuator connections on ABE-7R16T231 electromechanical output relay base (size 10 mm)

At a Glance

This is an overview of the actuator connections on base TELEFAST 2 ABE-7R16T231, with 1 OF electromechanical relay, distribution of a common per group of 8 channels.

Illustration

Description of the connection terminal blocks.

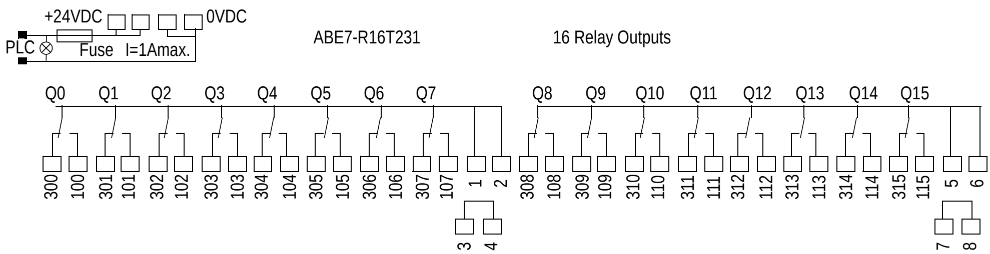
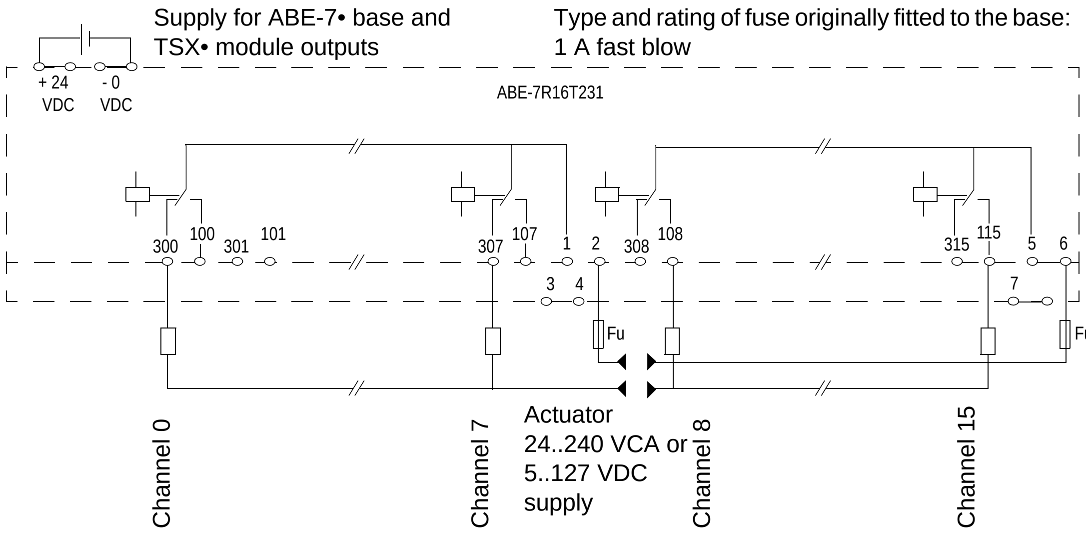


Illustration Output connection functions.



Fu Fuse rating according to the load.

> **Note:** protection of relay contacts:
> - a protection circuit must be mounted onto the terminals of each actuator:
>   - RC or MOV circuit in the case of alternating current;
>   - discharge diode for direct current.

23.25 TELEFAST 2 ABE-7P16T214 connection base

Actuator connections on ABE-7P16T214 electromechanical or static output relay bases (size 10 mm)

At a Glance

This is an overview of the actuator connections on the TELEFAST 2 ABE-7P16T214 base, 16 relay outputs, 1 F, potential free contact, 1 fuse per channel, relay not provided.

Illustration

Description of the connection terminal blocks.

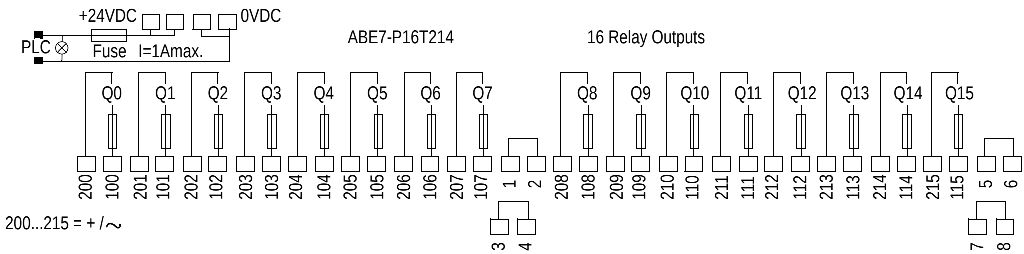
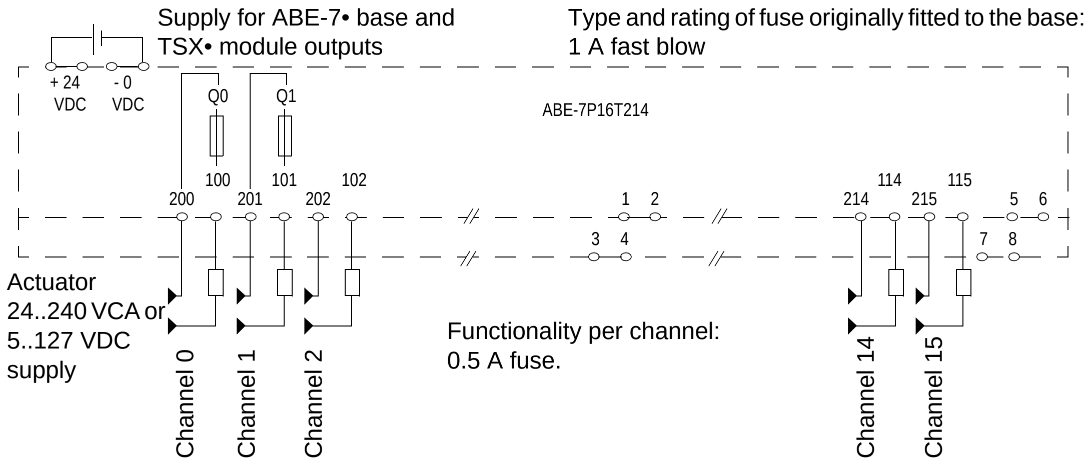


Illustration Output connection functions.



> **Note:** provide one protection fuse per actuator or per group if fed from the same voltage.
> Protection of relay contacts:
> - a protection circuit must be mounted onto the terminals of each actuator:
>   - RC or MOV circuit in the case of alternating current;
>   - discharge diode for direct current.

23.26 TELEFAST 2 ABE-7P16T215 connection base

Actuator connections on ABE-7P16T215 electromechanical or static output relay bases (size 10 mm)

At a Glance

This is an overview of the actuator connections on the TELEFAST 2 ABE-7P16T215 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 connection terminal blocks.

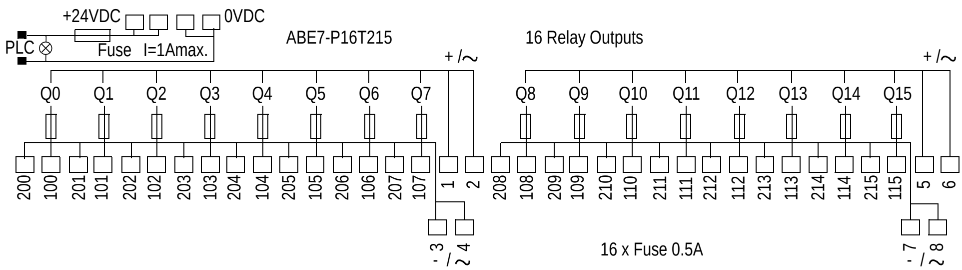
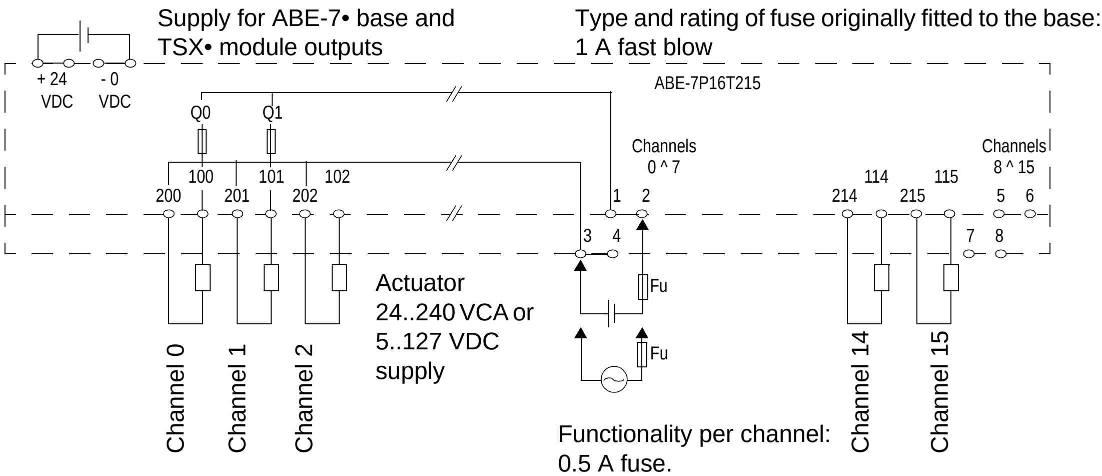


Illustration Output connection functions.



Fu Fuse rating according to the load.

Note: protection of relay contacts:
- a protection circuit must be mounted onto the terminals of each actuator:
  - RC or MOV circuit in the case of alternating current;
  - discharge diode for direct current.

23.27 TELEFAST 2 ABE-7R16T330/P16T330 connection bases

Actuator connections on ABE-7R16T330/P16T330 electromechanical output relay bases (size 12.5 mm)

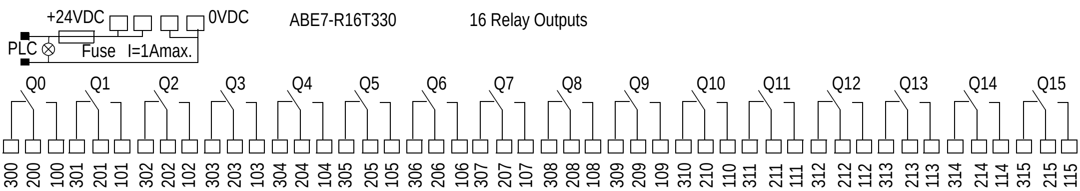
At a Glance

This is a description of the actuator connections on:

- the TELEFAST 2 ABE-7R16T330 bases, 16 relay outputs, potential free contact, with electromagnetic relay;
- the TELEFAST 2 ABE-7P16T330 bases, 16 relay outputs, potential free contact, relay not provided.

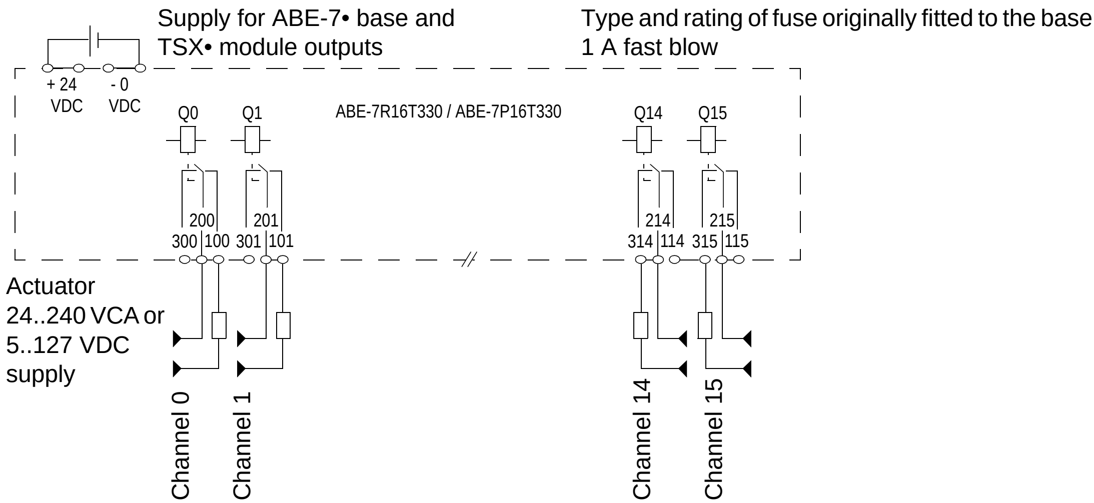
Illustration

Description of the connection terminal blocks.



ABE-7R16T330/P16T330 16 output relays, 1 OF, potential free contact, ABE-7R16T330 with electromagnetic relays, ABE-7P16T330 relays not provided.

Illustration Output connection functions.



Note: provide one protection fuse per actuator or per group if fed from the same voltage.
Protection of relay contacts:
- a protection circuit must be mounted onto the terminals of each actuator:
  - RC or MOV circuit in the case of alternating current;
  - discharge diode for direct current.

23.28 TELEFAST 2 ABE-7R16T332/P16T332 connection bases

Actuator connections on ABE-7R16T332/P16T332 electromechanical output relay bases (size 12.5 mm)

At a Glance

This is a description of the actuator connections on:

- the TELEFAST 2 ABE-7R16T332 base, 16 relay outputs, 1 OF, distribution of the 2 polarities by 4 channel group, with electromagnetic relay;
- the TELEFAST 2 ABE-7P16T332 base, 16 relay outputs, 1 OF, distribution of the 2 polarities by 4 channel group, relays not provided.

Illustration

Description of the connection terminal blocks.

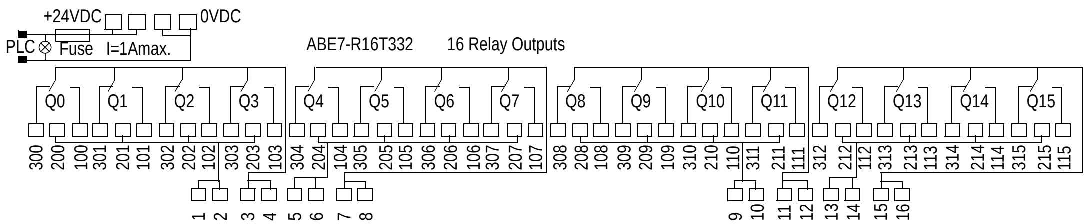
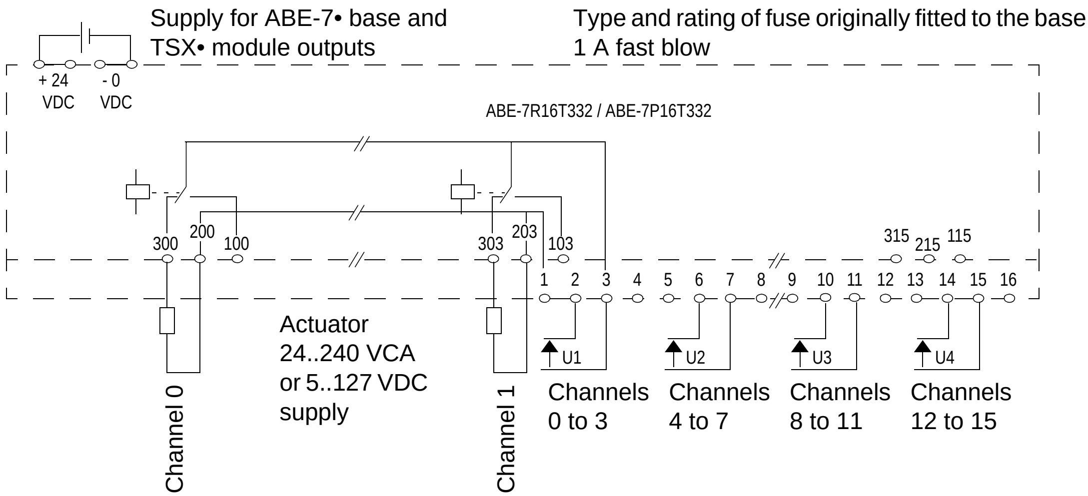


Illustration Output connection functions.



Note: provide one protection fuse per actuator or per group if fed from the same voltage.
Protection of relay contacts:

- a protection circuit must be mounted onto the terminals of each actuator:
  - RC or MOV circuit in the case of alternating current;
  - discharge diode for direct current.

23.29 TELEFAST 2 ABE-7R16T370 connection base

Actuator connections on ABE-7R16T370 electromechanical output relay bases (size 12.5 mm)

At a Glance

This is an overview of the actuator connections on the TELEFAST 2 ABE-7R16T370 base, 16 relay outputs, 2 OF, potential free contact.

Illustration

Description of the connection terminal blocks.

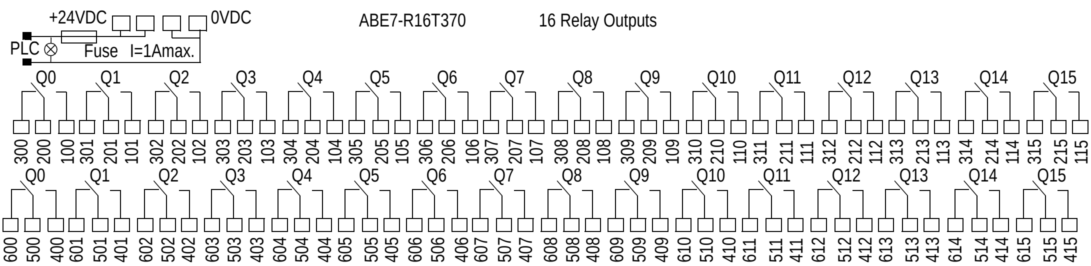
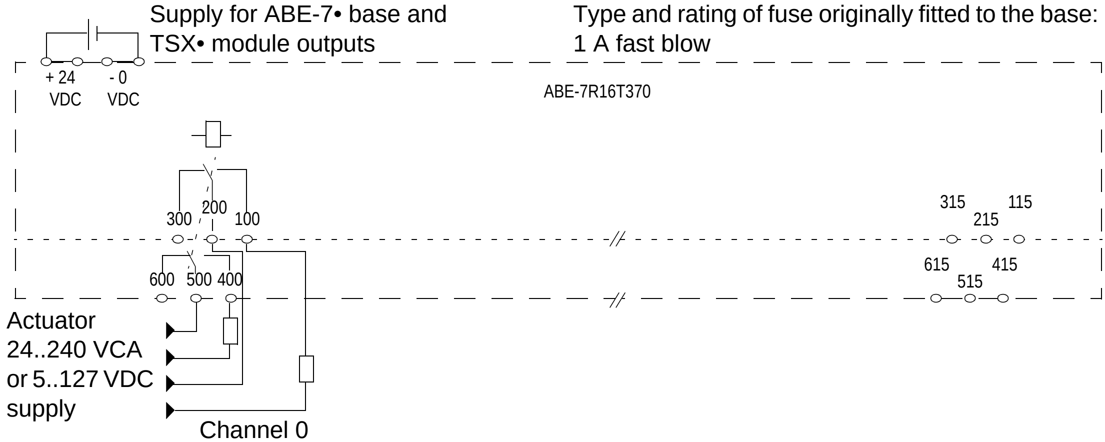


Illustration Output connection functions.



Note: provide one protection fuse per actuator or per group if fed from the same voltage.
Protection of relay contacts:
- a protection circuit must be mounted onto the terminals of each actuator:
  - RC or MOV circuit in the case of alternating current;
  - discharge diode for direct current.

23.30 TELEFAST 2 ABE-7P16T334 connection base

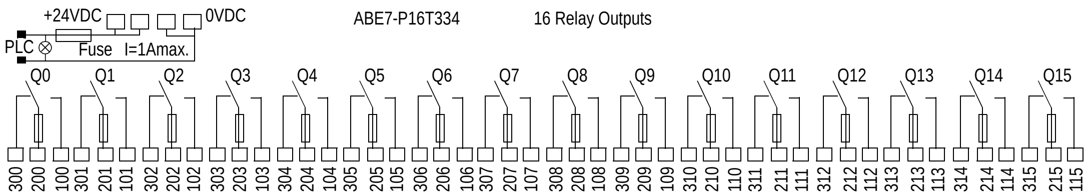
Actuator connections on ABE-7P16T334 electromechanical or static output relay bases (size 12.5 mm)

At a Glance

This is an overview of the actuator connections on the TELEFAST 2 ABE-7P16T334 base, 16 relay outputs, 1 OF, potential free contact, relays not provided.

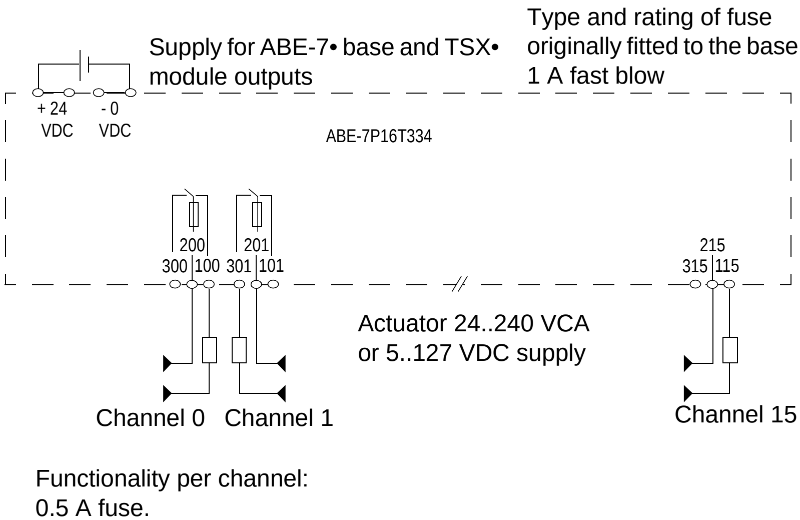
Illustration

Description of the connection terminal blocks.



Illustration

Output connection functions.



> **Note:** provide one protection fuse per actuator or per group if fed from the same voltage.
> Protection of relay contacts:
> - a protection circuit must be mounted onto the terminals of each actuator:
>   - RC or MOV circuit in the case of alternating current;
>   - discharge diode for direct current.

23.31 TELEFAST 2 ABE-7P16T318 connection base

Actuator connections on ABE-7P16T318 electromechanical or static output relay base (width 12.5 mm)

At a Glance

This is an overview of the actuator connections on the TELEFAST 2 ABE-7P16T318 base, 16 relay outputs, 1 OF, distribution of the 2 polarities per group of 4 channels, 1 fuse and 1 isolator per channel, relays not provided.

Illustration

Description of the connection terminal blocks.

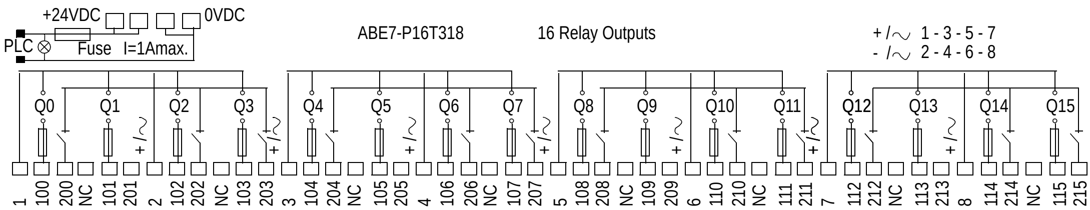
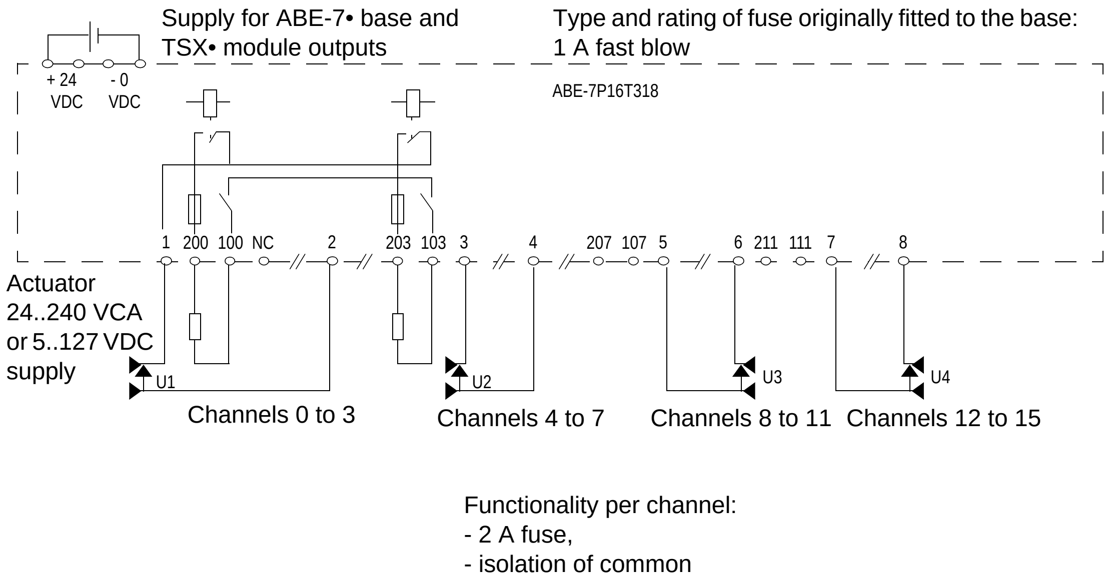


Illustration Output connection functions.



Note: provide a protection fuse on the actuator supply.
Protection of relay contacts:
● a protection circuit must be mounted onto the terminals of each actuator:
  ● RC or MOV circuit in the case of alternating current;
  ● discharge diode for direct current.

23.32 TELEFAST 2 ABE-7P16F310 connection base

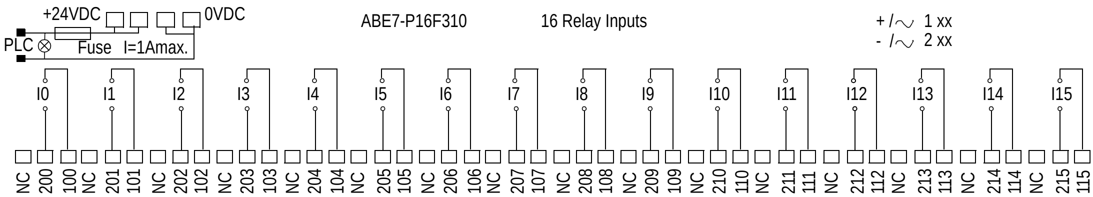
Sensor connections on ABE-7P16F310 static input relay base (width 12.5 mm)

At a Glance

This is an overview of the actuator connections on the TELEFAST 2 ABE-7P16F310 base, 16 relay outputs, potential free contact, relays not provided.

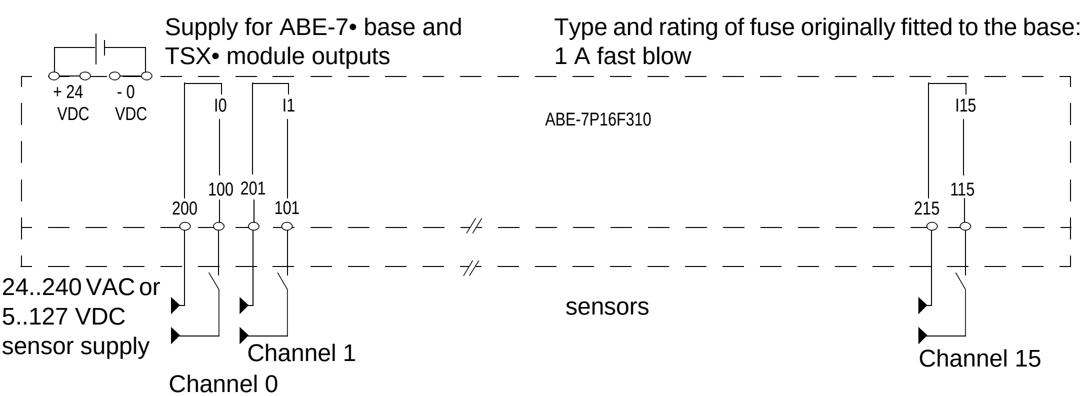
Illustration

Description of the connection terminal blocks.



Illustration

Output connection functions.



> **Note:** provide one protection fuse per group of sensors if supplied from the same voltage.

23.33 TELEFAST 2 ABE-7P16F312 connection base

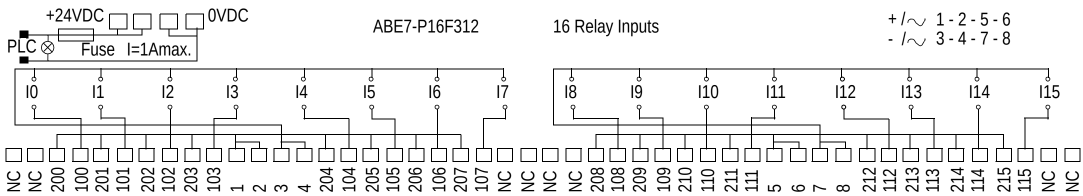
Sensor connections on ABE-7P16F312 static input relay bases (size 12.5 mm)

At a Glance

This is an overview of the actuator connections on the TELEFAST 2 ABE-7P16F312 base, 16 relay outputs, distribution of the 2 polarities per 8 channel group, relays not provided.

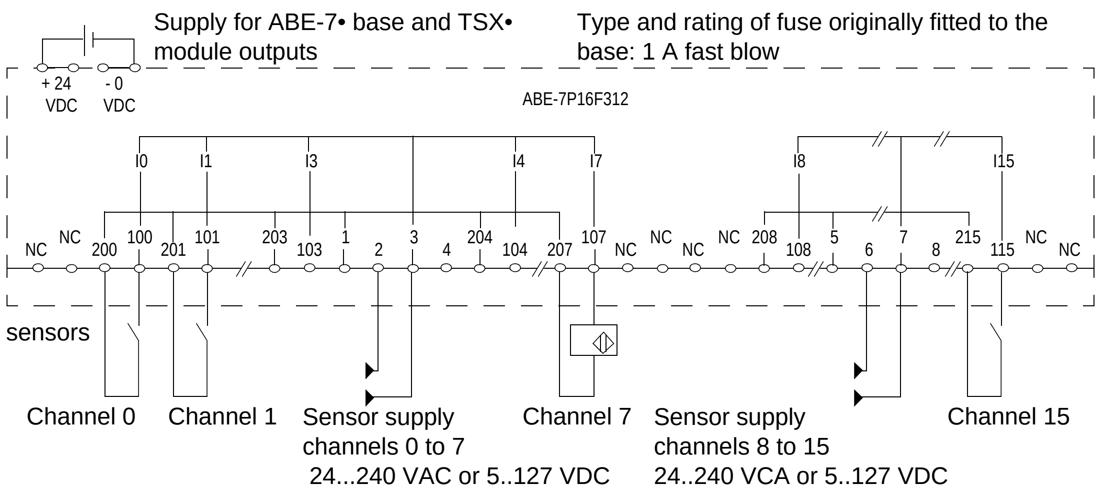
Illustration

Description of the connection terminal blocks.



Illustration

Output connection functions.



Note: plan for a protection fuse for the sensor supply.

23.34 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:

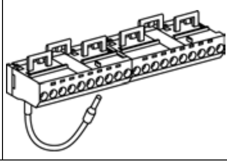
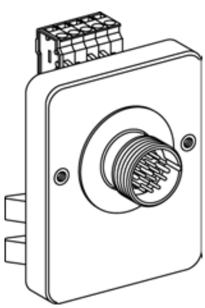
Catalog of TELEFAST 2 connection base accessories

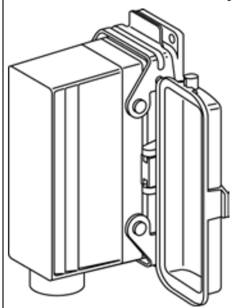
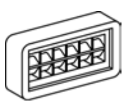
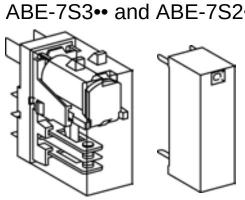
At a Glance

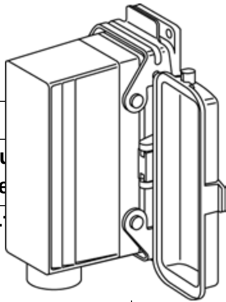
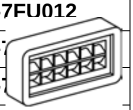
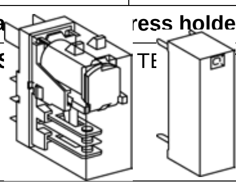
The catalog of connection base accessories is shown here TELEFAST 2 for discrete I/O modules.

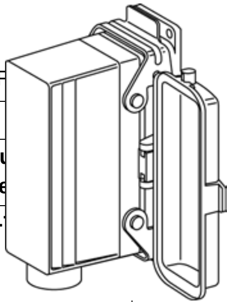
Catalog

The table below shows the catalog of connection base accessories TELEFAST 2.

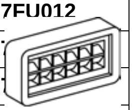
Product reference	Illustration	Description
Additional shunt terminal block		
ABE-7BV10	-	Terminal block fitted with 10 screw terminal blocks.
ABE-7BV20	TELEFAST 2 accessory 	Terminal block fitted with 20 screw terminal blocks.
Adapter base		
ABE-7ACC02	-	Enables the changeover from 16 channels to 2 x 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.

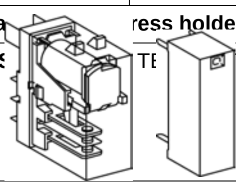
Product reference	Illustration	Description
ABE-7ACC80	TELEFAST 2 accessory 	Connectors HE10 for 32 channels -> HARTING type connector.
ABE-7ACC81	-	Plug-in descriptive form for ABE-7ACC80.
Removable continuity module		
ABE-7ACC20	-	10mm-wide.
ABE-7ACC21		12.5 mm-wide.
Client address-labeling software		
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).

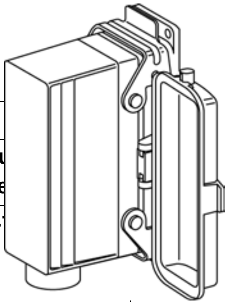
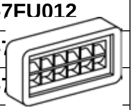
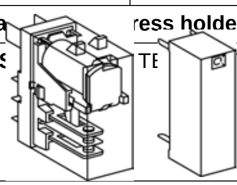
Produ refere	on	Description
ABE-7 	ST 2 accessory	Connectors HE10 for 32 channels -> HARTING type connector.
ABE-7ACC81	-	Plug-in descriptive form for ABE-7ACC80.
Removable continuity module		
ABE-7ACC20	-	10mm-wide.
ABE-7ACC21		12.5 mm-wide.
Client address-labeling software		
ABE-7LOGV10	-	-
Rapid fusion 5 x 20 glass fuse		
ABE-7FU012	-	0.125 A
ABE-7 		0.5 A
ABE-7		1 A
ABE-7FU200		2 A
ABE-7FU630		6.3 A
Self-a ress holder		
AR1-S 	TE T 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).

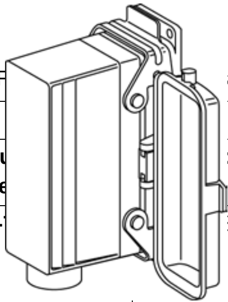
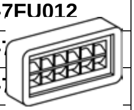
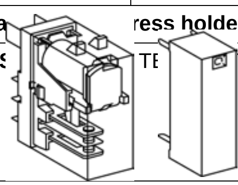


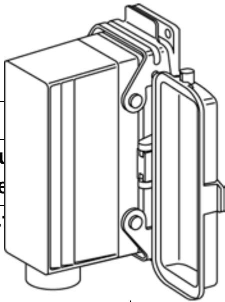
Produ[illegible] refere[illegible]	[illegible]on	Description
ABE-[illegible]	[illegible]ST 2 accessory	Connectors HE10 for 32 channels -> HARTING type connector.
ABE-7ACC81	-	Plug-in descriptive form for ABE-7ACC80.
Removable continuity module		
ABE-7ACC20	-	10mm-wide.
ABE-7ACC21		12.5 mm-wide.
Client address-labeling software		
ABE-7LOGV10	-	-
Rapid fusion 5 x 20 glass fuse		
ABE-7FU012	-	0.125 A
ABE-[illegible]		0.5 A
ABE-[illegible]		1 A
ABE-7FU200		2 A
ABE-7FU630		6.3 A
Self-a[illegible]ress holder		
AR1-[illegible]	TE[illegible]T 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).



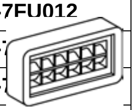


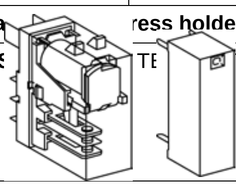
Produ refere	**on**	**Description**
ABE- 	ST 2 accessory	Connectors HE10 for 32 channels -> HARTING type connector.
ABE-7ACC81	-	Plug-in descriptive form for ABE-7ACC80.
Removable continuity module		
ABE-7ACC20	-	10mm-wide.
ABE-7ACC21		12.5 mm-wide.
Client address-labeling software		
ABE-7LOGV10	-	-
Rapid fusion 5 x 20 glass fuse		
ABE-7FU012	-	0.125 A
ABE- 		0.5 A
ABE-		1 A
ABE-7FU200		2 A
ABE-7FU630		6.3 A
Self-a ress holder		
AR1- 	TE T 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).

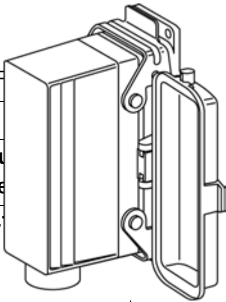
Produ refere	on	Description
ABE-7 	ST 2 accessory	Connectors HE10 for 32 channels -> HARTING type connector.
ABE-7ACC81	-	Plug-in descriptive form for ABE-7ACC80.
Removable continuity module		
ABE-7ACC20	-	10mm-wide.
ABE-7ACC21		12.5 mm-wide.
Client address-labeling software		
ABE-7LOGV10	-	-
Rapid fusion 5 x 20 glass fuse		
ABE-7FU012	-	0.125 A
ABE-7 		0.5 A
ABE-7		1 A
ABE-7FU200		2 A
ABE-7FU630		6.3 A
Self-a ress holder		
AR1-S 	TE T 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).



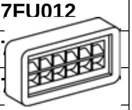
Produ refere	on	Description
ABE-7	ST 2 accessory	Connectors HE10 for 32 channels -> HARTING type connector.
ABE-7ACC81	-	Plug-in descriptive form for ABE-7ACC80.
Removable continuity module		
ABE-7ACC20	-	10mm-wide.
ABE-7ACC21		12.5 mm-wide.
Client address-labeling software		
ABE-7LOGV10	-	-
Rapid fusion 5 x 20 glass fuse		
ABE-7FU012	-	0.125 A
ABE-7		0.5 A
ABE-7		1 A
ABE-7FU200		2 A
ABE-7FU630		6.3 A
Self-a ress holder		
AR1-S	TE T 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).

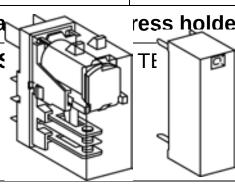


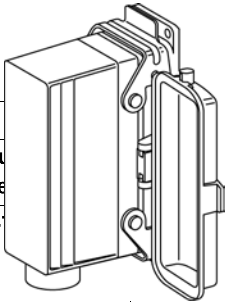




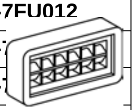
Produ refere	on	Description
ABE-	ST 2 accessory	Connectors HE10 for 32 channels -> HARTING type connector.
ABE-7ACC81	-	Plug-in descriptive form for ABE-7ACC80.
Removable continuity module		
ABE-7ACC20	-	10mm-wide.
ABE-7ACC21		12.5 mm-wide.
Client address-labeling software		
ABE-7LOGV10	-	-
Rapid fusion 5 x 20 glass fuse		
ABE-7FU012	-	0.125 A
ABE-		0.5 A
ABE-		1 A
ABE-7FU200		2 A
ABE-7FU630		6.3 A
Self-a ress holder		
AR1-	TE T 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).

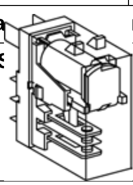


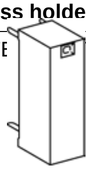


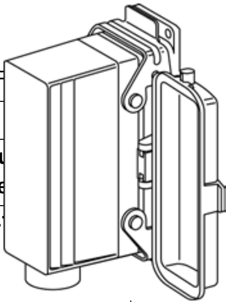


Produ[illegible] refere[illegible]	**[illegible]on**	**Description**
ABE-[illegible]	[illegible]ST 2 accessory	Connectors HE10 for 32 channels -> HARTING type connector.
ABE-7ACC81	-	Plug-in descriptive form for ABE-7ACC80.
Removable continuity module		
ABE-7ACC20	-	10mm-wide.
ABE-7ACC21		12.5 mm-wide.
Client address-labeling software		
ABE-7LOGV10	-	-
Rapid fusion 5 x 20 glass fuse		
ABE-7FU012	-	0.125 A
ABE-[illegible]		0.5 A
ABE-[illegible]		1 A
ABE-7FU200		2 A
ABE-7FU630		6.3 A
Self-a[illegible]ress holder		
AR1-[illegible]	TE[illegible]T 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).

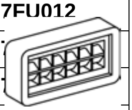


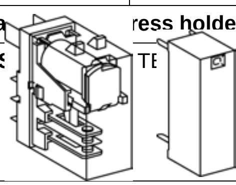






Product reference	[illegible]on	Description
ABE-[illegible]	[illegible]ST 2 accessory	Connectors HE10 for 32 channels -> HARTING type connector.
ABE-7ACC81	-	Plug-in descriptive form for ABE-7ACC80.
Removable continuity module		
ABE-7ACC20	-	10mm-wide.
ABE-7ACC21		12.5 mm-wide.
Client address-labeling software		
ABE-7LOGV10	-	-
Rapid fusion 5 x 20 glass fuse		
ABE-7FU012	-	0.125 A
ABE-[illegible]		0.5 A
ABE-[illegible]		1 A
ABE-7FU200		2 A
ABE-7FU630		6.3 A
Self-a[illegible]ress holder		
AR1-[illegible]	TE[illegible]T 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 *Characteristics of the removable ABR-7xxx electromechanical output relays, p. 357*.	
(2)	For electrical characteristics, see *Characteristics of the removable ABS-7Sxx static output relays, p. 360*.	
(3)	For electrical characteristics, see *Characteristics of the removable ABS-7Exx static input relays, p. 359*.	
(4)	Association table for base relays, see*Association table for the relays on ABE-7R16Txxx, ABE-7P16Txxx and ABE-7P16Fxxx bases., p. 356*.	

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	-

Bases ABE-7••	equipped with electromagnetic relays				not equipped with relays			
	R16T21•	**R16T23•**	**R16T33•**	**R16T370**	**P16T21•**	**P16T33•**	**P16T318**	**P16F31•**
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			

ABR-7••• reference			**S21**	**S23**	**S33**	**S37**
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	-
	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		<= 2 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

II

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:

TSX STZ 10 extension Bus module

24

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 Maps:

Operating principle

Introduction

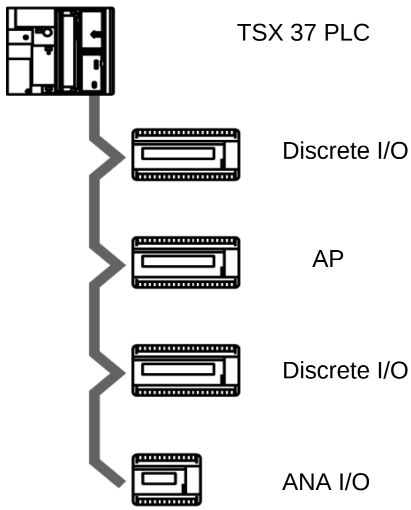
The TSX STZ 10 communication demi-module links a TSX 3710/21/22 PLC with the TSX 07 PLCs which can be used either as discrete (Discrete I/O) inputs/outputs, or as PLCs (AP) of the TSX 07 EX input/output extension modules **.** (Discrete I/O), TSX AMN4 analog input/output modules **.** (ANA. I/O).

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:

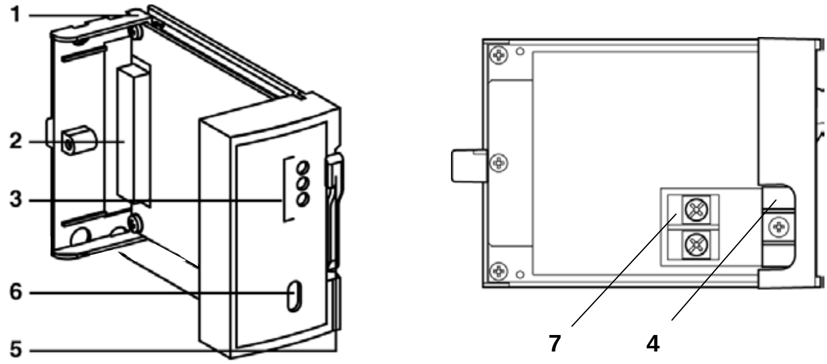
The characteristics of the nano-PLC (TSX 07) link are defined in the following table:

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

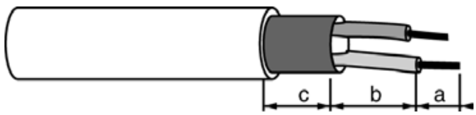
Connecting up to the nano-PLC requires neither accessories nor special tools. Cables are secured to the terminals with the aid of a screwdriver.
Electrical connections are made to the terminals located inside the module (since the upper part is always open).

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:



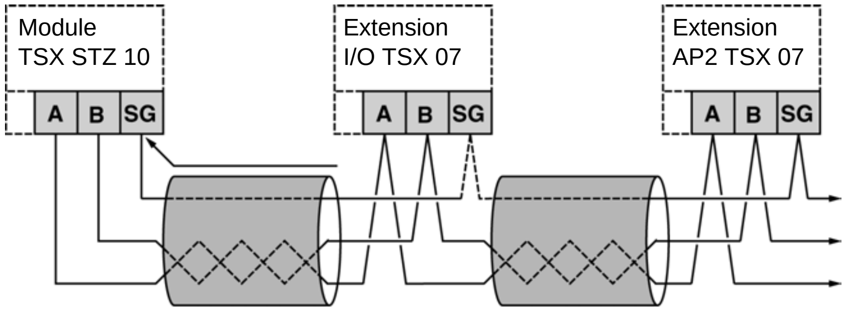
The module must be out of the rack when connection work is being carried out.
It is advisable to put a tip on each wire (AWG 24).

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:



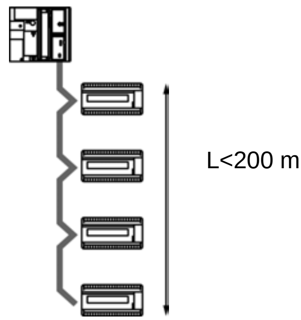
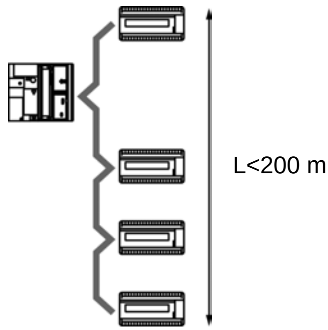
Uni-Telway cable: TSX CSA...or TSX CA 0003

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: Imax = 175 mA,
- typical current: Ityp = 130 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.

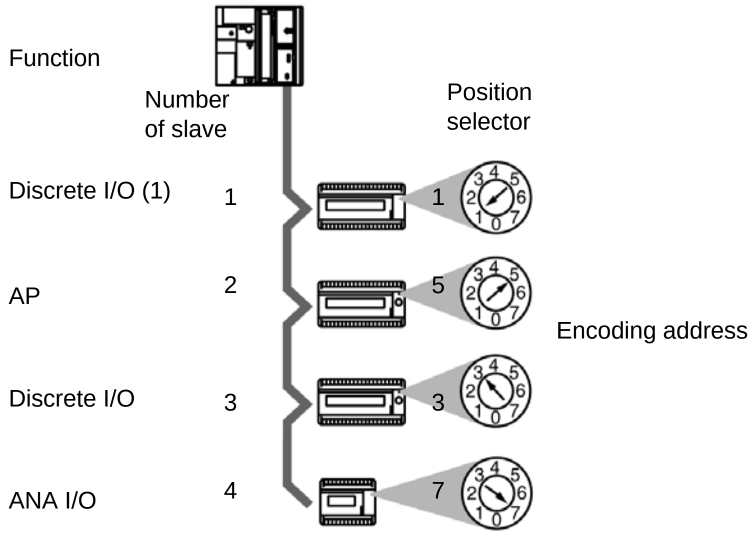
Coordination of hardware and software addresses

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	
● ●	◉ ou ◉	○ ◉	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

● Voyant allumé
NS : non significatif

○ Voyant éteint

◉ Voyant clignotant

AS-i bus interface module: TSX SAZ 10

25

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:

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).

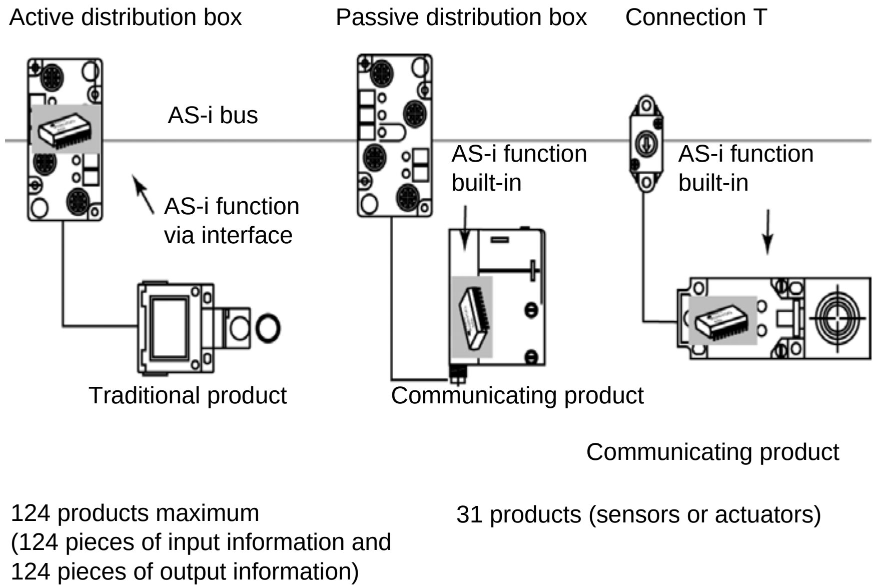
The main types of sensors/ actuators

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.

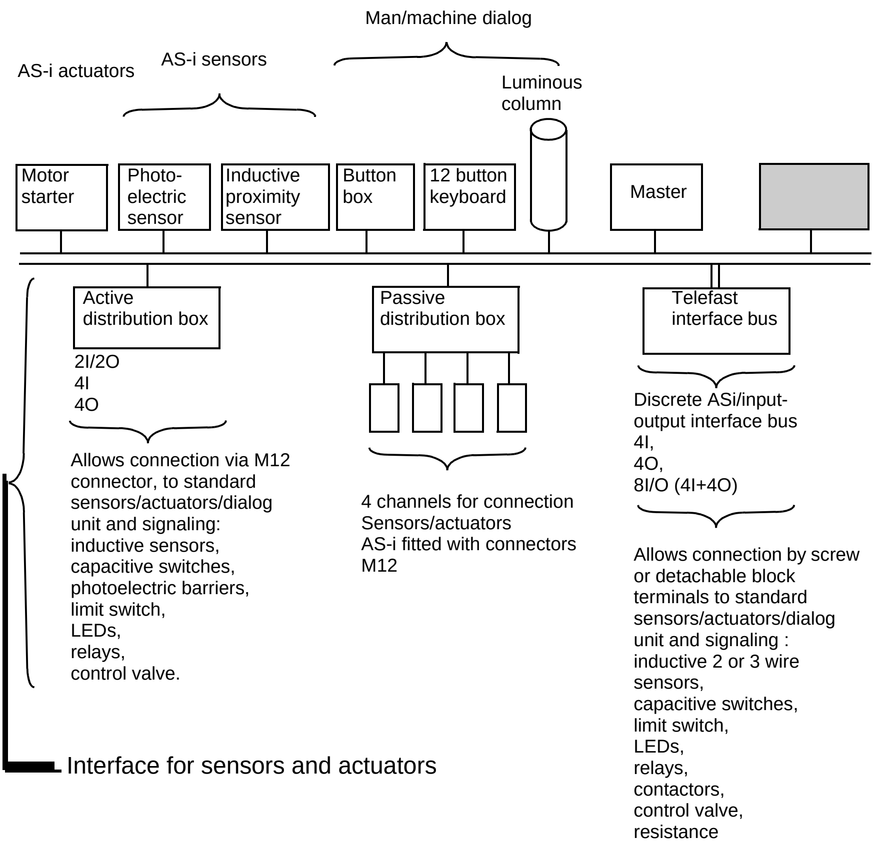
Illustration

Illustration:



Overview of a certain number of products from the Telemecanique catalogue which can be connected to the AS-i bus

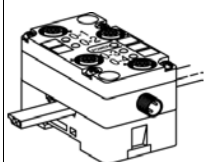
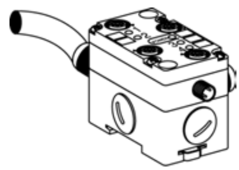
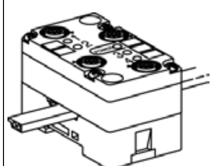
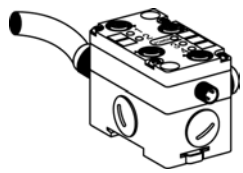
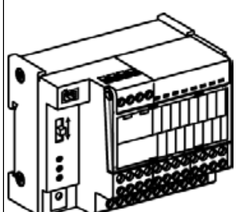
Non-exhaustive list:

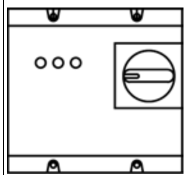
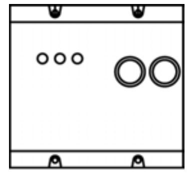
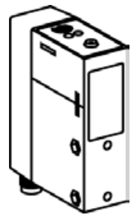
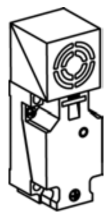
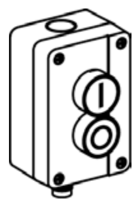
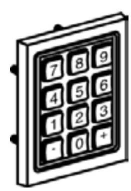


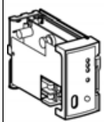
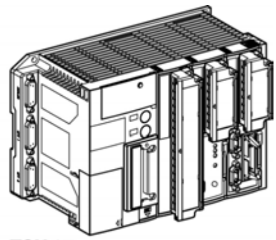
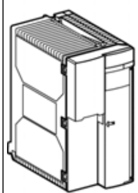
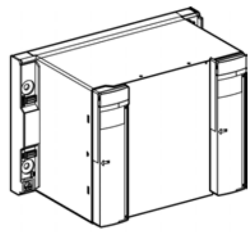
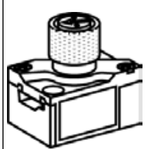
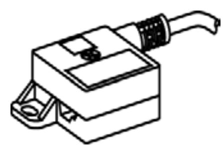
General overview of the main elements which make up the AS-i bus

General overview of the main constituent elements

The following table draws up the list of the main elements in an AS-i bus

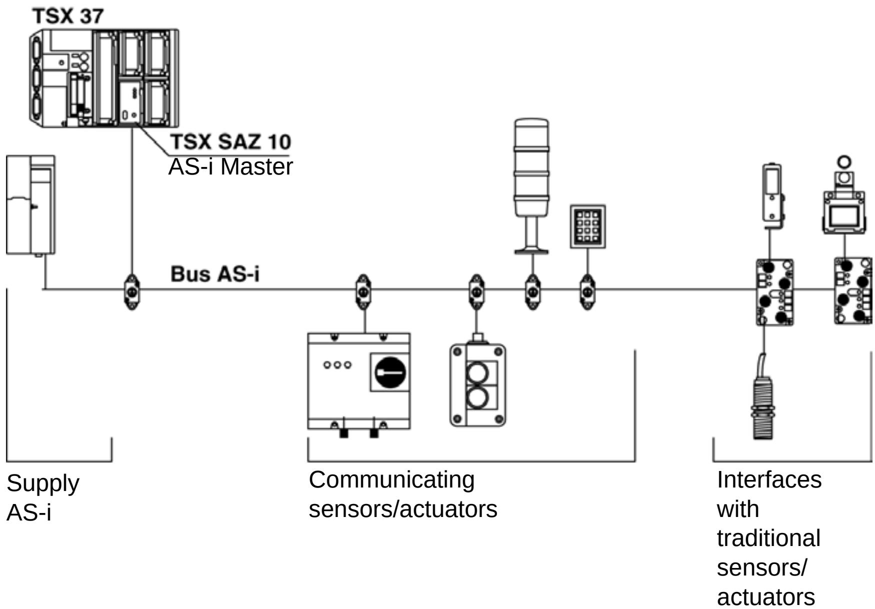
Element	Illustration
the cable It transmits the data and carries the energy. It can be made up from: ● either a flat, unshielded, polarized two-wire cable, ● or a round, standard, shielded or unshielded two-wire cable.	 Guiding ribbon cable  Round cable
The active and passive dispatchers IP67 waterproof 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:

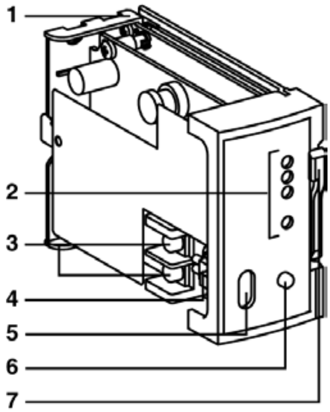
Characteristics	Description
Slave addressing	Each slave connected to the AS-i bus must have an address between 1 and 31 (coding on 5 bits). The slaves delivered from the factory have the address 0 (the address of the slave is memorized in a non-volatile way). The programming of the address is achieved 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 x 0.75mm^2 2 x 1.5mm^2 or 2 x 2.5mm^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).

Characteristics	Description
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

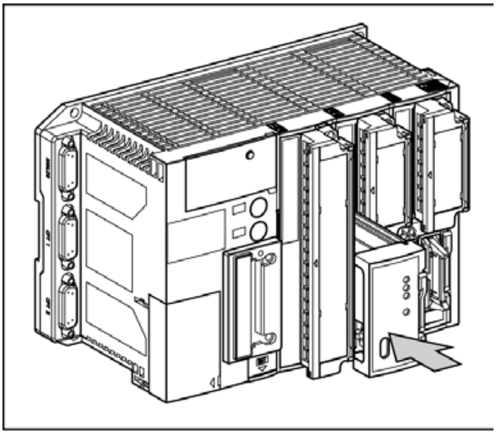
The TSX SAZ 10 module **must be mounted in position 4** on a TSX 37 10/ 37 21/ 37 22 PLC, version V ≥ 2.0.

The module is inserted and extracted in accordance with the general procedure for inserting and extracting modules on TSX 37 PLCs 37 (see (Installation manual TSX Micro Volume 1 - Chapter installation)).

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



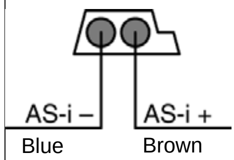
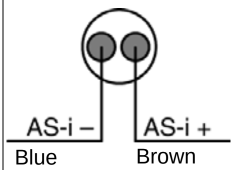
Note: a TSX 37 10/21/22 PLC station only accepts a single TSX SAZ 10 module. The TSX 37 05 and TSX 08 PLCs only accept TSX SAZ 10 modules. When a TSX SAZ 10 module is installed (position 4), the position can only receive an analog or counting half-size module, the half-size discrete inputs/outputs are 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:

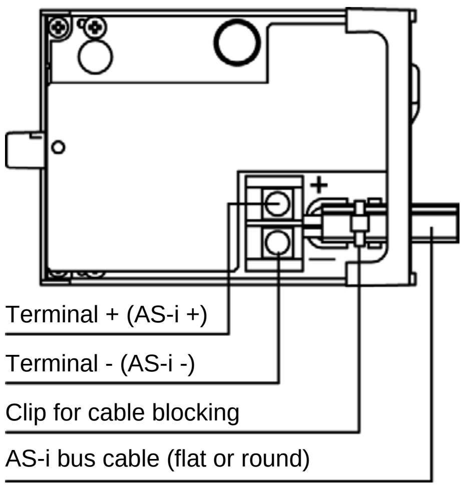
- pole +: AS-i + connection,
- pole -: AS-i - connection.

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

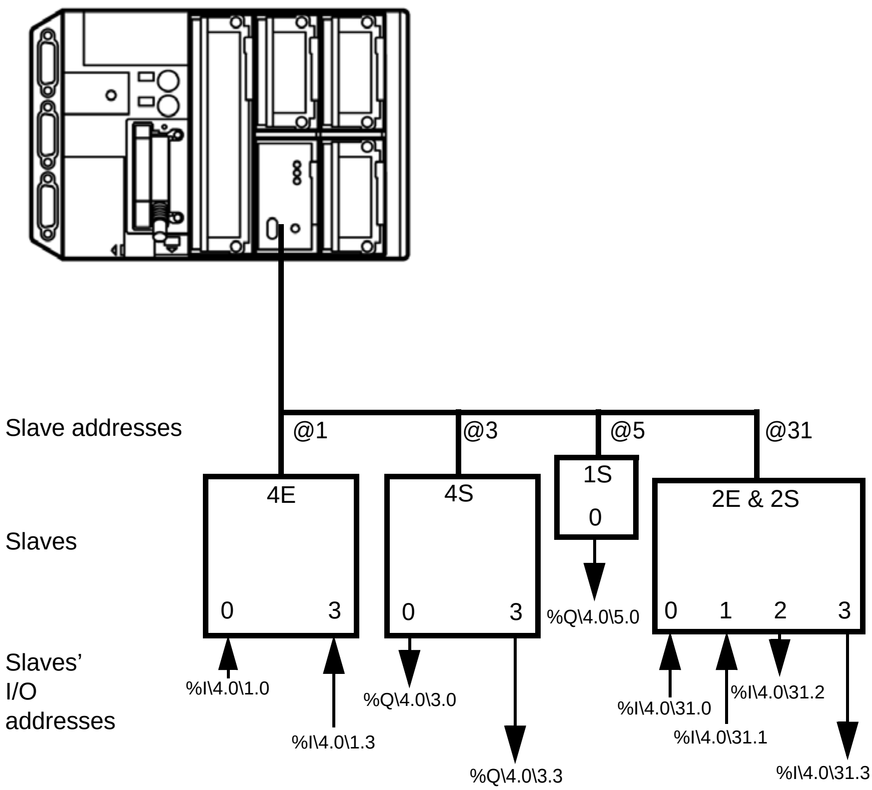
Addressing input/output objects

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 %I\4.0\n.rank n= number of the slave on the AS-i bus (1 to 31).

Outputs %Q\4.0\n.rank rank= number of the slave's input or output bit (0 to 3).

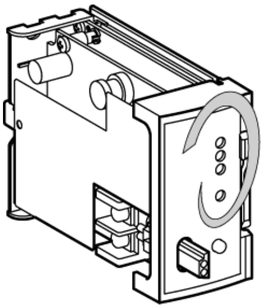


Diagnostics for TSX SAZ 10 module and AS-i bus

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	

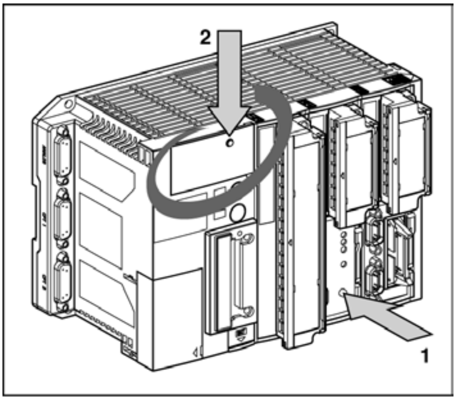
Diagnostics using the PLC display panel

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).

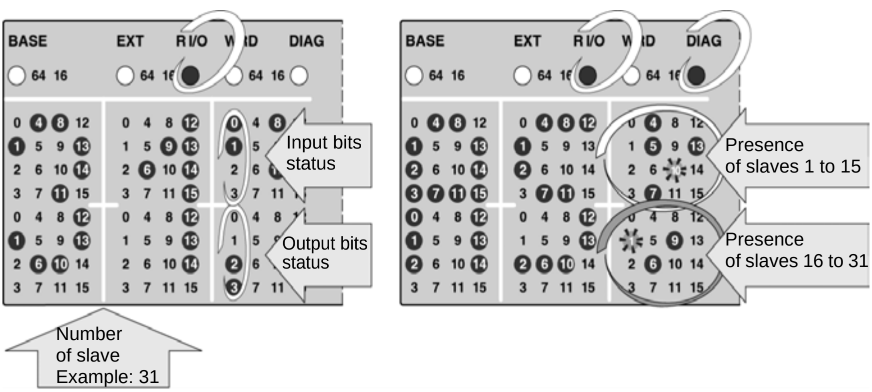
These modes can be accessed by a combination of actions on the push buttons of (1) the TSX SAZ 10 module and (2) the PLC display panel.

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).

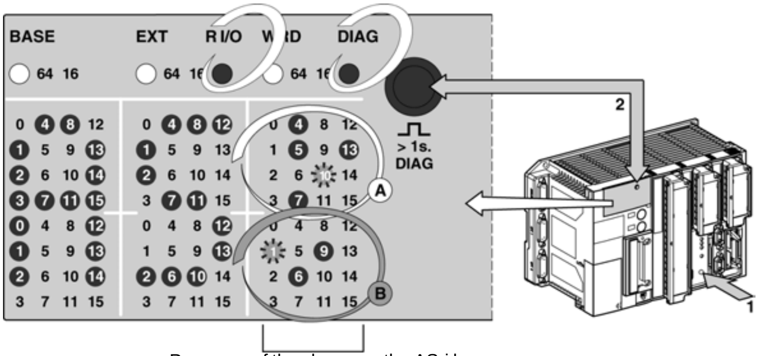
Procedure for access

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:



Presence of the slaves on the AS-i bus

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

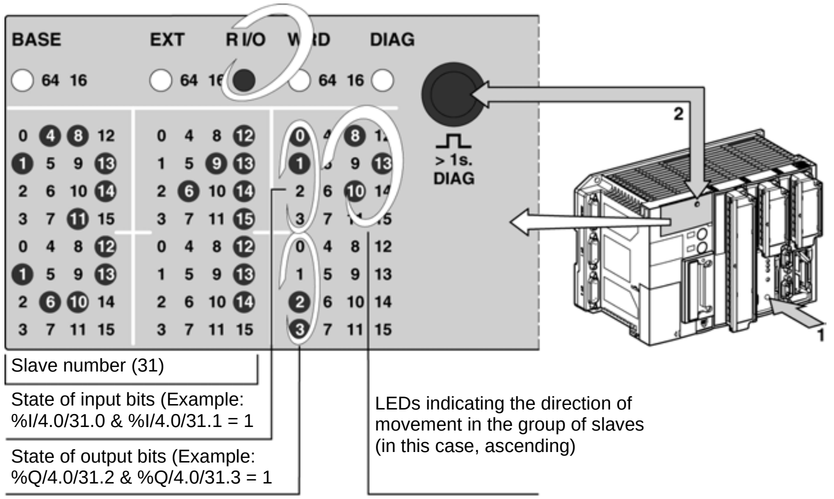
The PLC display panel enables the status of the input/output bits of each slave present on the bus to be displayed.

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.

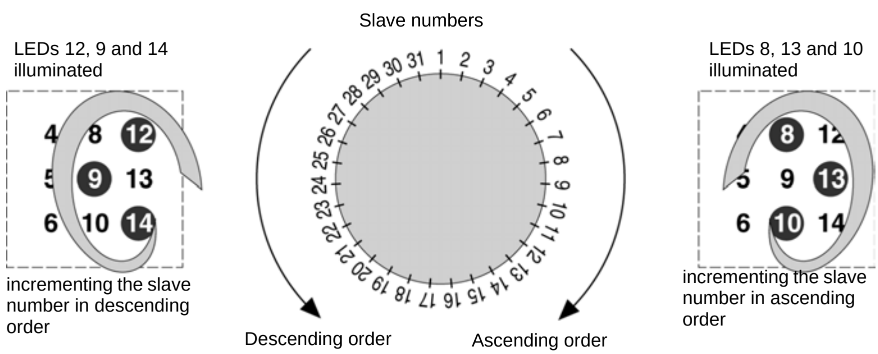
Illustration:



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.

Process and AS-i supply

III

At a Glance

Aim of this Part

This Part describes Process and AS-i supply and their installation.

What's in this part?

This Part contains the following Chapters:

Process and AS-i supply: introduction

26

At a Glance

Aim of this Chapter

This Chapter introduces Process and AS-i supply.

What's in this Chapter?

This chapter contains the following topics:

General introduction to Process and AS-i power supply modules

General

A wide range of power supply units and modules is offered to meet your needs in the best possible way:

- TBX SUP 10 and TSX SUP 1..1 process power supply units and modules, designed to supply 24 VDC to a PLC system periphery, and driven by PLCs (TSX Micro and Premium). This periphery being composed of sensors, pre-actuators, encoders, operator dialog terminals, regulators, LEDs, push-buttons, pneumatic actuators, etc. . This 24 V power supply can be delivered using a 100/240 V, 50/60 Hz AC network.
  The power supply modules TBX SUP 10 and TSX SUP 1011 can also be connected to a 125 VDC network.
- The AS-i power supply units and modules TSX SUP A02 and A05 designed to supply 30 VDC to the components connected to an AS-i field bus. This power supply is distributed over the same wires as those used for data exchange.

The attachment mode for these products has been specially designed to respond to the specific mounting distances and specifications of TSX Micro and TSX Premium PLCs, and TBX products.

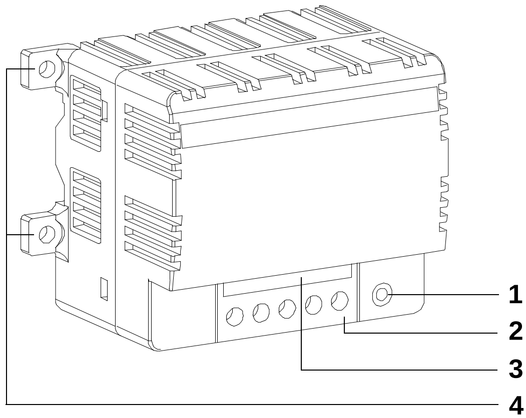
All the products are mounted:

- on a Telequick AM1-PA mounting plate,
- on a central DIN rail AM1-DP200/DE200, except for the high-power power supply blocks TSX SUP 1101 and TSX SUP A05.

Physical description of TBX SUP 10 supply block

Illustration

Diagram and numbers:



Number table

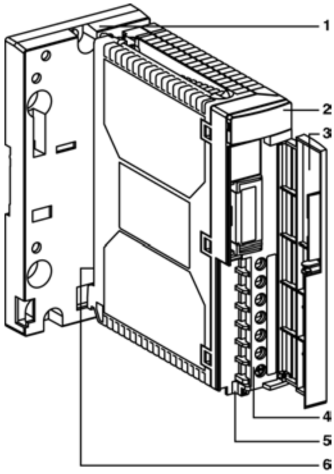
The following table shows the numbers and their corresponding descriptions from the diagram above:

Numbers	Description
1	LED showing power-up of module.
2	Screw terminal block for supply voltage wiring.
3	Identification label for the wire terminals.
4	Wings for fixing the module.

Physical description of the TSX SUP 1011 supply module

Illustration

Diagram and numbers:



Number table

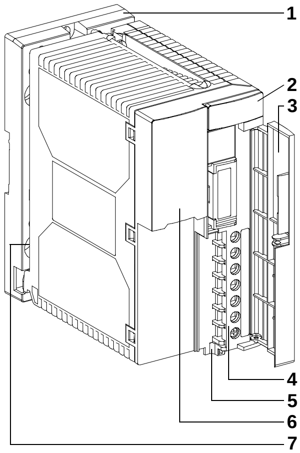
The following table shows the numbers and their corresponding descriptions from the diagram above:

Numbers	Description
1	Support board for fixing the supply module directly onto the AM1-DE200 / DP200 DIN mounting track or the AM1-PA Telequick perforated board.
2	Display block with: ● a 24 V LED (green): lit if the established internal and output voltages are correct, ● a LSH LED (orange) "power optimization mode": lit if the power supply is running in parallelization mode with power optimization.
3	Flap for protecting the terminal block.
4	Screw terminal block for connection: ● to the AC/DC supply network, ● to 24 VDC output.
5	Hole for the cable-tightening clip to go through.
6	"NOR/LSH" switch placed at the back of the module to control the power optimization system. ● NOR position: normal operation without power optimization (default position), ● LSH position: operation with power optimization with supply running in parallel. **Note:** Access to the switch requires the module to be removed from the support board.

Physical description of TSX 1021/1051 supply modules

Illustration

Diagram and numbers:



Number table

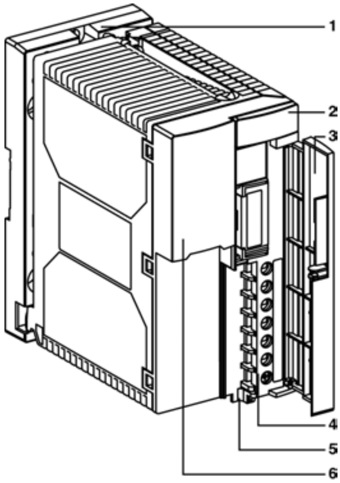
The following table shows the numbers and their corresponding descriptions from the diagram above:

Numbers	Description
1	Support board for fixing the supply module directly onto the AM1-DE200 / DP200 DIN mounting track or the AM1-PA Telequick perforated board.
2	Display block with: ● a 24 V LED (green): lit if the internal and output voltages are correct, ● a LSH LED (orange) only on TSX SUP 1021 "power optimization mode": lit if the power supply is running in parallelization mode with power optimization.
3	Flap for protecting the terminal block.
4	Screw terminal block for connection: ● to the AC/DC supply network, ● to 24 VDC output.
5	Hole for the cable-tightening clip to go through.
6	110/220 V voltage selector. On delivery, the selector is set at 220.
7	"NOR/LSH" switch placed at the back of the module to control the power optimization system. This switch is only present on the TSX SUP 1021 module. ● NOR position: normal operation without power optimization (default position), ● LSH position: operation with power optimization with supply running in parallel. **Note:** Access to the switch requires the module to be removed from the support board.

Physical description of the TSX SUP A02 supply module

Illustration

Diagram and numbers:



Number table

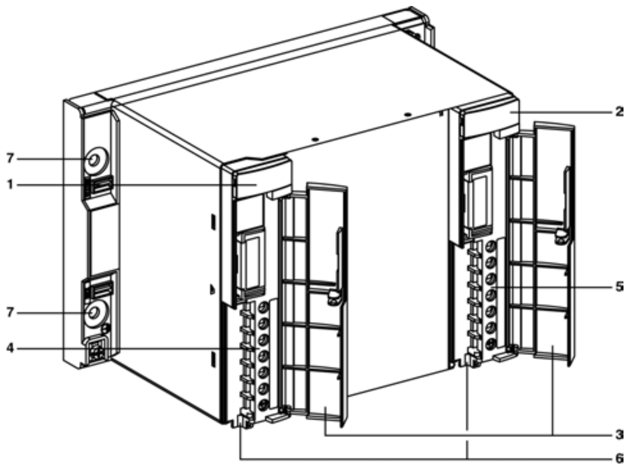
The following table shows the numbers and their corresponding descriptions from the diagram above:

Numbers	Description
1	Support board for mounting the supply module directly onto the AM1-DE200 / DP200 DIN mounting rail or the AM1-PA Telequick board.
2	Display block with: ● an AS-i LED (green): lit if the internal and output voltages are correct,
3	Flap for protecting the terminal block.
4	Screw terminal block for connection: ● to an alternating supply network, ● from AS-i 30 VDC output.
5	Hole for the cable-tightening clip to go through.
6	110/220 V voltage selector. On delivery, the selector is set at 220.

Description of TSX SUP 1101/A05 supply blocks

Illustration

Diagram and numbers:



Number table

The following table shows the numbers and their corresponding descriptions from the diagram above:

Numbers	Description
1	Display block with an ON LED (orange): lit if power supply is running.
2	Display block with: ● a 24 V LED (green): lit if 24 VDC output voltage is present and correct, ● an AS-i LED (green): lit if the AS-i 30 VDC output voltage is present and correct. This LED is only present on the TSX SUP A05.
3	Flap for protecting terminal blocks.
4	Screw terminal block for connection to alternating supply network.
5	Screw terminal block for connecting AS-i 24 VDC and 30 VDC output voltage to TSX SUP A05.
6	Holes for the cable-tightening clip to go through.
7	Four mounting holes for M6 screws.

Physical description of the support board

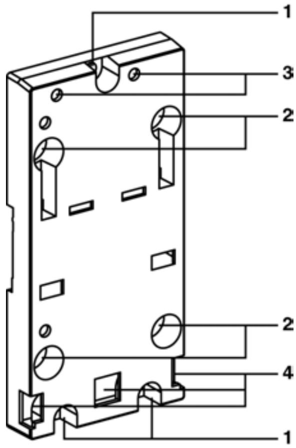
Introduction

Each TSX SUP 10.1 and TSX SUP A02 supply module is delivered mounted on a support board. This is used to fix the supply module: the DIN AM1-DE200 or AM1-DP200 profile, or to a Telequick AM1-PA perforated mounting plate.

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

Illustration

Diagram and numbers:



Information Table

The following table shows the numbers and their corresponding descriptions from the diagram above:

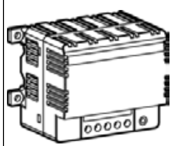
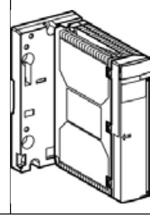
Number	Description
1	Three 5.5 mm diameter holes for mounting the board onto a panel or an AM1-PA perforated board with a mounting distance of 140 mm (mounting distance for TSX 37 PLCs).
2	Four 6.5 mm diameter holes for mounting the board onto a panel or an AM1-PA perforated board with a mounting distance of 88.9 mm (mounting distance for TSX 57 PLCs).
3	Two M4 holes for mounting TSX SUP 1011/1021/1051/A02 supply module(s).
4	Windows designed to ink pins situated at the bottom and at the back of the module.

Note:
• each of these supply modules can also be mounted on a TSX RKY••• rack in place of another module, except in position PS. This must only be used by a TSX PSY••• supply module for supplying rack modules.
• the following operations require the module to be removed from the support board:
- positioning the "NOR/LSH" switch onto "LSH",
- mounting the board onto a panel or AM1-PA perforated board,
- mounting the module onto a TSX RKY••• rack.

Catalog of 24 VDC process supply

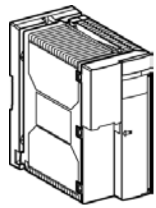
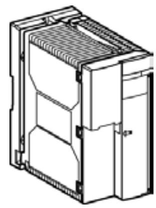
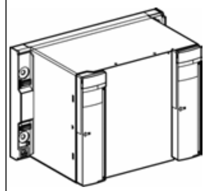
Selection table

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 SUP 1011 suppliers, ● 4A with 2 TSX SUP 1021 suppliers. Using this mode means output voltage can vary slightly: 24V + or - 5% instead 24 V + or - 3% in normal mode. When sharing loads, the power imbalance can reach a maximum of 25%.
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

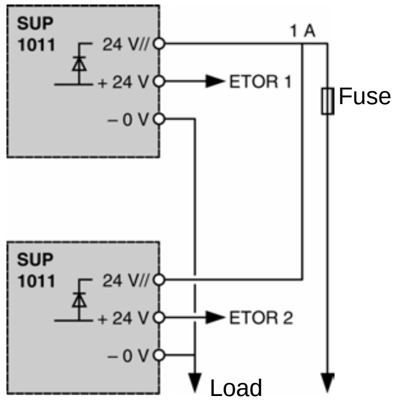
Principle:

To 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 the necessary connections (see *Connection of TSX SUP 1011/1021 power supplies, p. 432*).

The suppliers are configured in power optimization mode.

Example: provide 1A with redundancy from 2 TSX SUP 1011 suppliers.



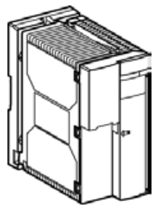
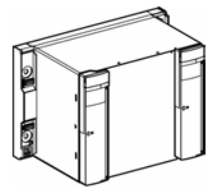
Discrete inputs 1 and 2 on the PLC indicate the failure of one or other of the power supplies.

Note: TSX SUP 1051 and 1101 suppliers are not equipped with a serial diode, which is required for the redundancy function.

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.

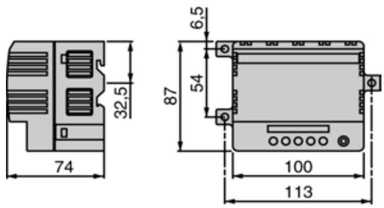
What's in this Chapter?

This Chapter contains the following Maps:

TBX SUP 10 dimensions/mounting/connections

Dimensions/ mounting

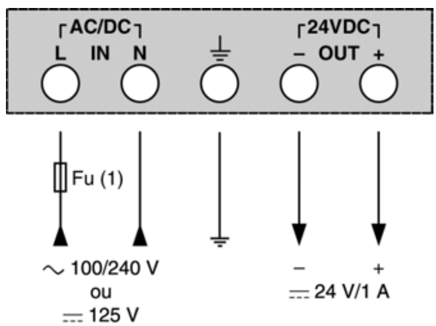
Illustration:



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

Personnel safety

For personnel safety, the module ground terminal must be connected to the protective ground with a green/yellow wire.

Failure to observe this precaution will result in death or serious injury.

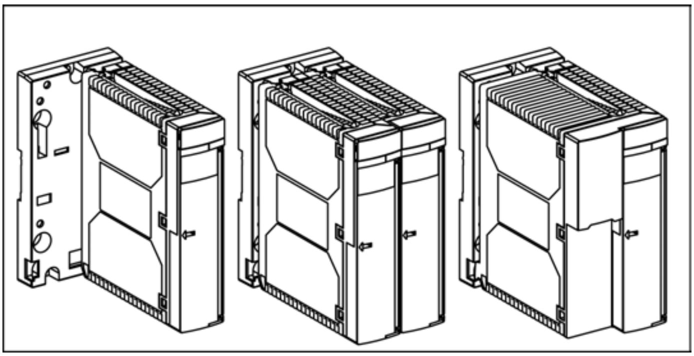
Dimensions/mounting Process and AS-i supply modules

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.

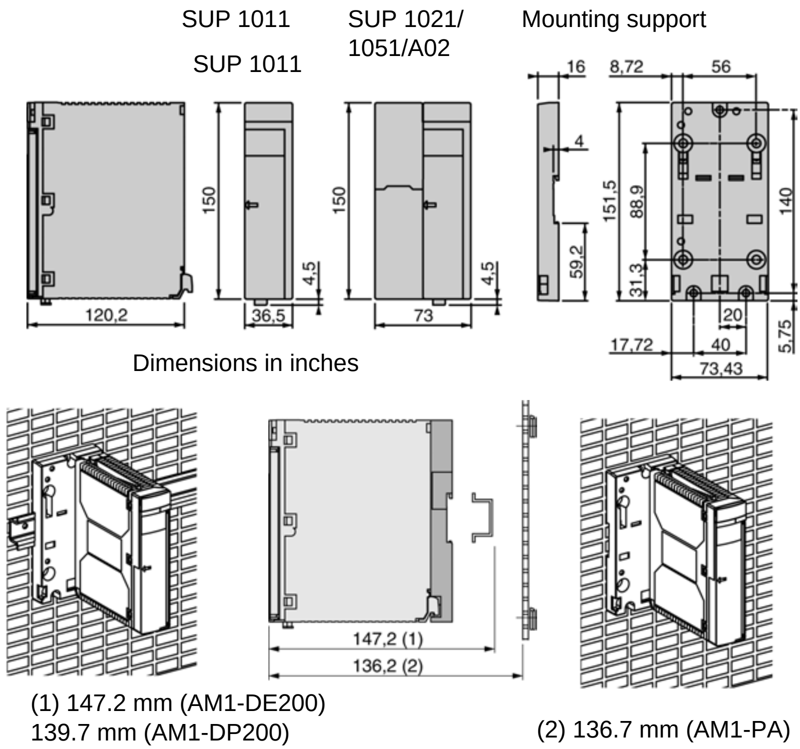
Note: In the case of a TELEQUICK board, the module has to be removed.



1 module	2 modules	1 module
TSX SUP 1011	TSX SUP 1011	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:

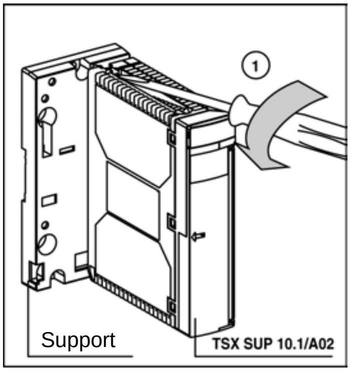
Step	Action
1	Check that the module is fixed to the support.
2	Fix the module + support assembly onto the mounting rail.

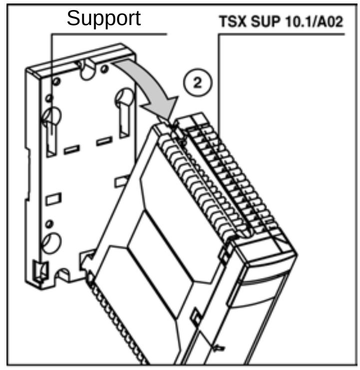
Removing the module

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.

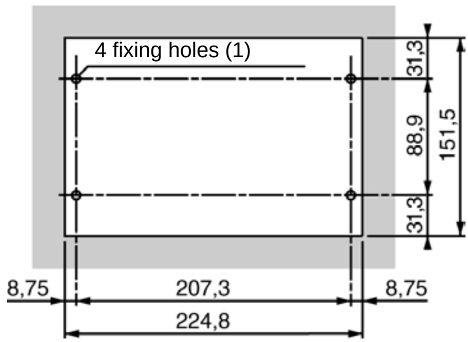
TSX SUP 1101/A05 supply block dimensions/mounting

Introduction

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

Panel mounting

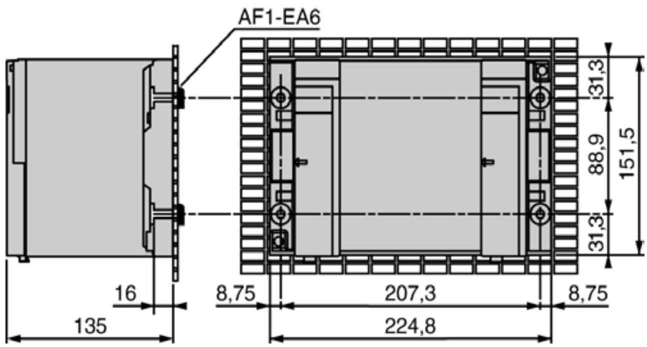
Screw-hole layout (dimensions in millimeters):



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

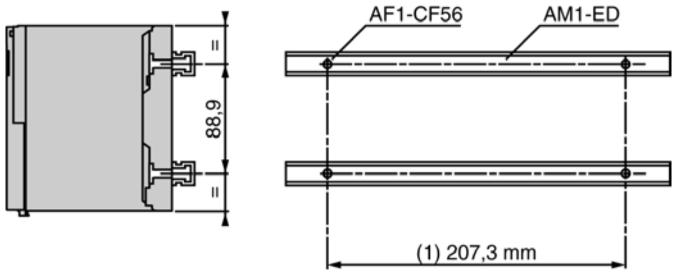
Mounting on an AM1-PA Telequick perforated board

Fix the supply block with M6 x 25 screws + washers and AF1-EA6 clips nuts (dimensions in millimeters):



Mounting on an AM1-ED••• mounting rail

Fix the supply block using 4 M6 x 25 screws + washers and AF1-CF6 $^{1}/_{4}$ turn sliding nuts (dimensions in millimeters):



Summary of mounting methods

Summary table of mounting methods

The following table lists a summary of the different methods available for mounting Process and AS-i supply modules:

Supply module product reference	TBX SUP 10	TSX SUP 1011	TSX SUP 1021	TSX SUP 1051	TSX SUP 1101	TSX SUP A02	TSX SUP A05
AM1-PA Telequick board	X	X	X	X	X	X	X
AM1-DE200/ DP200 central DIN rail	X	X	X	X		X	
AM1-ED DIN rail with 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?

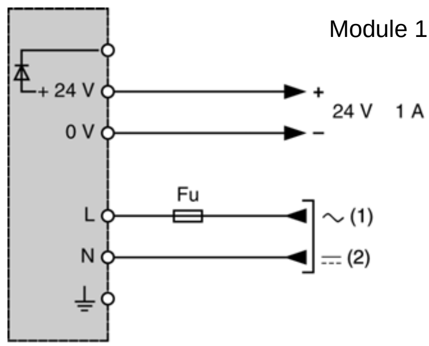
This chapter contains the following topics:

Connection of TSX SUP 1011/1021 power supplies

Illustration

Connection diagram:

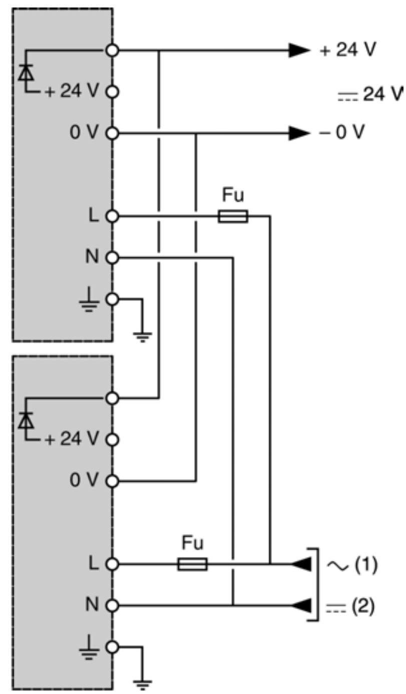
Normal connection



Parallelization

Module 1

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.

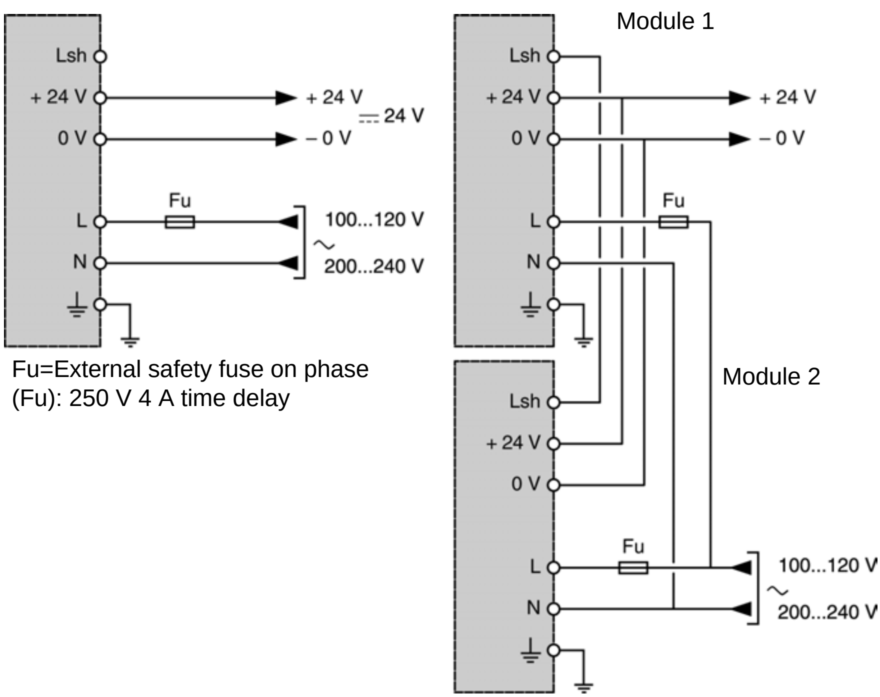
Connection of TSX SUP 1051 power supplies

Illustration

Connection diagram:

Normal connection

Parallelization



Fu=External safety fuse on phase (Fu): 250 V 4 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) 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.

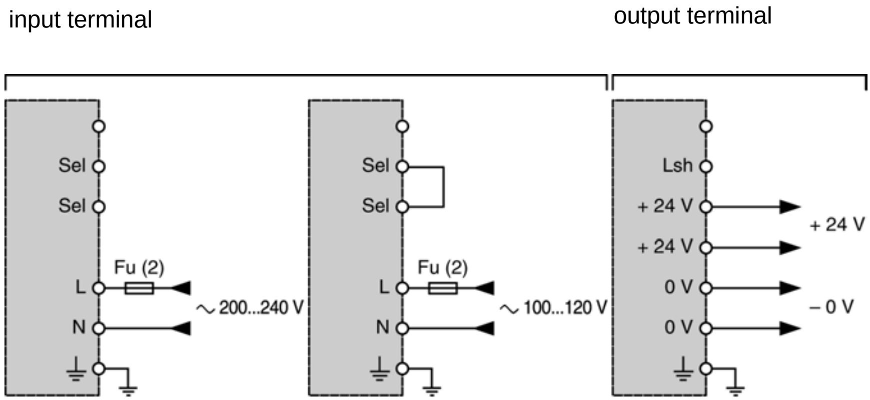
Secondary: to comply with isolation requirements (EN 60950) for a 24 V SELV isolated voltage, the following wiring is used:

- 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:

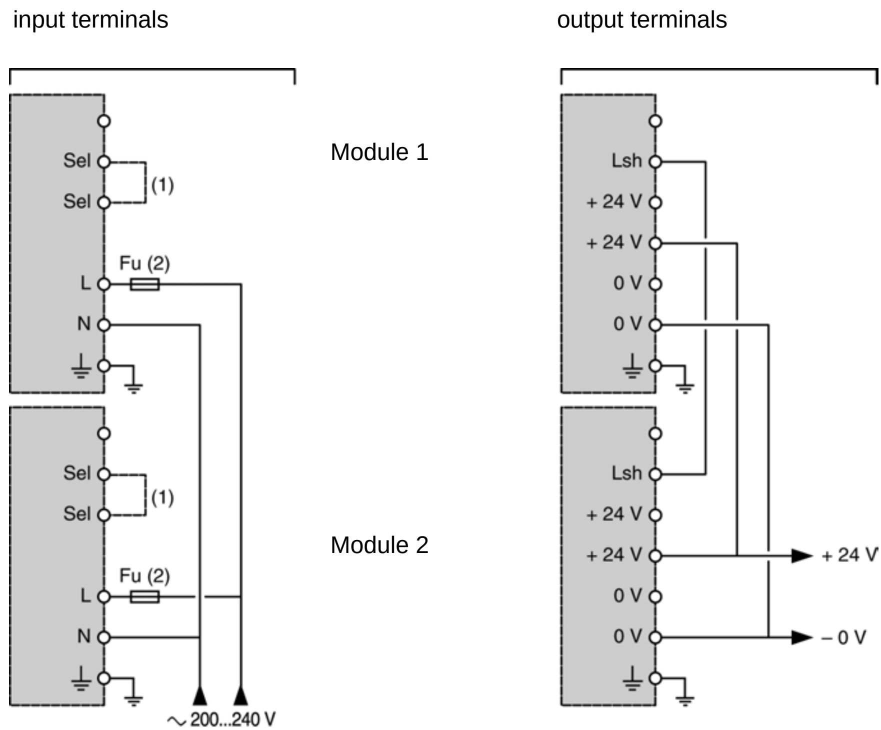


AC network connection 200..240 V

AC network connection 100..120 V

24 VDC output connection.

Illustration 2 Parallel connection diagram (parallelization):



(1) Connection for a 100...120 VAC power supply.

(2) External fuse on phase (Fu): 250 V 6.3 A time delay.

Connection rules

Primary: Observe the rules concerning phase and neutral when wiring.

- an operating voltage ≥ 600 VAC with a cross-section of 1.5 mm^2 (14 AWG) or 2.5 mm^2 (12 AWG) for connection to the mains,

DANGER

HAZARDOUS VOLTAGE

the ground terminal of the module must be connected to the protective earth using a green/yellow wire.

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

The power supply terminal is protected by a flap which allows access to the wiring terminals. The wires come vertically out of the power supply at its base. These wires can be kept in place with a cable-clip.

Secondary: To comply with isolation requirements (EN 60950) for a 24 V SELV isolated voltage, the following wiring is used:

- an operating voltage ≥ 300 VAC with a cross-section of 2.5 mm^2 (12 AWG) for the 24 V outputs and the ground.
- Wire the two 24 V terminals in parallel, or distribute the load over the two 24 V outputs when the total current to be supplied is greater than 5 A.

Connecting AS-i supply modules

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At a Glance

Aim of this Chapter

This Chapter deals with the connection of AS-i supply modules.

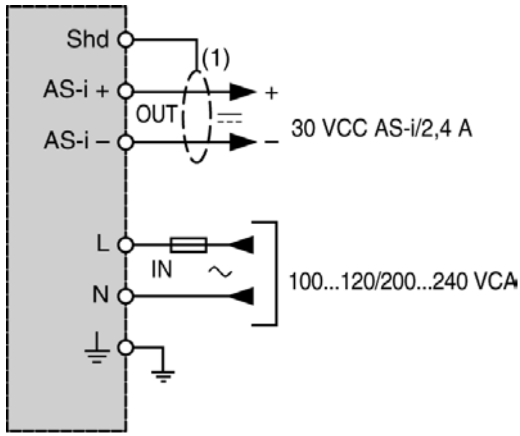
What's in this Chapter?

This Chapter contains the following Maps:

Connecting TSX SUP A02 supply modules

Illustration

Connection diagram:

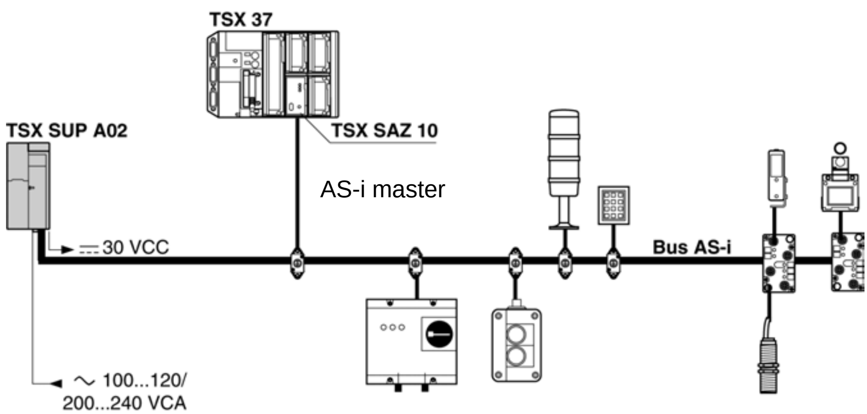


(1) Shielded AS-i cable screen in case of disrupted surroundings.

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

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 observe this precaution 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.

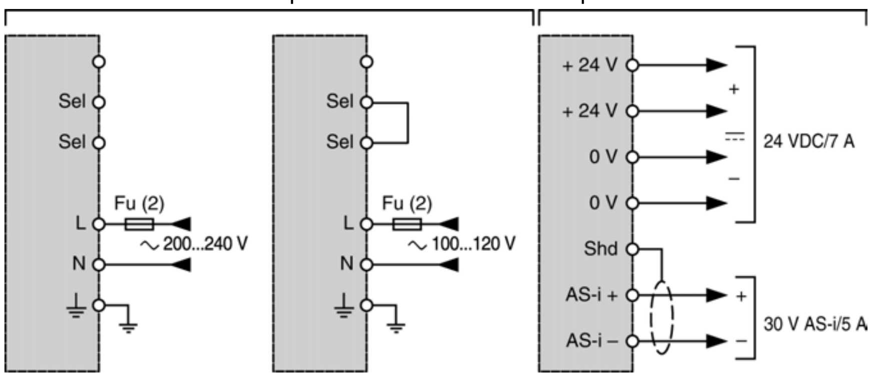
Using a shielded cable for the AS-i bus is only necessary if the installation is overly disrupted in terms of EMC (Electro Magnetic Compatibility).

Connecting TSX SUP A05 supply modules

Illustration

Connection diagram:

Input terminal   Output terminal



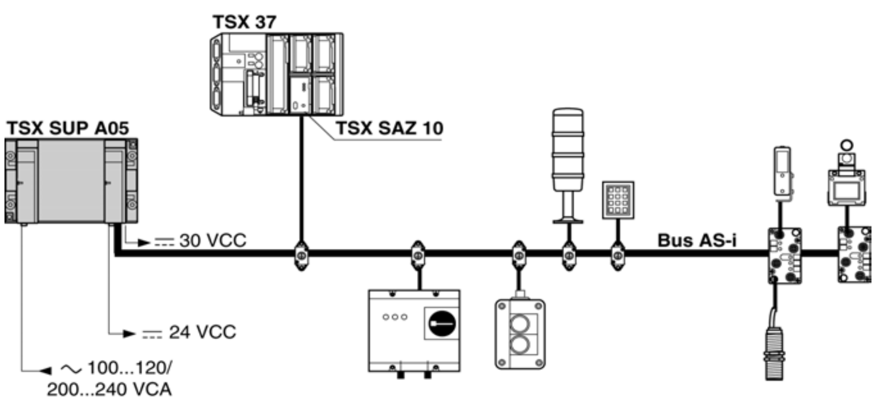
Connection to alternating network 200...240 V	Connection to an alternating network 100...120 V	AS-i 24V and 30 V DC output connection

(1) Connection if supply is from 100120V 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.

Connection overview

The TSX SUP A05 supply module is designed to supply the AS-i bus, including the slaves which are connected to it (30V/5A output). It also has an auxiliary supply (24 VDC/7A) for sensors/actuators which consume large amounts of current. For this, a black AS-i ribbon cable is used.

Principle diagram:



Rules of connection

Primary: 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 observe this precaution will result in death or serious injury.**

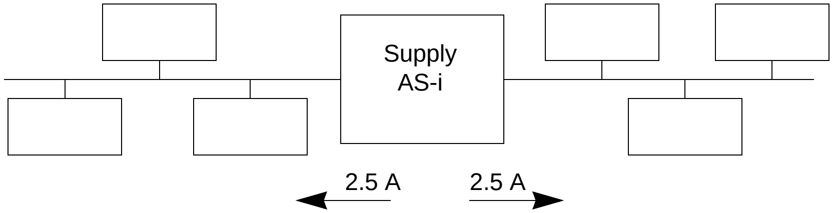
The "alternating current network supply" and "30 VDC and 24 VDC output" AS-i terminal blocks are protected by a flap which allows access to the wiring terminals. Wire output passes vertically to the bottom. Wiring can be maintained in position by a cable tightening clip.

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 caliber of the supply module adapted to the total consumption of the AS-i segment. Available calibers are 2.4A (TSX SUP A02) and 5A (TSX SUP A05).
A caliber of 2.4A 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 falls 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 fall between the master and the last slave on the bus must not exceed 3V. 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**	**1.5 mm^2**	**2.5 mm^2**
Linear resistance	52 milli Ohms/meter	27 milli Ohms/meter	16 milli Ohms/meter
Voltage fall for 1A over 100 meters	5.2V	2.7V	1.6V

The cable which can be used for most applications is the cable with a cross-section of 1.5 mm^2. 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. The lengths of cables which link a slave to a passive distribution box must be taken into account.

Process and AS-i supply module characteristics

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At a Glance

Aim of this Chapter

This Chapter presents the different electrical characteristics of Process and AS-i supply modules in a table.

What's in this Chapter?

This chapter contains the following topics:

Electrical characteristics of process supply modules: TBX SUP 10 and TSX SUP 1011

Table of characteristics

The following table describes the electrical characteristics of supply modules: TBX SUP 10 and TSX SUP 1011:

Process supply module			**TBX SUP 10 24V/1A**	**TSX SUP 1011 24V/1A**
Primary				
Nominal input voltage		V	alternating 100240 direct 125	alternating 100240 direct 125
Input limit voltage		V	alternating 90264 direct 88156	alternating 85264 direct 105156
Network frequency		Hz	47...63	47...63/360...440
Nominal input current (U=100V)		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^2t on trigger (1)	to 100 V	A^2s	2	0.63
	to 240 V	A^2s	2	2.6
Power factor			0.6	0.6
Harmonic (3)			10% (Phi=0°and 180°)	10% (Phi=0°and 180°)
Full load efficiency		%	>75	>75
Secondary				
Useful power (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 mV	240 240	150 240
Accepted length of micro-power outages (3)		ms	≤10 in AC ≤1 in DC	≤10 in AC ≤1 in DC

Process supply module			**TBX SUP 10 24V/1A**	**TSX SUP 1011 24V/1A**
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

(1) Values on initial power-up at 25°C. These elements are to be taken into account on start-up for the dimensioning of protection devices.

(2) Output power and current for an ambient temperature of 60°C. Input value in ( ) = output in a ventilated cabinet or within a temperature range of 0+40°C.

(3) A nominal voltage for a repetition period of 1Hz.

Electrical characteristics of process supply modules: TSX SUP 1021/1051/1101

Table of characteristics

The following table describes the electrical characteristics of supply modules: TSX SUP 1021/1051/1101:

Process supply 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 I^2t on trigger (1)	to 100 V	A^2s	4	8.6	8.5
	to 240 V	A^2s	4	8.6	8.5
Power factor			0.6	0.52	0.5
Harmonic 3			10% (φ=0°et 180°)		
Full load efficiency		%	>75	>80	
Secondary					
Useful power (2)		W	53(60)	120	240
Nominal output current (2)		A	2.2	5	10
Output voltage (0°C-60°c) V			24+/-3%		24+/-1%
Residual ripple (peak to peak)		mV	150	200	
Maximum HF noise (peak to peak) mV		mV	240		
Accepted length of micro-power outages (3)		ms	<=10		
Start-up time on resisting load		s	<1		
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		

(1) Values on initial power-up at 25°C. These elements are to be taken into account on start-up for the dimensioning of protection devices.

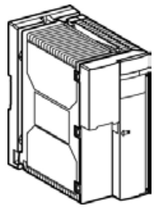
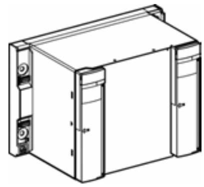
(2) Output power and current for an ambient temperature of 60°C. Input value in ( ) = output in a ventilated cabinet or within a temperature range of 0+40°C.

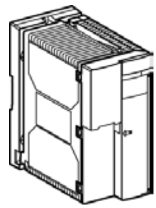
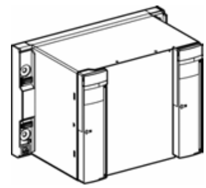
(3) A nominal voltage for a repetition period of 1Hz.

Electrical characteristics of AS-i supply modules: TSX SUP A02/A05

Table of Characteristics

The following table describes the electrical characteristics of supply modules: TSX SUP A02/A05:

References			**TSX SUP A02** **30V AS-i / 2.4A**	**TSX SUP A05 24V/7 AS-i & 30V AS-i/5A**
				
Primary				
Nominal input voltage		V	alternating 100..0.120/ 200..0.240	alternating 100..0.120/200..0.240
Input limit voltage		V	alternating 85...132/ 170...264	alternating 85...132/170...264
Network frequency		Hz	47...63/360...440	47...63/360...440
Nominal input current (U=100V)		On	1.3	5
Maximum call current (1)	to 100 V	On	30	50
	to 240 V	On	30	50
Maximum It on trigger (1)	to 100 V	As	0.06	0.17
	to 240 V	As	0.03	0.17
Maximum I^2t on trigger (1)	to 100 V	A^2s	4	8.5
	to 240 V	A^2s	4	8.5
Power factor			0.6	0.51
Harmonic 3			10% (Phi=0°and 180°)	10% (Phi=0°and 180°)
Full load efficiency		%	>75	>80
Secondary				
Output		W	72(84) (2)	230 (3)
Peak nominal current	30 V AS-i output	On	2.4(2.8) (2)	5 (3)(4)
	24 V output	On	-	7 (3)(4)

References			**TSX SUP A02 30V AS-i / 2.4A**	**TSX SUP A05 24V/7 AS-i & 30V AS-i/5A**	
					
Output voltage Global variation (-10°C to +60°C)		V V	30(AS-i) 29.5 to 31.6	24 +/-3%	30(AS-i) 29.5 to 31.6
Ripple (from 10 to 500 kHz) Ripple (from 0 to 10 kHz)		mV mV	50 300	200 240	50 300
Start-up time on resisting load		s	<2 (where C=15000 micro Farads	<2 (where C= 15000 micro Farads)	
Length of micro power outages (5)		ms	≤10		
Protection against	Short circuits and overloads		fallback to 0 and automatic reset after fault has disappeared	current limit on each output	
	Over-voltages	V	cuts off at U>36	cuts off at U>36	
Power dissipation		W	24	60	

(1) Values on initial power-up at 25°C. These elements are to be taken into account on start-up for the dimensioning of protection devices.

(2) Output and output current for an ambient temperature of 60°C. Input value () = surge output.

(3) Output and output current for a maximum ambient temperature of 55°C, if product index II = 01 (60°C if product index II > 01).

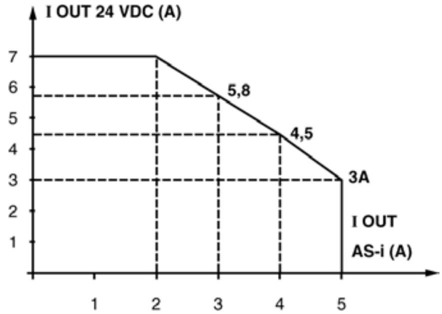
(4) distribution of current for each output (see *Chart of available currents on 30 V AS-i and 24 V output from the TSX SUP A05 supply block., p. 454*).

(5) Acceptable period at nominal voltage for a repetition period of 1 Hz.

Chart of available currents on 30 V AS-i and 24 V output from the TSX SUP A05 supply block.

The maximum power which can be delivered by the supply block is 230 W. If consumption is 5 A on the 30 V AS-i, possible flow on 24 V output is no greater than 3 A (see chart below).

Chart:



Physical environmental characteristics

Table of characteristics

The following table describes the electrical characteristics of Process and AS-i supply modules:

Process and AS-i supply blocks/modules		**TBX SUP 10**	**TSX SUP 1011/1021** **TSX SUP 1051/1101** **TSX SUP A02/A05**
Connection to screw terminals maximum capacity per terminal	 mm^2	1 terminal per output 1 x 2.5 (12 AWG)	1011/1021/1051/A02: 1 output terminal 1101 : 2 terminals/output A05: 2 terminals/output (24 VDC) 1 terminal/output (30 VDC AS-i) 2 x 1.5 (14 AWG) with adapter or 1 x 2.5 (12 AWG)
Temperature: Storage Operating	 °C °C	-25 to +70 +5 to +55	-25 to +70 0 to +60 (TSX SUP 1011/1021/1051/1101 -10 to +60 (TSX SUP A02/A05) (1)
Relative humidity	%	5-95	
Cooling	%	By natural convection	
Reference standard		-	Very Low Voltage Safety (EN 60950 and IEC 1131-2)
Dielectric strength: Primary/secondary Primary/ground Secondary/ground	 V eff V eff V eff	50/60 Hz-1 mm 1500 1500 500	 3500 2200 500
Insulation resistance Primary/secondary Primary/ground	 MΩ MΩ	 ≥ 100 ≥ 100	
Leakage current		I≤=3.5 mA (EN 60950)	
Electrostatic uploading immunity		6 kV per contact/8 KV in the air (complies with IEC 1000-4-2)	
Fast electric surge		2 kV (serial mode and common mode on input and output)	
Electromagnetic field influence		10 V/m (80 MHz to 1 GHz)	
Rejected electromagnetic disturbances		(comply with FCC 15-A et EN 55022 class A Test conditions: nominal U and I, resisting load, cable: 1 meter horizontally, 0.8 meters vertically	
Shock wave		Input: 4 kV MC, 2 kV MS Outputs: 2 kV MF, 0.5 kV MS (complies with IEC 1000-4-5)	

Process and AS-i supply blocks/modules		**TBX SUP 10**	**TSX SUP 1011/1021** **TSX SUP 1051/1101** **TSX SUP A02/A05**
Vibration (2)		1 mm 3 Hz to 13.2 Hz 1g 57 Hz to 150 Hz (2g TSX SUP A02/A05) (complies with IEC 68-2-6, FC test)	
Degree of protection		IP 20.5	IP 20.5, terminal IP 21.5
MTBF at 40°C	H	100 000	
Length of life at 50°C	H	30 000 (at nominal voltage and 80 % of nominal power)	

(1) -10°C +55°C for TSX SUP A05 supply module with product index II=01.

-10°C +60°C for TSX SUP A05 supply module with product index II > 01.

(2) complies with IEC 68-2-6, FC test with module or block mounted on a board or panel.

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