Modicon Premium PLCs

TSX 57/PCX 57
Safety and Discrete Interfaces
Installation Manual Volume 2

07/2008 eng

35009581.02

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Document Set

At a Glance

This manual is made up of 5 Volumes :

- Volume 1
  - Racks / Power supplies / Processors
  - Commissioning / Diagnostics / Maintenance
  - Standards and service conditions
  - Process supply
- Volume 2
  - Discrete interfaces
  - Safety
- Volume 3
  - Counting
  - Movement control
- Volume 4
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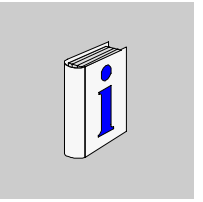
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About the Book



At a Glance

Document Scope

This manual describes the hardware installation for Premium Discrete Input /Output modules and safety modules.

Validity Note

This manual has been updated to include the latest functions of the Discrete Input / Output modules and safety modules.

Related Documents

Title of Documentation	Reference Number
Premium PLCs – Hardware installation manual	TSX DM 57 xxE
Junior PL7 / Application Specific-Pro Premium PLCs	TLX DS 57 PL7 xxE
Catalog of components for Télémécanique safety applications	MK TED 2980 10FR

User Comments

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Discrete I/O modules

I

At a Glance

Overview

This part presents the range of discrete I/O modules on the Premium PLC.

What's in this Part?

This part contains the following chapters:

Chapter	Chapter Name	Page
1	General overview of discrete I/O modules	17
2	General rules for implementing Discrete I/O modules	23
3	Fault processing for Discrete I/O modules	47
4	TSX DEY 08D2 input module	57
5	TSX DEY 16D2 Discrete input module	63
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General overview of discrete I/O modules

1

At a Glance

Overview

This chapter gives a general introduction to the Discrete I/O modules.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
General description of Discrete I/O modules	18
Physical description of Discrete modules with screw terminal block connection	19
Physical description of Discrete modules with HE10 connectors	21

General description of Discrete I/O modules

At a Glance

The Discrete I/O modules of the Premium range are standard format modules (occupying one single position), equipped with either a HE10 connector, or a screw terminal block (TSX BLY 01).

For modules fitted with HE10 type connector outputs, a series of products known as TELEFAST 2 (see *TELEFAST 2 connection interface links for the Discrete I/O modules, p. 261*) are available that enable I/O modules to be quickly connected to operational parts.

A wide range of Discrete inputs and outputs make it possible to meet the following requirements:

- functional: direct or alternating I/Os, positive or negative logic;
- modularity: 8, 16, 32 or 64 channels/modules.

Inputs

Inputs receive signals from the sensors and carry out the following functions:

- acquisition;
- adaptation;
- galvanic insulation;
- filtering;
- protection against interference.

Outputs

Outputs store the orders given by the processor, in order to control pre-actuators via decoupling and amplification circuits.

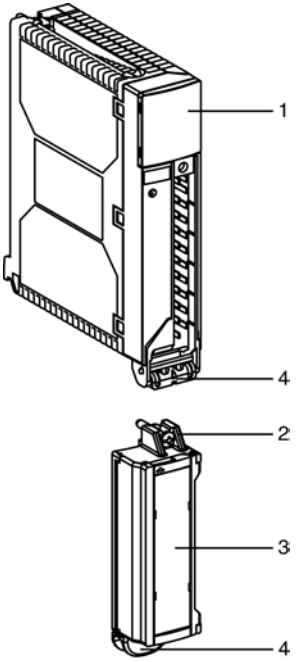
Physical description of Discrete modules with screw terminal block connection

At a Glance

The following is a physical description of Discrete I/O modules with screw terminal block connection.

Illustration

The I/O modules are housed in plastic cases which provide IP20 protection for all the electronic parts.



Elements

The following table describes the different elements of the Discrete I/O modules with screw terminal block connection.

Number	Description
1	Module display and diagnostics block.
2	Removable screw terminal block for directly connecting I/Os to the sensors and pre-actuators (Reference: TSX BLY 01). Certain output modules contain integrated fuses which are accessible from the front when the terminal block is removed.
3	Swing door for access to the block's screws and also acting as a marking label display area.
4	Rotating base comprising the locating device.

Note: The terminal blocks are supplied separately.

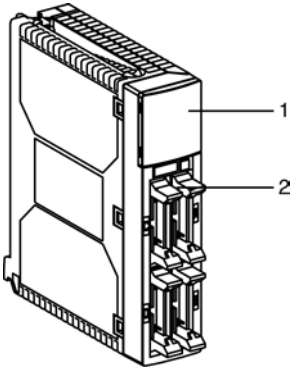
Physical description of Discrete modules with HE10 connectors

At a Glance

The following is a physical description of Discrete I/O modules with HE10 connectors.

Illustration

The I/O modules are housed in plastic cases which provide IP20 protection for all the electronic parts.



Elements

The following table describes the different elements of the Discrete I/O modules with HE10 connectors.

Number	Description
1	Module display and diagnostics block.
2	**HE10** connector, with a protective cover. They are used to connect I/Os to the sensors and pre-actuators either directly or via TELEFAST 2 (see *TELEFAST 2 connection interface links for the Discrete I/O modules, p. 261*) connection bases.

General rules for implementing Discrete I/O modules

2

At a Glance

Overview

This chapter presents the general rules for implementing Discrete I/O modules.

What's in this Chapter?

This chapter contains the following topics:

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Fitting of Discrete I/O modules	24
Fitting a screw terminal block to a Discrete I/O module.	26
Identification of Discrete I/O modules with screw terminal block connections	28
Identification of Discrete I/O modules with HE10 connectors	30
Choice of direct current power supply for sensors and pre-actuators associated with Discrete I/O modules.	32
Precautions and general rules for wiring with Discrete I/O modules	33
Means of connecting Discrete I/O modules: connecting screw terminal block modules	37
Connecting Discrete I/O Modules: HE10 Connector Modules	39
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Sensor/input compatibility and pre-actuator/output compatibility	43

Fitting of Discrete I/O modules

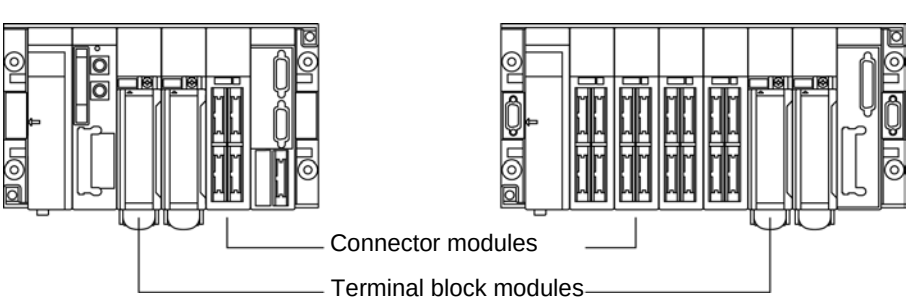
At a Glance

Every Premium Discrete I/O module is of standard format. Fitting operations (installation, assembly and disassembly) are described below.

Installation

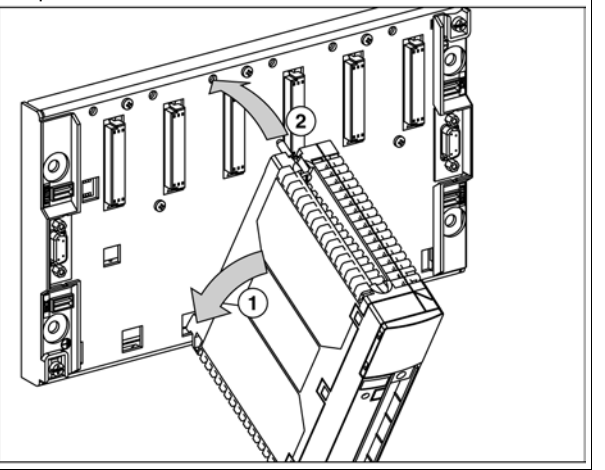
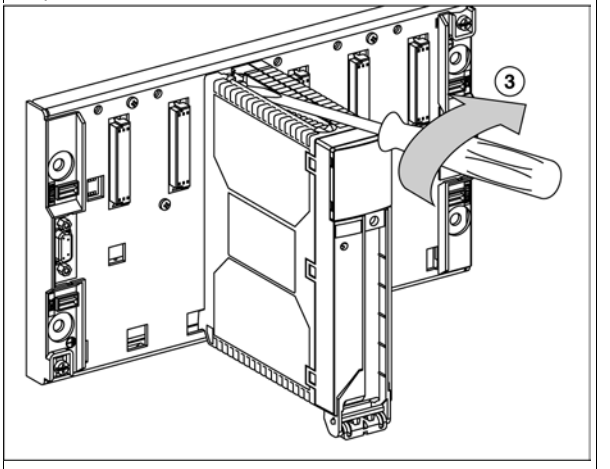
Discrete I/O modules, powered by the backplane bus, can be positioned on either the standard rack or on an extendable rack. They can be safely handled without turning off the rack power supply.

The diagram below shows Discrete I/O modules installed in the rack.



Assembly/ Disassembly

The table below shows the procedure for assembling Discrete I/O modules on the rack.

Step	Action	Illustration
1	Position the locating pins situated at the rear of the module (on the lower section) in the corresponding slots in the rack.	Step 1 and 2 
2	Pivot the module towards the top of the rack so as to engage the backplane connector.	
3	Tighten the fastening screws of the upper section of the module so as to firmly attach the module to the rack (torque setting: 2.0 N.m). **Warning**: If this screw is left untightened, the module will not remain in position in the rack.	Step 3 
Note:	**Assembling and disassembling modules is thus carried out only when: sensor and pre-actuator voltage is switched off, and the terminal block is disconnected**	

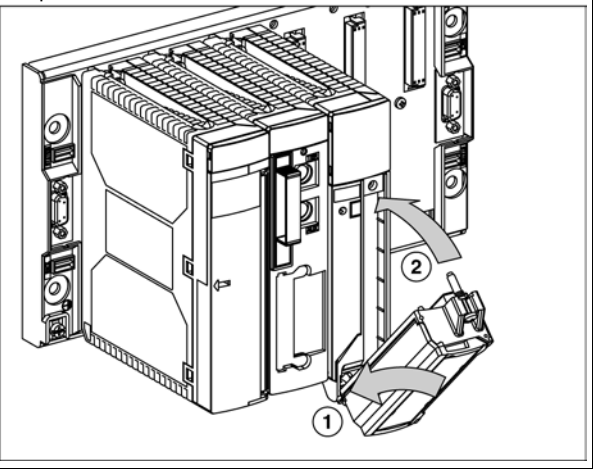
Fitting a screw terminal block to a Discrete I/O module.

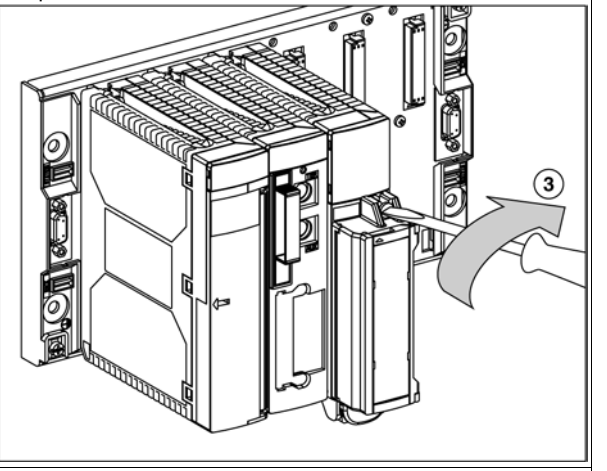
At a Glance

Every Premium Discrete I/O module with screw terminal block connection requires the latter to be connected to the module. Fitting operations (installation, assembly and disassembly) are described below.

Assembly/ Disassembly

The table below shows the procedure for assembling the screw terminal block onto a Discrete I/O module.

Step	Action	Illustration
1	With the module in position in the rack, place the terminal block on the module as shown opposite.	Step 1 and 2 
2	Pivot the terminal block so as to bring it to the engaged position on the module.	
Note:	**The first time a screw terminal block is mounted on a module which takes this type of connection, the terminal block is coded according to the type of module on which it is assembled. This coding is the result of the transfer from the module to the terminal block of two encoded pins. From then on, any use of the terminal block with a different module type is inhibited by this mechanical coding.** **The code is transferred automatically during step 1.**	

Step	Action	Illustration
3	Tighten the fastening screws of the upper section of the terminal block so as to firmly attach the terminal block to the module (torque setting: 2.0 N.m).	Step 3 

Note:	**The first time a screw terminal block is mounted on a module which takes this type of connection, the terminal block is coded according to the type of module on which it is assembled. This coding is the result of the transfer from the module to the terminal block of two encoded pins. From then on, any use of the terminal block with a different module type is inhibited by this mechanical coding.** **The code is transferred automatically during step 1.**

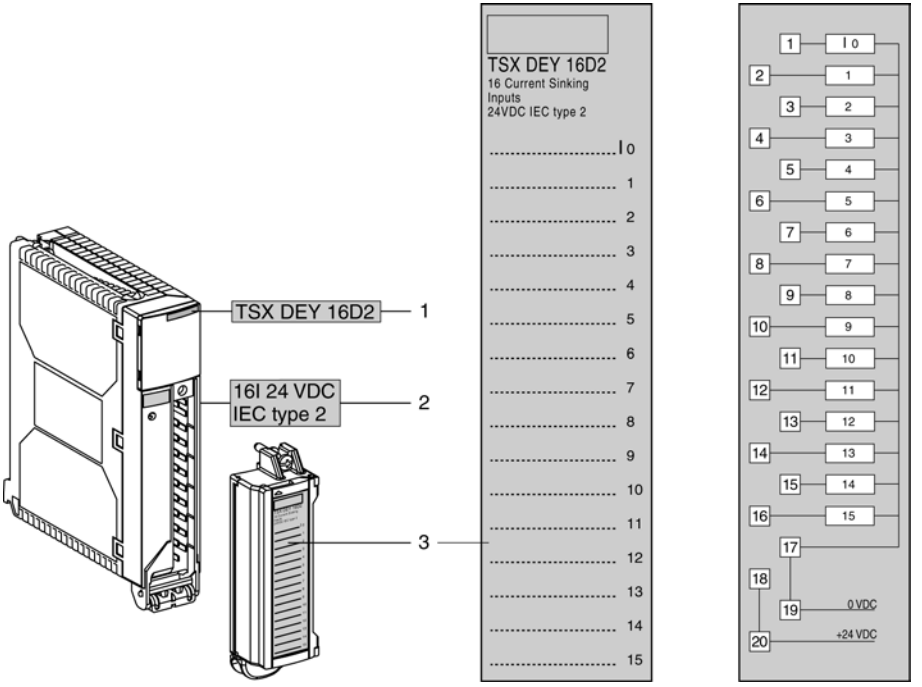
Identification of Discrete I/O modules with screw terminal block connections

At a Glance

Discrete I/O modules with screw terminal block connection are identified by the markings on the lid of the front section of the module, and the labels located on the terminal block.

Illustration

The following diagram illustrates the identification of Discrete I/O modules with screw terminal block connection.



Description

The table below shows the different elements for the identification of Discrete I/O modules, and gives an explanation for each one.

Number	Location	Type of identification
1	On module display block	A marking giving the module reference number.
2	Under the module display block	A marking indicating the module's characteristics.
3	On the terminal block	A removable label (supplied with the module), to be placed inside the door, printed on both sides and displaying the following indications: ● External view (door closed): ● the reference number of the module; ● the number of channels; ● a box for entering the module's position number (address); ● the designation of each channel (symbol). ● Internal view (door open): ● The wiring diagram for inputs and outputs with the number of channels and connection terminals.

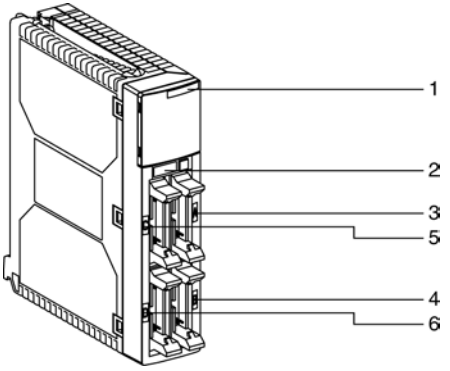
Identification of Discrete I/O modules with HE10 connectors

At a Glance

Discrete I/O modules with HE10 connectors are identified by the markings on the lid of the front section of the module.

Illustration

The following diagram illustrates the identification of TSX DEY••/DSY•• I/O modules with HE10 connectors.



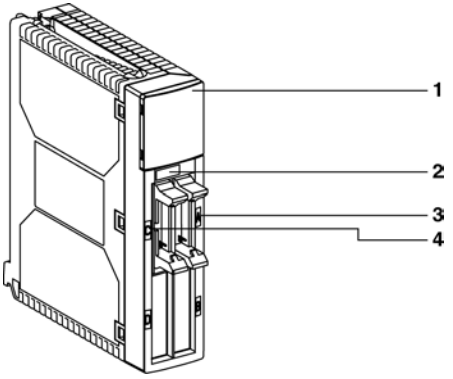
Description

The table below shows the different elements for the identification of TSX DEY••/DSY•• I/O modules, and gives an explanation for each one.

Number	Location	Type of identification
1	On module display block	A marking giving the module reference number.
2	Under the module display block	A marking indicating the module's characteristics.
3	Under the module display block	A marking giving the corresponding channel addresses: ● channels 0 to 15 of the module (I or Q)
4	Under the module display block	A marking giving the corresponding channel addresses: ● channels 16 to 31 of the module (I or Q)
5	Under the module display block	A marking giving the corresponding channel addresses: ● channels 32 to 47 of the module (I or Q)
6	Under the module display block	A marking giving the corresponding channel addresses: ● channels 48 to 63 of the module (I or Q)

Illustration

The following diagram illustrates the identification of TSX DEY 32D3K input modules and TSX DMY 28FK/28RFK mixed I/O modules with HE10 connectors.



Description

The following diagram shows the different elements for the identification of TSX DEY 32D3K input modules and TSX DMY 28FK/28RFK mixed I/O modules, and gives an explanation for each one.

Number	Location	Type of identification
1	On module display block	A marking giving the module reference number.
2	Under the module display block	A marking indicating the module's characteristics.
3	Under the module display block	A marking giving the corresponding channel addresses: ● Input channels 0 to 15 of TSX DEY 32D3K or TSX DMY 28FK/28RFK modules (I).
4	Under the module display block	A marking giving the corresponding channel addresses: ● Input channels 16 to 31 of the TSX DEY 32D3K module (I). ● output channels 16 to 27 of TSX DMY 28FK/28RFK modules (Q).

Choice of direct current power supply for sensors and pre-actuators associated with Discrete I/O modules.

At a Glance

The following is a presentation of precautions for choosing sensors and pre-actuators associated with Discrete I/O modules.

External direct current power supplies

When using an external 24 VDC direct current power supply, it is advised to use either:

- regulated power supplies;
- non-regulated power supplies but with the following filtering:
  - 1000 microF/A with full-wave single phase rectification and 500 microF/A with tri-phase rectification;
  - 5% maximum peak to peak ripple;
  - maximum voltage variation: -20% to +25% of the nominal voltage (including ripple).

Note: Rectified power supplies with no filtering are prohibited.

Ni-Cad battery power supplies

This type of power supply can be used to power sensors and pre-actuators and all associated I/Os that have a normal operating voltage of 30 VDC maximum.

While being charged, this type of battery can reach, for a duration of one hour, a voltage of 34 VDC. For this reason, all I/O modules with an operating voltage of 24 VDC can withstand this voltage (34 VDC) for up to one hour every 24 hours. This type of operation entails the following restrictions:

- at 34 VDC, the maximum current withstood by the outputs must under no circumstances exceed the maximum current defined for a voltage of 30 VDC;
- temperature downgrading imposing the following restrictions:
  - 80% of I/Os at 1 at up to 30°C;
  - 50% of I/Os at 1 to 60°C.

Precautions and general rules for wiring with Discrete I/O modules

At a Glance

The Discrete I/Os feature protective measures which ensure a high resistance to industrial environmental conditions. Certain rules, shown below, must nevertheless be respected.

External power supplies for sensors and pre-actuators.

External sensor and pre-actuator power supplies associated with Discrete I/O modules must be protected against this short circuits and overloads by quick-blow fuses.

For **HE10** connector Discrete I/O modules, the sensor/pre-actuator power supply must be linked to each connector, except in the event where the corresponding channels are not in use and are not assigned to any task.

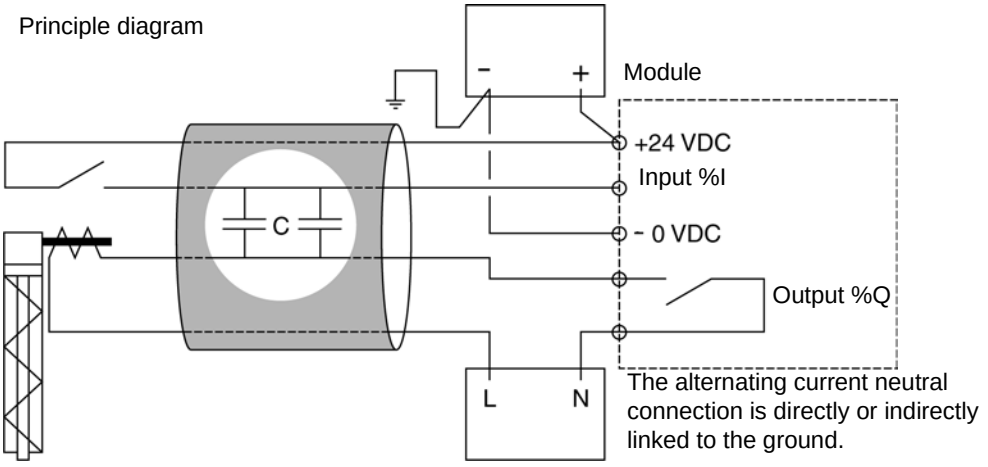
Note: if an I/O module with screw block terminals or HE10 connector is present in the PLC, the sensor/pre-actuator voltage must be connected to the module; otherwise an "external supply" error is signaled and the I/O LED comes on.
In the event that the 24 VDC installation is not carried out according to SELV (safety extra low voltage) standards, the 24 VDC power supplies must have the 0V linked to mechanical ground, which is in turn linked to the ground as close as possible to the power supply. This restriction is necessary for personnel safety in the event of a power phase coming into contact with the 24 VDC supply.

Inputs

Recommendations for use concerning Discrete I/O module inputs are as follows:

- for fast input modules (**TSX DEY 16 FK/DMY 28FK/DMY 28RFK**):
  - in the event that 24 VDC direct current inputs are used, it is recommended to adapt the filtering time to the required function;
  - in order for bounces not to be taken into account upon closure of contacts, it is not advisable to use sensors with mechanical contact outputs if the filtering time is reduced to under 3 ms;
  - for faster operation, the use of direct current inputs and sensors is recommended, as alternating current inputs have a much higher response time.
- for 24 VDC inputs and line coupling with an alternating current network:
  - operation can be disturbed if the coupling between cables relaying an alternating current and cables relaying signals intended for direct current inputs is too large. This is illustrated in the following circuit diagram. When the

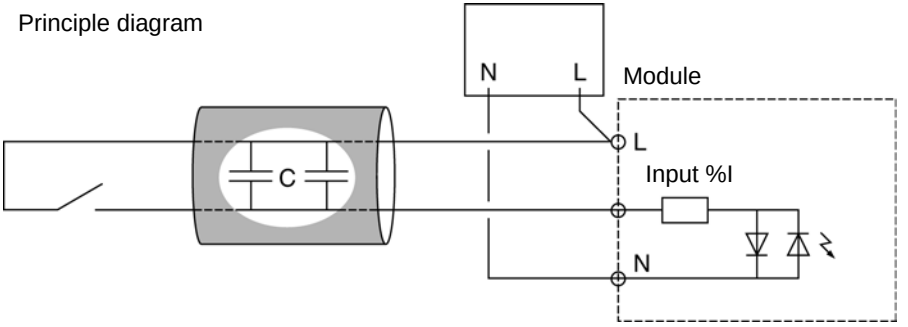
Principle diagram



input contact is open, an alternating current exceeding the cable's interference capacities may generate a current in the input which might cause it to be set to 1.
  - the line capacity values that must not be exceeded, for a 240 VCA/50 Hz line coupling, are given in the summary table at the end of this paragraph. For a coupling with a different voltage, the following formula can be applied: Acceptable capacity = (Capacity at 240 VAC x 240) / line voltage
- for 24 to 240 VAC inputs and line coupling:

- In this case, when the line that controls the input is open, the current passes according to the coupling capacity of the cable (see circuit diagram below).

Principle diagram



- the line capacity values that must not be exceeded are given in the summary table at the end of this paragraph.

The summary table below shows the acceptable line capacity values.

Module	**Maximum coupling capacity**
24 VDC inputs	
TSX DEY 32 / **TSX DEY 64D2K**	25 nF (1)
TSX DEY 16D2	45 nF (1)
TSX DEY 16FK / **TSX DMY 28FK** / **TSX DMY 28RFK**	10 nF (1) (2) 30 nF (1) (3) 60 nF (1) (4)
24 to 240 VAC inputs	
TSX DEY 16A2	50 nF
TSX DEY 16A3	60 nF
TSX DEY 16A4	70 nF
TSX DEY 16A5	85 nF
Legend	
(1)	Max. admissible coupling capacity with 240 VAC / 50 Hz line
(2)	Filtering = 0.1 ms
(3)	Filtering = 3.5 ms
(4)	Filtering = 7.5 ms

Outputs

Recommendations for use concerning Discrete I/O module outputs are as follows:

- it is recommended to segment starts, protecting each one with a quick-blow fuse, if currents are high;
- wires of a sufficient diameter should be used to avoid drops in voltage and overheating.

Cable routing

Precautions for use to be taken concerning the wiring system are as follows:

- in order to reduce the number of alternating couplings, power circuit cables (power supplies, power switches, etc.) must be separated from input cables (sensors) and output cables (pre-actuators) both inside and outside the equipment.
- outside the equipment, cables leading to inputs / outputs should be placed in covers that make them easily distinguishable from those containing wires relaying high energy levels. They should also be placed preferably in separate grounded metal cableways. These various cables must be routed at least 100 mm apart.

Means of connecting Discrete I/O modules: connecting screw terminal block modules

At a Glance

Discrete I/O module terminal blocks feature an automatic code transfer device activated on first use. This allows fitting errors to be avoided when replacing a module. This coding guarantees electrical compatibility by module type.

Description of the screw terminal block

Every terminal block can receive bare wires or wires with terminations or spade terminals.

The capacity of each terminal is:

- minimum: 1 x 0.2 mm^2 wire (AWG 24) without termination;
- maximum: 1 x 2 mm^2 wire without termination or 1 x 1.5 mm^2 with termination.

Illustration of the termination and the spade terminal.



(1) 5.5 mm maximum.

The maximum capacity of the terminal block is 16 x 1 mm^2 wires (AWG) + 4 x 1.5 mm^2 wires (AWG).

Screw clamps come with slots for the following types of screwdriver:

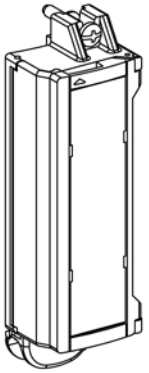
- Pozidriv No. 1;
- 5 mm diameter flat head.

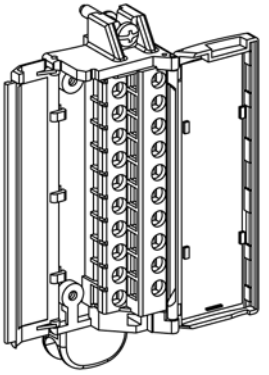
Screw connection terminal blocks feature captive screws. On the supplied blocks, these screws are not tightened.

Note: The maximum torque setting for tightening connection terminal block screws is 0.8 N.m

Note: Screw terminal blocks must be engaged or disengaged with sensor and pre-actuator voltage switched off.

The diagram below shows the method for opening the screw terminal block door.





Connecting Discrete I/O Modules: HE10 Connector Modules

At a Glance

HE10 connector modules are connected to sensors, pre-actuators or terminal blocks using a pre-formed cable designed to allow the smooth and direct transition of module inputs/outputs from wire to wire.

Pre-Formed Cable TSX CDP 301 / 501

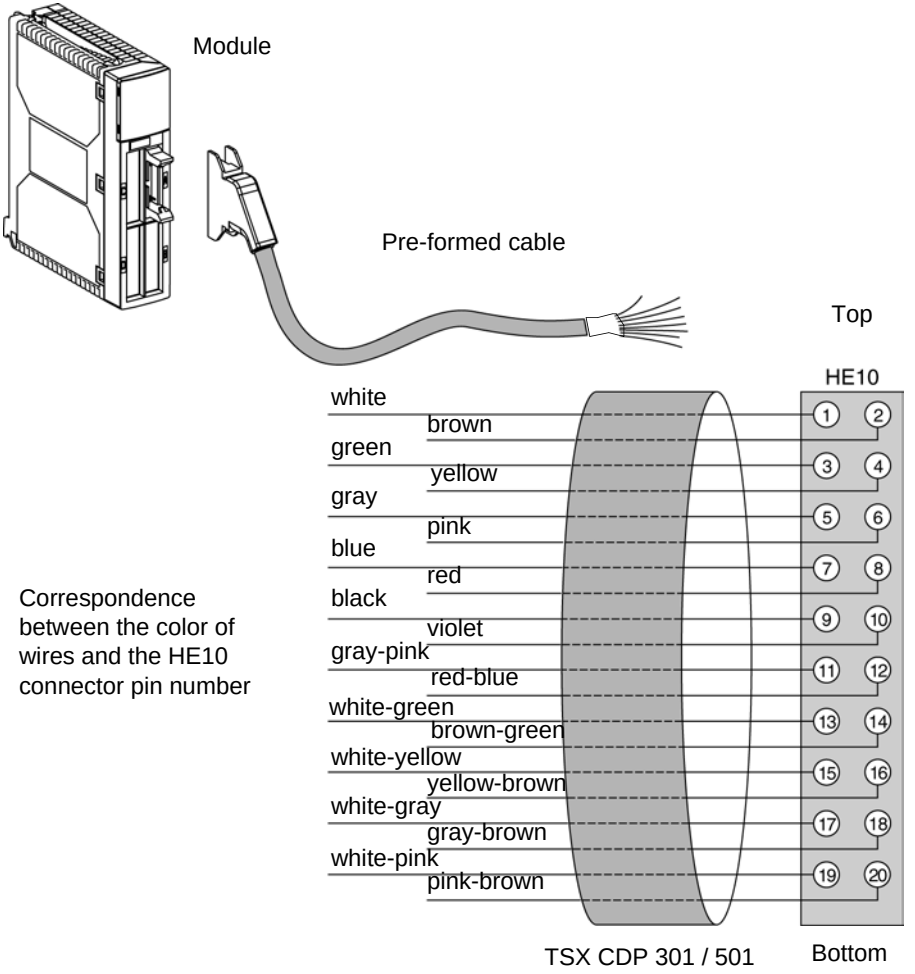
The 3-meter long TSX CDP 301 or 5-meter long TSX CDP 501 pre-formed cables consist of:

- a molded HE10 connector at one end with 20 protruding sheathed wires with a cross-section of 0.34 mm^2;
- free wires at the other end, differentiated by a color code complying with DIN 47100.

Note: A nylon thread built into the cable allows easy-stripping of the sheath.

Note: HE10 connectors must be engaged or disengaged with sensor and pre-actuator voltage switched off.

The diagram below shows the connection of the pre-formed cable to the module.



Correspondence between the color of wires and the HE10 connector pin number

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

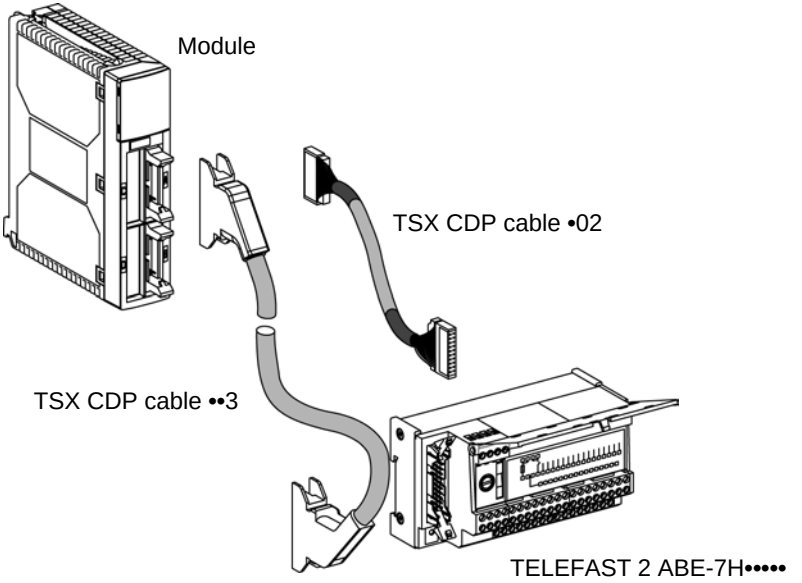
The 22 gage connection cable (0.34 mm^2) comes in five different lengths:

- 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).

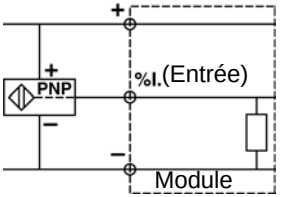
Sensor/input compatibility and pre-actuator/output compatibility

At a Glance

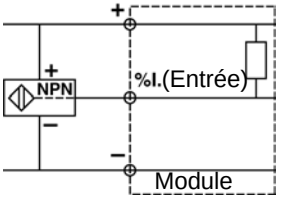
The following is a description of compatibility between sensors and Discrete I/O module inputs, and between pre-actuators and Discrete I/O module outputs.

Sensor/input compatibility

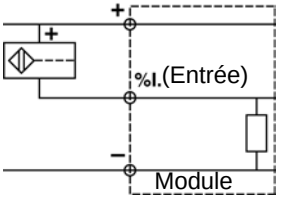
- Compatibility between 3-wire sensors and 24 and 48 V DC inputs
  - 3-wire sensors and IEC 1131-2 compliant type 1 and type 2 positive logic (sink) inputs: all 3-wire PNP inductive or capacitive proximity sensors and photo-electric detectors which have an operating voltage of 24 and 48 VDC are compatible with all positive logic inputs;



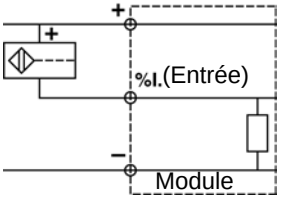
  - 3-wire sensors and negative logic (source) inputs: all NPN 3-wire inductive or capacitive proximity sensors and photo-electric detectors which have an operating voltage of 24 VDC are compatible with negative logic inputs from the Premium range.



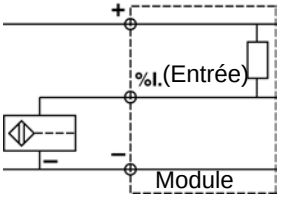
- Compatibility between 2-wire sensors and 24 VDC inputs
  - 2-wire sensors and IEC 1131-2 compliant type 1 positive logic (sink) inputs: all proximity sensors or other 2-wire sensors with an operating voltage of 24 VDC and with the characteristics described below are compatible with all type 1 positive logic 24 VDC inputs from the Premium range:
    Voltage drop in closed state: <= 7 V;
    minimum switched current: <= 2.5 mA;
    residual current in open state: <= 1.5 mA



- 2-wire sensors and IEC 1131-2 compliant type 2 positive logic (sink) inputs: all 2-wire proximity sensors with an operating voltage of 24 and 48 VDC and which are IEC 947-5-2 compliant are compatible with all type 2 positive logic 24 and 48 VDC inputs;



- 2-wire sensors and negative logic (source) inputs: all proximity sensors or other 2-wire sensors with an operating voltage of 24 VDC direct current and with the characteristics described below are compatible with all negative logic 24 VDC inputs from the Premium range:
  Voltage drop in closed state: <= 7 V;
  minimum switched current: <= 2.5 mA;
  residual current in open state: <= 1.5 mA



- Compatibility between 2-wire sensors and 24/48/100..120/200..240 VAC inputs
  - all IEC 947-5-2 compliant 2-wire AC proximity sensors able to withstand 100...120 VAC are compatible with all type 2 IEC 1131-2 compliant 110..120 VAC inputs;
  - all IEC 947-5-2 compliant 2-wire AC proximity sensors and other sensors able to withstand 200..240 VAC are compatible with all type 2 IEC 1131-2 compliant 200..240 VAC inputs from the Premium range of between 220..240 VAC.

The following table provides a summary of compatibility between sensors and Discrete I/O module inputs.

	Types of input				
Types of proximity sensor	**24 VDC Type 1 Positive logic**	**24/48 VDC Type 2 Positive logic**	**24 VDC Negative logic**	**24/48 VAC 100.0.120 VAC Type 2**	**200..240 VAC Type 2**
All PNP-type 3-wire (DC) proximity sensors	Compatibility	Compatibility	-	-	-
All NPN-type 3-wire (DC) proximity sensors	-	-	Compatibility	-	-
Telemecanique or other brand 2-wire (DC) proximity sensors with the following characteristics: Voltage drop in closed state <= 7 V Minimum switched current <= 2.5 mA Residual current in open state <= 1.5 mA	Compatibility	Compatibility	Compatibility	-	-
2-wire (AC/DC) proximity sensor	-	Compatibility	-	Compatibility	Compatibility (1)
2-wire (AC) proximity sensor	-	-	-	Compatibility	Compatibility (1)
Legend					
(1)	In the nominal voltage range of 220..240 VAC.				
DC	DC voltage operation.				
AC	AC voltage operation.				
AC/DC	AC or DC voltage operation.				

Compatibility of pre-actuators with outputs

- Compatibility of DC pre-actuators and outputs
  - comply with the output's maximum current and maximum switching frequency as specified in the table of characteristics;
  - where low consumption pre-actuators are used, special attention must be paid to the leakage current of the idle output, to ensure that the following inequation is satisfied:
    I nominal ≥ (50 x I leakage)
    given that:
    I nominal = current consumed by the pre-actuator;
    I leakage = leakage current in idle output state.
- Compatibility of tungsten filament lamps and transistor outputs (static current)
  - for outputs with protection against short circuits, the maximum power of the tungsten filament lamps specified in the table of characteristics must be complied with. If not, the lamp's pick-up current might cause a tripped output at the time of power-up.
- Compatibility of AC pre-actuators and outputs
  - Inductive AC pre-actuators have a pick-up current of up to 10 times their holding current for a duration of 2/F seconds (F = alternating current frequency). Relay outputs are therefore set to withstand these conditions (AC14 and AC15). The table of characteristics for relay outputs gives the maximum authorized running power (in AV) according to the number of operations.
    Reminder: The thermal current is the current that can at any time accept a closed relay whilst maintaining an acceptable heat level. In no event can this current be switched by the relay.
- Compatibility of lamps and bidirectional triode thyristor outputs
  - ensure that the maximum power is equal to:
    U x I max

- Compatibility of AC pre-actuators with relay bidirectional triode thyristor outputs
  - comply with the specified maximum current;
  - where low consumption pre-actuators are used, special attention must be paid to the leakage current of the idle output, to ensure that the following inequation is satisfied:
    I nominal ≥ (50 x I leakage)
    given that:
    I nominal = current consumed by the pre-actuator;
    I leakage = leakage current in idle output state.

Fault processing for Discrete I/O modules

3

At a Glance

Overview

This chapter presents hardware fault processing for Discrete I/O modules.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
General protective measures of Discrete I/O modules	48
Discrete Inputs/Outputs fault display	49
Discrete Inputs/Outputs fault diagnostics	52
Checking the Discrete Input / Output connection	55

General protective measures of Discrete I/O modules

At a Glance

The following is a description of the general protective measures integrated into the channels of Discrete I/O direct current modules.

DC outputs

Every transistor output (except where specifically labeled "Non-Protected"), features a protective device which allows the following to be detected when an output is active:

- an overload or short circuit; failures such as these cause the output to be deactivated (tripped) and the failure to be indicated on the display on the front panel of the module (the LED corresponding to the channel flashes, the I/O error LED comes on);
- a polarity reversal; a failure such as this causes the power supply to short circuit without damaging the module. In order to obtain optimal protection, a quick-blow fuse must be installed on the power supply and upstream from the pre-actuators;
- an inductive overload; each output is individually protected against inductive overloads and has a fast electro-magnet demagnetization circuit using a zener diode which allows the mechanical cycle of certain fast machines to be reduced.

DC inputs

24 and 48 VDC dc inputs are of constant current type. For any input voltage in excess of 11 V (for 24 VDC inputs) or 20 V (for 48 VDC inputs), the input current remains constant.

This characteristic has the following advantages:

- guaranteed minimum current in active state in accordance with IEC standards;
- limited consumed current when input voltage increases, to avoid the module overheating unnecessarily;
- reduced consumed current to the power supply sensor supplied by the PLC power supply or a process power supply.

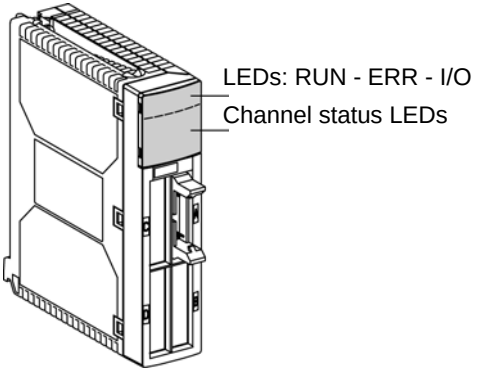
Discrete Inputs/Outputs fault display

At a Glance

The Discrete I/O modules are equipped with a display block featuring LEDs that allow the module's operating modes and any failures to be displayed.

Illustration

The diagram below shows the position of the three fault display LEDs, on the front panel of the Discrete I/O modules.



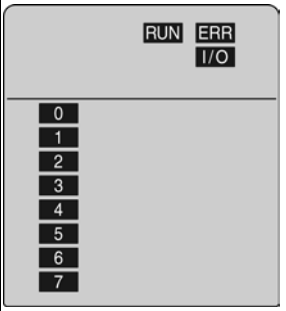
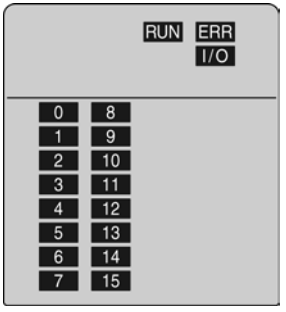
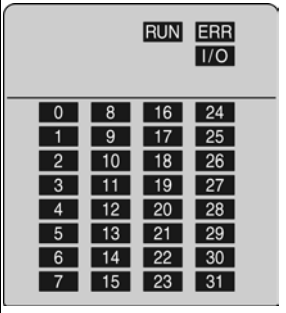
Description

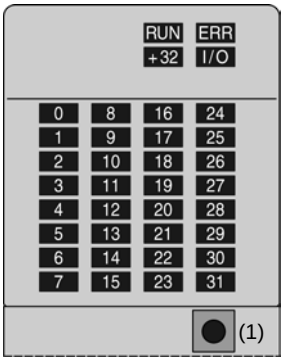
The following table explains how the LEDs located on the Discrete I/O display block operate.

Display LEDs	**On** ●	**Flashing** ⊗	**Off** ○
RUN (green)	Module operating normally.	-	Module faulty or off.
ERR (red)	Internal fault: Module failure.	Communication error if **RUN** LED is on. Module non-configured if **RUN** LED is off.	No internal error.
I/O (red)	External error: overload, short circuit, sensor/pre-actuator voltage error.	Terminal block error.	No external error.
Channel status	Channel at 1	Channel error, overload or short circuit.	Channel at 0

Fault display blocks

There are several fault display blocks depending on the type of Discrete I/O module:

Module	Illustration	Description
8-channel modules	Fault display block 	These modules have: ● 3 **RUN** - **ERR** - **I/O** module status LEDs; ● 8 channel status LEDs.
16-channel modules	Fault display block 	These modules have: ● 3 **RUN** - **ERR** - **I/O** module status LEDs; ● 16 channel status LEDs.
28 and 32-channel modules	Fault display block 	These modules have: ● 3 **RUN** - **ERR** - **I/O** module status LEDs; ● 32 channel status LEDs.

Module	Illustration	Description
64-channel modules	Fault display block 	These modules have: ● 3 **RUN** - **ERR** - **I/O** module status LEDs; ● 1 x **+32** LED to display channels 32 to 36; ● 32 channel status LEDs. ● 1 switch to display channels 32 to 63.

(1) Switch for viewing channels higher than 31. Exists only on 64-channel modules.

Example: channel 41 display, the LEDs 9 + 32 are on if the channel is set to 1

Note: In the case of 28 I/O mixed input/out modules, TSX DMY 28FK/ 28RFK
- LEDs 0 to 15 display the state of the inputs,
- LEDs 16 to 27 display the state of the outputs.

Discrete Inputs/Outputs fault diagnostics

At a Glance

The diagnostics function detects any errors that may be in progress. Three error groups can be identified:

- internal errors;
- external errors;
- other errors.

Internal faults

This category contains all internal module errors and all communication errors that prevent a Discrete I/O module from operating correctly.

All internal faults of the module that can detected by it are signaled on the front display panel by the red LED "ERR" and the green LED "RUN" is switched off.

A communication error may be caused by a hardware error at the backplane bus, or a processor or extension cable error.

External faults

All input modules and transistor output modules are equipped with a voltage monitoring device for sensors and pre-actuators. When the voltage of sensors or pre-actuators is below the level required to guarantee the correct operation of the module, the red "I/O" LED lights up and the "External voltage" fault is signaled in the language objects.

- on input modules, when the sensor voltage is correct, the state viewed by the input is that of the sensor, whatever the type of sensor used (within the recommended range).
- for an output module, when the pre-actuator voltage is correct, the status demanded of the pre-actuator is the status determined by the application.

However, it is up to the user to check that the supply voltage of the pre-actuators is within the range adapted to the pre-actuators used (take into account the output voltage drop).

The following errors fall into this category:

- **terminal block error**: all terminal block modules contain a device for checking the presence of a terminal block in the module. Where a terminal block is missing or badly inserted in the module, the error is detected and is alerted by the flashing of the I/O LED on the front panel of the module.
- **overload and short circuit**: transistor output modules contain a device for checking the load status. In the event of overload or short circuit of one or several outputs, the circuits of these will be tripped and the errors will be shown on the front panel of the module - the LEDs corresponding to the faulty outputs will flash and the red I/O LED will light up.

- **sensor voltage error**: all input modules contain a device for checking sensor voltage for all module channels. This device checks that sensor and module power supply voltages are of a sufficiently high level to guarantee the correct operation of the module's input channels. When sensor voltage is less than or equal to a defined threshold, the error is shown by the I/O LED lighting up on the front panel of the module.
- **pre-actuator voltage error**: all 24/48 VDC transistor output modules contain a device for checking pre-actuator voltage all module channels. This device checks that pre-actuator and module power supply voltages are of a sufficiently high level to guarantee the correct operation of the module's output channels. This voltage must be greater than 18 V (24 VDC supply), 36 V (48 VDC supply) for modules with direct current transistor outputs. In the event of pre-actuator voltage being less than or equal to this threshold, outputs are set to 0 and the error is show by the I/O LED lighting up on the front panel of the module.

Note: The sensor/pre-actuator voltage check is unique to terminal block modules. In 32 or 34 channel connector modules, there is one checking device per connector (equivalent to one per group of 16 channels). A sensor or pre-actuator voltage error leads to all the inputs and outputs affected by the error - i.e. all channels for a terminal block module and the group(s) of 16 channels for a 32 or 64 channel connector module - to be set to faulty.

Note: Relay and bi-directional triode thyristor output modules do not contain pre-actuator voltage checking devices.

Other errors

The Other errors category includes switched off modules.

Description

The following table can be used to determine module's status on the basis of the LEDs located on the Discrete I/O modules' display block.

State of module		**Display LEDs**		
		RUN (green)	**ERR (red)**	**I/O (red)**
Normal operation		●	○	○
Internal faults	Module failure, no PLC communication	○	●	○
	Module failure, PLC communication possible	●	●	○
	Communication fault	●	⊗	○
External faults	Terminal block error	●	○	⊗
	Overload, short circuit, sensor/ pre-actuator voltage error	●	○	●
Other errors	Module off	○	⊗	○

Legend	
●	LED on
⊗	LED flashing
○	LED off

Checking the Discrete Input / Output connection

At a Glance

In order to check the Discrete I/O connection, ensure that:

- sensor data is registered by the corresponding inputs and the processor;
- control orders from the processor are registered by the outputs and transmitted to the corresponding pre-actuators.



WARNING

Risk of injury

Active outputs can activate machine movements.
It is therefore recommended that all power be turned off before this check is carried out:

- remove power fuses from the motor controls;
- shut off the hydraulic and pneumatic units;
- then power up the PLC fitted with its Discrete I/O modules.

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

Description

It is possible to check the connection of the Discrete I/O modules:

- without a terminal:
  - by activating each sensor and checking whether the corresponding input LED changes status. If it is remains unchanged, check the wiring and correct operation of the sensor.
- using the terminal:
  - use of a terminal makes it possible to perform a more comprehensive I/O check. To do this, an application with configured I/Os at minimum (an empty application is sufficient but if the application is empty no module should be declared in the 'FAST task') should be previously loaded onto the PLC from a programming terminal.
  - this check can be carried out, with the PLC in RUN, either from an **ADJUST** 117 type terminal, or from a FTX 417/507 type terminal or from a PC equipped with PL7 Junior or PL7 Pro software giving access to debug functions;
  - this check can also be carried out with the entire application loaded in the memory. In this case, stop the processing of the program by de-activating the tasks (MAST, FAST and event) by setting system bits **%S30**, **%S31**, **%S38** to 0.

Input check

The following table shows the procedure for checking input connections.

Step	Action
1	Activate each sensor and check that the corresponding input LED changes status.
2	Check on the terminal screen that the corresponding input bit (**%I•**) also changes status.

Output check

The following table shows the procedure for checking output connections.

Step	Action
1	From the terminal, set each bit (**%Q•**) that corresponds to an output to 1 then 0.
2	Check that the corresponding output LED turns on then off and that the corresponding pre-actuator activates then de-activates.

TSX DEY 08D2 input module

4

At a Glance

Overview

This chapter describes the TSX DEY 08D2 module, its characteristics and its connection to the different sensors.

What's in this Chapter?

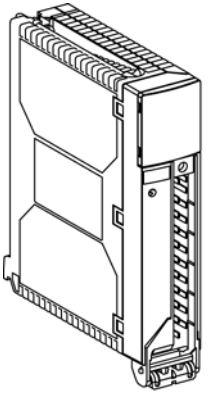
This chapter contains the following topics:

Topic	Page
Presentation of the TSX DEY 08D2 module	58
Characteristics of the TSX DEY 08D2 module	59
Connecting the TSX DEY 08D2 module	61

Presentation of the TSX DEY 08D2 module

General

The TSX DEY 08D2 module



The TSX DEY 08D2 module is a 24 VDC 8-channel terminal block Discrete input module with positive logic.

Characteristics of the TSX DEY 08D2 module

At a Glance

This section provides a description of the general characteristics of the TSX DEY 08D2 module.

General Characteristics

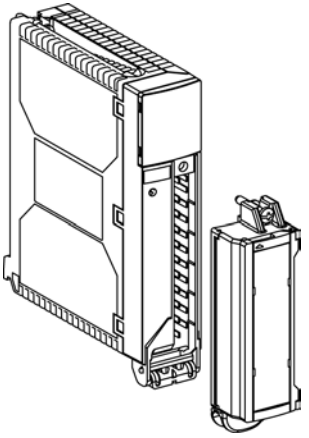
The following table shows the general characteristics of the TSX DEY 08D2 module:

The TSX DEY 08D2 module			24 VDC positive logic inputs
Nominal input values		Voltage	24 VDC
		Current	7 mA
Threshold input values	at 1	Voltage	>= 11 V
		Current	>= 6.5 mA (for U = 11 V)
	at 0	Voltage	<= 5 V
		Current	<= 2 mA
	Sensor supply (including ripple)		19..30 V (possibly up to 34 V, limited to 1 hour every 24 hours)
Input impedance	at nominal U		4 kOhms
Response Time	typical		4 ms
	maximum		7 ms
IEC 1131-2 compliance			type 2
2 wire / 3 wire PNP proximity sensor compatibility (see *Sensor/input compatibility, p. 43*)			IEC 947-5-2
Dielectric rigidity			1500 V actual, 50 / 60 Hz for 1 min
Resistance of insulation			10 MOhms (below 500 VDC)
Insulation			Remote inputs
Input type			current sink
Paralleling of inputs (1)			yes
Sensor voltage check threshold	OK		> 18 V
	Fault		< 14 V
Check response time	on appearance		1 ms < T < 3 ms
	on disappearance		8 ms < T < 30 ms
5 V consumption	typical		55 mA
	maximum		65 mA
Sensor supply consumption (2)	typical		25 mA + (7 x Nb) mA
	maximum		33 mA + (7 x Nb) mA
Dissipated power (2)			1 W + (0.15 x Nb) W
Legend			
(1)	This characteristic is used to connect several inputs to the same module in parallel, or to different modules for input redundancy.		
(2)	Nb = number of channels at 1.		

Connecting the TSX DEY 08D2 module

At a Glance

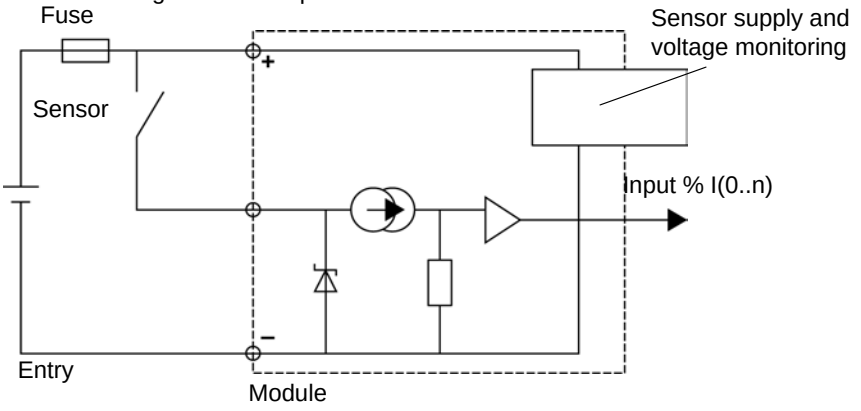
The TSX DEY 08D2 module comprises 8 x 24 VDC inputs, with type 2 positive logic.



This module is fitted with a removable connection terminal block for the connection of inputs.

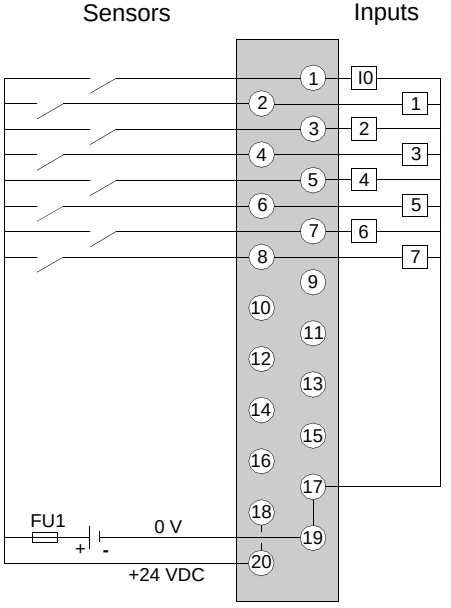
Principle Diagram

The circuit diagram for an input is shown below.



Module connection

The following diagram shows the connection of the module to the sensors.



FU1 0.5 A quick-blow fuse

TSX DEY 16D2 Discrete input module

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At a Glance

Overview

This chapter describes the TSX DEY 16D2 module, its characteristics and its connection to the different sensors.

What's in this Chapter?

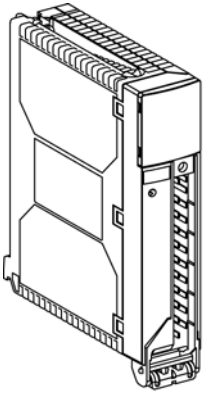
This chapter contains the following topics:

Topic	Page
Presentation of the TSX DEY 16D2 module	64
Characteristics of the TSX DEY 16D2 positive logic module	65
Discrete I/O module temperature downgrading	67
Connecting the TSX DEY 16D2 module	69

Presentation of the TSX DEY 16D2 module

General

The TSX DEY 16D2 module



The TSX DEY 16D2 module is a 24 VDC 16-channel terminal block Discrete input module with positive logic.

Characteristics of the TSX DEY 16D2 positive logic module

At a Glance

This section provides a description of the general characteristics of the TSX DEY 16D2 module.

General Characteristics

The following table shows the general characteristics of the TSX DEY 16D2 module:

The TSX DEY 16D2 module			24 VDC positive logic inputs
Nominal input values		Voltage	24 VDC
		Current	7 mA
Threshold input values	at 1	Voltage	>= 11 V
		Current	>= 6.5 mA (for U = 11 V)
	at 0	Voltage	<= 5 V
		Current	<= 2 mA
	Sensor supply (including ripple)		19..30 V (possibly up to 34 V, limited to 1 hour every 24 hours)
Input impedance	at nominal U		4 kOhms
Response Time	maximum		4 ms
	maximum		7 ms
IEC 1131-2 compliance			type 2
2 wire / 3 wire NPN proximity sensor compatibility (see *Sensor/input compatibility, p. 43*)			IEC 947-5-2
Dielectric rigidity			1500 V actual, 50 / 60 Hz for 1 min
Resistance of insulation			10 MOhms (below 500 VDC)
Insulation			Remote inputs
Input type			current sink
Paralleling of inputs (1)			yes
Sensor voltage check threshold	OK		> 18 V
	Fault		< 14 V
Check response time	on appearance		1 ms < T < 3 ms
	on disappearance		8 ms < T < 30 ms
5 V consumption	typical		80 mA
	maximum		90 mA
Sensor supply consumption (2)	typical		25 mA + (7 x Nb) mA
	maximum		33 mA + (7 x Nb) mA
Dissipated power (2)			1 W + (0.15 x Nb) W
Temperature downgrading (see *Discrete I/O module temperature downgrading, p. 67*)			The characteristics at 60 °C are guaranteed for 60% of inputs set to 1
Legend			
(1)	This characteristic is used to connect several inputs to the same module in parallel, or to different modules for input redundancy.		
(2)	Nb = number of channels at 1.		

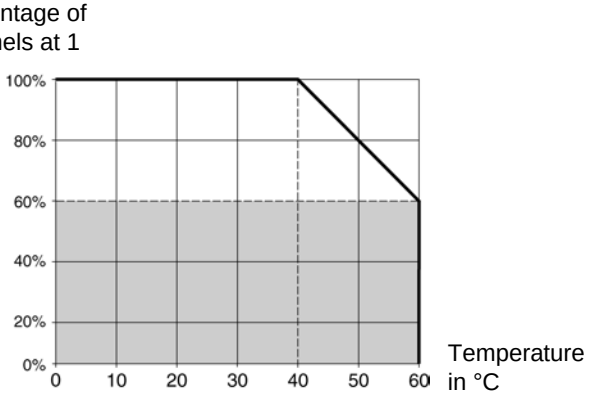
Discrete I/O module temperature downgrading

At a Glance

All characteristics for the different Discrete modules are given for a load rate of 60% of channels simultaneously set to 1.

In the event of a greater load rate, refer to the following downgrading curve.

Discrete I/O module temperature downgrading.



Example 1: a 24 VDC/0.5 A 16 transistor output module, with each output delivering 0.5 A. At 60%, the maximum admissible output current is 16 x 0.5 x 60% = 4.8 A or the equivalent of about 10 simultaneously active outputs.

Example 2: the same 24 V DC/0.5 A 16 transistor output module, with each output delivering 0.3 A. At 60%, the maximum admissible output current is 16 x 0.3 x 60% = 2.9 A or the equivalent of about 16 simultaneously active outputs. In this case, there is no downgrading of the outputs; the maximum admissible current for the module is not exceeded.

Relay outputs

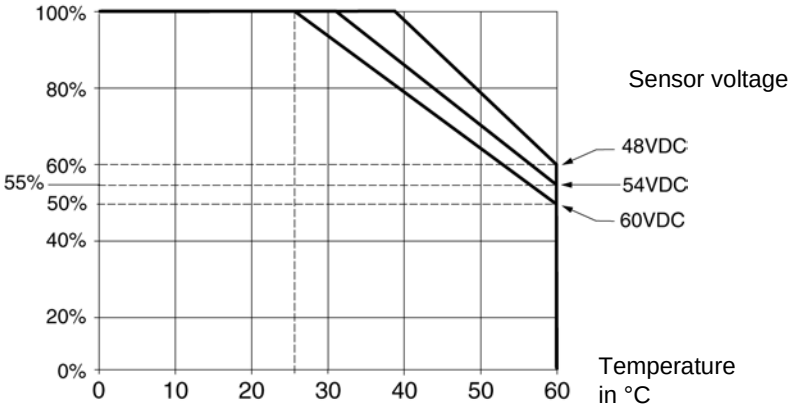
There is no temperature downgrading for relay output modules (TSX DSY 08R5/08R4D/08R5A/16R5). The user must therefore check there is enough overall consumption on the 24 V supply.

Note: For the outputs, temperature downgrading is based on the maximum current flowing from the active outputs.

The TSX DEY 32D3K module

When the TSX DEY 32D3K module is used under extreme conditions (sensor voltage and temperature), the downgrading conditions defined below must be respected.

Temperature downgrading of discrete input modules TSX DEY 32D3K.



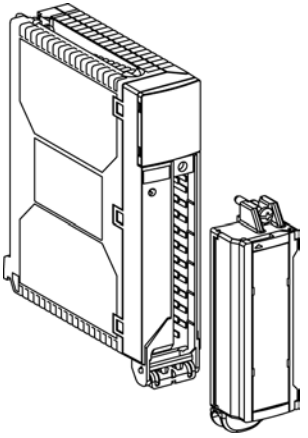
The following curves show the percentage of inputs simultaneously set to 1, depending on:

- service temperature;
- sensor supply voltage.

Connecting the TSX DEY 16D2 module

At a Glance

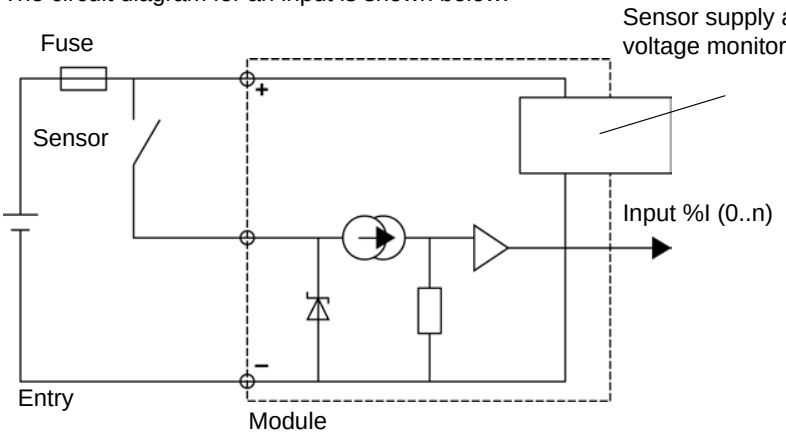
The TSX DEY 16D2 module comprises 16 x 24 VDC inputs, with type 2 positive logic.



This module is fitted with a removable connection terminal block for the connection of inputs.

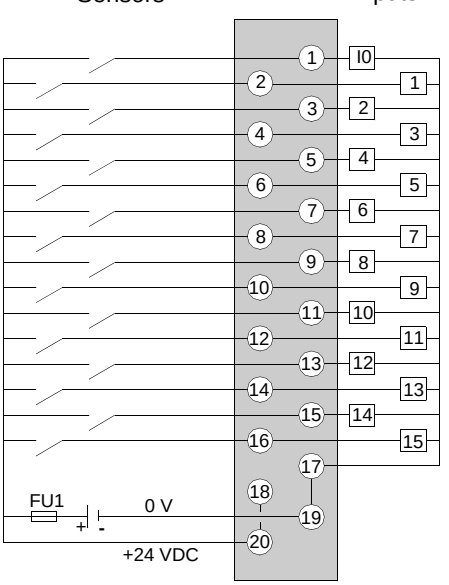
Principle Diagram

The circuit diagram for an input is shown below.



Module connection

The following diagram shows the connection of the module to the sensors.



FU1 0.5 A quick-blow fuse

TSX DEY 16D3 Discrete input module

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At a Glance

Overview

This chapter describes the TSX DEY 16D3 module, its characteristics and its connection to the different sensors.

What's in this Chapter?

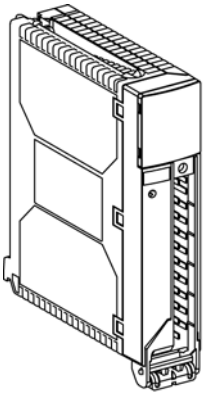
This chapter contains the following topics:

Topic	Page
Presentation of the TSX DEY 16D3 module	72
Characteristics of the TSX DEY 16D3 positive logic module	73
Connecting the TSX DEY 16D3 module	75

Presentation of the TSX DEY 16D3 module

General

The TSX DEY 16D3 module



The TSX DEY 16D3 module is a 48 VDC 16-channel terminal block Discrete input module with positive logic.

Characteristics of the TSX DEY 16D3 positive logic module

At a Glance

This section provides a description of the general characteristics of the TSX DEY 16D3 module.

General Characteristics

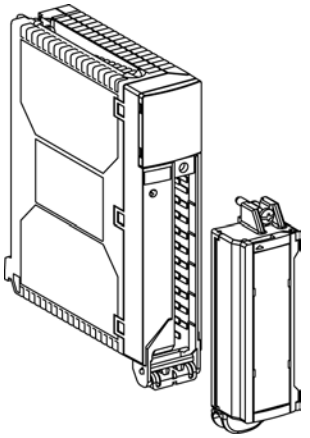
The following table shows the general characteristics of the TSX DEY 16D3 module:

The TSX DEY 16D3 module			48 VDC positive logic inputs
Nominal input values		Voltage	48 VDC
		Current	7 mA
Threshold input values	at 1	Voltage	>= 30 V
		Current	>= 6.5 mA (for U = 30 V)
	at 0	Voltage	<= 10 V
		Current	<= 2 mA
	Sensor supply (including ripple)		38.0.60 V
Input impedance	at nominal U		7 kOhms
Response Time	typical		4 ms
	maximum		7 ms
IEC 1131-2 compliance			type 2
2 wire / 3 wire NPN proximity sensor compatibility (see *Sensor/input compatibility, p. 43*)			IEC 947-5-2
Dielectric rigidity			1500 V actual, 50 / 60 Hz for 1 min
Resistance of insulation			10 MOhms (below 500 VDC)
Insulation			Remote inputs
Input type			current sink
Paralleling of inputs (1)			yes
Sensor voltage check threshold	OK		> 36 V
	Fault		< 24 V
Check response time	on appearance		1 ms < T < 3 ms
	on disappearance		8 ms < T < 30 ms
5 V consumption	typical		80 mA
	maximum		90 mA
Sensor supply consumption (2)	typical		25 mA + (7 x Nb) mA
	maximum		33 mA + (7 x Nb) mA
Dissipated power (2)			1 W + (0.3 x Nb) W
Temperature downgrading (see *Discrete I/O module temperature downgrading, p. 67*)			The characteristics at 60 °C are guaranteed for 60% of inputs set to 1
Legend			
(1)	This characteristic is used to connect several inputs to the same module in parallel, or to different modules for input redundancy.		
(2)	Nb = number of channels at 1.		

Connecting the TSX DEY 16D3 module

At a Glance

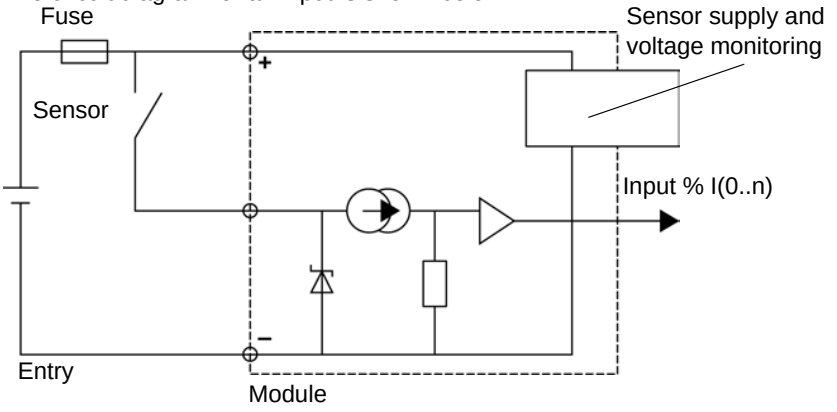
The TSX DEY 16D3 module comprises 16 x 48 VDC inputs, with type 2 positive logic.



This module is fitted with a removable connection terminal block for the connection of inputs.

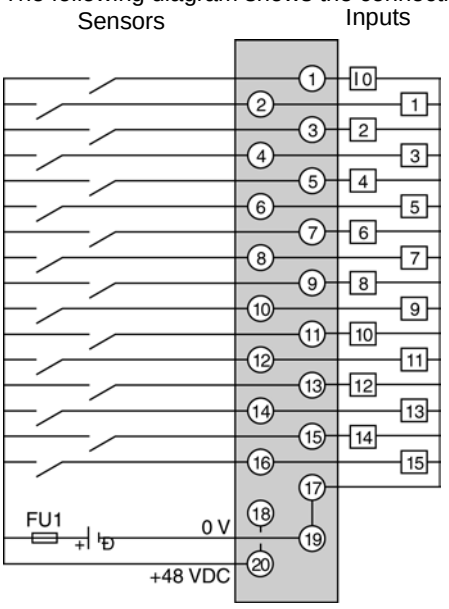
Principle Diagram

The circuit diagram for an input is shown below.



Module connection

The following diagram shows the connection of the module to the sensors.



FU1 0.5 A quick-blow fuse

TSX DEY 16A2 Discrete input module

7

At a Glance

Overview

This chapter describes the TSX DEY 16A2 module, its characteristics and its connection to the different sensors.

What's in this Chapter?

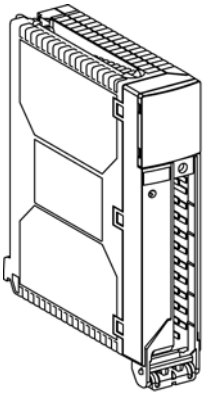
This chapter contains the following topics:

Topic	Page
Presentation of the TSX DEY 16A2 module	78
Characteristics of the TSX DEY 16A2 alternating voltage module	79
Characteristics of the 24 VDC negative logic TSX DEY 16A2 module	82
Connecting the alternating voltage TSX DEY 16A2 module	84
Connecting the 24 VDC negative logic TSX DEY 16A2 module	86

Presentation of the TSX DEY 16A2 module

General

The TSX DEY 16A2 module



The TSX DEY 16A2 module is a 24 VAC 16-channel terminal block Discrete input module.

Although intended for AC use, this module can also be used with direct current for negative logic applications.

Characteristics of the TSX DEY 16A2 alternating voltage module

At a Glance

This section provides a description of the characteristics of the alternating voltage TSX DEY 16A2 module.

Characterization

The following table shows the characteristics of the alternating voltage TSX DEY 16A2 module:

The TSX DEY 16A2 module			24 VAC alternating voltage inputs
Nominal input values		Voltage	24 VAC
		Current	15 mA
		Frequency	50/60 Hz
Threshold input values	at 1	Voltage	>= 10 V
		Current	>= 6 mA (for U = 10 V)
	at 0	Voltage	<= 5 V
		Current	<= 4 mA
	Frequency		47..63 HZ
	Sensor supply		20.0.26 V
	Peak current at activation (at nominal U)		15 mA
Input impedance	at nominal U		1.6 kOhms
Response Time	Activation		15 ms
	Deactivation		20 ms
IEC 1131-2 compliance			type 2
2 wire proximity sensor compatibility (see *Sensor/input compatibility, p. 43*)			IEC 947-5-2
Filtering			Built-in, 50 or 60 Hz network
Dielectric rigidity	Input / ground or Input / internal logic		1500 V actual, 50 / 60 Hz for 1 min
Resistance of insulation			> 10 MOhms (below 500 VDC)
Insulation			Remote inputs
Input type			Resistive
Sensor voltage check threshold	OK		> 18 V
	Fault		< 14 V
Check response time	on appearance		20 ms < T < 50 ms
	on disappearance		5 ms < T < 15 ms
5 V consumption	typical		80 mA
	maximum		90 mA
Sensor supply consumption (1)	typical		15 mA + (15 x Nb) mA
	maximum		19 mA + (15 x Nb) mA
Dissipated power (1)			1 W + (0.35 x Nb) W
Temperature downgrading (see *p. 67*)			The characteristics at 60 °C are guaranteed for 60% of inputs set to 1

Legend	
(1)	Nb = number of channels at 1.

Characteristics of the 24 VDC negative logic TSX DEY 16A2 module

At a Glance

This section provides a description of the characteristics of the 24 VDC direct current negative logic TSX DEY 16A2 module.

Characterization

The following table shows the characteristics of the 24 VDC negative logic TSX DEY 16A2 module:

The TSX DEY 16A2 module			24 VDC negative logic inputs
Nominal input values		Voltage	24 VDC
		Current	16 mA (output)
Threshold input values (1)	at 1	Voltage	<= (Ual - 14 V)
		Current	>= 6.5 mA (output)
	at 0	Voltage	>= (Ual -5 V)
		Current	<= 2 mA (output)
	Sensor supply (including ripple)		19..30 V (possibly up to 34 V, limited to 1 hour every 24 hours)
Input impedance	at nominal U		1.6 kOhms
Response Time	typical		10 ms
	maximum		20 ms
IEC 1131-2 compliance			negative logic not taken into account by the standard
2 wire / 3 wire NPN proximity sensor compatibility (see *p. 43*)			IEC 947-5-2
Filtering			Built-in, 50 or 60 Hz network
Dielectric rigidity	Input / ground or Input / internal logic		1500 V actual, 50 / 60 Hz for 1 min
Resistance of insulation			> 10 MOhms (below 500 VDC)
Insulation			Remote inputs
Input type			Resistive
Paralleling of inputs			No
Sensor voltage check threshold	OK		> 18 V
	Fault		< 14 V
Check response time	on appearance		20 ms < T < 40 ms
	on disappearance		5 ms < T < 10 ms
5 V consumption	typical		80 mA
	maximum		90 mA
Sensor supply consumption (2)	typical		15 mA + (15 x Nb) mA
	maximum		19 mA + (15 x Nb) mA
Dissipated power (2)			1 W + (0.4 x Nb) W

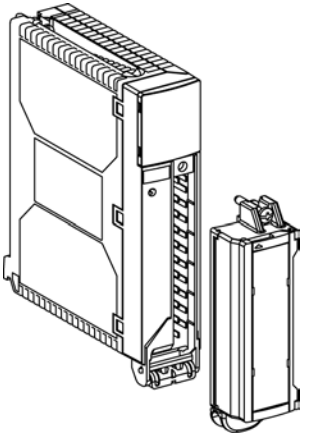
Temperature downgrading (see *p. 67*)	The characteristics at 60 °C are guaranteed for 60% of inputs set to 1
Legend	
(1)	Ual = Sensor supply
(2)	Nb = number of channels at 1.

Note: The TSX DEY 16A2 module input filtering time is between 10 and 20 ms.

Connecting the alternating voltage TSX DEY 16A2 module

At a Glance

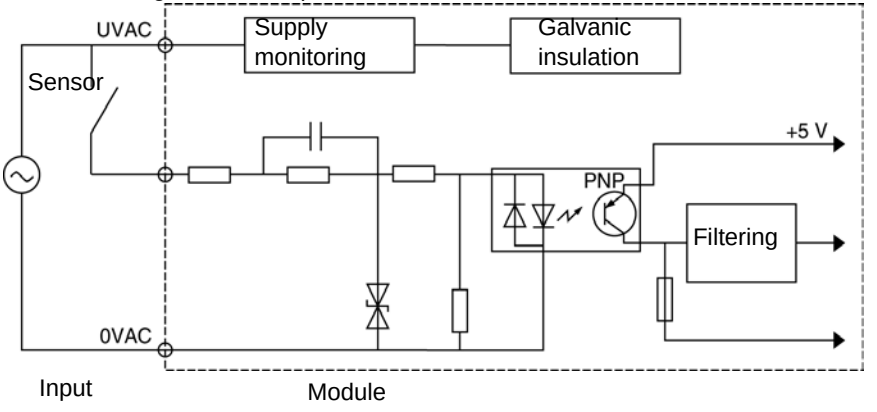
The alternating voltage TSX DEY 16A2 module comprises 16 x 24 VAC type 2 inputs.



This module is fitted with a removable connection terminal block for the connection of inputs.

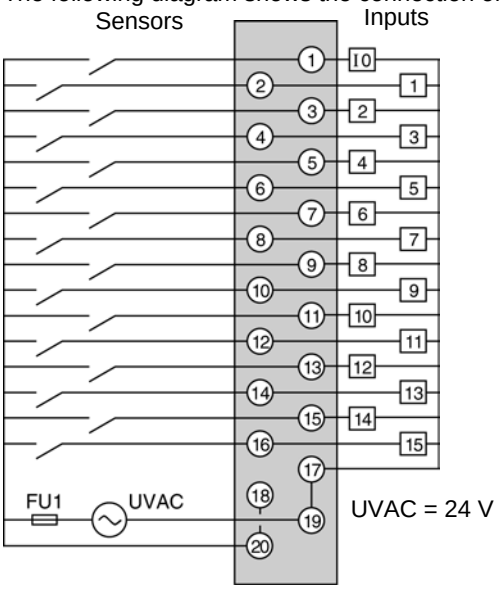
Circuit diagram

The circuit diagram for an input is shown below.



Module connection

The following diagram shows the connection of the module to the sensors.

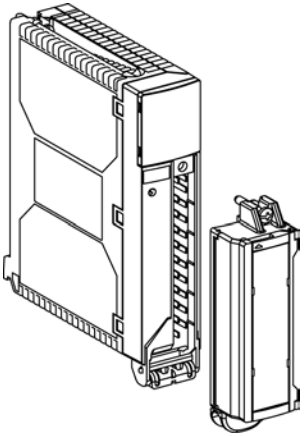


FU1 0.5 A quick-blow fuse

Connecting the 24 VDC negative logic TSX DEY 16A2 module

At a Glance

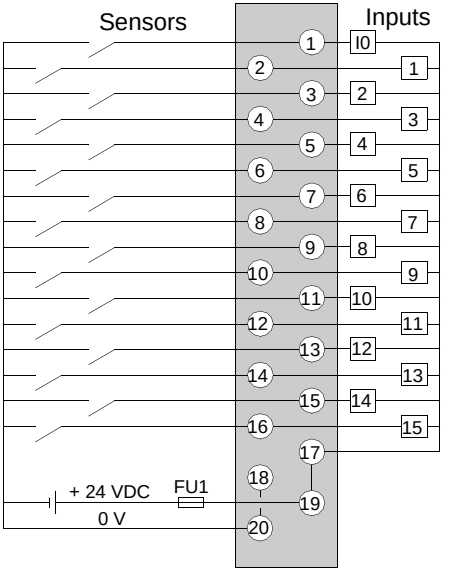
The TSX DEY 16A2 module can be use in direct current with its 16 inputs in negative logic.



This module is fitted with a removable connection terminal block for the connection of inputs.

Module connection

The following diagram shows the connection of the module to the sensors.



FU1 0.5 A quick-blow fuse

Note: When the 0 V sensor is grounded, it is not recommended to use the negative logic. If a wire should accidentally become disconnected and come into contact with the mechanical ground, this might set the input to 1, which could create an accidental command.

TSX DEY 16A3 Discrete input module

8

At a Glance

Overview

This chapter describes the TSX DEY 16A3 module, its characteristics and its connection to the different sensors.

What's in this Chapter?

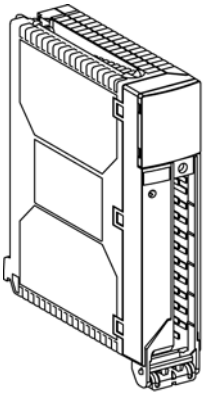
This chapter contains the following topics:

Topic	Page
Presentation of the TSX DEY 16A3 module	90
Characteristics of the TSX DEY 16A3 alternating voltage module	91
Connecting the TSX DEY 16A3 module	93

Presentation of the TSX DEY 16A3 module

General

The TSX DEY 16A3 module



The TSX DEY 16A3 module is a 48 VAC 16-channel terminal block Discrete input module.

Characteristics of the TSX DEY 16A3 alternating voltage module

At a Glance

This section provides a description of the general characteristics of the TSX DEY 16A3 module.

General Characteristics

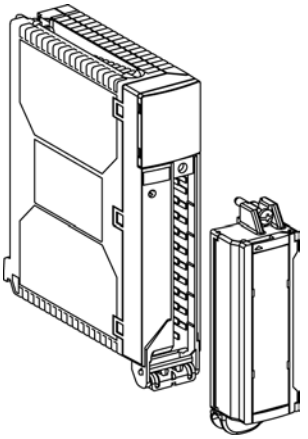
The following table shows the general characteristics of the TSX DEY 16A3 module:

The TSX DEY 16A3 module			48 VAC alternating voltage inputs
Nominal input values		Voltage	48 VAC
		Current	16 mA
		Frequency	50/60 Hz
Threshold input values	at 1	Voltage	>= 29 V
		Current	>= 6 mA (for U = 29 V)
	at 0	Voltage	<= 10 V
		Current	<= 4 mA
	Frequency		47..63 HZ
	Sensor supply		40.0.52 V
	Peak current at activation (at nominal U)		80 mA
Input impedance	at nominal U		3.2 kOhms
Response Time	Activation		10 ms
	Deactivation		20 ms
IEC 1131-2 compliance			type 2
2 wire proximity sensor compatibility (see *p. 43*)			IEC 947-5-2
Filtering			Built-in, 50 or 60 Hz network
Dielectric rigidity	Input / ground or Input / internal logic		1500 V actual, 50 / 60 Hz for 1 min
Resistance of insulation			> 10 MOhms (below 500 VDC)
Insulation			Remote inputs
Input type			Capacitive
Sensor voltage check threshold	OK		> 36 V
	Fault		< 24 V
Check response time	on appearance		20 ms < T < 50 ms
	on disappearance		5 ms < T < 15 ms
5 V consumption	typical		80 mA
	maximum		90 mA
Sensor supply consumption (1)	typical		16 mA + (16 x Nb) mA
	maximum		20 mA + (16 x Nb) mA
Dissipated power (1)			1 W + (0.35 x Nb) W
Temperature downgrading (see *p. 67*)			The characteristics at 60 °C are guaranteed for 60% of inputs set to 1
Legend			
(1)	Nb = number of channels at 1.		

Connecting the TSX DEY 16A3 module

At a Glance

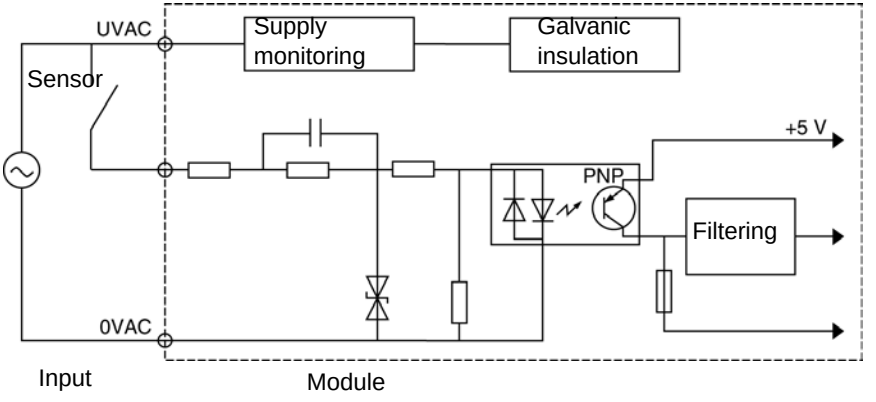
The TSX DEY 16A3 module comprises 16 x 48 VAC type 2 inputs.



This module is fitted with a removable connection terminal block for the connection of inputs.

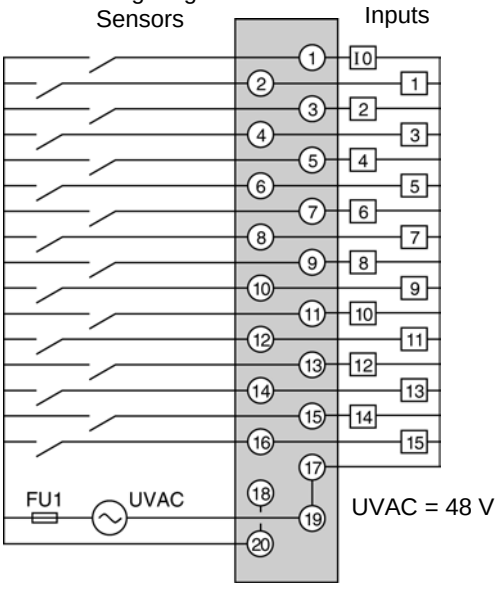
Circuit diagram

The circuit diagram for an input is shown below.



Module connection

The following diagram shows the connection of the module to the sensors.



FU1 0.5 A quick-blow fuse

TSX DEY 16A4 Discrete input module

9

At a Glance

Overview

This chapter describes the TSX DEY 16A4 module, its characteristics and its connection to the different sensors.

What's in this Chapter?

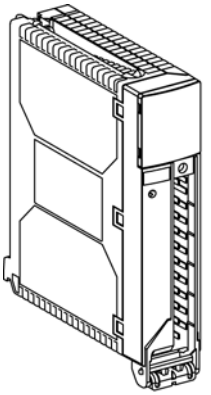
This chapter contains the following topics:

Topic	Page
Presentation of the TSX DEY 16A4 module	96
Characteristics of the TSX DEY 16A4 alternating voltage module	97
Connecting the TSX DEY 16A4 module	99

Presentation of the TSX DEY 16A4 module

General

The TSX DEY 16A4 module



The TSX DEY 16A4 module is a 100..120 VAC 16-channel terminal block Discrete input module.

Characteristics of the TSX DEY 16A4 alternating voltage module

At a Glance

This section provides a description of the general characteristics of the TSX DEY 16A4 module.

General Characteristics

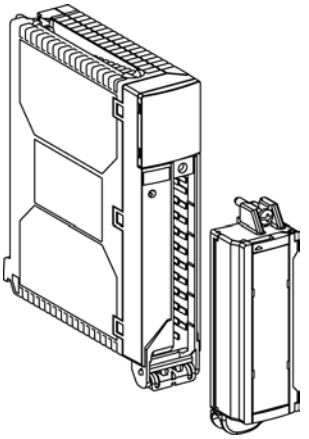
The following table shows the general characteristics of the TSX DEY 16A4 module:

The TSX DEY 16A4 module			100.0.120 VAC alternating voltage inputs
Nominal input values		Voltage	100.0.120 VAC
		Current	12 mA
		Frequency	50/60 Hz
Threshold input values	at 1	Voltage	>= 74 V
		Current	>= 6 mA (for U = 74 V)
	at 0	Voltage	<= 20 V
		Current	<= 4 mA
	Frequency		47..63 HZ
	Sensor supply		85.0.132 V
	Peak current at activation (at nominal U)		160 mA
Input impedance	at nominal U		9.2 kOhms
Response Time	Activation		10 ms
	Deactivation		20 ms
IEC 1131-2 compliance			type 2
2 wire proximity sensor compatibility (see *p. 43*)			IEC 947-5-2
Filtering			Built-in, 50 or 60 Hz network
Dielectric rigidity	Input / ground or Input / internal logic		1500 V actual, 50 / 60 Hz for 1 min
Resistance of insulation			> 10 MOhms (below 500 VDC)
Insulation			Remote inputs
Input type			Capacitive
Sensor voltage check threshold	OK		> 82 V
	Fault		< 40 V
Check response time	on appearance		20 ms < T < 50 ms
	on disappearance		5 ms < T < 15 ms
5 V consumption	typical		80 mA
	maximum		90 mA
Sensor supply consumption (1)	typical		15 mA + (15 x Nb) mA
	maximum		19 mA + (15 x Nb) mA
Dissipated power (1)			1 W + (0.35 x Nb) W
Temperature downgrading (see *p. 67*)			The characteristics at 60 °C are guaranteed for 60% of inputs set to 1
Legend			
(1)	Nb = number of channels at 1.		

Connecting the TSX DEY 16A4 module

At a Glance

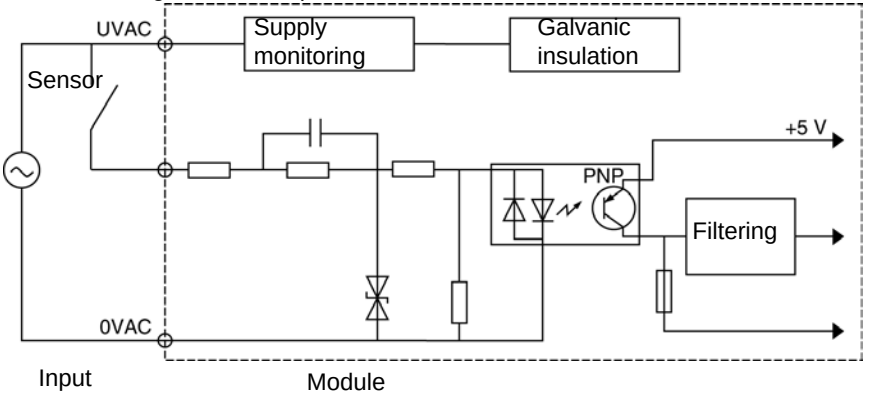
The TSX DEY 16A4 module comprises 16 x 120 VAC type 2 inputs.



This module is fitted with a removable connection terminal block for the connection of inputs.

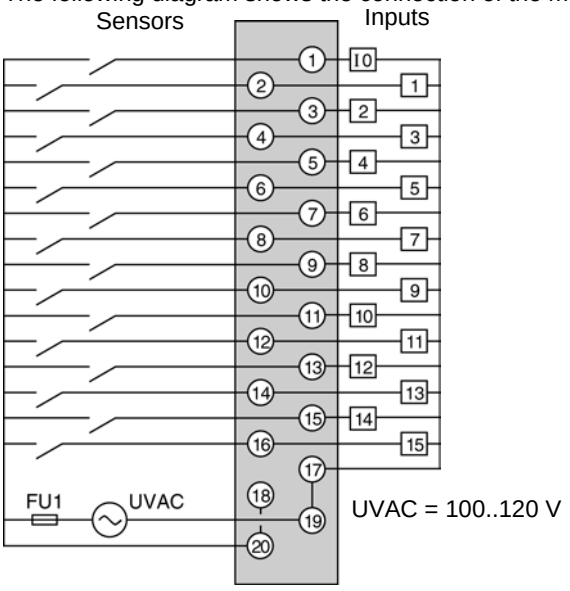
Circuit diagram

The circuit diagram for an input is shown below.



Module connection

The following diagram shows the connection of the module to the sensors.



FU1 0.5 A quick-blow fuse

TSX DEY 16A5 Discrete input module

10

At a Glance

Overview

This chapter describes the TSX DEY 16A5 module, its characteristics and its connection to the different sensors.

What's in this Chapter?

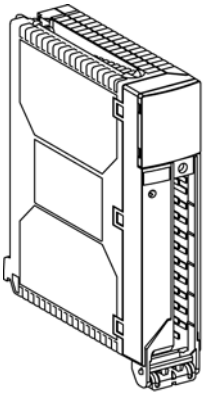
This chapter contains the following topics:

Topic	Page
Presentation of the TSX DEY 16A5 module	102
Characteristics of the TSX DEY 16A5 alternating voltage module	103
Connecting the TSX DEY 16A5 module	105

Presentation of the TSX DEY 16A5 module

General

The TSX DEY 16A5 module



The TSX DEY 16A5 module is a 200..240 VAC 16-channel terminal block Discrete input module.

Characteristics of the TSX DEY 16A5 alternating voltage module

At a Glance

This section provides a description of the general characteristics of the TSX DEY 16A5 module.

General Characteristics

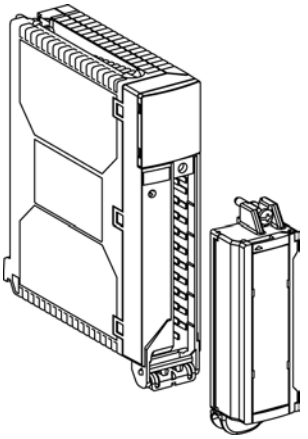
The following table shows the general characteristics of the TSX DEY 16A5 module:

The TSX DEY 16A5 module			200..240 VAC alternating voltage inputs
Nominal input values		Voltage	200..240 VAC
		Current	15 mA
		Frequency	50/60 Hz
Threshold input values	at 1	Voltage	>= 159 V
		Current	>= 6 mA (for U = 159 V)
	at 0	Voltage	<= 40 V
		Current	<= 4 mA
	Frequency		47..63 HZ
	Sensor supply		170.0.264 V
	Peak current at activation (at nominal U)		300 mA
Input impedance	at nominal U		20 kOhms
Response Time	Activation		10 ms
	Deactivation		20 ms
IEC 1131-2 compliance			type 1
2 wire proximity sensor compatibility (see *p. 43*)			IEC 947-5-2
Filtering			Built-in, 50 or 60 Hz network
Dielectric rigidity	Input / ground or Input / internal logic		2000 V actual, 50 / 60 Hz for 1 min
Resistance of insulation			> 10 MOhms (below 500 VDC)
Insulation			Remote inputs
Input type			Capacitive
Sensor voltage check threshold	OK		> 164 V
	Fault		< 80 V
Check response time	on appearance		20 ms < T < 50 ms
	on disappearance		5 ms < T < 15 ms
5 V consumption	typical		80 mA
	maximum		90 mA
Sensor supply consumption (1)	typical		12 mA + (12 x Nb) mA
	maximum		16 mA + (12 x Nb) mA
Dissipated power (1)			1 W + (0.4 x Nb) W
Temperature downgrading (see *p. 67*)			The characteristics at 60 °C are guaranteed for 60% of inputs set to 1
Legend			
(1)	Nb = number of channels at 1.		

Connecting the TSX DEY 16A5 module

At a Glance

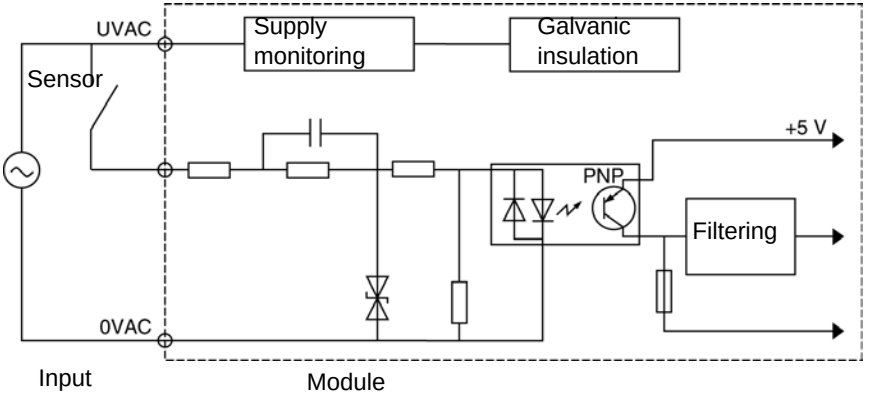
The TSX DEY 16A5 module comprises 16 x 200..240 VAC type 1 inputs.



This module is fitted with a removable connection terminal block for the connection of inputs.

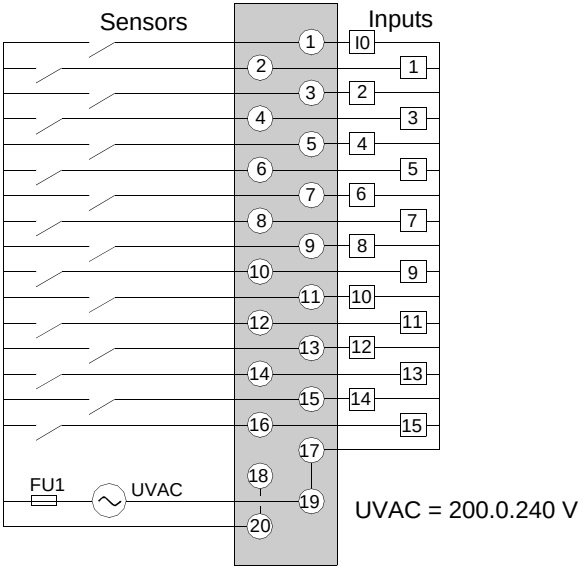
Circuit diagram

The circuit diagram for an input is shown below.



Module connection

The following diagram shows the connection of the module to the sensors.



FU1 0.5 A quick-blow fuse

The TSX DEY 16FK Discrete input module

11

At a Glance

Overview

This chapter describes the TSX DEY 16FK module, its characteristics and its connection to the different sensors.

What's in this Chapter?

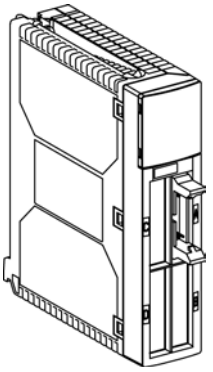
This chapter contains the following topics:

Topic	Page
Presentation of the TSX DEY 16FK module	108
Specific functions of Discrete modules: programmable input filtering	109
Specific functions of Discrete modules: input latching	110
Specific functions of Discrete modules: input event management	112
Characteristics of the TSX DEY 16FK positive logic module	113
Connecting the TSX DEY 16FK module	116

Presentation of the TSX DEY 16FK module

General

The TSX DEY 16FK module



The TSX DEY 16FK module is a 24 VDC 16 x fast channel terminal block Discrete input module with positive logic.

This module's inputs have the following specific functions:

- programmable filtering: inputs are equipped with a filtering system which is configurable for each channel;
- latching: allows particularly short pulses with a duration lower than the PLC cycle time to be taken into account;
- event inputs: allows events to be taken into account and processed immediately.

Specific functions of Discrete modules: programmable input filtering

At a Glance

Modules TSX DEY 16FK, TSX DMY 28FK and TSX DMY 28RFK are equipped with a filtering system which is configurable per channel and allows the input filtering time to be modified.

Description

The inputs of modules TSX DEY 16FK, TSX DMY 28FK and TSX DMY 28RFK are filtered by:

- a fixed analog filter ensuring a maximum immunity of 0.1 ms for line interference filtering;
- a digital filter which can be configured in steps of 0.5 ms. The terminal can be used to adjust this filtering in configuration mode (See Manual Premium PLC applications volume 1).

Note: For bounces not to be taken into account upon closure of the mechanical contacts, it is recommended to use a filtering time > 3 ms.

Note: In order to be IEC 1131-2 compliant, the filtering time must be set to a value >= 3.5 ms.

Specific functions of Discrete modules: input latching

At a Glance

Modules TSX DEY 16FK and TSX DMY 28FK are equipped with the input latching function (See Manual Premium PLC applications volume 1).

The input latching function allows particularly short pulses with a duration lower than the PLC cycle time to be taken into account.

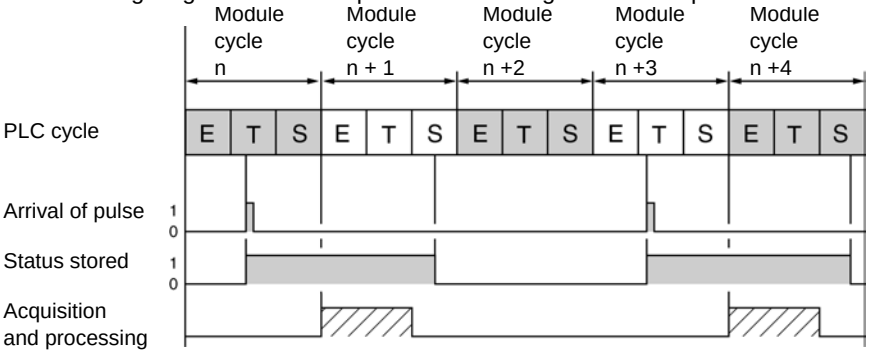
This function takes the pulse into account, in order to process it in the following master (**MAST**) or fast (**FAST**) task cycle without interrupting the PLC cycle.

The pulse is taken into account when the input's status is loaded, which can be either:

- a switch from 0 to 1  ;
- a switch from 1 to 0  .

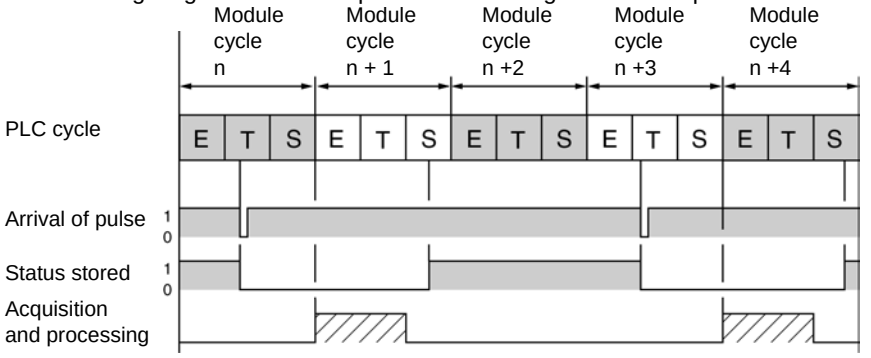
Illustration

The following diagram shows the process of latching a state on a pulse from 0 to 1.



Illustration

The following diagram shows the process of latching a state on a pulse from 1 to 0.



Description

The following table gives a description of the elements shown in the above diagrams:

Part Number	Description
E	Input acquisition.
T	Processing of program.
S	Outputs updated.

Note: The time separating the arrival of two pulses at the same input must be greater than or equal to the PLC cycle time.

Note: The minimum duration of a pulse must be greater than the chosen filtering time.

Specific functions of Discrete modules: input event management

At a Glance

Modules TSX DEY 16FK and TSX DMY 28FK allow up to 16 event inputs (See Manual Premium PLC applications volume 1) to be configured. These inputs allow events (**Evt**) to be taken into account, and ensure that they are immediately processed by the processor (uninterrupted processing).

Description

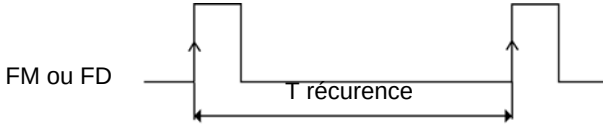
Event processing priority is given to the number 0. The event 0 is solely associated to channel 0.

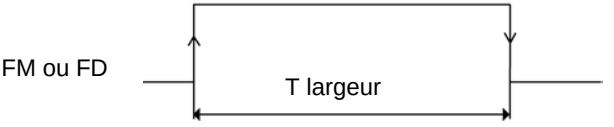
Event processing can be triggered:

- on a rising edge (from 0 to 1);
- on a falling edge (from 1 to 0) of the associated input;

When two edges are detected simultaneously on a module, the events are processed according to channel number, in ascending order.

The edge recurrence time on each input, or the pulse width on an input programmed in FM + FD, must correspond to those shown in the following diagram:





given that:

T recurrence or T width > 0.25 ms + (0.25 x number of module Evts);

Max. Evt frequency = 1 kHz / number of module Evts;

Max. number of Evts in burst = 100 Evts per 100 ms.

Characteristics of the TSX DEY 16FK positive logic module

At a Glance

This section provides a description of the general characteristics of the TSX DEY 16FK module.

General Characteristics

The following table shows the general characteristics of the TSX DEY 16FK module:

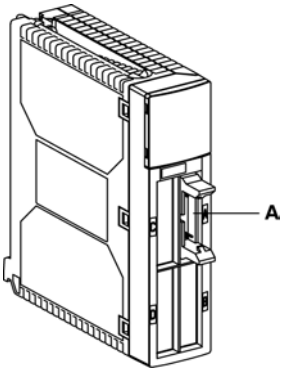
The TSX DEY 16FK module			24 VDC positive logic fast inputs
Nominal input values		Voltage	24 VDC
		Current	3.5 mA
Threshold input values	at 1	Voltage	>= 11 V
		Current	>= 3 mA
	at 0	Voltage	<= 5 V
		Current	<= 1.5 mA
	Sensor supply (including ripple)		19..30 V (possibly up to 34 V, limited to 1 hour every 24 hours)
Input impedance	at nominal U		6.3 kOhms
Response Time	by default		4 ms
	configurable filtering		0.1..7.5 ms (in 0.5 ms steps)
	programmable filtering		Yes
	latching		Yes
	Event		Yes
IEC 1131-2 compliance			type 1
2 wire / 3 wire PNP proximity sensor compatibility (see *p. 43*)			IEC 947-5-2
Dielectric rigidity	Input / ground or Input / internal logic		1500 V actual, 50 / 60 Hz for 1 min
Resistance of insulation			> 10 MOhms (below 500 VDC)
Insulation			Remote inputs
Input type			current sink
Paralleling of inputs (1)			Yes
Sensor voltage check threshold	OK		> 18 V
	Fault		< 14 V
Check response time	on appearance		8 ms < T < 30 ms
	on disappearance		1 ms < T < 3 ms
5 V consumption	typical		250 mA
	maximum		300 mA
Sensor supply consumption (2)	typical		20 mA + (3.5 x Nb) mA
	maximum		30 mA + (3.5 x Nb) mA
Dissipated power (2)			1.2 W + (0.1 x Nb) W
Temperature downgrading (see *p. 67*)			The characteristics at 60 °C are guaranteed for 60% of inputs set to 1

Legend	
(1)	This characteristic is used to connect several inputs to the same module in parallel, or to different modules for input redundancy.
(2)	Nb = number of channels at 1.

Connecting the TSX DEY 16FK module

At a Glance

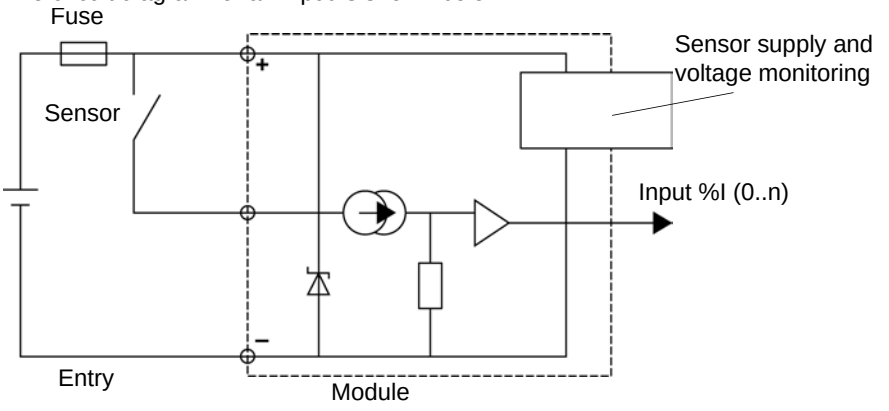
The TSX DEY 16FK module comprises 16 x 24 VDC type 1 fast input channels.



This module is equipped with a male HE10 connector (A) linked to the connection of inputs 0 to 15.

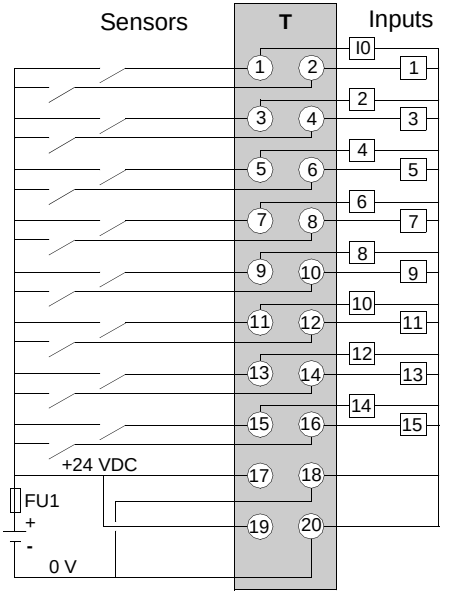
Principle Diagram

The circuit diagram for an input is shown below.



Module connection

The following diagram shows the connection of the module to the sensors.



FU1 0.5 A quick-blow fuse

The TSX DEY 32D2K Discrete input module

12

At a Glance

Overview

This chapter describes the TSX DEY 32D2K module, its characteristics and its connection to the different sensors.

What's in this Chapter?

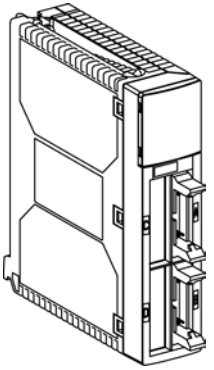
This chapter contains the following topics:

Topic	Page
Presentation of the TSX DEY 32D2K module	120
Characteristics of the TSX DEY 32D2K positive logic module	121
Connecting the TSX DEY 32D2K module	123

Presentation of the TSX DEY 32D2K module

General

The TSX DEY 32D2K module



The TSX DEY 32D2K module is a 24 VDC 32-channel connector Discrete input module with positive logic.

Characteristics of the TSX DEY 32D2K positive logic module

At a Glance

This section provides a description of the general characteristics of the TSX DEY 32D2K module.

General Characteristics

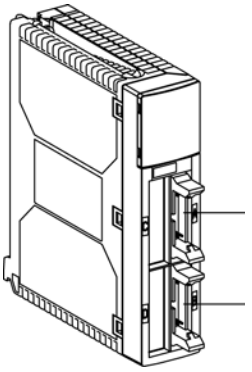
The following table shows the general characteristics of the TSX DEY 32D2K module:

The TSX DEY 32D2K module			24 VDC positive logic inputs
Nominal input values		Voltage	24 VDC
		Current	3.5 mA
Threshold input values	at 1	Voltage	>= 11 V
		Current	>= 3 mA
	at 0	Voltage	<= 5 V
		Current	<= 1.5 mA
	Sensor supply (including ripple)		19..30 V (possibly up to 34 V, limited to 1 hour every 24 hours)
Input impedance	at nominal U		6.3 kOhms
Response Time			4 ms
IEC 1131-2 compliance			type 1
2 wire / 3 wire PNP proximity sensor compatibility (see *p. 43*)			IEC 947-5-2
Dielectric rigidity	Input / ground or Input / internal logic		1500 V actual, 50 / 60 Hz for 1 min
Resistance of insulation			> 10 MOhms (below 500 VDC)
Insulation			Remote inputs
Input type			current sink
Paralleling of inputs			No
Sensor voltage check threshold	OK		> 18 V
	Fault		< 14 V
Check response time	on appearance		8 ms < T < 30 ms
	on disappearance		1 ms < T < 3 ms
5 V consumption	typical		135 mA
	maximum		155 mA
Sensor supply consumption (1)	typical		30 mA + (3.5 x Nb) mA
	maximum		40 mA + (3.5 x Nb) mA
Dissipated power (1)			1 W + (0.1 x Nb) W
Temperature downgrading (see *p. 67*)			The characteristics at 60 °C are guaranteed for 60% of inputs set to 1
Legend			
(1)	Nb = number of channels at 1.		

Connecting the TSX DEY 32D2K module

At a Glance

The TSX DEY 32D2K module comprises 32 x 24 VDC type 1 inputs.

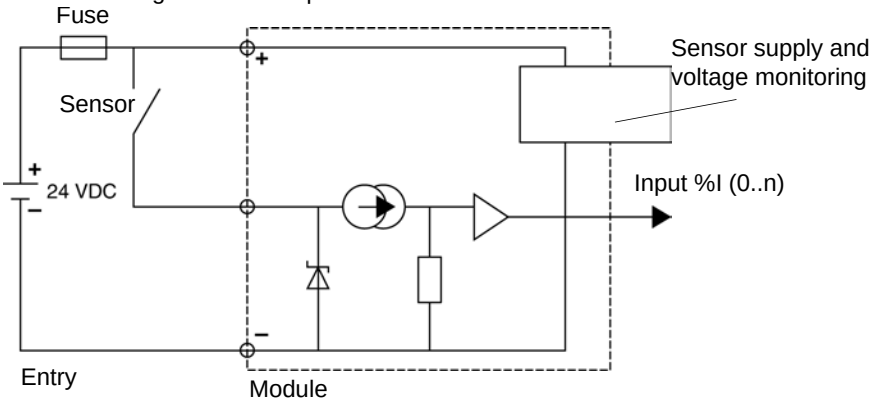


This module is fitted with 2 male HE10 connectors:

- connector A for inputs 0 to 15;
- connector B for inputs 16 to 31.

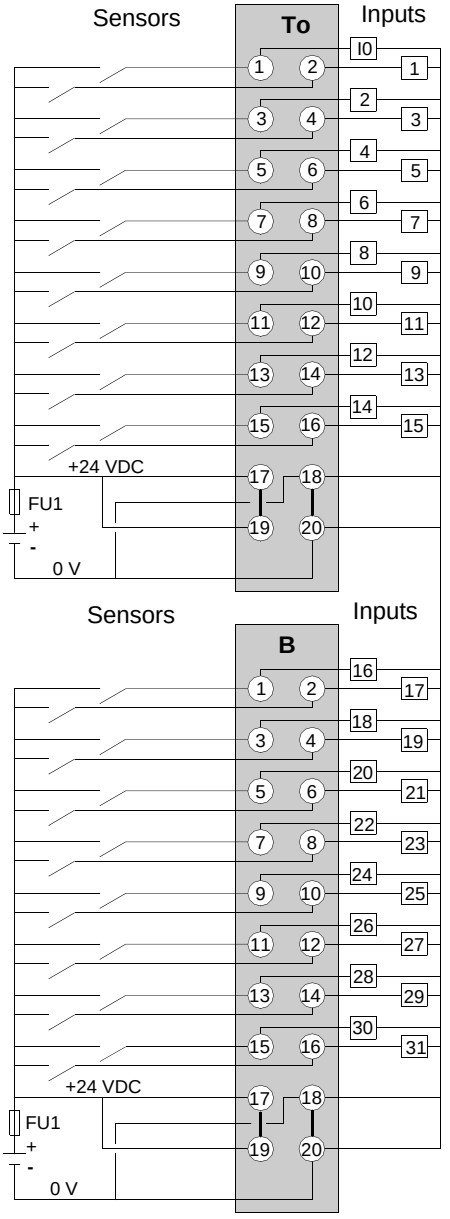
Input circuit diagram

The circuit diagram for the inputs is shown below.



Module connection

The following diagram shows the connection of the module to the sensors.



FU1 0.5 A quick-blow fuse

TSX DEY 32D3K Discrete input module

13

At a Glance

Overview

This chapter describes the TSX DEY 32D3K module, its characteristics and its connection to the different sensors.

What's in this Chapter?

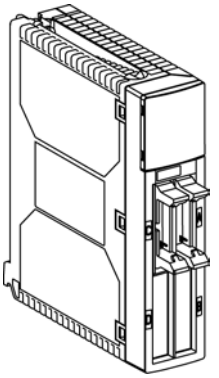
This chapter contains the following topics:

Topic	Page
Presentation of the TSX DEY 32D3K module	126
Characteristics of the TSX DEY 32D3K positive logic module	127
Connecting the TSX DEY 32D3K module	129

Presentation of the TSX DEY 32D3K module

General

The TSX DEY 32D3K module



The TSX DEY 32D3K module is a 48 VDC 32-channel connector Discrete input module with positive logic.

Characteristics of the TSX DEY 32D3K positive logic module

At a Glance

This section provides a description of the general characteristics of the TSX DEY 32D3K module.

General Characteristics

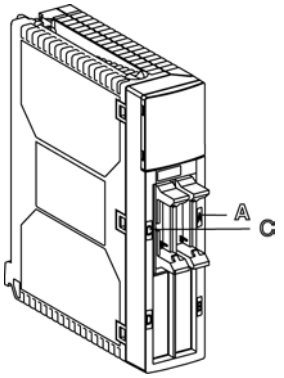
The following table shows the general characteristics of the TSX DEY 32D3K module:

The TSX DEY 32D3K module			48 VDC positive logic inputs
Nominal input values		Voltage	48 VDC
		Current	7 mA
Threshold input values	at 1	Voltage	>= 30 V
		Current	>= 6.5 mA (for U = 30 V)
	at 0	Voltage	<= 10 V
		Current	<= 2 mA
	Sensor supply (including ripple)		38.0.60 V
Input impedance	at nominal U		6.3 kOhms
Response Time			4 ms
IEC 1131-2 compliance			type 2
2 wire / 3 wire PNP proximity sensor compatibility (see *p. 43*)			IEC 947-5-2
Dielectric rigidity	Input / ground or Input / internal logic		1500 V actual, 50 / 60 Hz for 1 min
Resistance of insulation			> 10 MOhms (below 500 VDC)
Insulation			Remote inputs
Input type			current sink
Paralleling of inputs			Yes
Sensor voltage check threshold	OK		> 36 V
	Fault		< 24 V
Check response time	on appearance		8 ms < T < 30 ms
	on disappearance		1 ms < T < 3 ms
5 V consumption	typical		300 mA
	maximum		350 mA
Sensor supply consumption (1)	typical		50 mA + (7 x Nb) mA
	maximum		66 mA + (7 x Nb) mA
Dissipated power (1)			2.5 W + (0.34 x Nb) W
Temperature downgrading (see *p. 67*)			The characteristics at 60 °C are guaranteed for 60% of inputs set to 1
Legend			
(1)	Nb = number of channels at 1.		

Connecting the TSX DEY 32D3K module

At a Glance

The TSX DEY 32D3K module comprises 32 x 48 VDC type 2 inputs.

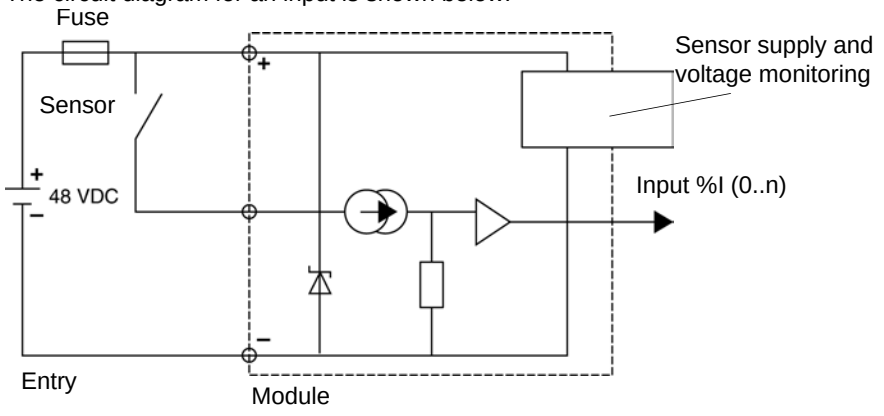


This module is fitted with 2 male HE10 connectors:

- connector A for inputs 0 to 15;
- connector C for inputs 16 to 31.

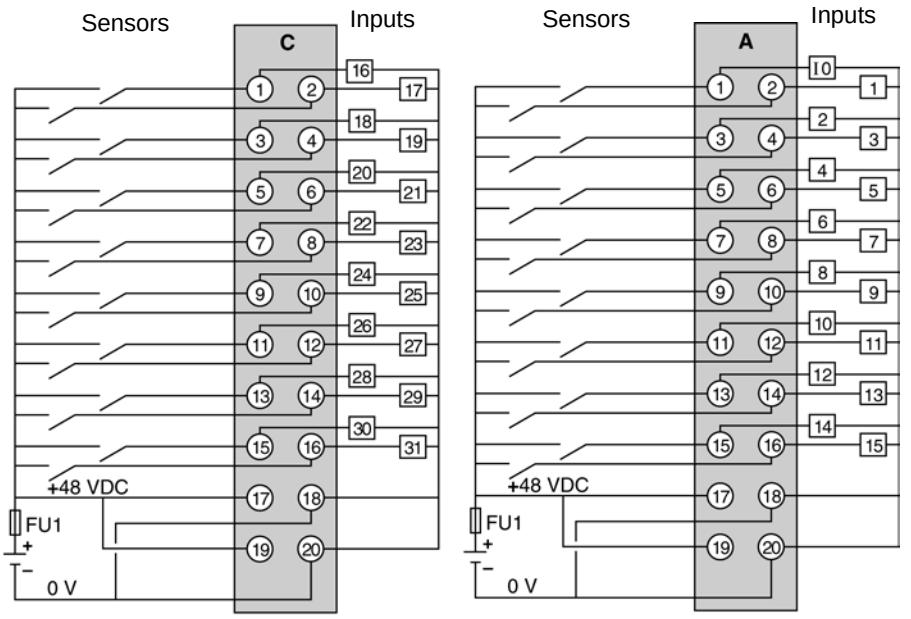
Principle Diagram

The circuit diagram for an input is shown below.



Module connection

The following diagram shows the connection of the module to the sensors.



FU1 0.5 A quick-blow fuse

TSX DEY 64D2K Discrete input module

14

At a Glance

Overview

This chapter describes the TSX DEY 64D2K module, its characteristics and its connection to the different sensors.

What's in this Chapter?

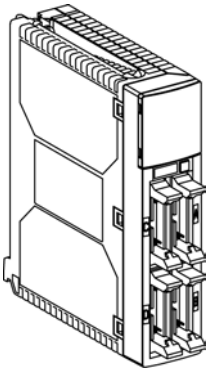
This chapter contains the following topics:

Topic	Page
Presentation of the TSX DEY 64D2K module	132
Characteristics of the TSX DEY 64D2K positive logic module	133
Connecting the TSX DEY 64D2K module	135

Presentation of the TSX DEY 64D2K module

General

The TSX DEY 64D2K module



The TSX DEY 64D2K module is a 24 VDC 64-channel connector Discrete input module with positive logic.

Characteristics of the TSX DEY 64D2K positive logic module

At a Glance

This section provides a description of the general characteristics of the TSX DEY 64D2K module.

General Characteristics

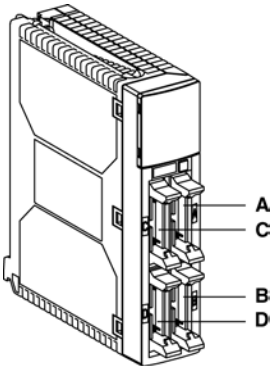
The following table shows the general characteristics of the TSX DEY 64D2K module:

The TSX DEY 64D2K module			24 VDC positive logic inputs
Nominal input values		Voltage	24 VDC
		Current	3.5 mA
Threshold input values	at 1	Voltage	>= 11 V
		Current	>= 3 mA
	at 0	Voltage	<= 5 V
		Current	<= 1.5 mA
	Sensor supply (including ripple)		19..30 V (possibly up to 34 V, limited to 1 hour every 24 hours)
Input impedance	at nominal U		6.3 kOhms
Response Time			4 ms
IEC 1131-2 compliance			type 1
2 wire / 3 wire PNP proximity sensor compatibility (see *p. 43*)			IEC 947-5-2
Dielectric rigidity	Input / ground or Input / internal logic		1500 V actual, 50 / 60 Hz for 1 min
Resistance of insulation			> 10 MOhms (below 500 VDC)
Insulation			Remote inputs
Input type			current sink
Paralleling of inputs			No
Sensor voltage check threshold	OK		> 18 V
	Fault		< 14 V
Check response time	on appearance		8 ms < T < 30 ms
	on disappearance		1 ms < T < 3 ms
5 V consumption	typical		135 mA
	maximum		175 mA
Sensor supply consumption (1)	typical		60 mA + (3.5 x Nb) mA
	maximum		80 mA + (3.5 x Nb) mA
Dissipated power (1)			1.5 W + (0.1 x Nb) W
Temperature downgrading (see *p. 67*)			The characteristics at 60 °C are guaranteed for 60% of inputs set to 1
Legend			
(1)	Nb = number of channels at 1.		

Connecting the TSX DEY 64D2K module

At a Glance

The TSX DEY 64D2K module comprises 64 x 24 VDC type 1 inputs.

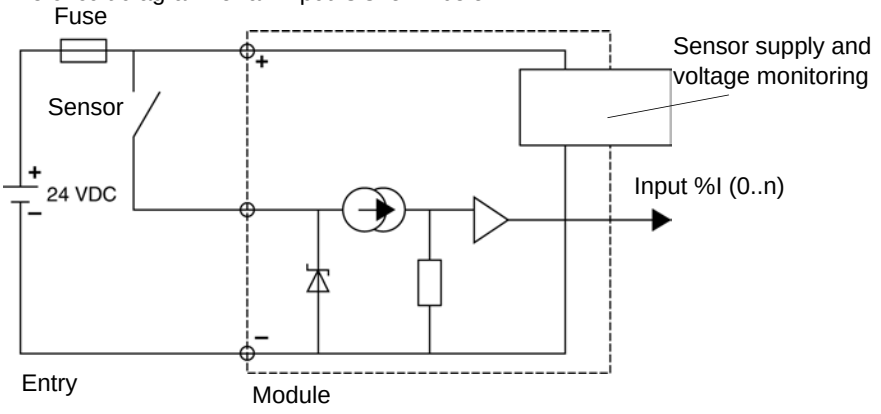


This module is fitted with 4 male HE10 connectors:

- connector A for inputs 0 to 15;
- connector B for inputs 16 to 31;
- connector C for inputs 32 to 47;
- connector D for inputs 48 to 63.

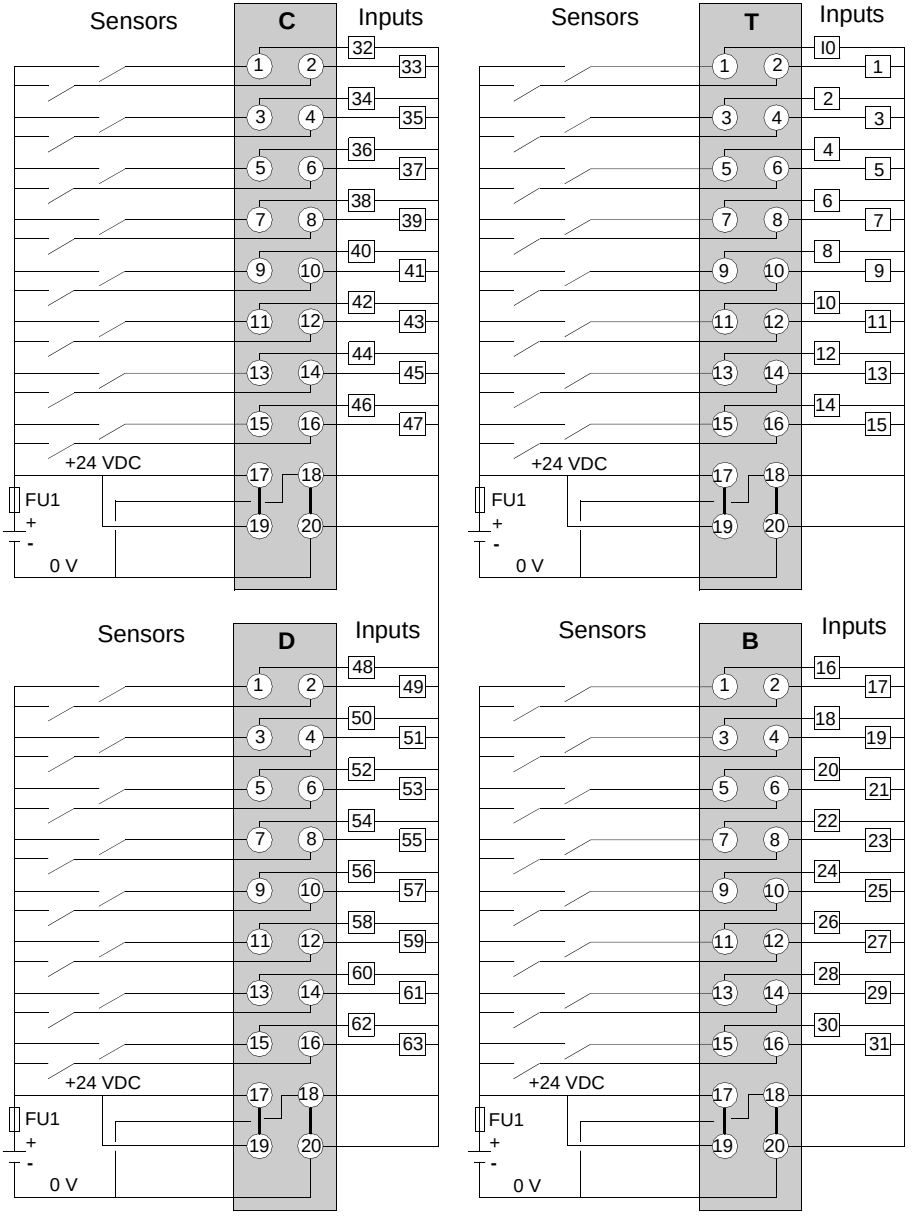
Principle Diagram

The circuit diagram for an input is shown below.



Module connection

The following diagram shows the connection of the module to the sensors.



FU1 0.5 A quick-blow fuse

TSX DSY 08T2 output module

15

At a Glance

Overview

This chapter describes the TSX DSY 08T2 module, its characteristics and its connection to the different pre-actuators.

What's in this Chapter?

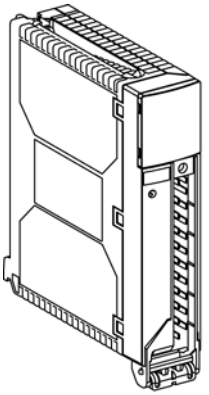
This chapter contains the following topics:

Topic	Page
Presentation of the TSX DSY 08T2 module	138
Characteristics of the TSX DSY 08T2 positive logic module	139
Connecting the TSX DSY 08T2 module	142

Presentation of the TSX DSY 08T2 module

General

The TSX DSY 08T2 module



The TSX DSY 08T2 module is an 8-channel terminal block Discrete transistor output module for direct current (positive logic).

Characteristics of the TSX DSY 08T2 positive logic module

At a Glance

This section provides a description of the general characteristics of the TSX DEY 08T2 module.

General Characteristics

The following table shows the general characteristics of the TSX DSY 08T2 module:

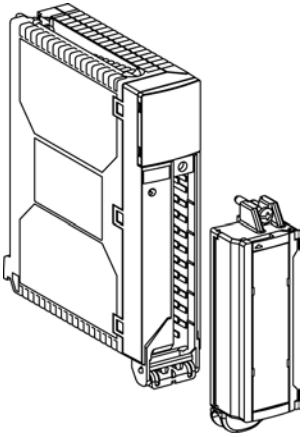
The TSX DSY 08T2 module		24 VDC positive logic transistor outputs
Nominal values	Voltage	24 VDC
	Current	0.5 A
Threshold values (1)	Voltage (including ripple)	19..30 V (34 V possible for 1 hour every 24 hours)
	Current/channel	0.625 A
	Current/module	4 A
Power of tungsten filament lamp	Maximum	6 W
Wetting Current	at 0	<0.5 mA
Voltage drop	at 1	< 1.2 V
Load impedance	minimum	48 Ohms
Response time (2)		1.2 ms
Frequency of switching to inductive load		0.5 / LI^2 Hz
Paralleling of outputs		Yes (maximum of 2)
Compatibility with IEC 1131-2 DC inputs		Yes (type 1 and type 2)
Built-in protection	against over-voltage	Yes, by Transil diode
	against inversions	Yes, by inverted diode (3)
	against short-circuits and overloads	Yes, by current limiter and electric circuit-breaker 1.5 In < Id < 2 In
Pre-actuator voltage check threshold	OK	> 18 V
	Fault	< 14 V
Check response time	on appearance	T < 4 ms
	on disappearance	T < 30 ms
5 V consumption	typical	55 mA
	maximum	65 mA
24 V pre-actuator consumption (4)	typical	30 mA
	maximum	40 mA
Dissipated power (5)		1 W + (0.75 x Nb) W
Dielectric rigidity	Output / ground or Output / internal logic	1500 V actual, 50 / 60 Hz for 1 min
Resistance of insulation		> 10 MOhms (below 500 VDC)
Insulation		Remote outputs
Temperature downgrading (see *p. 67*)		The characteristics at 60 °C are guaranteed for 60% of max. module current

Legend	
(1)	For U <= 30 V or 34 V.
(2)	All the outputs are equipped with fast electromagnet demagnetization circuits. Electromagnet discharge time < L/R
(3)	Fit a fuse to the +24 V pre-actuator supply.
(4)	Excluding load current.
(5)	Nb = number of outputs at 1.

Connecting the TSX DSY 08T2 module

At a Glance

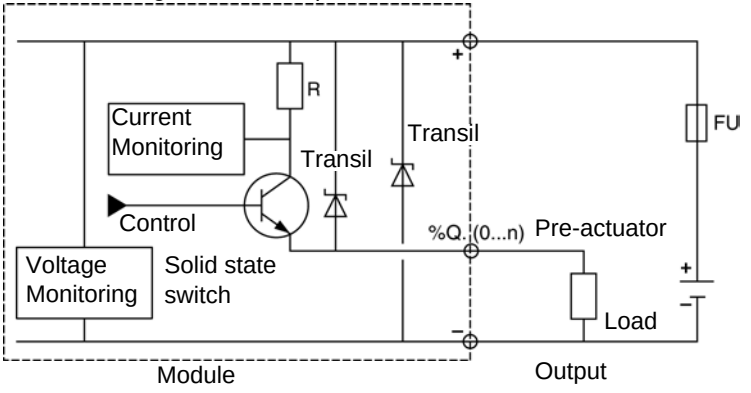
The TSX DSY 08T2 module comprises 8 x 24 VDC protected transistor output channels.



This module is equipped with a removable 20 post screwed connection terminal block, allowing outputs to be connected:

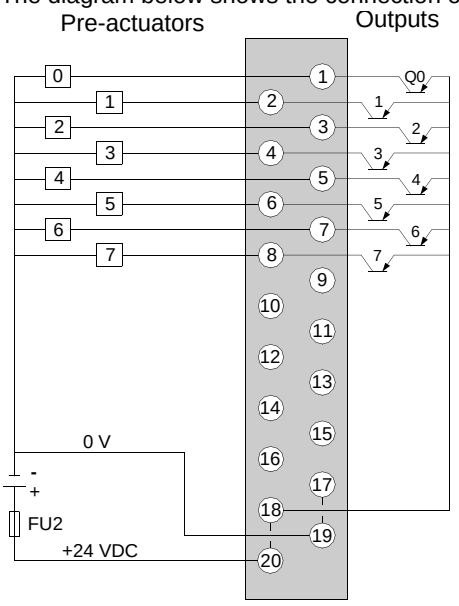
Circuit Diagram

The circuit diagram for an output is shown below.



Module connection

The diagram below shows the connection of the module to the pre-actuators.



FU2 6.3 A quick-blow fuse

TSX DSY 08T22 Discrete output module

16

At a Glance

Overview

This chapter describes the TSX DSY 08T22 module, its characteristics and its connection to the different pre-actuators.

What's in this Chapter?

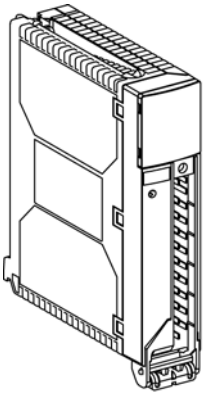
This chapter contains the following topics:

Topic	Page
Presentation of the TSX DSY 08T22 module	146
Characteristics of the TSX DSY 08T22 positive logic module	147
Connecting the TSX DSY 08T22 module	150

Presentation of the TSX DSY 08T22 module

General

The TSX DSY 08T22 module



The TSX DSY 08T22 module is an 8-channel terminal block Discrete transistor output module for direct current (positive logic).

Characteristics of the TSX DSY 08T22 positive logic module

At a Glance

This section provides a description of the general characteristics of the TSX DSY 08T22 module.

General Characteristics

The following table shows the general characteristics of the TSX DSY 08T22 module:

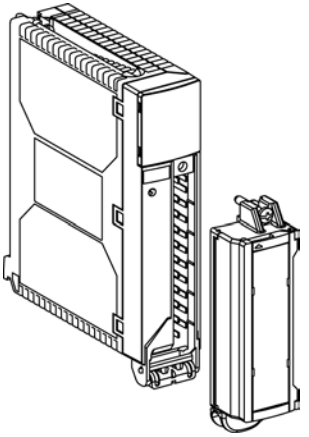
The TSX DSY 08T22 module		24 VDC positive logic transistor outputs
Nominal values	Voltage	24 VDC
	Current	2 A
Threshold values (1)	Voltage (including ripple)	19..30 V (34 V possible for 1 hour every 24 hours)
	Current/channel	2.5 A
	Current/module	14 A
Power of tungsten filament lamp	Maximum	10 W
Wetting Current	at 0	<1 mA
Voltage drop	at 1	< 0.5 V
Load impedance	minimum	12 Ohms
Response time (2)		0.2 ms
Frequency of switching to inductive load		0.5 / LI^2 Hz
Paralleling of outputs		Yes (maximum of 2)
Compatibility with IEC 1131-2 DC inputs		Yes (type 1 and type 2)
Built-in protection	against over-voltage	Yes, by Transil diode
	against inversions	Yes, by inverted diode (3)
	against short-circuits and overloads	Yes, by current limiter and electric circuit-breaker 1.5 In < Id < 2 In
Pre-actuator voltage check threshold	OK	> 18 V
	Fault	< 14 V
Check response time	on appearance	T < 4 ms
	on disappearance	T < 30 ms
5 V consumption	typical	55 mA
	maximum	65 mA
24 V pre-actuator consumption (4)	typical	30 mA
	maximum	50 mA
Dissipated power (5)		1.3 W + (0.2 x Nb) W
Dielectric rigidity	Output / ground or Output / internal logic	1500 V actual, 50 / 60 Hz for 1 min
Resistance of insulation		> 10 MOhms (below 500 VDC)
Insulation		Remote outputs
Temperature downgrading (see *p. 67*)		The characteristics at 60 °C are guaranteed for 60% of max. module current

Legend	
(1)	For U <= 30 V or 34 V.
(2)	All the outputs are equipped with fast electromagnet demagnetization circuits. Electromagnet discharge time < L/R
(3)	Fit a fuse to the +24 V pre-actuator supply.
(4)	Excluding load current.
(5)	Nb = number of outputs at 1.

Connecting the TSX DSY 08T22 module

At a Glance

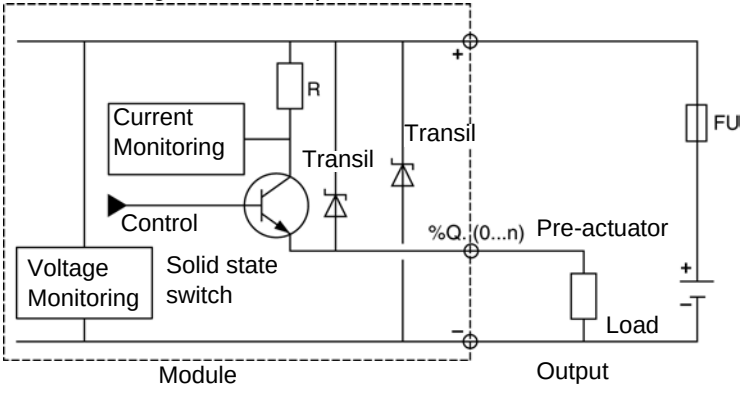
The TSX DSY 08T22 module comprises 8 x 24 VDC protected transistor output channels.



This module is equipped with a removable 20 post screwed connection terminal block, allowing outputs to be connected:

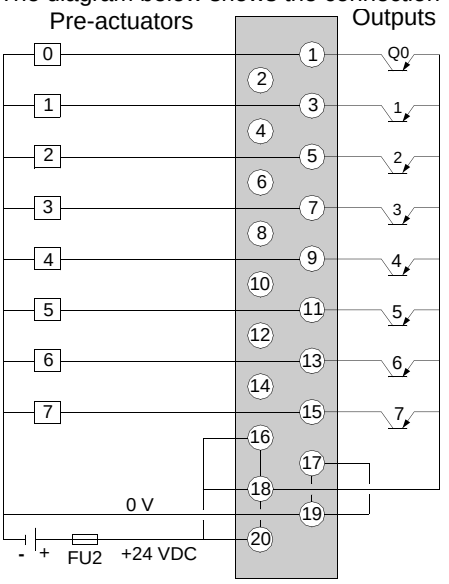
Circuit Diagram

The circuit diagram for an output is shown below.



Module connection

The diagram below shows the connection of the module to the pre-actuators.



FU2 16 A quick-blow fuse

TSX DSY 08T31 Discrete output module

17

At a Glance

Overview

This chapter describes the TSX DSY 08T31 module, its characteristics and its connection to the different pre-actuators.

What's in this Chapter?

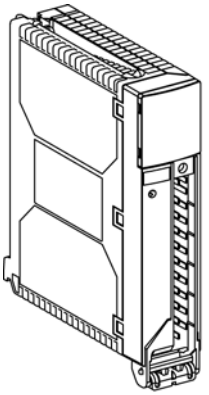
This chapter contains the following topics:

Topic	Page
Presentation of the TSX DSY 08T31 module	154
Characteristics of the TSX DSY 08T31 positive logic module	155
Connecting the TSX DSY 08T31 module	158

Presentation of the TSX DSY 08T31 module

General

The TSX DSY 08T31 module



The TSX DSY 08T31 module is an 8-channel terminal block Discrete transistor output module for direct current (positive logic).

Characteristics of the TSX DSY 08T31 positive logic module

At a Glance

This section provides a description of the general characteristics of the TSX DEY 08T31 module.

General Characteristics

The following table shows the general characteristics of the TSX DSY 08T31 module:

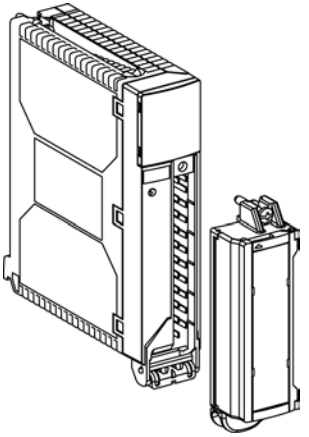
The TSX DSY 08T31 module		48 VDC positive logic transistor outputs
Nominal values	Voltage	48 VDC
	Current	1 A
Threshold values (1)	Voltage (including ripple)	38.0.60 V
	Current/channel	1.25 A
	Current/module	7 A
Power of tungsten filament lamp	Maximum	10 W
Wetting Current	at 0	<1 mA
Voltage drop	at 1	< 1 V
Load impedance	minimum	48 Ohms
Response time (2)		0.2 ms
Frequency of switching to inductive load		0.5 / LI^2 Hz
Paralleling of outputs		Yes (maximum of 2)
Compatibility with IEC 1131-2 DC inputs		Yes (type 1 and type 2)
Built-in protection	against over-voltage	Yes, by Transil diode
	against inversions	Yes, by inverted diode (3)
	against short-circuits and overloads	Yes, by current limiter and electric circuit-breaker 1.5 In < Id < 2 In
Pre-actuator voltage check threshold	OK	> 36 V
	Fault	< 24 V
Check response time	on appearance	T < 4 ms
	on disappearance	T < 30 ms
5 V consumption	typical	55 mA
	maximum	65 mA
24 V pre-actuator consumption (4)	typical	30 mA
	maximum	50 mA
Dissipated power (5)		2.2 W + (0.55 x Nb) W
Dielectric rigidity	Output / ground or Output / internal logic	1500 V actual, 50 / 60 Hz for 1 min
Resistance of insulation		> 10 MOhms (below 500 VDC)
Insulation		Remote outputs
Temperature downgrading (see *p. 67*)		The characteristics at 60 °C are guaranteed for 60% of max. module current

Legend	
(1)	For U <= 30 V or 34 V.
(2)	All the outputs are equipped with fast electromagnet demagnetization circuits. Electromagnet discharge time < L/R
(3)	Fit a fuse to the +48 V pre-actuator supply.
(4)	Excluding load current.
(5)	Nb = number of outputs at 1.

Connecting the TSX DSY 08T31 module

At a Glance

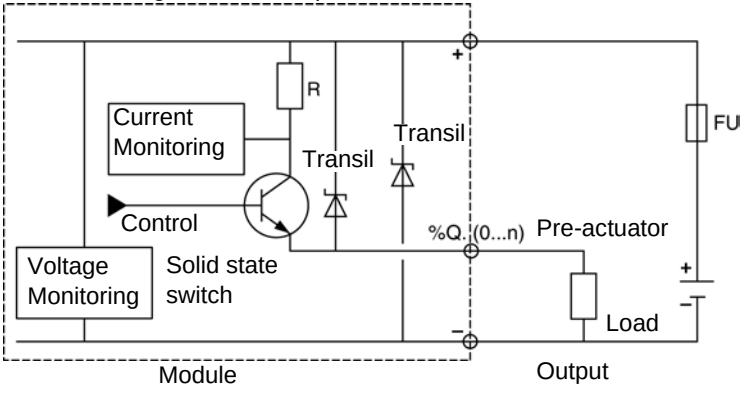
The TSX DSY 08T31 module comprises 8 x 48 VDC protected transistor output channels.



This module is equipped with a removable 20 post screwed connection terminal block, allowing outputs to be connected:

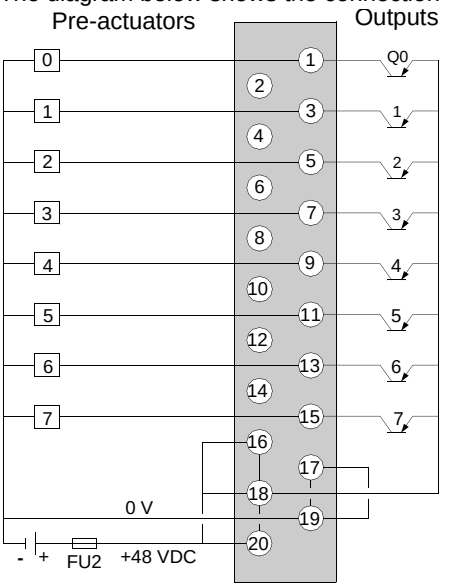
Circuit Diagram

The circuit diagram for an output is shown below.



Module connection

The diagram below shows the connection of the module to the pre-actuators.



FU2 10 A quick-blow fuse

TSX DSY 16T2 Discrete output module

18

At a Glance

Overview

This chapter describes the TSX DSY 16T2 module, its characteristics and its connection to the different pre-actuators.

What's in this Chapter?

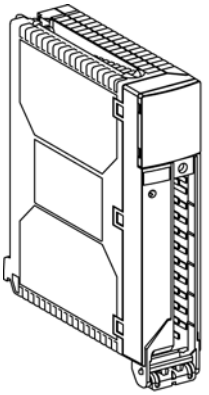
This chapter contains the following topics:

Topic	Page
Presentation of the TSX DSY 16T2 module	162
Characteristics of the TSX DSY 16T2 positive logic module	163
Connecting the TSX DSY 16T2 module	166

Presentation of the TSX DSY 16T2 module

General

The TSX DSY 16T2 module



The TSX DSY 16T2 module is a 16-channel terminal block Discrete transistor output module for direct current (positive logic).

Characteristics of the TSX DSY 16T2 positive logic module

At a Glance

This section provides a description of the general characteristics of the TSX DSY 16T2 module.

General Characteristics

The following table shows the general characteristics of the TSX DSY 16T2 module:

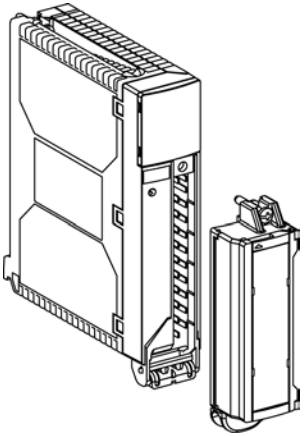
The TSX DSY 16T2 module		24 VDC positive logic transistor outputs
Nominal values	Voltage	24 VDC
	Current	0.5 A
Threshold values (1)	Voltage (including ripple)	19..30 V (34 V possible for 1 hour every 24 hours)
	Current/channel	0.625 A
	Current/module	7 A
Power of tungsten filament lamp	Maximum	6 W
Wetting Current	at 0	<0.5 mA
Voltage drop	at 1	< 1.2 V
Load impedance	minimum	48 Ohms
Response time (2)		1.2 ms
Frequency of switching to inductive load		0.5 / LI^2 Hz
Paralleling of outputs		Yes (maximum of 2)
Compatibility with IEC 1131-2 DC inputs		Yes (type 1 and type 2)
Built-in protection	against over-voltage	Yes, by Transil diode
	against inversions	Yes, by inverted diode (3)
	against short-circuits and overloads	Yes, by current limiter and electric circuit-breaker 1.5 In < Id < 2 In
Pre-actuator voltage check threshold	OK	> 18 V
	Fault	< 14 V
Check response time	on appearance	T < 4 ms
	on disappearance	T < 30 ms
5 V consumption	typical	80 mA
	maximum	90 mA
24 V pre-actuator consumption (4)	typical	40 mA
	maximum	60 mA
Dissipated power (5)		1.1 W + (0.75 x Nb) W
Dielectric rigidity	Output / ground or Output / internal logic	1500 V actual, 50 / 60 Hz for 1 min
Resistance of insulation		> 10 MOhms (below 500 VDC)
Insulation		Remote outputs
Temperature downgrading (see *p. 67*)		The characteristics at 60 °C are guaranteed for 60% of max. module current

Legend	
(1)	For U <= 30 V or 34 V.
(2)	All the outputs are equipped with fast electromagnet demagnetization circuits. Electromagnet discharge time < L/R
(3)	Fit a fuse to the +24 V pre-actuator supply.
(4)	Excluding load current.
(5)	Nb = number of outputs at 1.

Connecting the TSX DSY 16T2 module

At a Glance

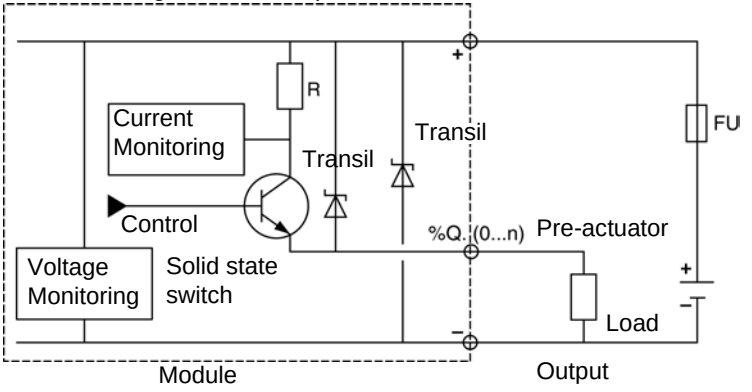
The TSX DSY 16T2 module comprises 16 x 24 VDC protected transistor output channels.



This module is equipped with a removable 20 post screwed connection terminal block, allowing outputs to be connected:

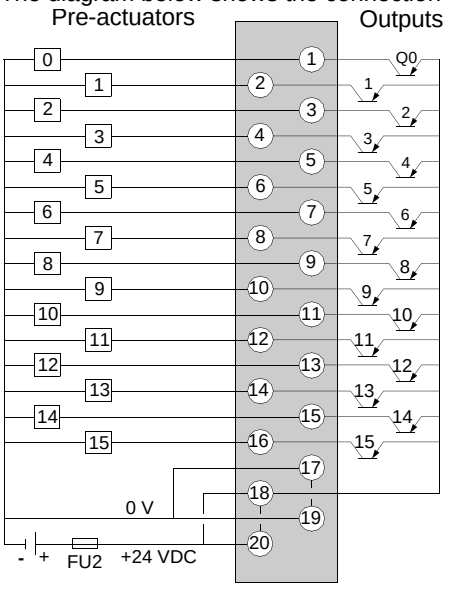
Circuit Diagram

The circuit diagram for an output is shown below.



Module connection

The diagram below shows the connection of the module to the pre-actuators.



FU2 6.3 A quick-blow fuse

TSX DSY 16T3 Discrete output module

19

At a Glance

Subject of this chapter

This chapter describes the TSX DSY 16T3 module, its characteristics and its connection to the different pre-actuators.

What's in this Chapter?

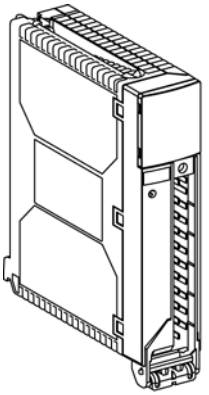
This chapter contains the following topics:

Topic	Page
Presentation of the TSX DSY 16T3 module	170
Characteristics of the TSX DSY 16T3 positive logic module	171
Connecting the TSX DSY 16T3 module	174

Presentation of the TSX DSY 16T3 module

General

The TSX DSY 16T3 module



The TSX DSY 16T3 module is a 16-channel terminal block Discrete transistor output module for direct current (positive logic).

Characteristics of the TSX DSY 16T3 positive logic module

At a Glance

This section provides a description of the general characteristics of the TSX DEY 16T3 module.

General Characteristics

The following table shows the general characteristics of the TSX DSY 16T3 module:

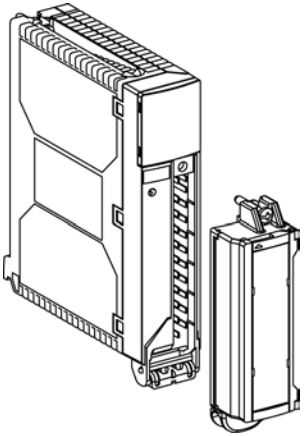
The TSX DSY 16T3 module		48 VDC positive logic transistor outputs
Nominal values	Voltage	48 VDC
	Current	0.25 A
Threshold values (1)	Voltage (including ripple)	38.0.60 V
	Current/channel	0.31 A
	Current/module	4 A
Power of tungsten filament lamp	Maximum	6 W
Wetting Current	at 0	<0.5 mA
Voltage drop	at 1	< 1.5 V
Load impedance	minimum	192 Ohms
Response time (2)		1.2 ms
Frequency of switching to inductive load		0.5 / LI^2 Hz
Paralleling of outputs		Yes (maximum of 2)
Compatibility with IEC 1131-2 DC inputs		Yes (type 1 and type 2)
Built-in protection	against over-voltage	Yes, by Transil diode
	against inversions	Yes, by inverted diode (3)
	against short-circuits and overloads	Yes, by current limiter and electric circuit-breaker 1.5 In < Id < 2 In
Pre-actuator voltage check threshold	OK	> 36 V
	Fault	< 24 V
Check response time	on appearance	T < 4 ms
	on disappearance	T < 30 ms
5 V consumption	typical	80 mA
	maximum	90 mA
24 V pre-actuator consumption (4)	typical	40 mA
	maximum	60 mA
Dissipated power (5)		2.4 W + (0.85 x Nb) W
Dielectric rigidity	Output / ground or Output / internal logic	1500 V actual, 50 / 60 Hz for 1 min
Resistance of insulation		> 10 MOhms (below 500 VDC)
Insulation		Remote outputs
Temperature downgrading (see *p. 67*)		The characteristics at 60 °C are guaranteed for 60% of max. module current

Legend	
(1)	For U <= 30 V or 34 V
(2)	All the outputs are equipped with fast electromagnet demagnetization circuits. Electromagnet discharge time < L/R
(3)	Fit a fuse to the +48 V pre-actuator supply.
(4)	Excluding load current.
(5)	Nb = number of outputs at 1.

Connecting the TSX DSY 16T3 module

At a Glance

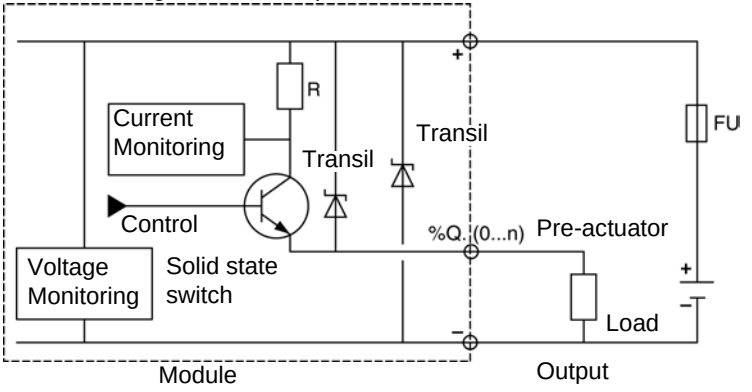
The TSX DSY 16T3 module comprises 16 x 48 VDC protected transistor output channels.



This module is equipped with a removable 20 post screwed connection terminal block, allowing outputs to be connected:

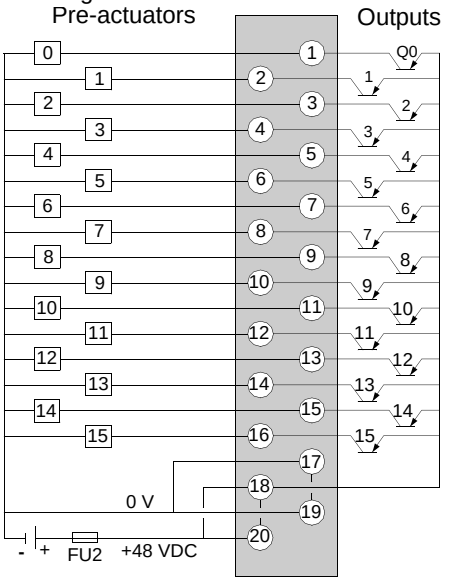
Circuit Diagram

The circuit diagram for an output is shown below.



Module connection

The diagram below shows the connection of the module to the pre-actuators.



FU2 10 A quick-blow fuse

TSX DSY 08R5 Discrete output module

20

At a Glance

Overview

This chapter describes the TSX DSY 08R5 module, its characteristics and its connection to the different pre-actuators.

What's in this Chapter?

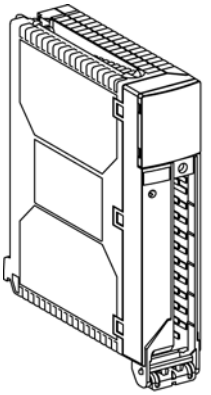
This chapter contains the following topics:

Topic	Page
Presentation of the TSX DSY 08R5 module	178
Relay output contact protection	179
Characteristics of the TSX DSY 08R5 module	180
Connecting the TSX DSY 08R5 module	182

Presentation of the TSX DSY 08R5 module

General

The TSX DSY 08R5 module



The TSX DSY 08R5 module is an 8-channel terminal block Discrete relay output module for 3 A thermal current.

Relay output contact protection

At a Glance

The outputs of the Discrete modules TSX DSY 08R5 and TSX DSY 16R5 do not feature any contact protection; it is therefore necessary to take the following precautions.

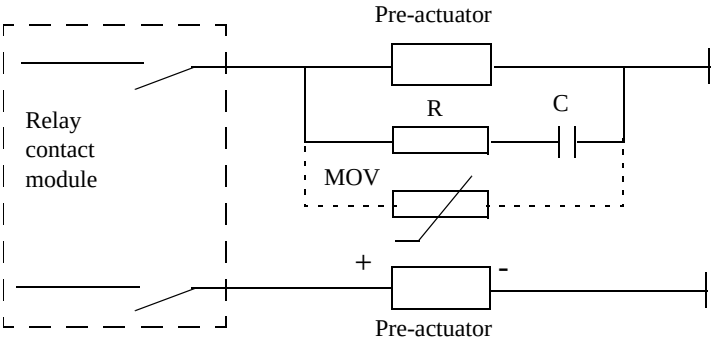
Precautions

These relay outputs feature no protective measures, in order to make it possible to control the following:

- galvanic insulated inputs - at low energy level and requiring zero leakage current;
- power circuits, whilst eliminating inductive over-voltages at the source.

It is therefore obligatory to mount the following on the pre-actuator coil terminals:

- an RC circuit or a MOV (ZNO) peak limiter for use with alternating current;
- a discharge diode for use with direct current.



Note: A relay output that has been used with an alternating current load must not be then used with direct current, and vice versa.

Characteristics of the TSX DSY 08R5 module

At a Glance

This part presents the general characteristics of the 3 A thermal current relay output module, TSX DSY 08R5.

General Characteristics

The following table shows the general characteristics of the TSX DSY 08R5 module:

The TSX DSY 08R5 module			3 A thermal current relay outputs			
Threshold service voltage (see *p. 67*)	Direct		10.0.34 VDC			
	Alternating		19.0.264 VAC			
Thermal current			3 A			
Maximum current per common			3 A (value not to be exceeded)			
Alternating current load	Resistive AC12	Voltage	24 V	48 V	100.0.120 V	200.0.240 V
		Power	50 VA (5)	50 VA (6) 110 VA (4)	110 VA (6) 220 VA (4)	220 VA (6)
	Inductive AC14 and AC15	Voltage	24 V	48 V	100.0.120 V	200.0.240 V
		Power	24 VA (4)	10 VA (10) 24 VA (8)	10 VA (11) 50 VA (7) 110 VA (2)	10 VA (11) 50 VA (9) 110 VA (6) 220 VA (1)
Direct current load	Resistive DC12	Voltage	24 V			
		Power	24 W (6) 40 W (3)			
	Inductive DC13 (L/R = 60 ms)	Voltage	24 V			
		Power	10 W (8) 24 W (6)			
	Minimum switchable load		1 mA / 5 V			
Response Time	Activation		< 8 ms			
	Deactivation		< 10 ms			
Type of contact			normally open			
Built-in protection	against short-circuits and overloads		None, compulsory installation of a quick-blow fuse on every channel or channel group.			
	against inductive overloads with alternating current		None, compulsory installation – in parallel to the terminals of each pre-actuator - of a RC circuit or MOV (ZNO) peak limiter, appropriate to the voltage in use.			
	against inductive overloads with direct current		None, compulsory installation of a discharge diode at the terminals of each pre-actuator.			

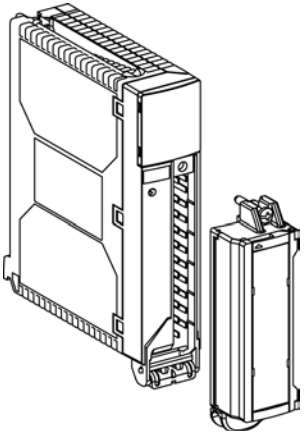
Dissipated power (12)			0.25 W + (0.2 x Nb) W
Dielectric rigidity	Output / ground or Output / internal logic		2000 V actual, 50 / 60 Hz for 1 min
Resistance of insulation			> 10 MOhms (below 500 VDC)
Insulation			Outputs insulated between contact and earth
Power supply consumption	5 V internal	Typical	55 mA
		Maximum	65 mA
	24 V relay (13)	Typical	8.5 mA
		Maximum	10 mA

Legend	
(1)	0.1 x 10^6 operations
(2)	0.15 x 10^6 operations
(3)	0.3 x 10^6 operations
(4)	0.5 x 10^6 operations
(5)	0.7 x 10^6 operations
(6)	1 x 10^6 operations
(7)	1.5 x 10^6 operations
(8)	2 x 10^6 operations
(9)	3 x 10^6 operations
(10)	5 x 10^6 operations
(11)	10 x 10^6 operations
(12)	Nb = number of outputs at 1.
(13)	Per channel at 1

Connecting the TSX DSY 08R5 module

At a Glance

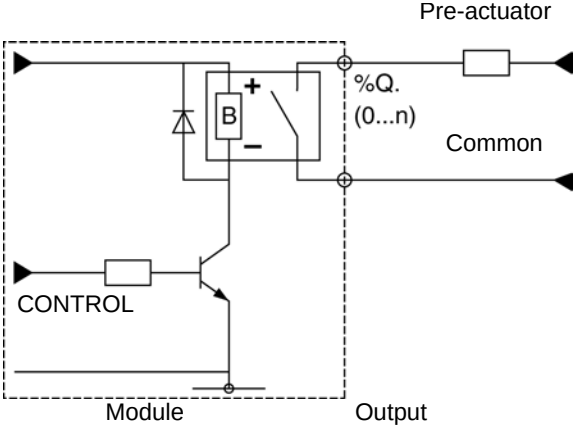
The TSX DSY 08R5 module comprises 8 relay output channels for 3 A thermal current.



This module is equipped with a removable 20 post screwed connection terminal block, allowing outputs to be connected:

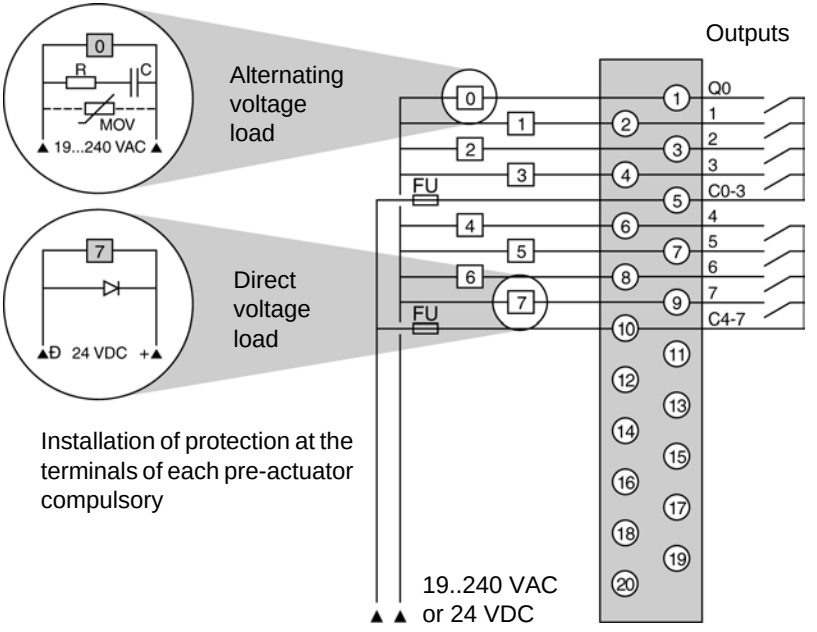
Circuit Diagram

The circuit diagram for an output is shown below.



Module connection

The diagram below shows the connection of the module to the pre-actuators.



TSX DSY 08R4D Discrete output module

21

At a Glance

Overview

This chapter describes the TSX DSY 08R4D module, its characteristics and its connection to the different pre-actuators.

What's in this Chapter?

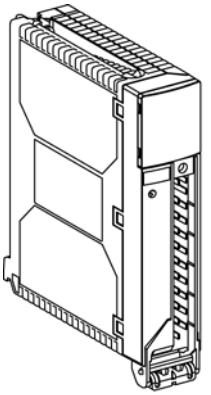
This chapter contains the following topics:

Topic	Page
Presentation of the TSX DSY 08R4D module	186
Fuse protection	187
Characteristics of the TSX DSY 08R4D module	188
Connecting the TSX DSY 08R4D module	190

Presentation of the TSX DSY 08R4D module

General

The TSX DSY 08R4D module



The TSX DSY 08R4D module is an 8-channel terminal block Discrete relay output module for direct current.

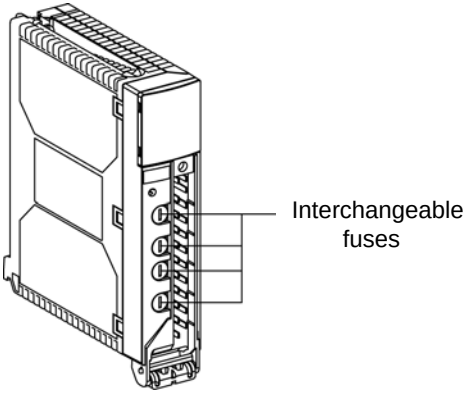
Fuse protection

At a Glance

The TSX DSY 08R5A, TSX DSY 08R4D, TSX DSY 08S5 and TSX DSY 16S5 Discrete output modules are supplied with interchangeable fuses which can be accessed from the front panel of the modules, once the terminal block is removed.

Illustration

The following diagram shows the location of the contact protection fuses.



Description

The fuses can be accessed by removing the terminal block.

If a fuse is faulty, the diagnostics are displayed on the front panel of the module. The I/O LED is on.

Characteristics of the TSX DSY 08R4D module

At a Glance

This section provides a description of the general characteristics of the TSX DSY 08R4D module.

General Characteristics

The following table shows the general characteristics of the TSX DSY 08R4D module:

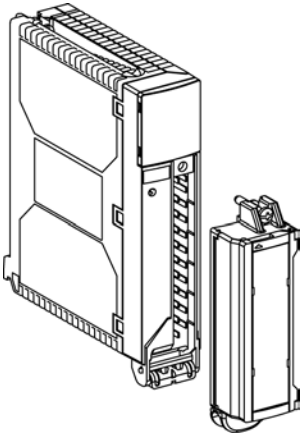
The TSX DSY 08R4D module			Relay outputs for direct current		
Threshold service voltage (see *p. 67*)	Direct		19.0.143 V		
	Alternating		prohibited		
Thermal current			5 A		
Maximum current per common			6 A (value not to be exceeded)		
Direct current load	Resistive DC12	Voltage	24 V	48 V	100.0.130 V
		Power	50 W (4) 100 W (2)	100 W (4) 200 W (2)	220 W (2) 440 W (1)
	Inductive DC13 (L/R = 60 ms)	Voltage	24 V	48 V	100.0.130 V
		Power	20 W (5) 50 W (4)	50 W (5) 100 W (4)	110 W (3) 220 W (2)
Response Time	Activation		< 10 ms		
	Deactivation		< 15 ms		
Type of contact (6)			2 x 2 O/C 2 x 2 C		
Built-in protection	against over-voltage		R-C and Ge-Mov circuit		
	against short-circuits and overloads		6.3 A interchangeable quick-blow fuse per common		
Dissipated power (7)			0.25 W + (0.24 x Nb) W		
Dielectric rigidity	Output / ground or Output / internal logic		2000 V actual, 50 / 60 Hz for 1 min		
Resistance of insulation			> 10 MOhms (below 500 VDC)		
Insulation			Outputs insulated between contact and earth		
Power supply consumption	5 V	Typical	55 mA		
		Maximum	65 mA		
	24 V relay (8)	Typical	10 mA		
		Maximum	12 mA		

Legend	
(1)	0.15 x 10^6 operations
(2)	0.3 x 10^6 operations
(3)	0.5 x 10^6 operations
(4)	1 x 10^6 operations
(5)	2 x 10^6 operations
(6)	O = open (idle); C = closed (operation)
(7)	Nb = number of outputs at 1.
(8)	Per channel at 1.

Connecting the TSX DSY 08R4D module

At a Glance

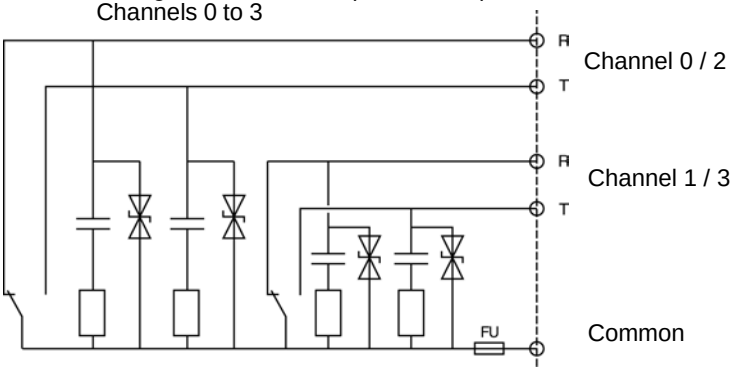
The TSX DSY 08R4D module comprises 8 x protected relay output channels for direct current.



This module is equipped with a removable 20 post screwed connection terminal block, allowing outputs to be connected:

Circuit Diagram

The circuit diagram for an idle / operation output is shown below.

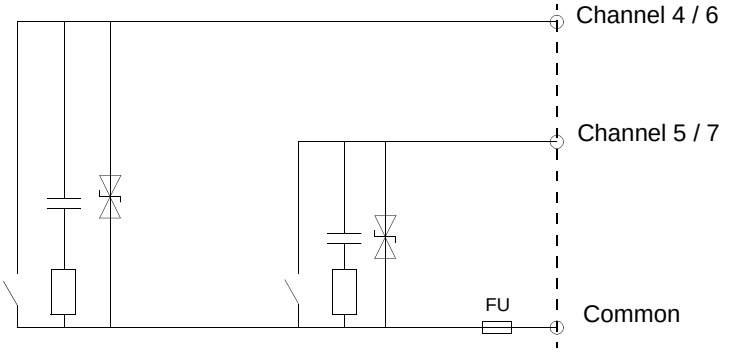


R Idle
T Operation
FU Quick-blow interchangeable 6.3 A fuse 1 fuse per common.

Circuit Diagram

The circuit diagram for an operation output is shown below.

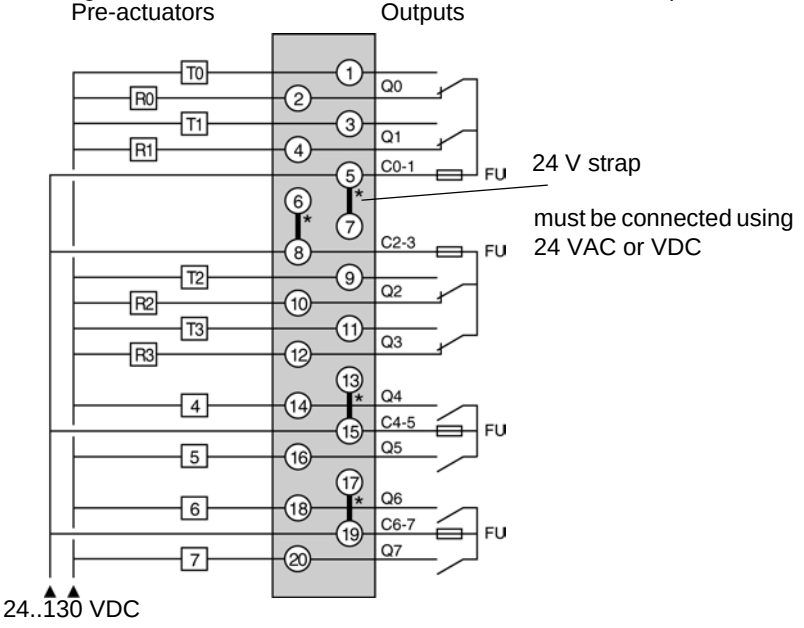
Channels 4 to 7



FU Quick-blow interchangeable 6.3 A fuse 1 fuse per common.

Module connection

The diagram below shows the connection of the module to the pre-actuators.



FU 6.3 A quick-blow fuse

TSX DSY 08R5A Discrete output module

22

At a Glance

Overview

This chapter describes the TSX DSY 08R5A module, its characteristics and its connection to the different pre-actuators.

What's in this Chapter?

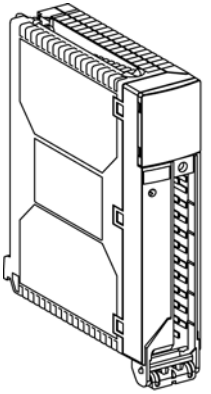
This chapter contains the following topics:

Topic	Page
Presentation of the TSX DSY 08R5A module	194
Characteristics of the TSX DSY 08R5A module	195
Connecting the TSX DSY 08R5A module	198

Presentation of the TSX DSY 08R5A module

General

The TSX DSY 08R5A module



The TSX DSY 08R5A module is an 8-channel terminal block Discrete relay output module for a 5 A thermal current.

This module features protection of contacts by interchangeable fuses (see *Fuse protection, p. 187*).

Characteristics of the TSX DSY 08R5A module

At a Glance

This section provides a description of the general characteristics of the TSX DSY 08R5A module.

General Characteristics

The following table shows the general characteristics of the TSX DSY 08R5A module:

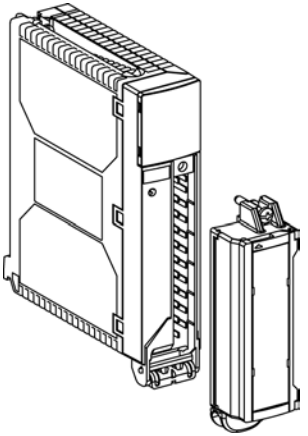
The TSX DSY 08R5A module			5 A thermal current relay outputs			
Threshold service voltage (see *p. 67*)	Direct		19.0.60 V			
	Alternating		19.0.264 V			
Thermal current			5 A			
Maximum current per common			6 A (value not to be exceeded)			
Alternating current load	Resistive AC12	Voltage	24 V	48 V	100.0.120 V	200.0.240 V
		Power	100 VA (5)	100 VA (6) 200 VA (4)	220 VA (6) 440 VA (4)	440 VA (6)
	Inductive AC14 and AC15	Voltage	24 V	48 V	100.0.120 V	200.0.240 V
		Power	50 VA (4)	20 VA (10) 50 VA (8)	20 VA (11) 110 VA (7) 220 VA (2)	20 VA (11) 110 VA (9) 220 VA (6) 440 VA (1)
Direct current load	Resistive DC12	Voltage	24 V	48 V	-	-
		Power	24 W (6) 50 W (3)	50W (6) 100 W (3)	-	-
	Inductive DC13 (L/R = 60 ms)	Voltage	24 V	48 V	-	-
		Power	10 W (8) 24 W (6)	24 W (8) 50 W (6)	-	-
Response Time	Activation		< 10 ms			
	Deactivation		< 15 ms			
Type of contact (12)			2 x 2 O/C 2 x 2 C			
Built-in protection	against over-voltage		R-C and Ge-Mov circuit			
	against short-circuits and overloads		6.3 A interchangeable quick-blow fuse per common			
Dissipated power (13)			0.25 W + (0.24 x Nb) W			
Dielectric rigidity	Output / ground or Output / internal logic		2000 V actual, 50 / 60 Hz for 1 min			
Resistance of insulation			> 10 MOhms (below 500 VDC)			
Insulation			Outputs insulated between contact and earth			
Power supply consumption	5 V	Typical	55 mA			
		Maximum	65 mA			
	24 V relay (14)	Typical	10 mA			
		Maximum	12 mA			

Legend	
(1)	0.1 x 10^6 operations
(2)	0.15 x 10^6 operations
(3)	0.3 x 10^6 operations
(4)	0.5 x 10^6 operations
(5)	0.7 x 10^6 operations
(6)	1 x 10^6 operations
(7)	1.5 x 10^6 operations
(8)	2 x 10^6 operations
(9)	3 x 10^6 operations
(10)	5 x 10^6 operations
(11)	10 x 10^6 operations
(12)	O = open (idle); C = closed (operation)
(13)	Nb = number of outputs at 1.
(14)	Per channel at 1.

Connecting the TSX DSY 08R5A module

At a Glance

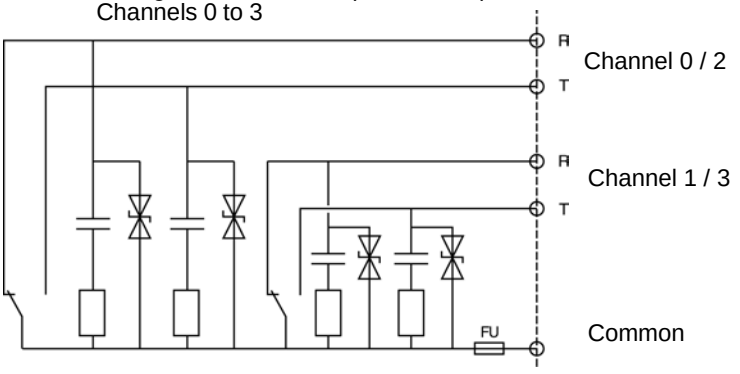
The TSX DSY 08R5A module comprises 8 protected relay output channels for 5 A thermal current.



This module is equipped with a removable 20 post screwed connection terminal block, allowing outputs to be connected:

Circuit Diagram

The circuit diagram for an idle / operation output is shown below.

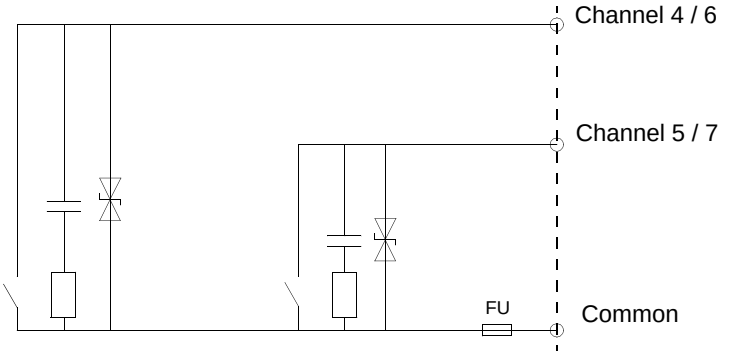


R Idle
T Operation
FU Quick-blow interchangeable 6.3 A fuse 1 fuse per common.

Circuit Diagram

The circuit diagram for an operation output is shown below.

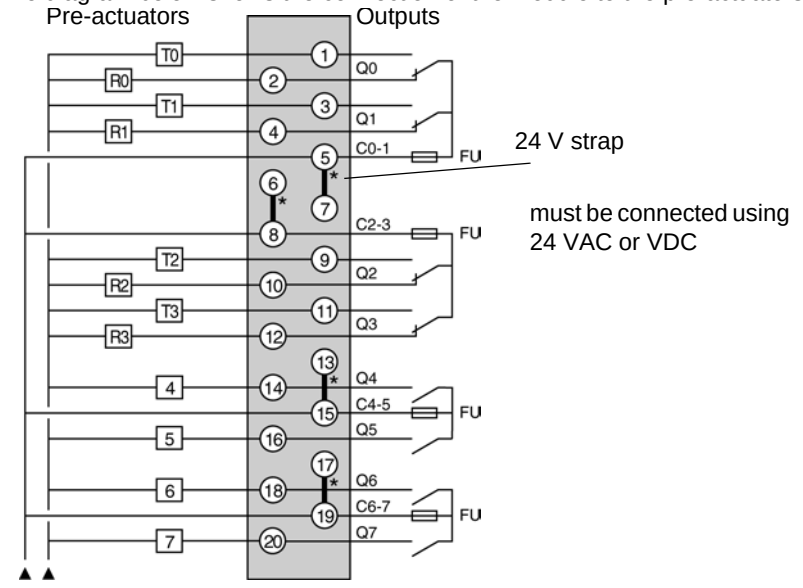
Channels 4 to 7



FU Quick-blow interchangeable 6.3 A fuse 1 fuse per common.

Module connection

The diagram below shows the connection of the module to the pre-actuators.



19..240 VAC
or 19..60 VDC (nominal = 48 VDC)

FU 6.3 A quick-blow fuse

TSX DSY 16R5 Discrete output module

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At a Glance

Overview

This chapter describes the TSX DSY 16R5 module, its characteristics and its connection to the different pre-actuators.

What's in this Chapter?

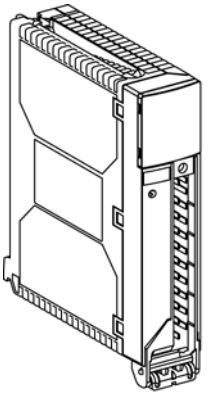
This chapter contains the following topics:

Topic	Page
Presentation of the TSX DSY 16R5 module	202
Characteristics of the TSX DSY 16R5 module	203
Connecting the TSX DSY 16R5 module	206

Presentation of the TSX DSY 16R5 module

General

The TSX DSY 16R5 module



The TSX DSY 16R5 module is a 16-channel terminal block Discrete relay output module for 3 A thermal current.

The outputs of this module do not feature any contact protection; additional precautions must therefore be taken (see *Relay output contact protection, p. 179*).

Characteristics of the TSX DSY 16R5 module

At a Glance

This section provides a description of the general characteristics of the TSX DSY 16R5 module.

General Characteristics

The following table shows the general characteristics of the TSX DSY 16R5 module:

The TSX DSY 16R5 module			3 A thermal current relay outputs			
Threshold service voltage (see *p. 67*)	Direct		10.0.34 VDC			
	Alternating		19.0.264 VAC			
Thermal current			3 A			
Maximum current per common			3 A (value not to be exceeded)			
Alternating current load	Resistive AC12	Voltage	24 V	48 V	100.0.120 V	200.0.240 V
		Power	50 VA (5)	50 VA (6) 110 VA (4)	110 VA (6) 220 VA (4)	220 VA (6)
	Inductive AC14 and AC15	Voltage	24 V	48 V	100.0.120 V	200.0.240 V
		Power	24 VA (4)	10 VA (10) 24 VA (8)	10 VA (11) 50 VA (7) 110 VA (2)	10 VA (11) 50 VA (9) 110 VA (6) 220 VA (1)
Direct current load	Resistive DC12	Voltage	24 V			
		Power	24 W (6) 40 W (3)			
	Inductive DC13 (L/R = 60 ms)	Voltage	24 V			
		Power	10 W (8) 24 W (6)			
	Minimum switchable load		1 mA / 5 V			
Response Time	Activation		< 8 ms			
	Deactivation		< 10 ms			
Type of contact			normally open			
Built-in protection	against short-circuits and overloads		None, compulsory installation of a quick-blow fuse on every channel or channel group.			
	against inductive overloads with alternating current		None, compulsory installation – in parallel to the terminals of each pre-actuator - of a RC circuit or MOV (ZNO) peak limiter, appropriate to the voltage in use.			
	against inductive overloads with direct current		None, compulsory installation of a discharge diode at the terminals of each pre-actuator.			
Dissipated power (12)			0.25 W + (0.2 x Nb) W			
Dielectric rigidity	Output / ground or Output / internal logic		2000 V actual, 50 / 60 Hz for 1 min			
Resistance of insulation			> 10 MOhms (below 500 VDC)			
Insulation			Outputs insulated between contact and earth			

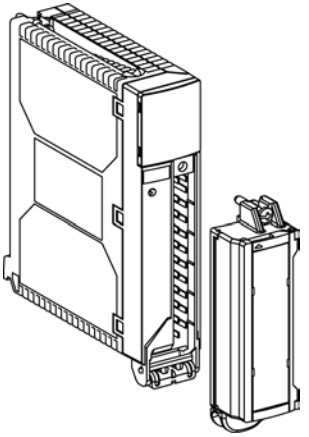
Power supply consumption	5 V internal	Typical	80 mA
		Maximum	90 mA
	24 V relay (13)	Typical	8.5 mA
		Maximum	10 mA

Legend	
(1)	0.1 x 10^6 operations
(2)	0.15 x 10^6 operations
(3)	0.3 x 10^6 operations
(4)	0.5 x 10^6 operations
(5)	0.7 x 10^6 operations
(6)	1 x 10^6 operations
(7)	1.5 x 10^6 operations
(8)	2 x 10^6 operations
(9)	3 x 10^6 operations
(10)	5 x 10^6 operations
(11)	10 x 10^6 operations
(12)	Nb = number of outputs at 1.
(13)	Per channel at 1

Connecting the TSX DSY 16R5 module

At a Glance

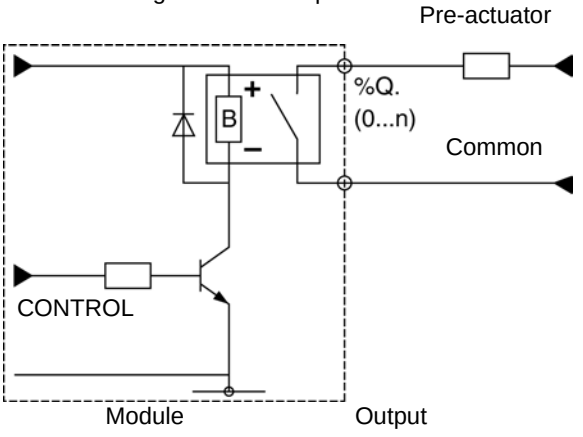
The TSX DSY 16R5 module comprises 16 relay output channels for 3 A thermal current.



This module is equipped with a removable 20 post screwed connection terminal block, allowing outputs to be connected:

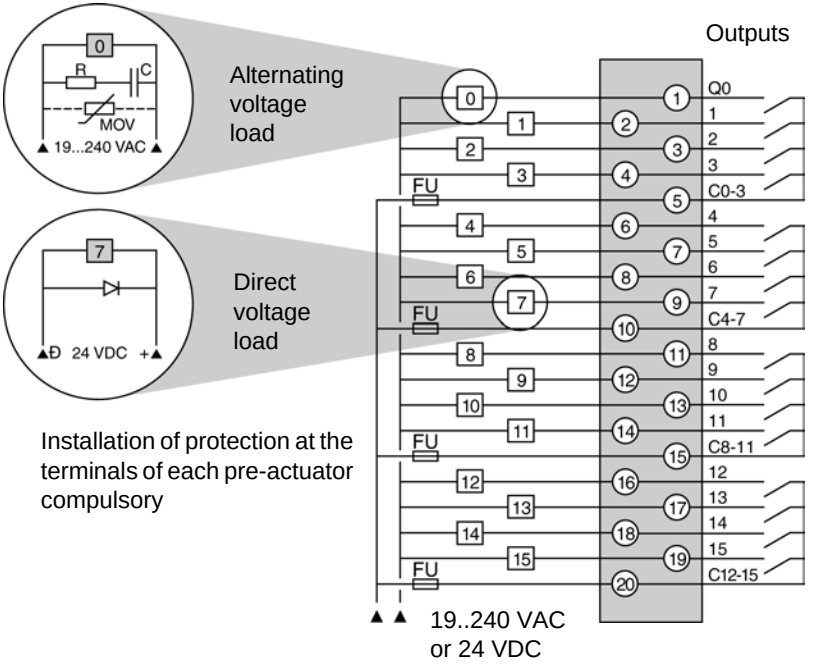
Circuit Diagram

The circuit diagram for an output is shown below.



Module connection

The diagram below shows the connection of the module to the pre-actuators.



Installation of protection at the terminals of each pre-actuator compulsory

Precaution

Note: In the event of pre-actuator supply voltage being obtained from a tri-phase network which is equal to or greater than 200 VAC, the pre-actuators must be supplied from the same phase.

TSX DSY 08S5 Discrete output module

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At a Glance

Overview

This chapter describes the TSX DSY 08S5 module, its characteristics and its connection to the different pre-actuators.

What's in this Chapter?

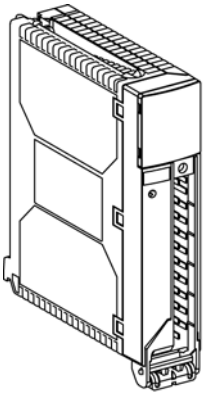
This chapter contains the following topics:

Topic	Page
Presentation of the TSX DSY 08S5 module	210
Characteristics of the TSX DSY 08S5 module	211
Connecting the TSX DSY 08S5 module	212

Presentation of the TSX DSY 08S5 module

General

The TSX DSY 08S5 module



The TSX DSY 08S5 module is a 8-channel terminal block Discrete bidirectional triode thyristor output module.

This module features protection of contacts by interchangeable fuses (see *Fuse protection, p. 187*).

Characteristics of the TSX DSY 08S5 module

At a Glance

This section provides a description of the general characteristics of the TSX DSY 08S5 module.

General Characteristics

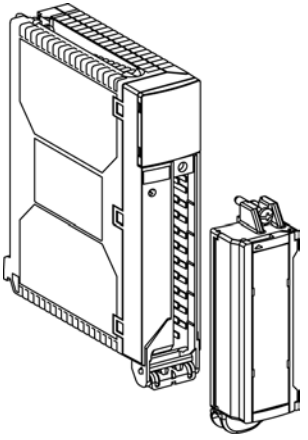
The following table shows the general characteristics of the TSX DSY 08S5 module:

The TSX DSY 08S5 module			Bidirectional triode thyristor outputs
Threshold service voltage	Direct		prohibited
	Alternating		41.0.264 V
Admissible current (see *p. 67*)	channel		2 A
	cycle		12 A
Wetting Current			<= 2 mA
Response Time	Activation		<= 10 ms
	Deactivation		<= 10 ms
Built-in protection	against over-voltage		R-C and Ge-Mov circuit
	against short-circuits and overloads		interchangeable quick-blow fuse per common - 5 A
Power dissipation			0.5 W + 1 W per A and per output
Dielectric rigidity	Output / ground or Output / internal logic		2000 V actual, 50 / 60 Hz for 1 min
Resistance of insulation			> 10 MOhms (below 500 VDC)
Insulation			Remote outputs
5 V supply consumption		Typical	125 mA
		Maximum	135 mA

Connecting the TSX DSY 08S5 module

At a Glance

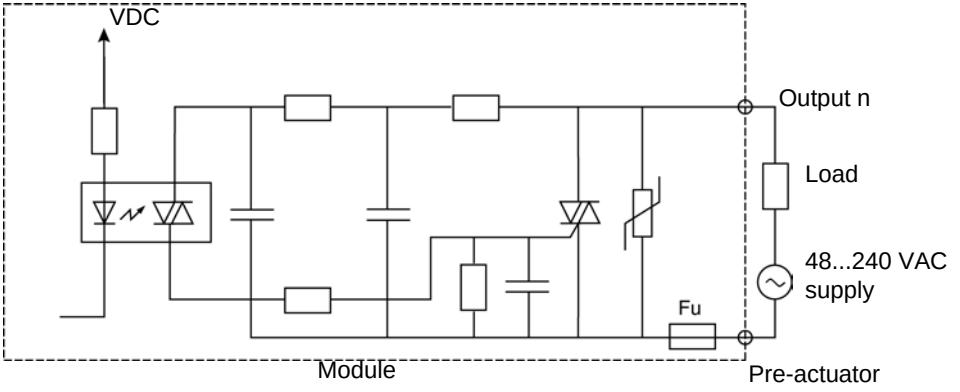
The TSX DSY 08S5 module comprises 8 bidirectional triode thyristor output channels.



This module is equipped with a removable 20 post screwed connection terminal block, allowing outputs to be connected:

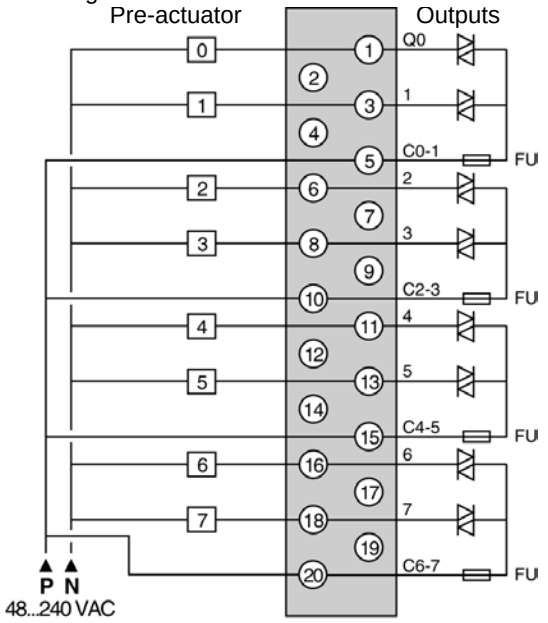
Circuit Diagram

The circuit diagram for an output is shown below.



Module connection

The diagram below shows the connection of the module to the pre-actuators.



FU Ultra-quick blow interchangeable 5 A fuse

TSX DSY 16S5 Discrete output module

25

At a Glance

Overview

This chapter describes the TSX DSY 16S5 module, its characteristics and its connection to the different pre-actuators.

What's in this Chapter?

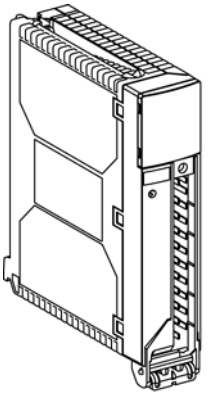
This chapter contains the following topics:

Topic	Page
Presentation of the TSX DSY 16S5 module	216
Characteristics of the TSX DSY 16S5 module	217
Connecting the TSX DSY 16S5 module	218

Presentation of the TSX DSY 16S5 module

General

The TSX DSY 16S5 module



The TSX DSY 16S5 module is a 16-channel terminal block Discrete bidirectional triode thyristor output module.

This module features protection of contacts by interchangeable fuses (see *Fuse protection, p. 187*).

Characteristics of the TSX DSY 16S5 module

At a Glance

This section provides a description of the general characteristics of the TSX DSY 16S5 module.

General Characteristics

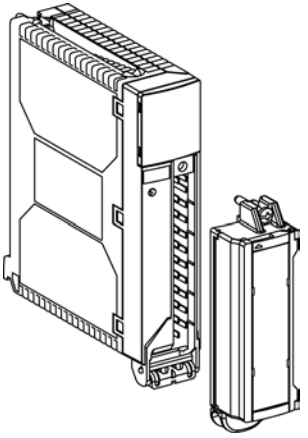
The following table shows the general characteristics of the TSX DSY 16S5 module:

The TSX DSY 16S5 module			Bidirectional triode thyristor outputs
Threshold service voltage	Direct		prohibited
	Alternating		41.0.264 V
Admissible current (see *p. 67*)	channel		1 A
	cycle		12 A
Wetting Current			<= 1.5 mA
Response Time	Activation		<= 10 ms
	Deactivation		<= 10 ms
Built-in protection	against over-voltage		R-C and Ge-Mov circuit
	against short-circuits and overloads		interchangeable quick-blow fuse per common - 5 A
Power dissipation			0.85 W + 1 W per A and per output
Dielectric rigidity	Output / ground or Output / internal logic		2000 V actual, 50 / 60 Hz for 1 min
Resistance of insulation			> 10 MOhms (below 500 VDC)
Insulation			Remote outputs
5 V supply consumption		Typical	220 mA
		Maximum	230 mA

Connecting the TSX DSY 16S5 module

At a Glance

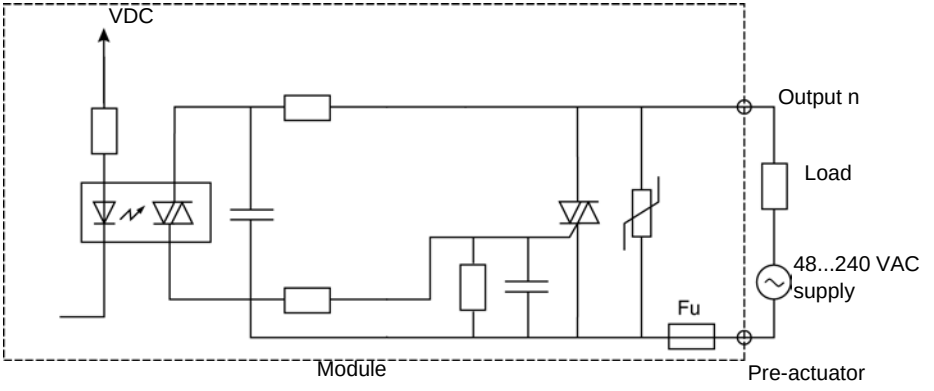
The TSX DSY 16S5 module comprises 16 bidirectional triode thyristor output channels.



This module is equipped with a removable 20 post screwed connection terminal block, allowing outputs to be connected:

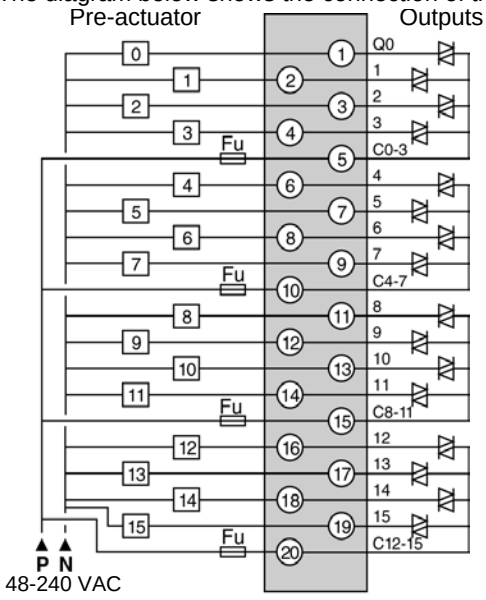
Circuit Diagram

The circuit diagram for an output is shown below.



Module connection

The diagram below shows the connection of the module to the pre-actuators.



FU Ultra-quick blow interchangeable 5 A fuse

TSX DSY 16S4 Discrete output module

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At a Glance

Overview

This chapter describes the TSX DSY 16S4 module, its characteristics and its connection to the different pre-actuators.

What's in this Chapter?

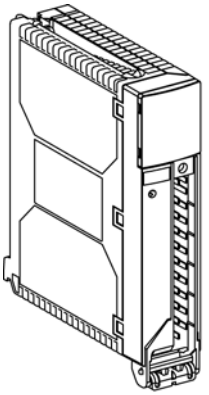
This chapter contains the following topics:

Topic	Page
Presentation of the TSX DSY 16S4 module	222
Characteristics of the TSX DSY 16S4 module	223
Connecting the TSX DSY 16S4 module	224

Presentation of the TSX DSY 16S4 module

General

The TSX DSY 16S4 module



The TSX DSY 16S4 module is a 16-channel terminal block Discrete bidirectional triode thyristor output module.

Characteristics of the TSX DSY 16S4 module

At a Glance

This section provides a description of the general characteristics of the **TSX DSY 16S4** module.

General Characteristics

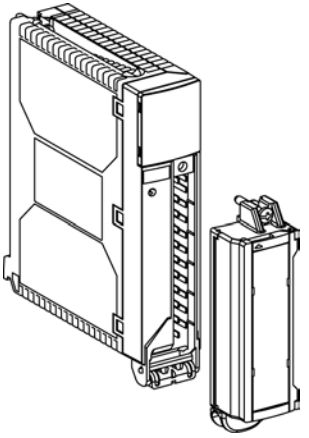
The following table shows the general characteristics of the TSX DSY 16S4 module:

The TSX DSY 16S4 module			Bidirectional triode thyristor outputs
Threshold service voltage	Direct		prohibited
	Alternating		20.0.132 V
Admissible current (see *p. 67*)	channel		1 A
	cycle		12 A
Wetting Current			<= 1.5 mA
Response Time	Activation		<= 10 ms
	Deactivation		<= 10 ms
Built-in protection	against over-voltage		R-C and Ge-Mov circuit
	against short-circuits and overloads		10 A non-interchangeable fireproof protection per common
Power dissipation			0.85 W + 1 W per A and per output
Dielectric rigidity	Output / ground or Output / internal logic		2000 V actual, 50 / 60 Hz for 1 min
Resistance of insulation			> 10 MOhms (below 500 VDC)
Insulation			Remote outputs
5 V supply consumption		Typical	220 mA
		Maximum	230 mA

Connecting the TSX DSY 16S4 module

At a Glance

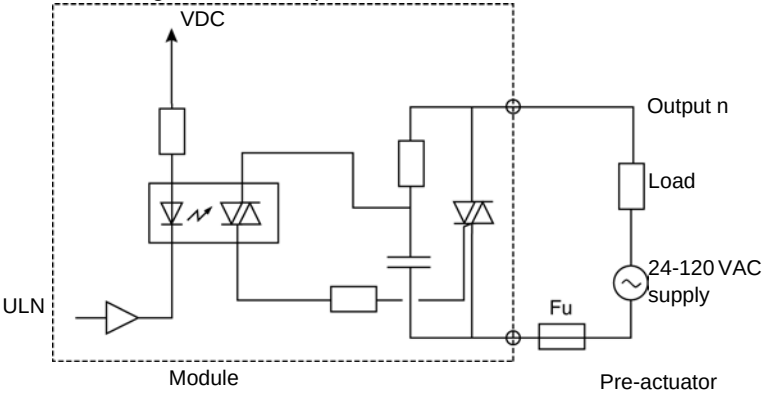
The TSX DSY 16S4 module comprises 16 bidirectional triode thyristor output channels.



This module is equipped with a removable 20 post screwed connection terminal block, allowing outputs to be connected:

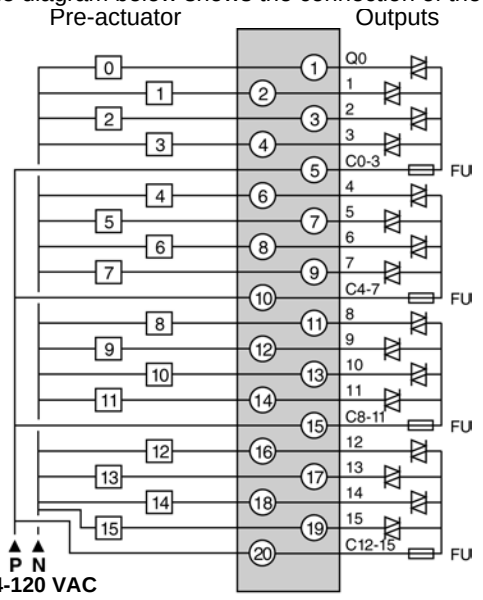
Circuit Diagram

The circuit diagram for an output is shown below.



Module connection

The diagram below shows the connection of the module to the pre-actuators.



FU Ultra-quick blow interchangeable 5 A fuse

TSX DSY 32T2K Discrete output module

27

At a Glance

Overview

This chapter describes the TSX DSY 32T2K module, its characteristics and its connection to the different pre-actuators.

What's in this Chapter?

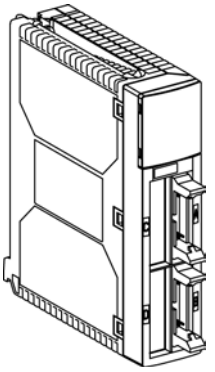
This chapter contains the following topics:

Topic	Page
Presentation of the TSX DSY 32T2K module	228
Characteristics of the TSX DSY 32T2K positive logic module	229
Connecting the TSX DSY 32T2K module	232

Presentation of the TSX DSY 32T2K module

General

The TSX DSY 32T2K module



The TSX DSY 32T2K module is a 32-channel connector Discrete transistor output module for direct current.

Characteristics of the TSX DSY 32T2K positive logic module

At a Glance

This section provides a description of the general characteristics of the TSX DSY 32T2K transistor output module with EH10 connectors.

General Characteristics

The following table shows the general characteristics of the TSX DSY 32T2K module:

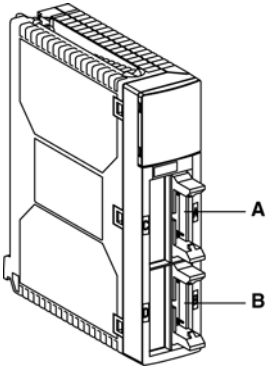
TSX DSY 32T2K module		24 VDC positive logic transistor outputs
Nominal values	Voltage	24 VDC
	Current	0.1 A
Threshold values (1)	Voltage (including ripple)	19..30 V (34 V possible for 1 hour every 24 hours))
	Current/channel	0.125 A
	Current/module	3.2 A
Power of tungsten filament lamp	Maximum	1.2 W
Wetting Current	at 0	< 0.1 mA (for U = 30 V)
Voltage drop	at 1	< 1.5 V (for I = 0.1 A)
Load impedance	minimum	220 Ohms
Response time (2)		1.2 ms
Frequency of switching to inductive load		0.5 / LI^2 Hz
Paralleling of outputs		Yes (maximum of 3)
Compatibility with IEC 1131-2 DC inputs		Yes (type 1 and type 2)
Built-in protection	against over-voltage	Yes, by Transil diode
	against inversions	Yes, by inverted diode (3)
	against short-circuits and overloads	Yes, by current limiter and electric circuit-breaker 0.125 A < Id < 0.185 A
Pre-actuator voltage check threshold	OK	> 18 V
	Fault	< 14 V
Check response time	on appearance	T < 4 ms
	on disappearance	T < 30 ms
5 V consumption	typical	135 mA
	maximum	155 mA
24 V pre-actuator consumption (4)	typical	30 mA
	maximum	40 mA
Dissipated power (5)		1.6 W + (0.1 x Nb) W
Dielectric rigidity	Output / ground or Output / internal logic	1500 V actual, 50 / 60 Hz for 1 min
Resistance of insulation		> 10 MOhms (below 500 VDC)
Insulation		Remote outputs
Temperature downgrading (see *p. 67*)		The characteristics at 60 °C are guaranteed for 60% of max. module current

Legend	
(1)	For U <= 30 V or 34 V.
(2)	All the outputs are equipped with fast electromagnet demagnetization circuits. Electromagnet discharge time < L/R
(3)	Fit a 2 A fuse to the +24 V pre-actuator supply (1 per connector).
(4)	Excluding load current.
(5)	Nb = number of outputs at 1.

Connecting the TSX DSY 32T2K module

At a Glance

The TSX DSY 32T2K module comprises 32 positive logic transistor output channels for direct current.

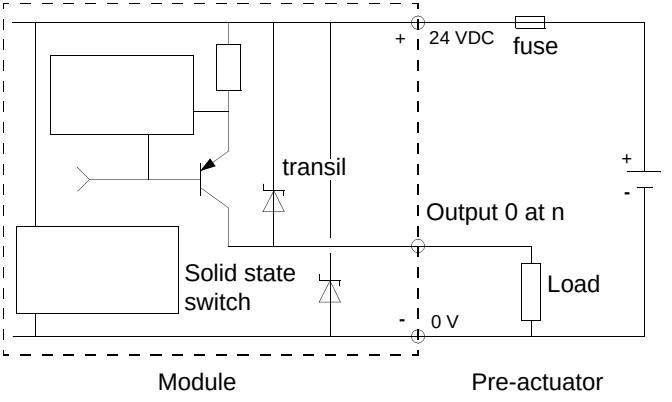


This module is fitted with 2 male HE10 connectors:

- connector A for outputs 0 to 15;
- connector B for outputs 16 to 31.

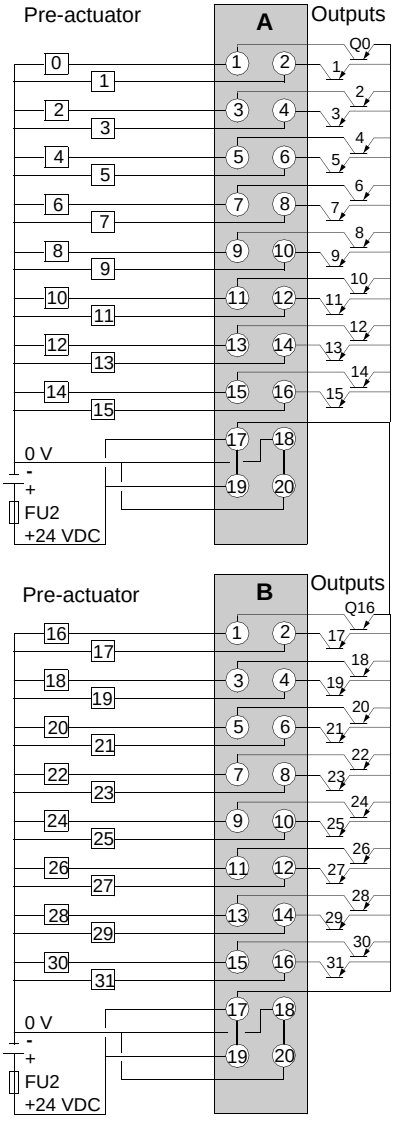
Circuit diagram

The circuit diagram for an output is shown below.



Module connection

The diagram below shows the connection of the module to the pre-actuators.



FU2 2 A quick-blow fuse.

Note: It is compulsory to connect:
- the + 24 VDC to terminals 17 and 19;
- the 0 V to terminals 18 and 20.

TSX DSY 64T2K Discrete output module

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At a Glance

Overview

This chapter describes the TSX DSY 64T2K module, its characteristics and its connection to the different pre-actuators.

What's in this Chapter?

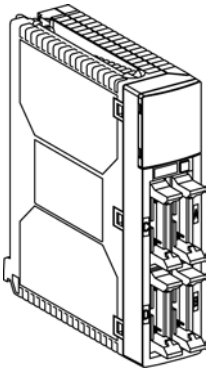
This chapter contains the following topics:

Topic	Page
Presentation of the TSX DSY 64T2K module	236
Characteristics of the TSX DSY 64T2K positive logic module	237
Connecting the TSX DSY 64T2K module	240

Presentation of the TSX DSY 64T2K module

General

The TSX DSY 64T2K module



The TSX DSY 64T2K module is a 64-channel connector Discrete transistor output module for direct current.

Characteristics of the TSX DSY 64T2K positive logic module

At a Glance

This section provides a description of the general characteristics of the TSX DSY 64T2K module.

General Characteristics

The following table shows the general characteristics of the TSX DSY 64T2K module:

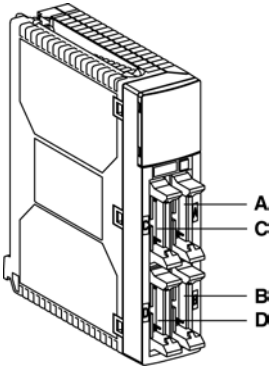
The TSX DSY 64T2K module		24 VDC positive logic transistor outputs
Nominal values	Voltage	24 VDC
	Current	0.1 A
Threshold values (1)	Voltage (including ripple)	19..30 V (34 V possible for 1 hour every 24 hours))
	Current/channel	0.125 A
	Current/module	5 A
Power of tungsten filament lamp	Maximum	1.2 W
Wetting Current	at 0	< 0.1 mA (for U = 30 V)
Voltage drop	at 1	< 1.5 V (for I = 0.1 A)
Load impedance	minimum	220 Ohms
Response time (2)		1.2 ms
Frequency of switching to inductive load		0.5 / LI^2 Hz
Paralleling of outputs		Yes (maximum of 3)
Compatibility with IEC 1131-2 DC inputs		Yes (type 1 and type 2)
Built-in protection	against over-voltage	Yes, by Transil diode
	against inversions	Yes, by inverted diode (3)
	against short-circuits and overloads	Yes, by current limiter and electric circuit-breaker 0.125 A < Id < 0.185 A
Pre-actuator voltage check threshold	OK	> 18 V
	Fault	< 14 V
Check response time	on appearance	T < 4 ms
	on disappearance	T < 30 ms
5 V consumption	typical	135 mA
	maximum	175 mA
24 V pre-actuator consumption (4)	typical	60 mA
	maximum	80 mA
Dissipated power (5)		2.4 W + (0.1 x Nb) W
Dielectric rigidity	Output / ground or Output / internal logic	1500 V actual, 50 / 60 Hz for 1 min
Resistance of insulation		> 10 MOhms (below 500 VDC)
Insulation		Remote outputs
Temperature downgrading (see *p. 67*)		The characteristics at 60 °C are guaranteed for 60% of max. module current

Legend	
(1)	For U <= 30 V or 34 V.
(2)	All the outputs are equipped with fast electromagnet demagnetization circuits. Electromagnet discharge time < L/R
(3)	Fit a 2 A fuse to the +24 V pre-actuator supply (1 per connector).
(4)	Excluding load current.
(5)	Nb = number of outputs at 1.

Connecting the TSX DSY 64T2K module

At a Glance

The TSX DSY 64T2K module comprises 64 positive logic transistor output channels for direct current.

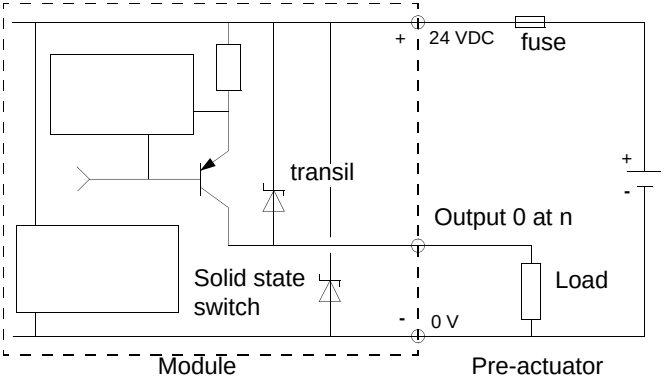


This module is fitted with 4 male HE10 connectors:

- connector A for outputs 0 to 15;
- connector B for outputs 16 to 31;
- connector C for outputs 32 to 47;
- connector D for outputs 48 to 63.

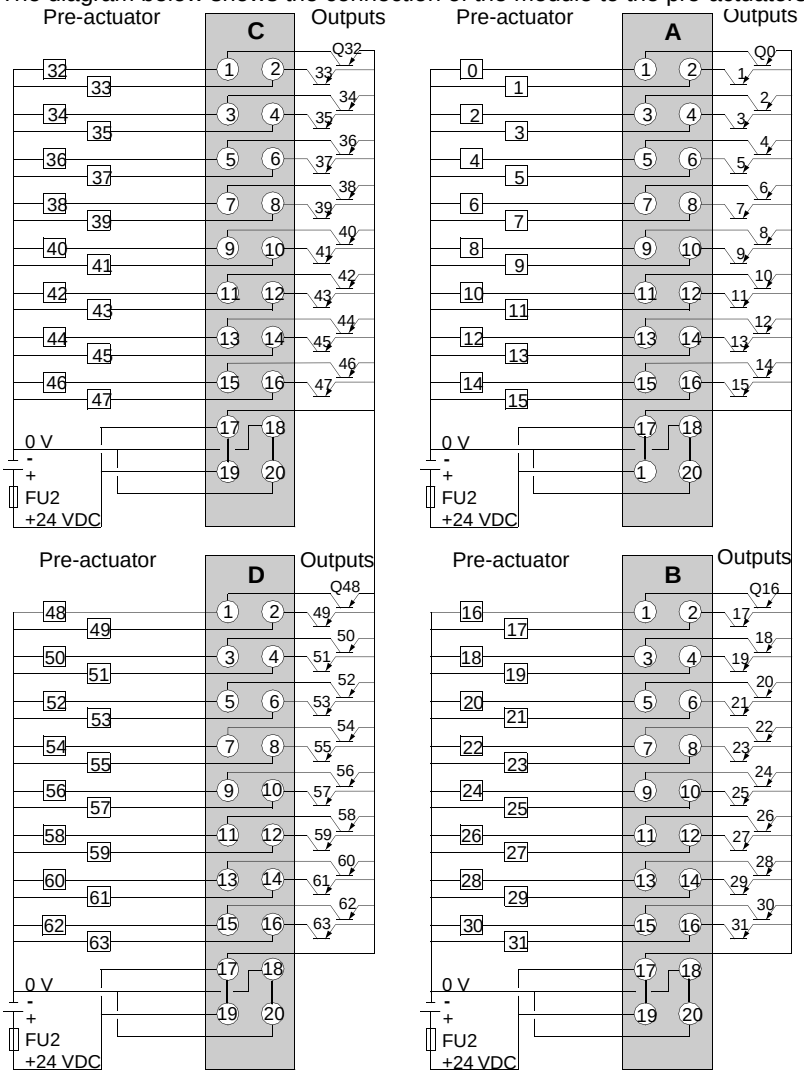
Circuit diagram

The circuit diagram for an output is shown below.



Module connection

The diagram below shows the connection of the module to the pre-actuators.



FU2 2 A quick-blow fuse.

Note: It is compulsory to connect:
- the + 24 VDC to terminals 17 and 19;
- the 0 V to terminals 18 and 20.

TSX DMY 28FK Discrete mixed I/O module

29

At a Glance

Overview

This chapter describes the TSX DMY 28FK module, its characteristics and its connection to the different sensors and pre-actuators.

What's in this Chapter?

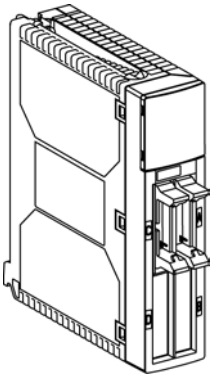
This chapter contains the following topics:

Topic	Page
Presentation of the TSX DMY 28FK module	244
Characteristics of the TSX DMY 28FK positive logic module	245
Connecting the TSX DMY 28FK module	248

Presentation of the TSX DMY 28FK module

General

The TSX DMY 28FK module



The TSX DMY 28FK is a Discrete mixed I/O module with both 16 x 24 VDC fast input connector channels and 12 x 24 VDC transistor output channels.

This module's inputs have the following specific functions:

- programmable filtering: inputs are equipped with a filtering system which is programmable for each channel (see *Specific functions of Discrete modules: programmable input filtering, p. 109*);
- latching: allows particularly short pulses with a duration lower than the PLC cycle time to be taken into account (see *Specific functions of Discrete modules: input latching, p. 110*);
- event inputs: allows events to be taken into account and processed immediately (see *Specific functions of Discrete modules: input event management, p. 112*).

Characteristics of the TSX DMY 28FK positive logic module

At a Glance

This section provides a description of the general characteristics of the TSX DMY 28FK mixed I/O module with EH10 connectors.

General Characteristics

The following table shows the general characteristics of the TSX DMY 28FK module inputs:

The TSX DMY 28FK module			24 VDC positive logic fast inputs
Nominal input values		Voltage	24 VDC
		Current	3.5 mA
Threshold input values	at 1	Voltage	>= 11 V
		Current	>= 3 mA
	at 0	Voltage	<= 5 V
		Current	<= 1.5 mA
	Sensor supply (including ripple)		19..30 V (possibly up to 34 V, limited to 1 hour every 24 hours)
Input impedance	at nominal U		6.3 kOhms
Response Time	by default		4 ms
	configurable filtering		0.1..7.5 ms (in 0.5 ms steps)
IEC 1131-2 compliance			type 1
2 wire / 3 wire proximity sensor compatibility (see *p. 43*)			IEC 947-5-2
Dielectric rigidity	Input / ground or Input / internal logic		1500 V actual, 50 / 60 Hz for 1 min
Resistance of insulation			> 10 MOhms (below 500 VDC)
Insulation			Remote inputs
Input type			current sink
Paralleling of inputs (1)			yes
Sensor voltage check threshold	OK		> 18 V
	Fault		< 14 V
Check response time	on appearance		8 ms < T < 30 ms
	on disappearance		1 ms < T < 3 ms
5 V consumption	typical		300 mA
	maximum		350 mA
Sensor supply consumption (2)	typical		20 mA + (3.5 x Nb) mA
	maximum		30 mA + (3.5 x Nb) mA
Dissipated power (2)			1.2 W + (0.1 x Nb) W
Temperature downgrading (see *p. 67*)			The characteristics at 60° are guaranteed for 60% of inputs set to 1
Legend			
(1)	This characteristic is used to connect several inputs to the same module in parallel, or to different modules for input redundancy.		
(2)	Nb = number of channels at 1.		

General Characteristics

The following table shows the general characteristics of the TSX DMY 28FK module outputs:

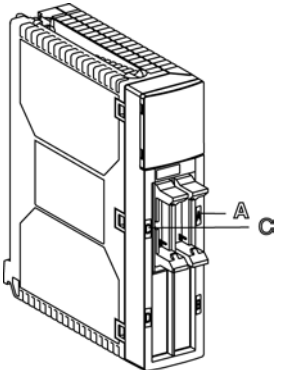
The TSX DMY 28FK module		24 VDC positive logic transistor outputs
Nominal values	Voltage	24 VDC
	Current	0.5 A
Threshold values (1)	Voltage (including ripple)	19..30 V (34 V possible for 1 hour every 24 hours))
	Current/channel	0.625 A
	Current/module	4 A
Power of tungsten filament lamp	Maximum	6 W
Wetting Current	at 0	<1 mA
Voltage drop	at 1	< 1.2 V
Load impedance	minimum	48 Ohms
Response time (2)		0.6 ms
Frequency of switching to inductive load		0.5 / LI^2 Hz
Paralleling of outputs		Yes (maximum of 2)
Compatibility with IEC 1131-2 DC inputs		Yes (type 1 and type 2)
Built-in protection	against over-voltage	Yes, by Transil diode
	against inversions	Yes, by inverted diode (3)
	against short-circuits and overloads	Yes, by current limiter and electric circuit-breaker 1.5 In < Id < 2 In
Pre-actuator voltage check threshold	OK	> 18 V
	Fault	< 14 V
Check response time	on appearance	T < 4 ms
	on disappearance	T < 30 ms
24 V pre-actuator consumption (4)	typical	30 mA
	maximum	40 mA
Dissipated power (5)		1 W + (0.75 x Nb) W
Dielectric rigidity	Output / ground or Output / internal logic	1500 V actual, 50 / 60 Hz for 1 min
Resistance of insulation		> 10 MOhms (below 500 VDC)
Insulation		Remote outputs
Temperature downgrading (see *p. 67*)		The characteristics at 60 °C are guaranteed for 60% of max. module current

Legend	
(1)	For U <= 30 V or 34 V.
(2)	All the outputs are equipped with fast electromagnet demagnetization circuits. Electromagnet discharge time < L/R
(3)	Fit a fuse to the +24 V pre-actuator supply.
(4)	Excluding load current.
(5)	Nb = number of outputs at 1.

Connecting the TSX DMY 28FK module

At a Glance

The TSX DMY 28FK mixed I/O module comprises 16 x 24 VDC fast input channels and 12 x 24 VDC/ 0.5A output channels.

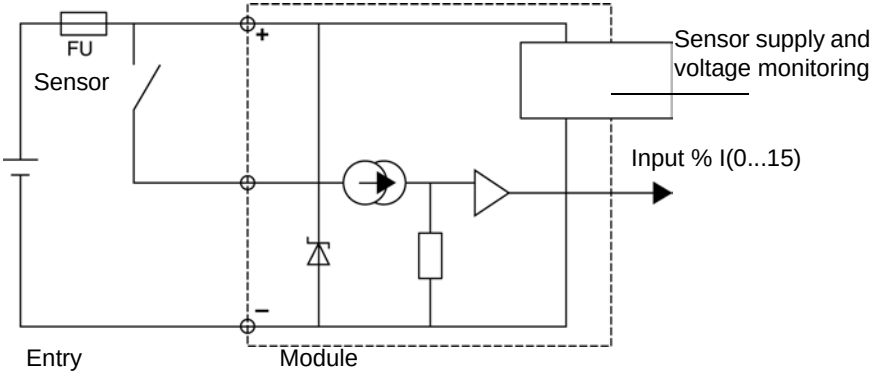


This module is fitted with 2 male HE10 connectors:

- Connector A reserved for inputs (addresses 0 to 15);
- Connector C reserved for outputs (addresses 16 to 27).

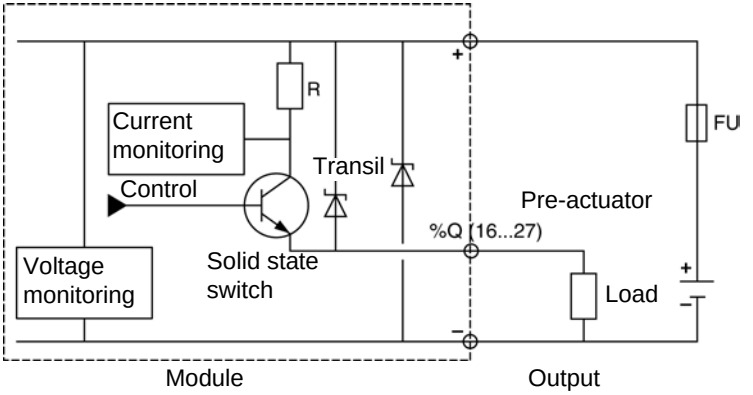
Circuit Diagram

The circuit diagram for an input is shown below.



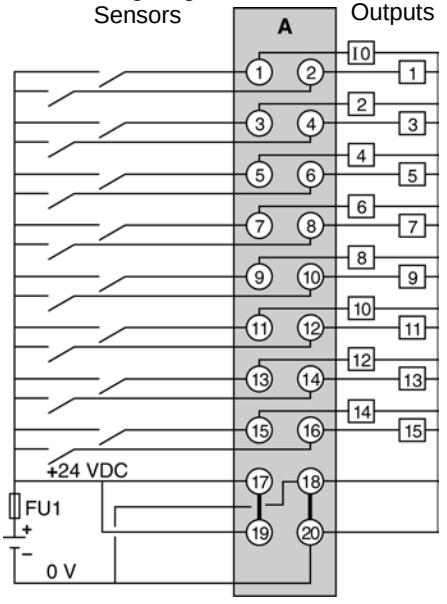
Circuit Diagram

The circuit diagram for an output is shown below.



Module connection

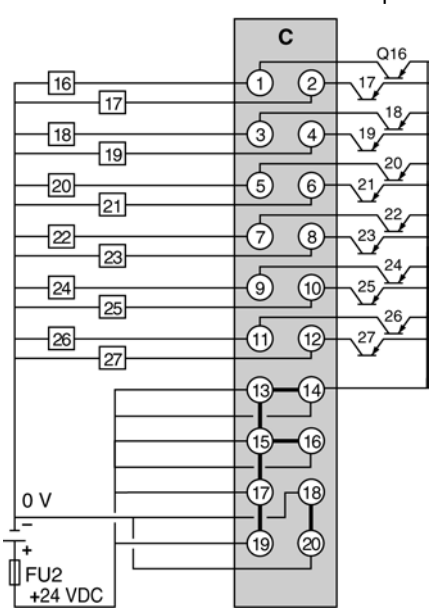
The following diagram shows the connection of the module to the sensors.



FU1 0.5 A quick-blow fuse.

Module connection

The diagram below shows the connection of the module to the pre-actuators.



FU2 10 A quick-blow fuse.

TSX DMY 28RFK Discrete mixed I/O module

30

At a Glance

Overview

This chapter describes the TSX DMY 28RFK module, its characteristics and its connection to the different sensors and pre-actuators.

What's in this Chapter?

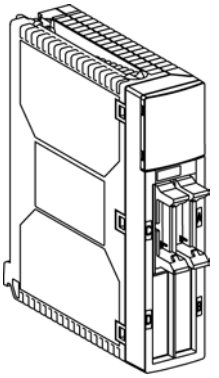
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Specific functions of the TSX DMY 28RFK module: reflex and timing	253
Characteristics of the TSX DMY 28RFK positive logic module	254
Connecting the TSX DMY 28RFK module	258

Presentation of the TSX DMY 28RFK module

General

The TSX DMY 28RFK module



The TSX DMY 28RFK is a Discrete mixed I/O module with both 16 x 24 VDC fast input connector channels and 12 x 24 VDC transistor output channels.

This module's inputs have the following specific functions:

- programmable filtering: inputs are equipped with a filtering system which is programmable for each channel (see *Specific functions of Discrete modules: programmable input filtering, p. 109*);
- reflex and timing: for applications requiring a faster response time than the FAST task or event processing (< 500 micros) (see *Specific functions of the TSX DMY 28RFK module: reflex and timing, p. 253*).

Specific functions of the TSX DMY 28RFK module: reflex and timing

At a Glance

The reflex and timing functions of the TSX DMY 28RFK module allow it to be used for applications requiring a faster response time than that of the **FAST** task or event processing (< 500 micros).

Description

Reflex and timing functions allow those PLC functions that are executed on the module and disconnected from the PLC task to be performed, by using the following as input variables:

- physical module inputs;
- module output commands;
- module or channel error data;
- physical module output statuses.

These functions are programmed using the PL7 software. (See Manual Premium PLC applications volume 1)

Characteristics of the TSX DMY 28RFK positive logic module

At a Glance

This section provides a description of the general characteristics of the TSX DMY 28RFK mixed I/O module with EH10 connectors.

General Characteristics

The following table shows the general characteristics of the TSX DMY 28RFK module inputs:

The TSX DMY 28RFK module			24 VDC positive logic fast inputs
Nominal input values		Voltage	24 VDC
		Current	3.5 mA
Threshold input values	at 1	Voltage	>= 11 V
		Current	>= 3 mA
	at 0	Voltage	<= 5 V
		Current	<= 1.5 mA
	Sensor supply (including ripple)		19..30 V (possibly up to 34 V, limited to 1 hour every 24 hours)
Input impedance	at nominal U		6.3 kOhms
Response Time	by default		4 ms
	configurable filtering		0.1..7.5 ms (in 0.5 ms steps)
IEC 1131-2 compliance			type 1
2 wire / 3 wire proximity sensor compatibility (see *p. 43*)			IEC 947-5-2
Dielectric rigidity	Input / ground or Input / internal logic		1500 V actual, 50 / 60 Hz for 1 min
Resistance of insulation			> 10 MOhms (below 500 VDC)
Insulation			Remote inputs
Input type			current sink
Paralleling of inputs (1)			yes
Sensor voltage check threshold	OK		> 18 V
	Fault		< 14 V
Check response time	on appearance		8 ms < T < 30 ms
	on disappearance		1 ms < T < 3 ms
5 V consumption	typical		300 mA
	maximum		350 mA
Sensor supply consumption (2)	typical		20 mA + (3.5 x Nb) mA
	maximum		30 mA + (3.5 x Nb) mA
Dissipated power (2)			1.2 W + (0.1 x Nb) W
Temperature downgrading (see *p. 67*)			The characteristics at 60° are guaranteed for 60% of inputs set to 1
Legend			
(1)	This characteristic is used to connect several inputs to the same module in parallel, or to different modules for input redundancy.		
(2)	Nb = number of channels at 1.		

General Characteristics

The following table shows the general characteristics of the TSX DMY 28RFK module outputs:

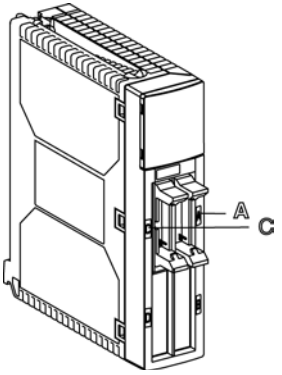
The TSX DMY 28RFK module		24 VDC positive logic transistor outputs
Nominal values	Voltage	24 VDC
	Current	0.5 A
Threshold values (1)	Voltage (including ripple)	19..30 V (34 V possible for 1 hour every 24 hours))
	Current/channel	0.625 A
	Current/module	4 A
Power of tungsten filament lamp	Maximum	6 W
Wetting Current	at 0	<1 mA
Voltage drop	at 1	< 1.2 V
Load impedance	minimum	48 Ohms
Response time (2)		0.6 ms
Frequency of switching to inductive load		0.5 / LI^2 Hz
Paralleling of outputs		Yes (maximum of 2)
Compatibility with IEC 1131-2 DC inputs		Yes (type 1 and type 2)
Built-in protection	against over-voltage	Yes, by Transil diode
	against inversions	Yes, by inverted diode (3)
	against short-circuits and overloads	Yes, by current limiter and electric circuit-breaker 1.5 In < Id < 2 In
Pre-actuator voltage check threshold	OK	> 18 V
	Fault	< 14 V
Check response time	on appearance	T < 4 ms
	on disappearance	T < 30 ms
24 V pre-actuator consumption (4)	typical	40 mA
	maximum	60 mA
Dissipated power (5)		1 W + (0.75 x Nb) W
Dielectric rigidity	Output / ground or Output / internal logic	1500 V actual, 50 / 60 Hz for 1 min
Resistance of insulation		> 10 MOhms (below 500 VDC)
Insulation		Remote outputs
Temperature downgrading (see *p. 67*)		The characteristics at 60 °C are guaranteed for 60% of max. module current

Legend	
(1)	For U <= 30 V or 34 V.
(2)	All the outputs are equipped with fast electromagnet demagnetization circuits. Electromagnet discharge time < L/R
(3)	Fit a fuse to the +24 V pre-actuator supply.
(4)	Excluding load current.
(5)	Nb = number of outputs at 1.

Connecting the TSX DMY 28RFK module

At a Glance

The TSX DMY 28RFK mixed I/O module comprises 16 x 24 VDC fast input channels and 12 x 24 VDC / 0.5 A output channels.

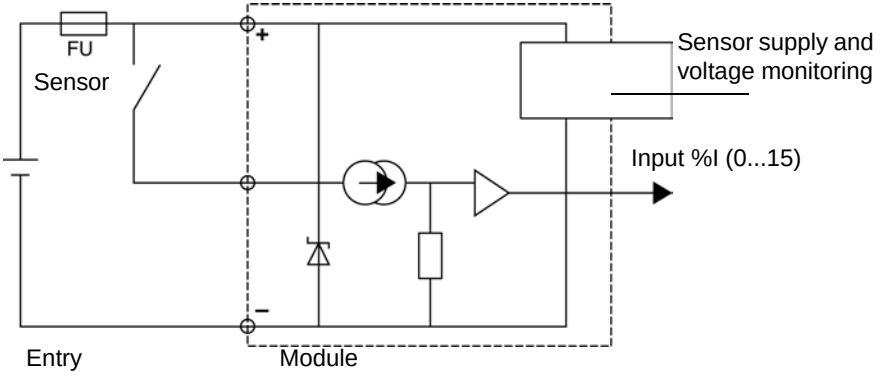


This module is fitted with 2 male HE10 connectors:

- Connector A reserved for inputs (addresses 0 to 15);
- Connector C reserved for outputs (addresses 16 to 27).

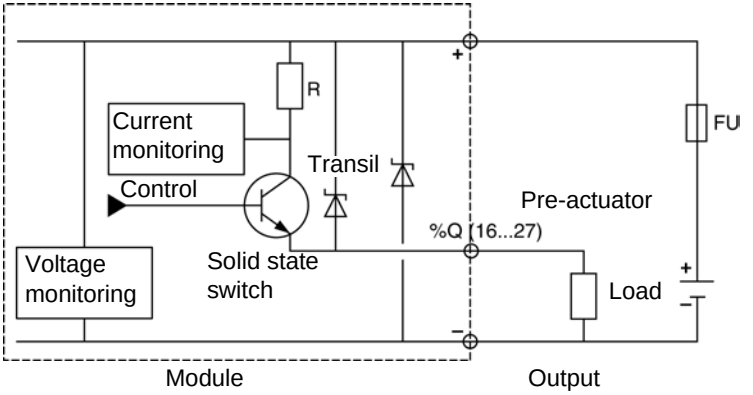
Circuit Diagram

The circuit diagram for an input is shown below.



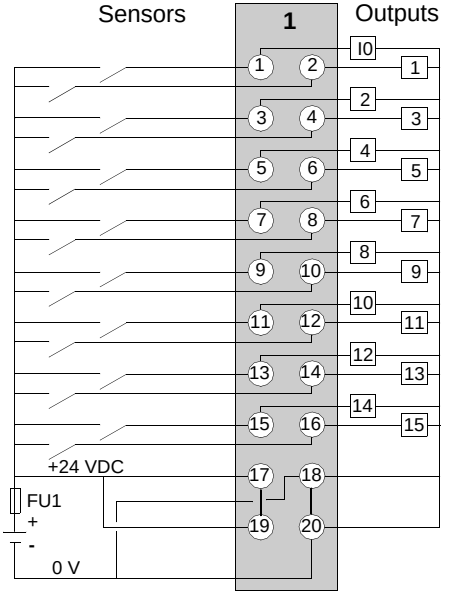
Circuit Diagram

The circuit diagram for an output is shown below.



Module connection

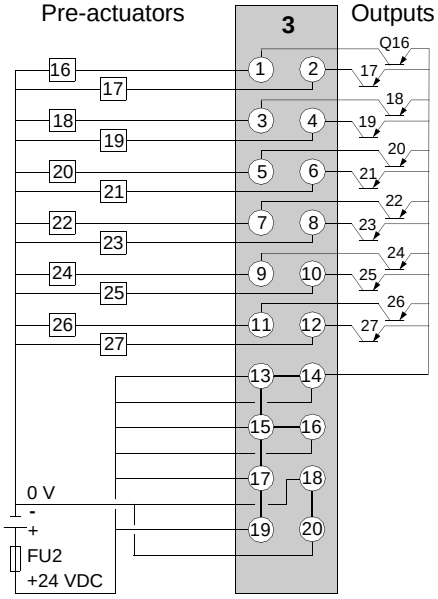
The following diagram shows the connection of the module to the sensors.



FU1 0.5 A quick-blow fuse.

Module connection

The diagram below shows the connection of the module to the pre-actuators.



FU2 10 A quick-blow fuse.

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

31

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:

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31.2	Connection principles for the TELEFAST 2 interfaces for discrete I/O	274
31.3	TELEFAST 2 ABE-7H08R10/08R11 and ABE-7H16R10/16R11 connection bases	280
31.4	TELEFAST 2 ABE-7H12R10/12R11 connection bases	282
31.5	TELEFAST 2 ABE-7H08R21 and ABE-7H16R20/16R21/16R23 connection bases	284
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31.8	TELEFAST 2 ABE-7H12S21 connection base	290
31.9	TELEFAST 2 ABE-7H16R30/16R31 connection bases	292
31.10	TELEFAST 2 ABE-7H12R50 connection base	294
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31.18	TELEFAST 2 ABE-7S16S2BO/S2B2 connection bases	319
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31.29	TELEFAST 2 ABE-7R16T370 connection base	344
31.30	TELEFAST 2 ABE-7P16T334 connection base	346
31.31	TELEFAST 2 ABE-7P16T318 connection base	348
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31.33	TELEFAST 2 ABE-7P16F312 connection base	351
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31.1 Introduction to the TELEFAST 2 connection interfaces for discrete I/O

At a Glance

Aim of this section

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

What's in this Section?

This section contains the following topics:

Topic	Page
General overview of TELEFAST 2 connection interfaces for discrete I/O modules	264
Catalogue of TELEFAST 2 connection bases	265
Combination of Premium I/O modules and TELEFAST 2 connection bases	272

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.

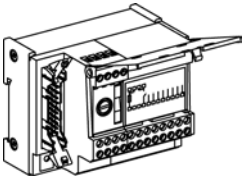
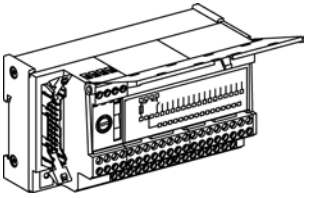
Catalogue of TELEFAST 2 connection bases

At a Glance

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

Catalog

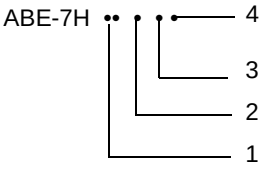
The table below shows the catalog of connection interface bases for discrete I/Os, 8/12/16 channels.

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:



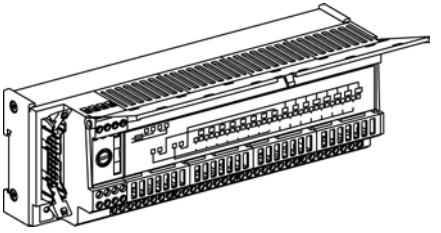
Description

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.

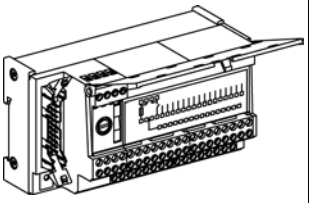
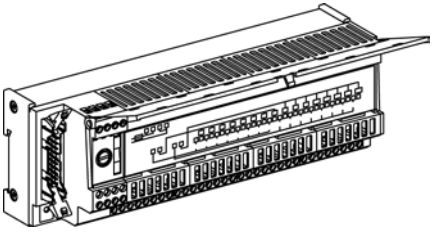
Number	Description
1	**08** = 8-channel base **12** = 12-channel base **16** = 16-channel base
2	Primary function: ● **R** = simple connection; ● **S** = isolator/channel; ● **F** = fuse/channel.
3	**1** = with 1 screw terminal per channel on 1 level **2** = with 2 screw terminals per channel on 2 levels **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

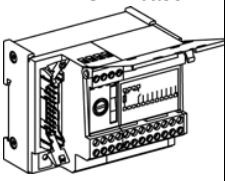
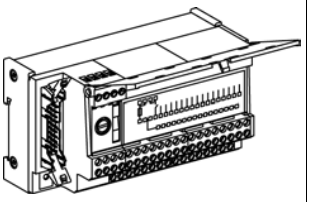
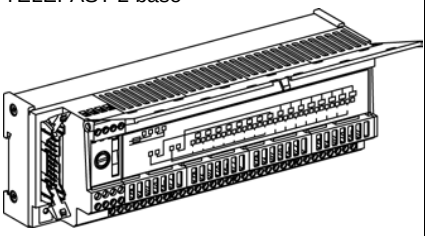
The table below shows the catalog of bases for connection and adaptation interfaces relating to inputs, 16 isolated channels.

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

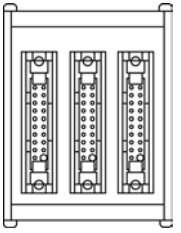
The table below shows the catalog of bases for connection and adaptation interfaces relating to static outputs, 8 and 16 channels.

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.

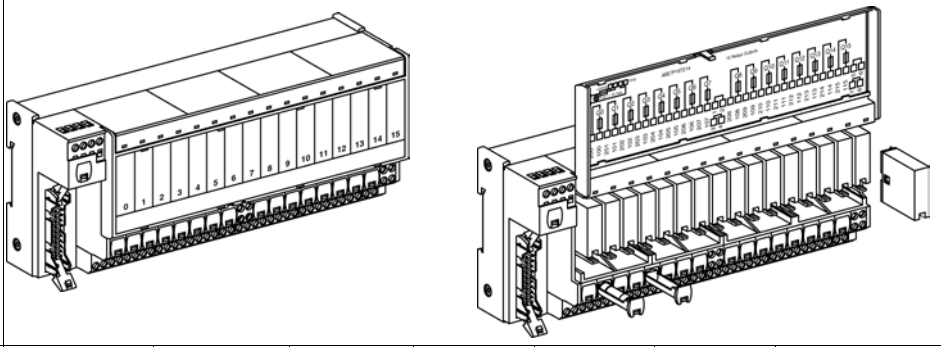
The table below shows the catalog of bases for connection and adaptation interfaces relating to relay outputs, 8 and 16 channels.

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.

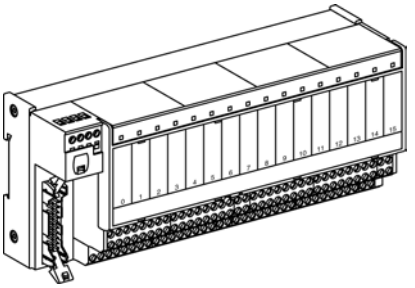
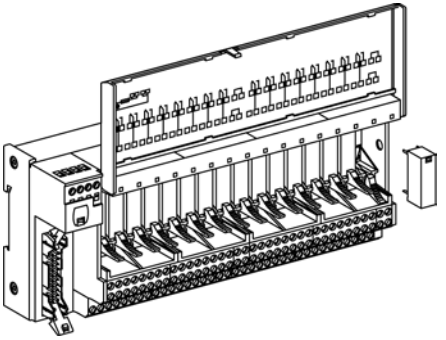
The table below displays the catalog entry showing the connection base for the adapter splitting 16 channels into 2 x 8 channels.

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.

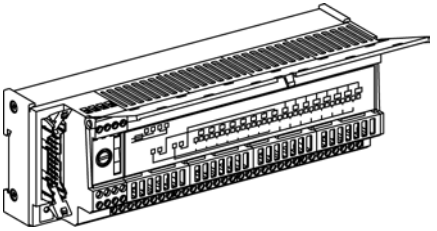
The table below shows the catalog of output adaptation interface bases with or without removable electromechanical or static relays, 16 channels.

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.

Combination of Premium I/O modules and TELEFAST 2 connection bases

At a Glance

The following shows the possible combinations of Discrete I/O modules and TELEFAST 2 connection bases.

Compatibility table

The following table summarizes compatibility between Discrete I/O modules and **TELEFAST 2** connection bases.

	TSX •• Discrete I/O modules and modularity							
	DEY 16FK	**DEY 32D2K DEY 64D2K**		**DEY 32D3K**	**DSY 32T2K DSY 64T2K**		**DMY 28FK DMY 28RFK**	
Modularity	**1 x 16 I**	**2 x 16 I**	**4 x 16 I**	**2 x 16 I**	**2 x 16 O**	**4 x 16 O**	**1 x 16 I**	**1 x 12 O**
Connection bases								
8 channels								
ABE-7H08R••	Yes (1)	Yes (1)	Yes (1)	-	Yes (1)	Yes (1)	Yes (1)	-
ABE-7H08S21	Yes (1)	Yes (1)	Yes (1)	-	Yes (1)	Yes (1)	Yes (1)	-
12 channels								
ABE-7H12R••	-	-	-	-	-	-	-	Yes
ABE-7H12S21	-	-	-	-	-	-	-	Yes
16 channels								
ABE-7H16R••	Yes	Yes	Yes	Yes (2)	Yes	Yes	Yes	-
ABE-7H16S21	Yes	Yes	Yes	-	Yes	Yes	Yes	-
ABE-7H16R23	Yes	Yes	Yes	-	-	-	Yes	-
ABE-7H16F43	-	-	-	-	Yes	Yes	-	-
ABE-7H16S43	Yes	Yes	Yes	-	-	-	Yes	-
Input adapter connection bases								
16 channels								
ABE-7S16E2••	Yes	Yes	Yes	-	-	-	Yes	-
ABE-7P16F3••	Yes	Yes	Yes	-	-	-	Yes	-
Output adapter connection bases								
8 channels								
ABE-7S08S2••	-	-	-	-	Yes (1)	Yes (1)	-	-
ABE-7R08S•••	-	-	-	-	Yes (1)	Yes (1)	-	-
16 channels								
ABE-7R16S•••	-	-	-	-	Yes	Yes	-	-
ABE-7R16T•••	-	-	-	-	Yes	Yes	-	-
ABE-7P16T•••	-	-	-	-	Yes	Yes	-	-
Legend								
(1)	With 16 to 2 x 8 channel adapter **ABE-7ACC02**.							
(2)	With **ABE-7H16R20** connection base only.							

31.2 Connection principles for the TELEFAST 2 interfaces for discrete I/O

At a Glance

Aim of this section

This section describes the connection principles for the TELEFAST 2 products for discrete input/output modules.

What's in this Section?

This section contains the following topics:

Topic	Page
Connecting a Discrete I/O module to a TELEFAST 2 base interface	275
Dimensions and mounting of the TELEFAST 2 connection bases	277

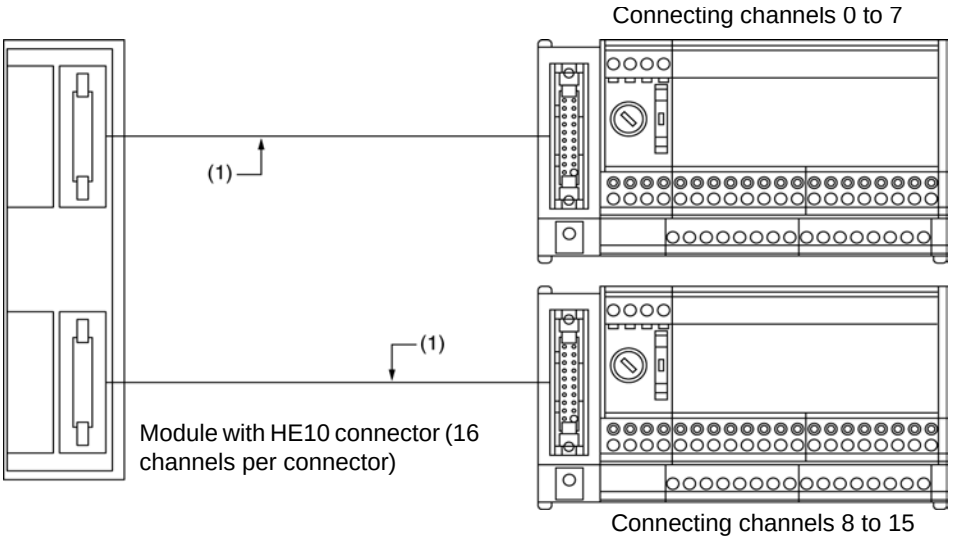
Connecting a Discrete I/O module to a TELEFAST 2 base interface

At a Glance

A multi-strand sheathed ribbon cable or connection cable (see *Ways of connecting discrete I/O modules: connecting modules to TELEFAST interfaces using an HE10 connector, p. 41*) is used to connect a Discrete I/O module with a HE10 connector to the TELEFAST 2 connection base.

Illustration

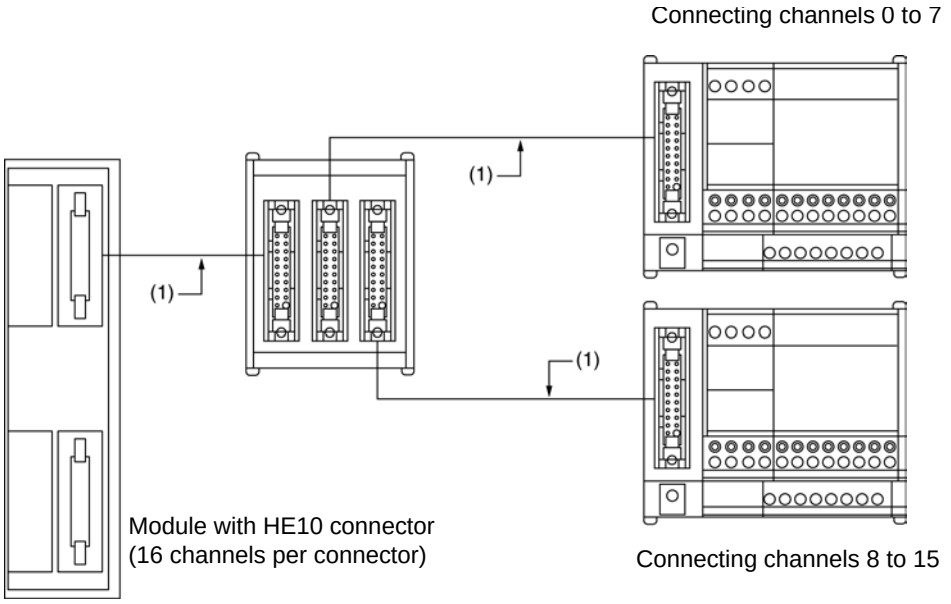
The following diagram shows the connection of a Discrete I/O module with an HE10 connector to a TELEFAST 2. connection base.



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

Illustration

The following diagram shows an example specific to the connection of 16 channels in 2 x 8 channel groups via the ABE-7ACC02 adapter base.



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

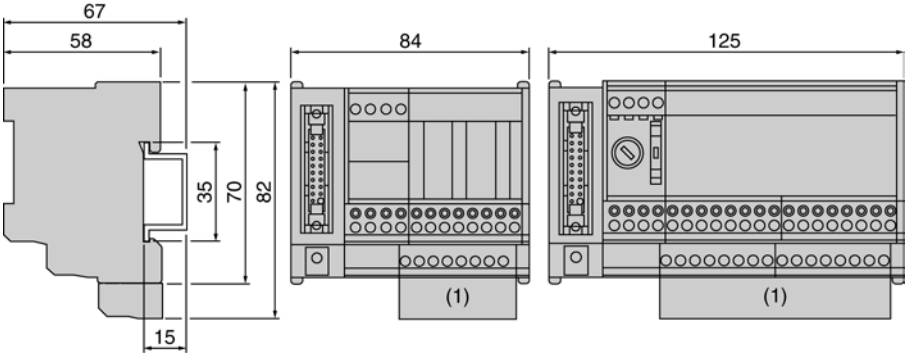
Dimensions and mounting of the TELEFAST 2 connection bases

At a Glance

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

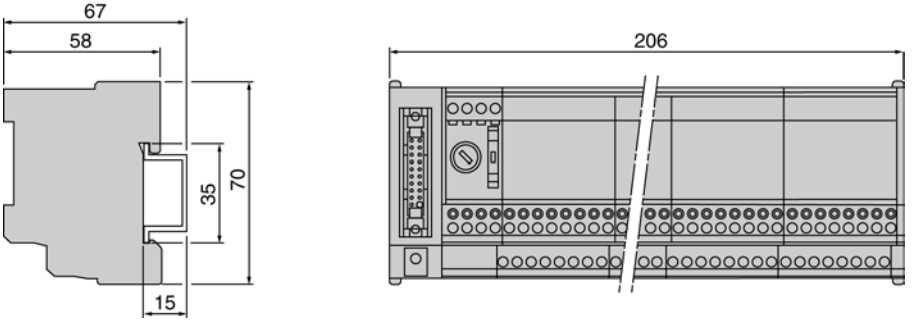
Illustration

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.

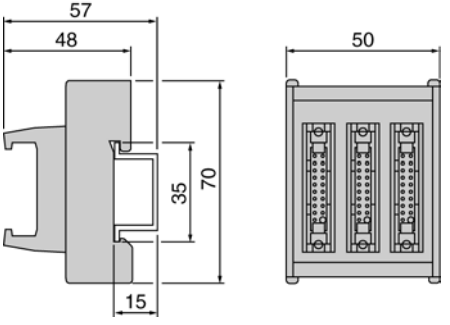


(1) Dimension with additional shunt terminal block ABE-7BV20 or ABE-7BV10.

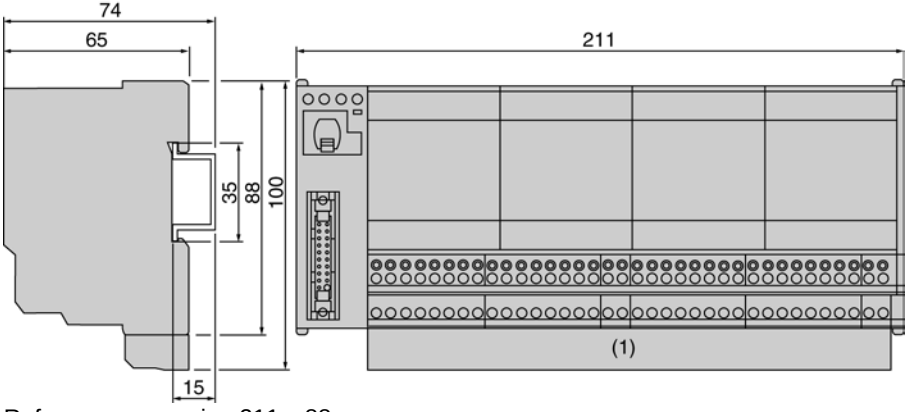
The illustration below shows the dimensions of the products: ABE-7H16S43, ABE-7S16E2••, ABE-7S08S2B1, ABE-7S16S2B•, ABE-7H16F43•, ABE-7R16S21.



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



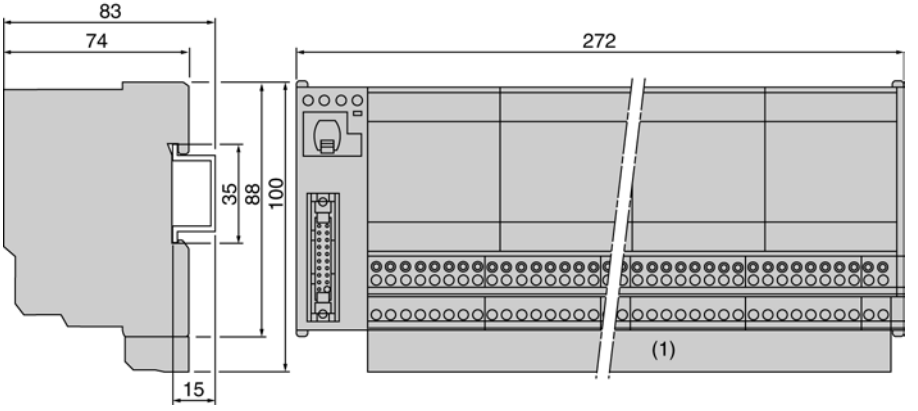
The illustration below shows the dimensions of the products: ABE-7R16T2••, ABE-7P16T2••.



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.

31.3 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.

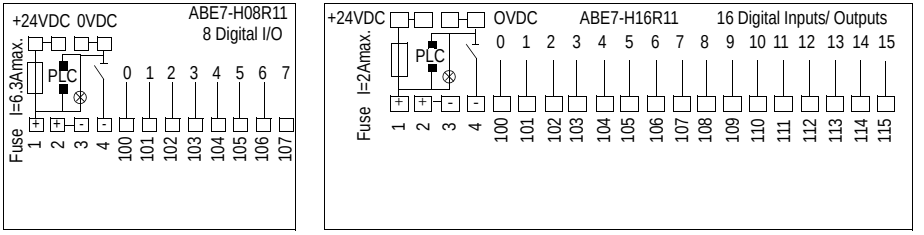
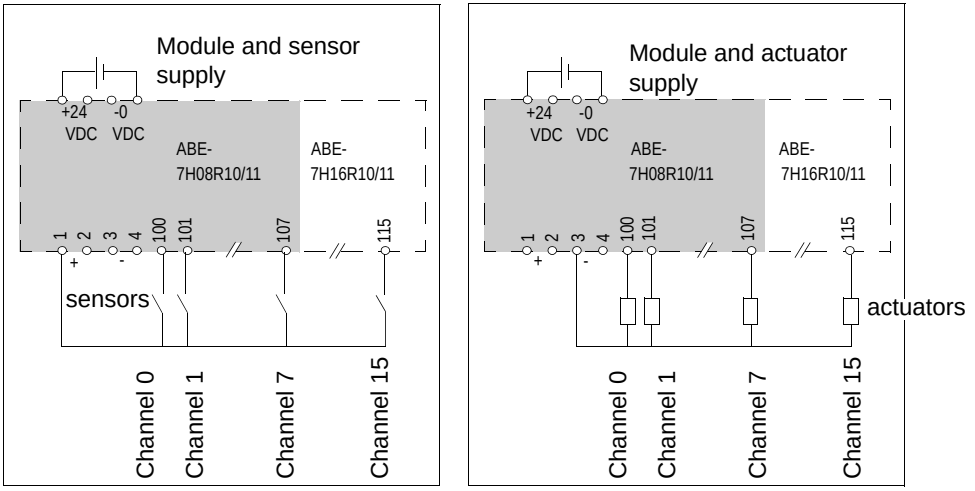


Illustration Connections for input and output functions.



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).

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

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

At a Glance

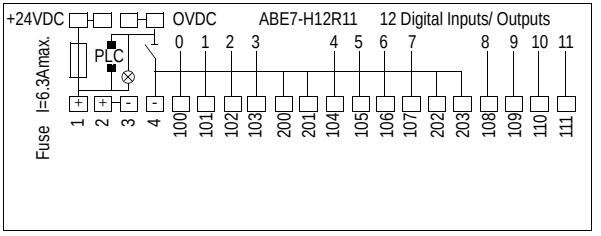
This is an overview of the sensor and actuator connections on TELEFAST 2 bases.

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.

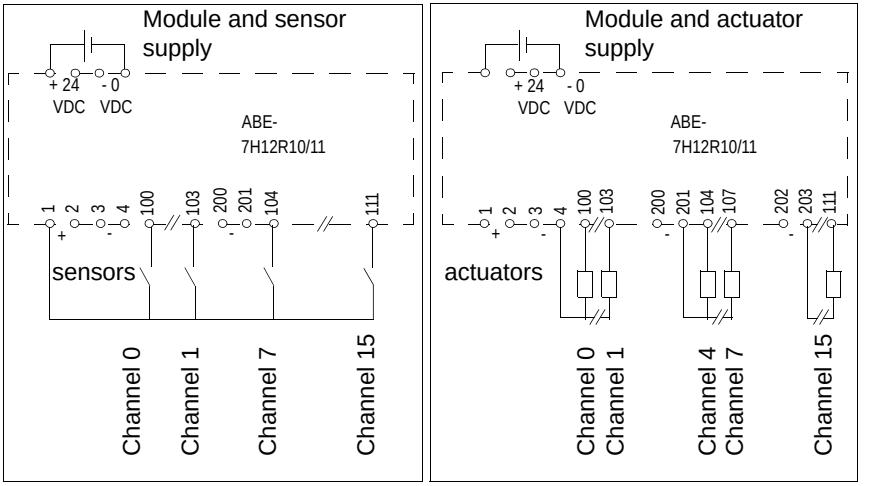
Illustration

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).

31.5 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

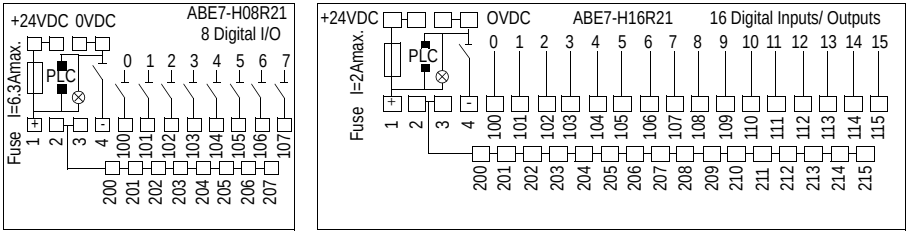
This is an overview of the sensor and actuator connections on TELEFAST 2 bases.

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.

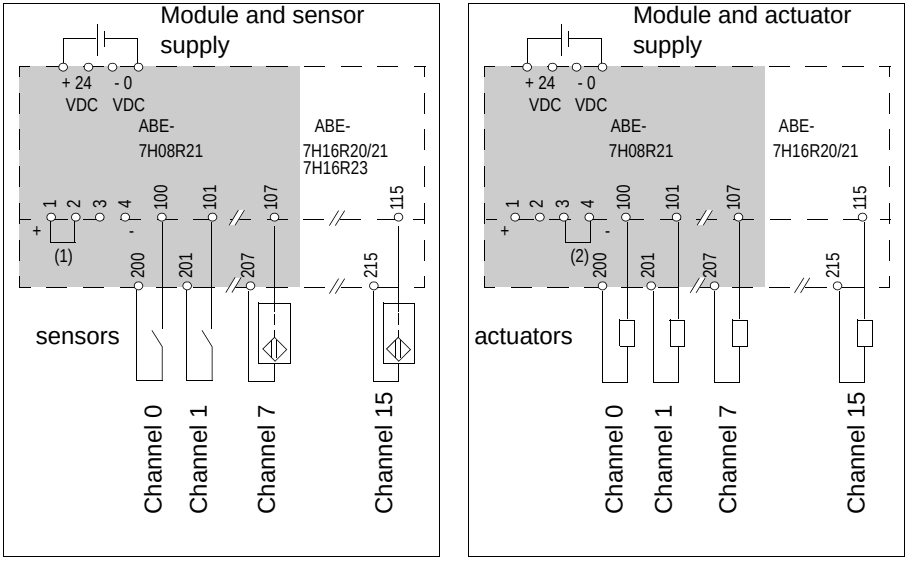
Illustration

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).

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

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

At a Glance

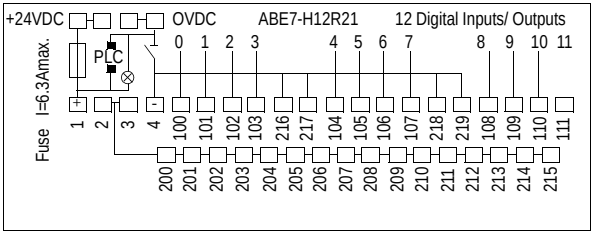
This is an overview of the sensor and actuator connections on TELEFAST 2 bases.

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.

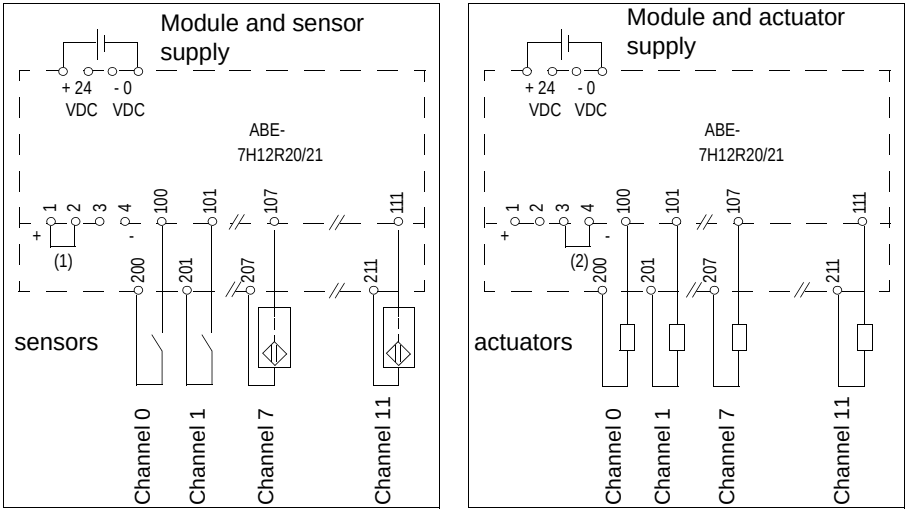
Illustration

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.

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

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

At a Glance

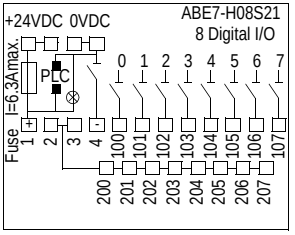
This is an overview of the sensor and actuator connections on TELEFAST 2 bases.

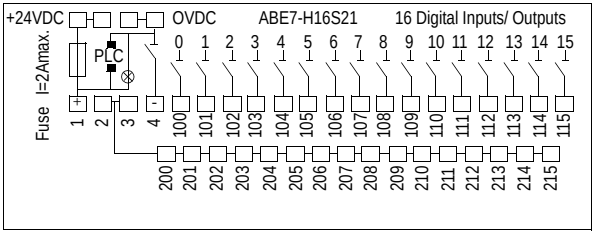
Note: The bases are originally equipped with a general-purpose, fast-blow fuse rated 2 A. To guarantee optimum protection, this fuse should be rated according to the application (connection to input or output functions) and the maximum current allowable in the base.
Type and rating of fuse to be fitted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

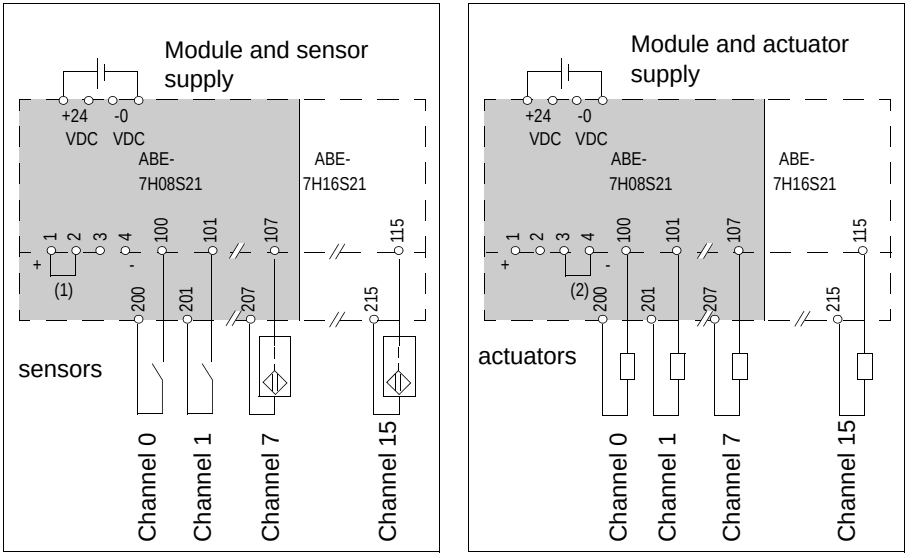
Description of the connection terminal blocks.





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).

31.8 TELEFAST 2 ABE-7H12S21 connection base

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

At a Glance

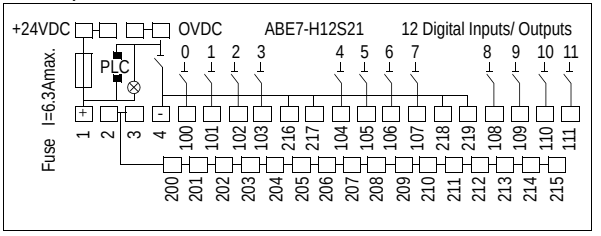
This is an overview of the sensor and actuator connections on the TELEFAST 2 base.

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.

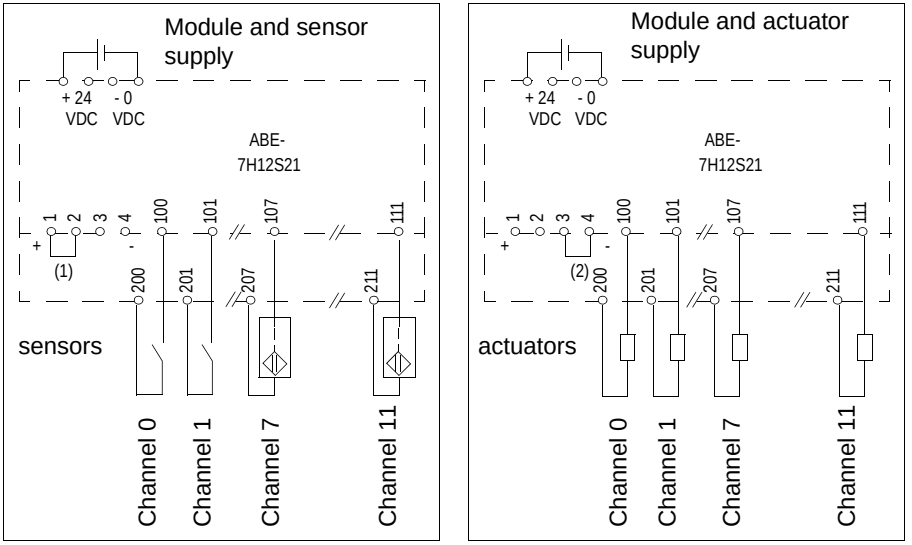
Illustration

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.

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

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

At a Glance

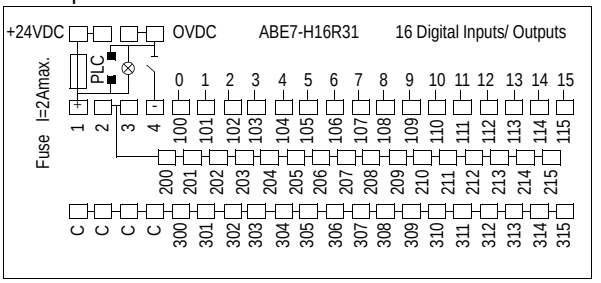
This is an overview of the sensor connections on TELEFAST 2 bases.

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.

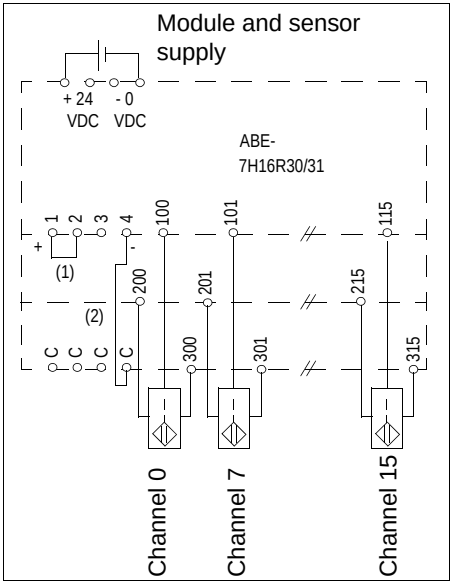
Illustration

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.

31.10 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.

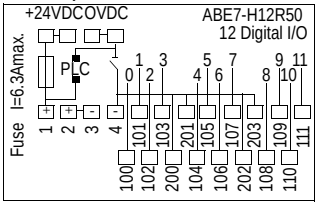
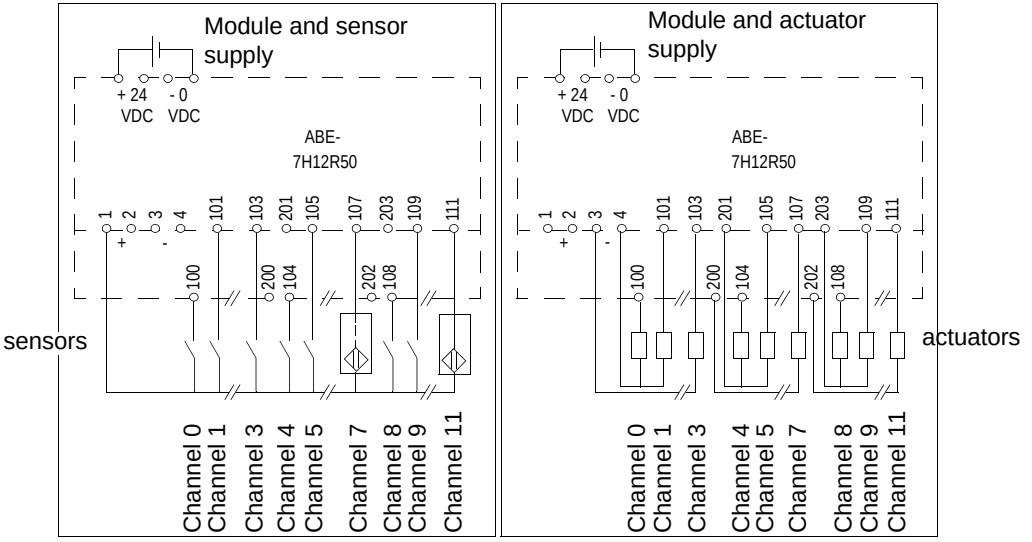


Illustration Connections for input and output functions.



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).

31.11 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.

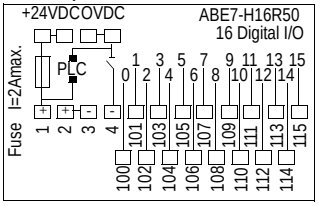
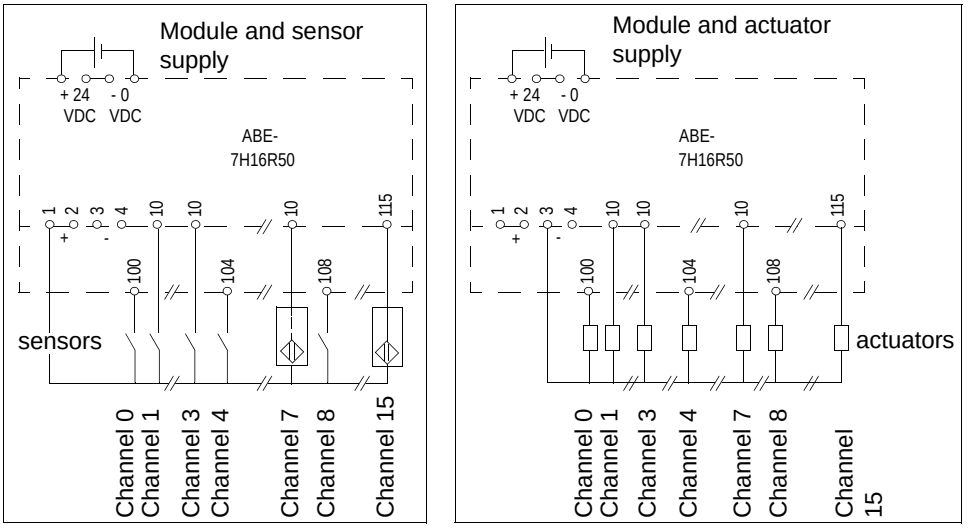


Illustration Connections for input and output functions.



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).

31.12 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.

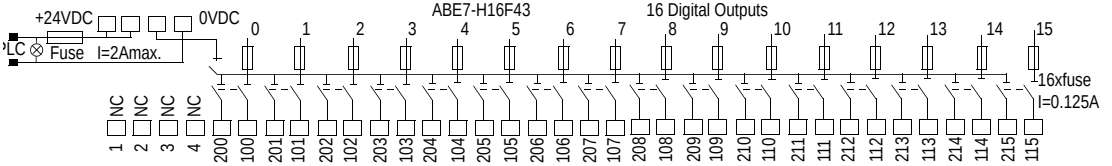
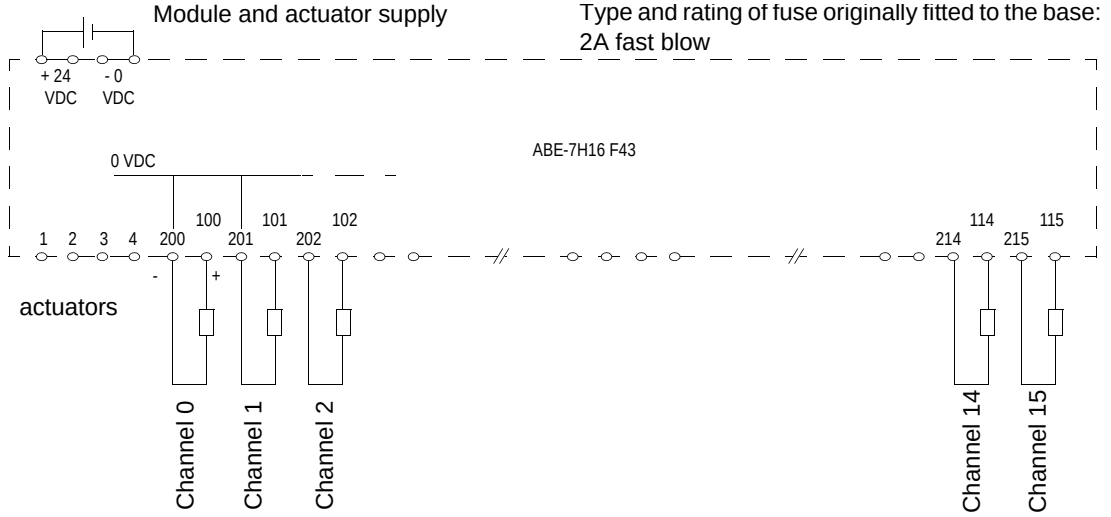


Illustration Output connection functions.



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.

31.13 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.

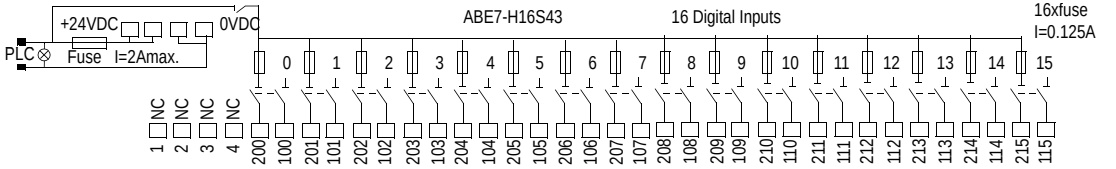
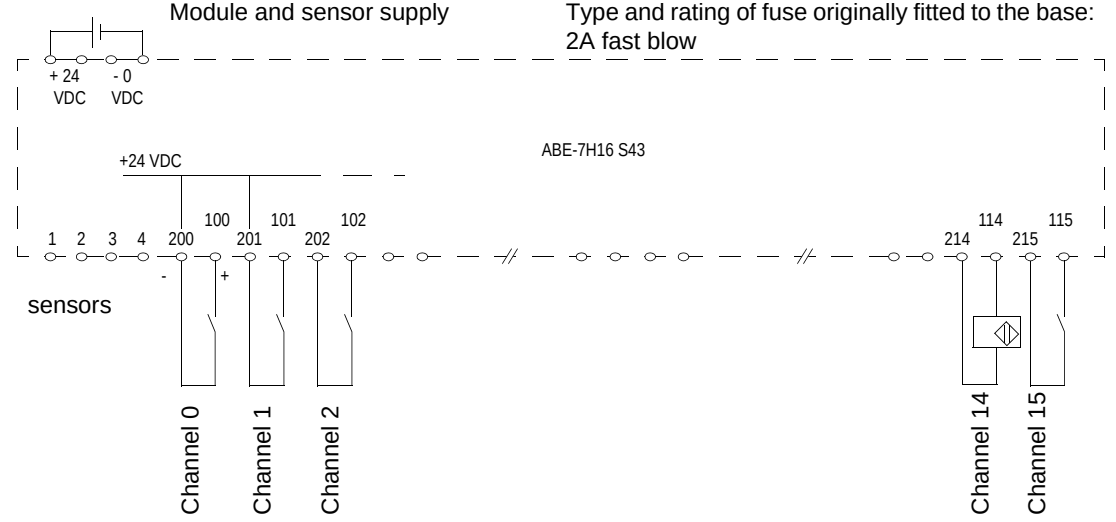


Illustration Input function connections.



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.

31.14 TELEFAST 2 ABE-7R08S111/16S111 connection bases

At a Glance

Aim of this section

This section introduces the TELEFAST 2 ABE-7R08S111/16S111 connection bases.

What's in this Section?

This section contains the following topics:

Topic	Page
Actuator connections on non removable relay output adaptation bases ABE-7R08S111/16S111.	301
Characteristics of non removable relay output adaptation bases ABE-7R08S111/16S111.	303

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

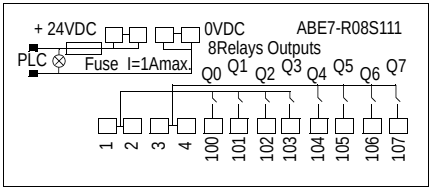
At a Glance

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.



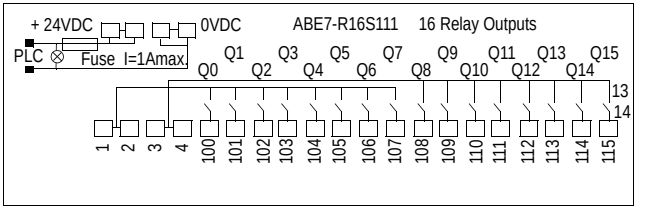
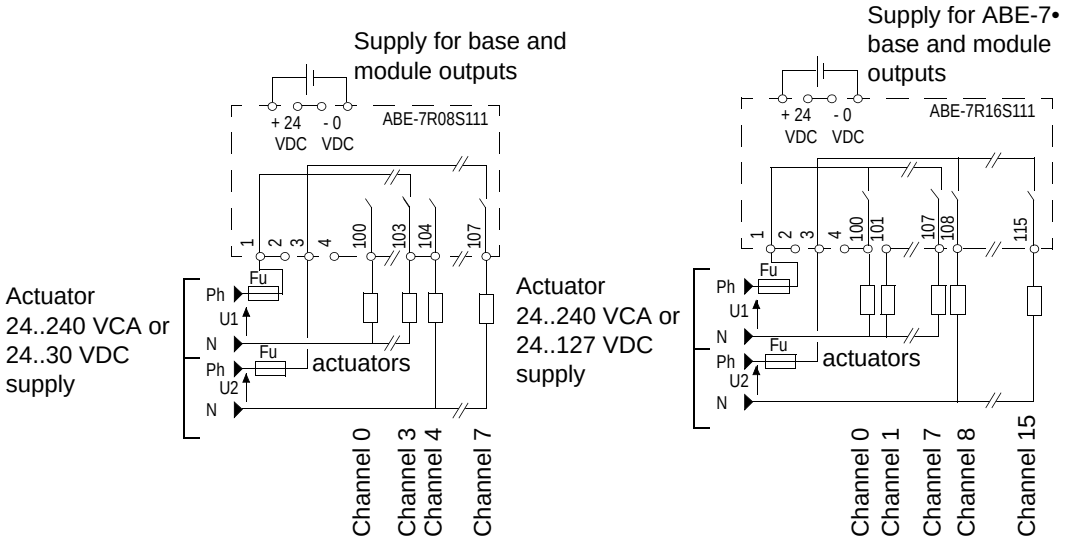


Illustration Output connection functions.



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

Base types			**ABE-7R08S111**	**ABE-7R16S111**
Channel number			8	16
Contact characterisitics				
Job limit voltage		Alternating	250 V	
		Direct	30 V	
Thermal current			3 A	
Alternating current load	Resistive, load AC12	Voltage	230 VAC	
		Current (1)	0.6 A	
	Inductive, load AC15	Voltage	230 VAC	
		Current (1)	0.4 A	
Direct current load	Resistive, load DC12	Voltage	24 VDC	
		Current (1)	0.6 A	
	Inductive, load DC13 (2)	Voltage	24 VDC	
		Current (1)	0.2 A	
Minimum switching		Current	1 mA	
		Voltage	5 V	
Response time		State 0 to 1	10 ms	
		State 1 to 0	6 ms	
Maximum speed of function loading			0.5 Hz	
Built-in protection measures	Against overloads and short-circuits:		None, provide one rapid fusion fuse per channel or group of channels.	
	Against alternating current inductive overcharging		None, each RC circuit or MOV (ZNO) suppressor, must be mounted on the posts of each pre-actuator appropriate to the voltage.	
	Against direct current inductive overcharging		none, each discharge diode must be mounted on the posts of each pre-actuator.	
Voltage assigned to insulation		Coil/contact	300 V	
Voltage assigned to shock resistance (1.2/50)		Coil/contact	2.5 kV	
Key				
(1)	For 0.5 x 10^6 maneuvers.			
(2)	L/R = 10 ms.			

31.15 TELEFAST 2 ABE-7R08S210/16S210 connection bases

At a Glance

Aim of this section

This section introduces the TELEFAST 2 ABE-7R08S210/16S210 connection bases.

What's in this Section?

This section contains the following topics:

Topic	Page
Actuator connections on non removable relay output adaptation bases ABE-7R08S210/16S210.	306
Characteristics of non removable relay output adaptation bases ABE-7R08S210/16S210.	308

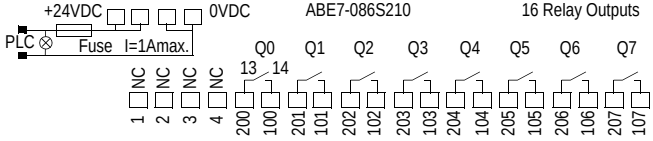
Actuator connections on non removable relay output adaptation bases ABE-7R08S210/16S210.

At a Glance

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

Illustration

Description of the connection terminal blocks.



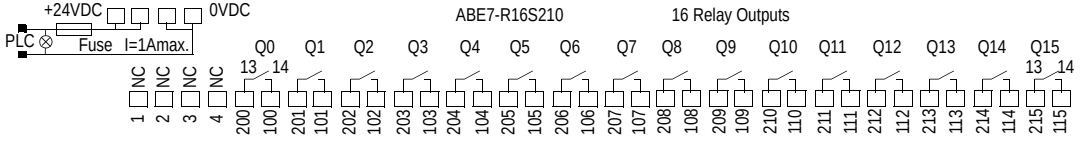
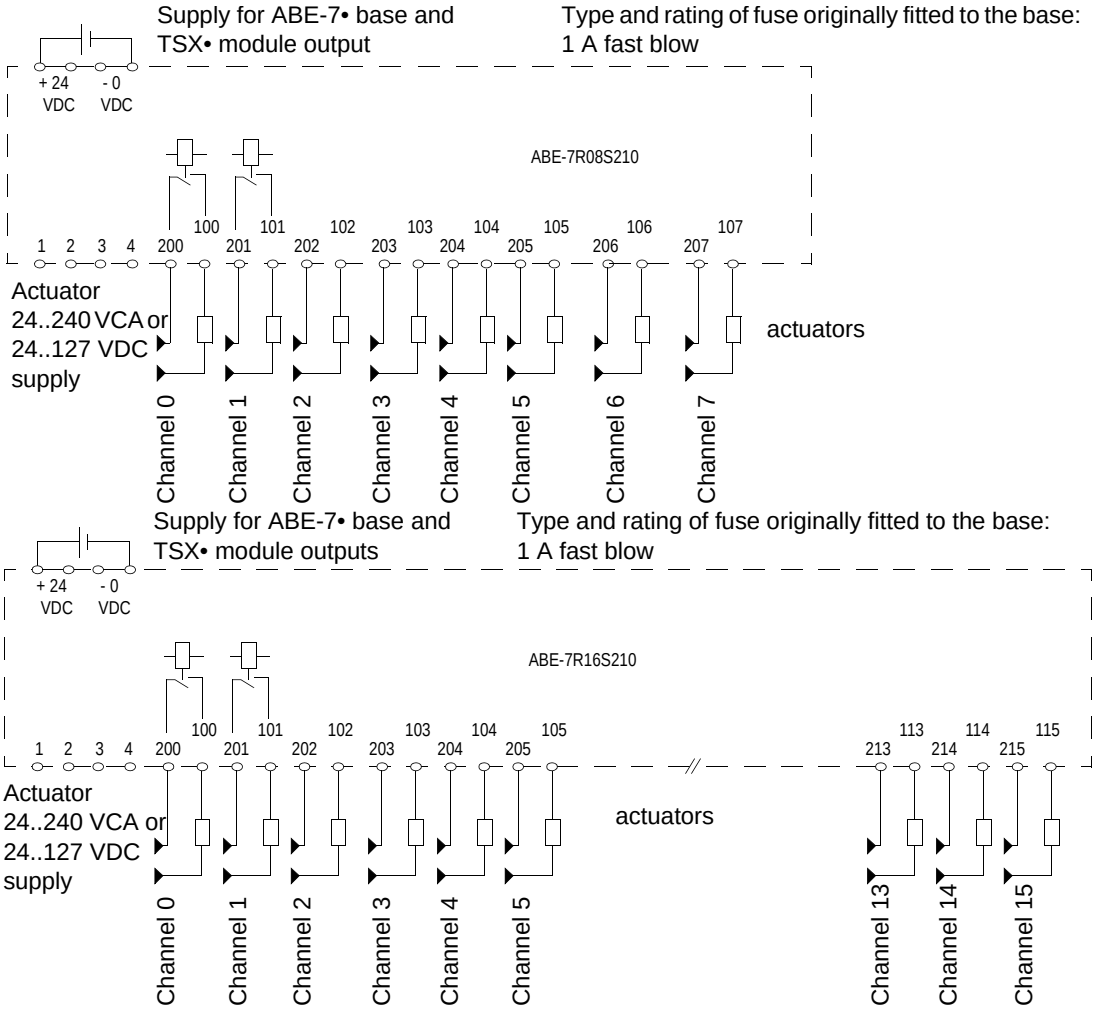


Illustration Output connection functions.



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

Base types			**ABE-7R08S210**	**ABE-7R16S210**
Channel number			8	16
Contact characteristics				
Job limit voltage		Alternating	250 V	
		Direct	125 V	
Thermal current			5 A	
Alternating current load	Resistive, load AC12	Voltage	230 VAC	
		Current (1)	1,5 A	
	Inductive, load AC15	Voltage	230 VAC	
		Current (1)	0.9 A	
Direct current load	Resistive, load DC12	Voltage	24 VDC	
		Current (1)	1.5 A	
	Inductive, load DC13 (2)	Voltage	24 VDC	
		Current (1)	0.6 A	
Minimum switching		Current	10 mA	
		Voltage	5 V	
Response time		State 0 to 1	10 ms	
		State 1 to 0	5 ms	
Maximum speed of function loading			0.5 Hz	
Built-in protection measures	Against overloads and short-circuits:		None, provide one rapid fusion fuse per channel or group of channels.	
	Against alternating current inductive overcharging		None, each RC circuit or MOV (ZNO) suppressor, must be mounted on the posts of each pre-actuator appropriate to the voltage.	
	Against direct current inductive overcharging		None, each discharge diode must be mounted on the posts of each pre-actuator.	
Voltage assigned to insulation		Coil/contact	300 V	
Voltage assigned to shock resistance (1.2/50)		Coil/contact	2.5 kV	
Key				
(1)	For 0.5 x 10^6 maneuvers.			
(2)	L/R = 10 ms.			

31.16 TELEFAST 2 ABE-7R16S212 connection base

At a Glance

Aim of this section

This section describes the connection base TELEFAST 2 ABE-7R16S212.

What's in this Section?

This section contains the following topics:

Topic	Page
Actuator connections on non removable relay output adaptation bases ABE-7R16S212.	311
Characteristics of non removable relay output adaptation bases ABE-7R16S212.	313

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.

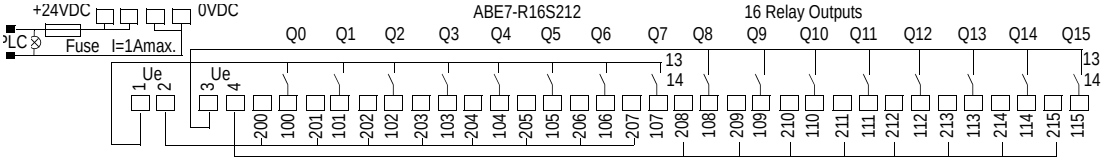
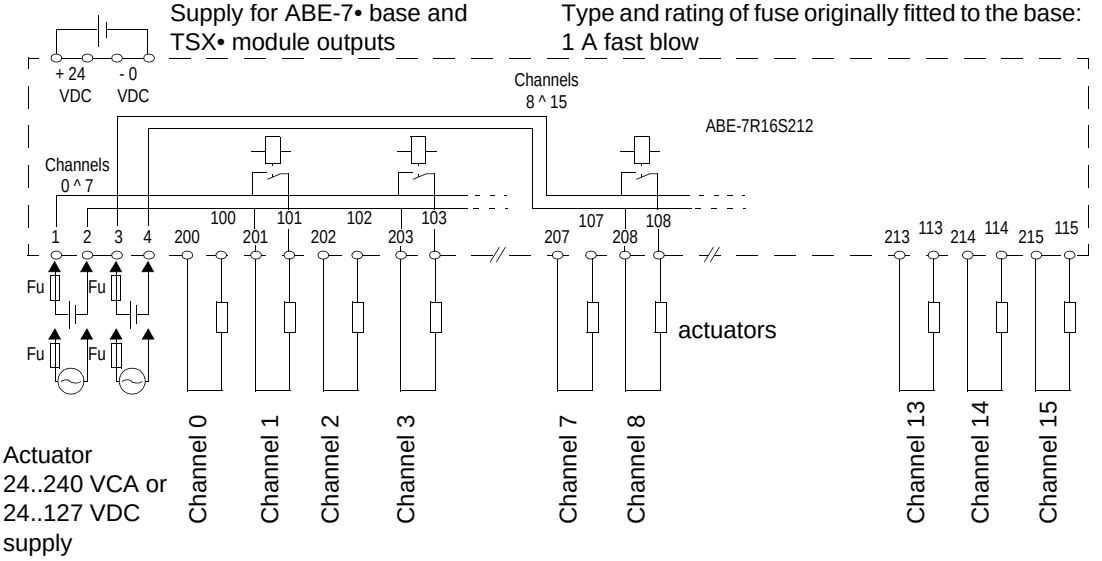


Illustration Output connection functions.



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.		

31.17 Connection bases TELEFAST 2 ABE-7S16E2B1/E2E1/E2E0/E2F0/E2M0

At a Glance

Aim of this section

This section introduces the TELEFAST 2 ABE-7 S16E2B1/E2E1/E2E0/E2F0/E2M0 connection bases.

What's in this Section?

This section contains the following topics:

Topic	Page
Sensor connections on non removable static relay input adaptation bases ABE-7S16E2B1/E2E1/E2E0/E2F0/E2M0	316
Characterisitics of non removable static relay input adaptation bases ABE-7S16E2B1/E2E1/E2E0/E2F0/E2M0	318

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.

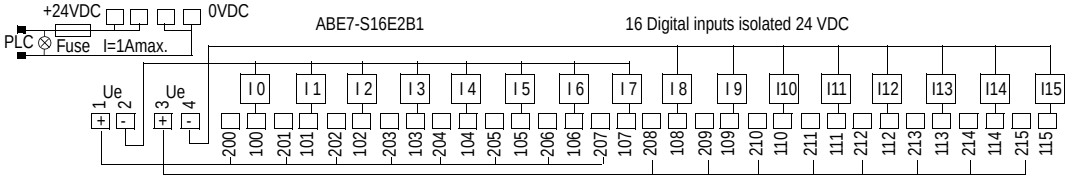
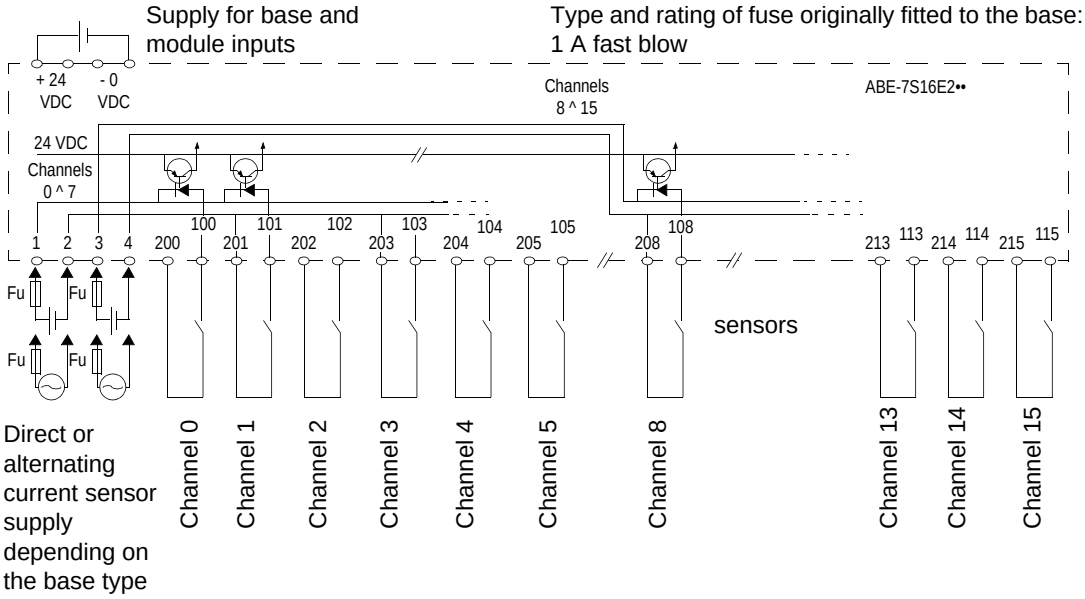


Illustration Input function connections.



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.						

31.18 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:

Topic	Page
Actuator connections on ABE-7S16S2B0/S2B2 static output adaptation bases	320
Characteristics of static output adaptation bases ABE-7S16S2B0/S2B2	321

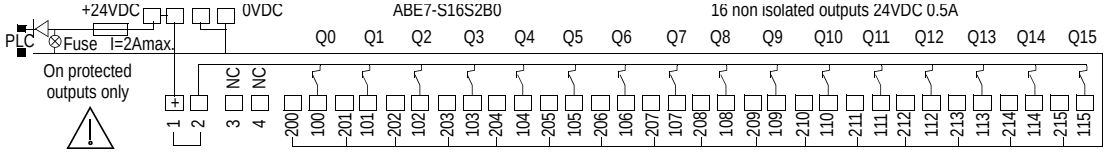
Actuator connections on ABE-7S16S2B0/S2B2 static output adaptation bases

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.

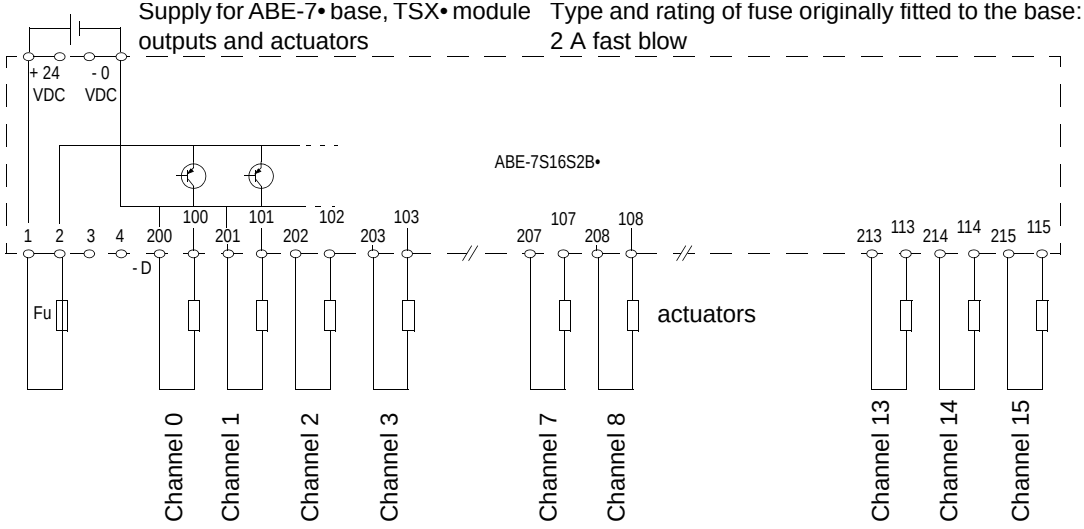
Illustration

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	

31.19 TELEFAST 2 ABE-7S08S2B1connection base

At a Glance

Aim of this section

This section describes the connection base TELEFAST 2 ABE-7S08S2B1.

What's in this Section?

This section contains the following topics:

Topic	Page
Actuator connections on ABE-7S08S2B1 static output adaptation base	323
Characteristics of ABE-7S08S2B1 static output adaptation bases	324

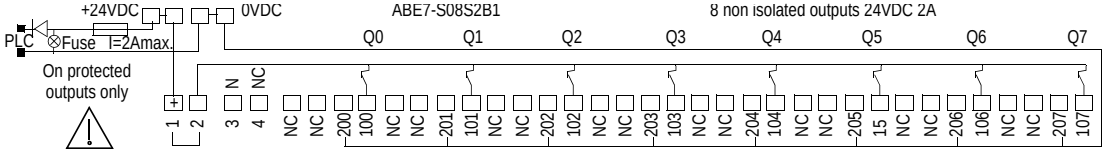
Actuator connections on ABE-7S08S2B1 static output adaptation base

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.

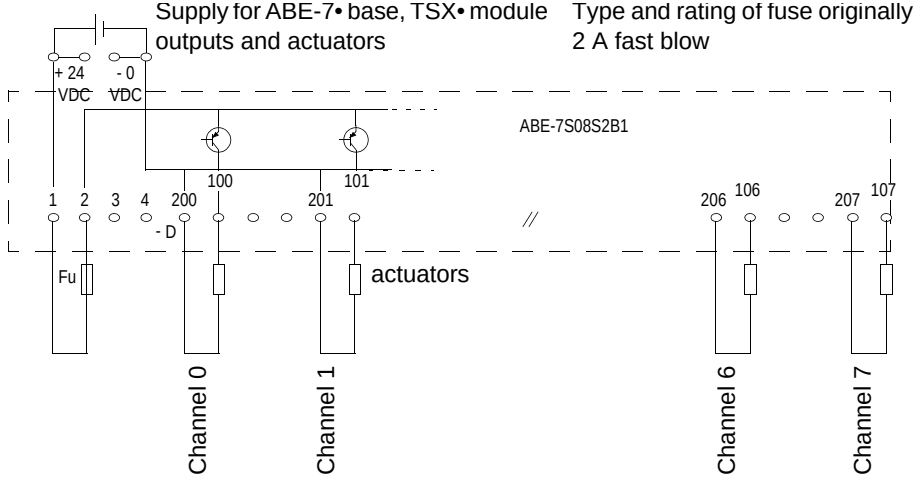
Illustration

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		

31.20 TELEFAST 2 ABE-7S08S2B0 connection base

At a Glance

Aim of this section

This section describes the TELEFAST 2 ABE-7S08S2B0 connection base.

What's in this Section?

This section contains the following topics:

Topic	Page
Actuator connections on the ABE-7S08S2B0 static output adaptation base	326
Characteristics of the ABE-7S08S2B0 static output adaptation bases	327

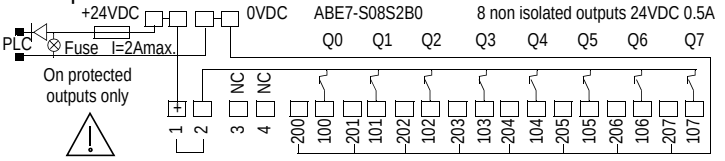
Actuator connections on the ABE-7S08S2B0 static output adaptation base

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.

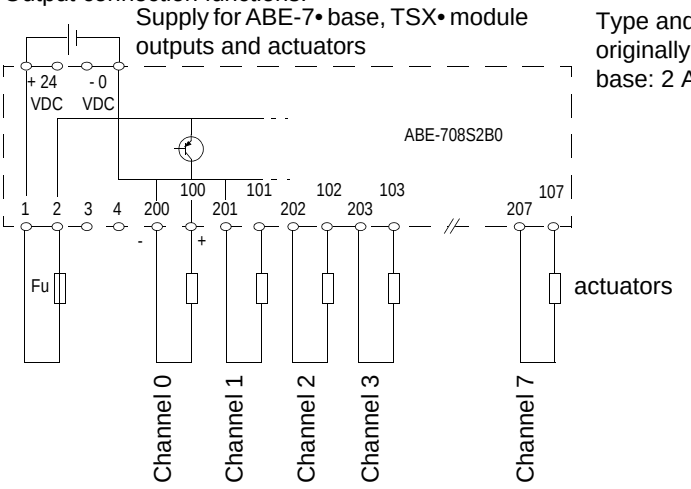
Illustration

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-7S08S2B0 base.

General characteristics

This table describes the general characteristics of the ABE-7S08S2B0 base.

Base type			**ABE-7S08S2B0**
Channel number			8
Output circuit characteristics			
Direct current load	Resistive, load DC12	Voltage	24 VDC
		Current	0.5 A
	Inductive, load DC13	Voltage	24 VDC
		Current	0.25 A
	Filament lamp		10 W
Thresholds		Voltage	19..30 VDC
Leakage current at state 0			<= 0.3 mA
Breakdown voltage at state 1			<= 0.6 V
Minimum current through channel			1 mA
Response time		State 0 to 1	0.1 ms
		State 1 to 0	0.02 ms
Built-in protection measures	Against overloads and short-circuits		Yes by current limiter and circuit breaker Id >0.75 A.
	Against inductive voltage overflow		Yes by integrated breakdown diode.
	Against polarity inversions		Yes by suppressor
Switching frequency on inductive load			< 0.6 LI^2
Error detection report			Yes
Voltage assigned to insulation		Input/output	300 V
Voltage assigned to shock resistance (1.2/50)		Input/output	2.5 kV

31.21 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.

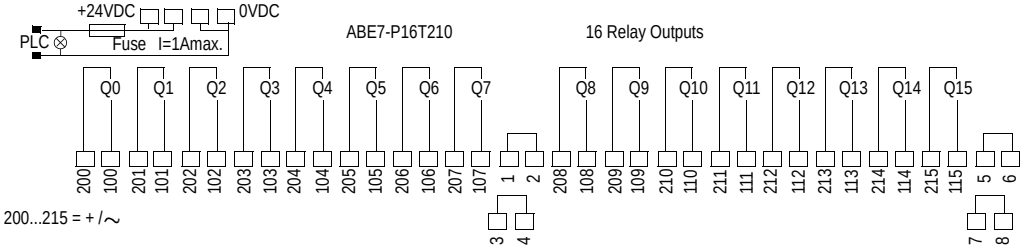
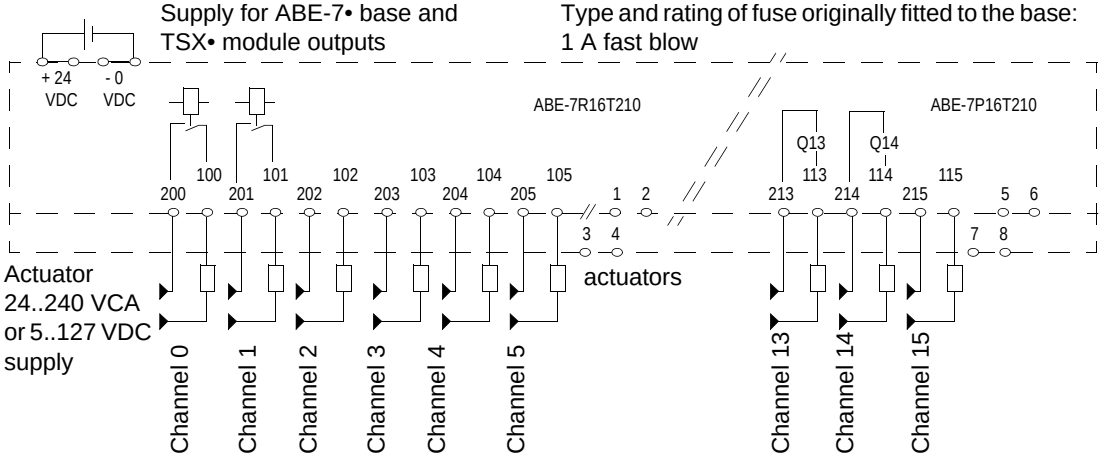


Illustration Output connection functions



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.

31.22 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.

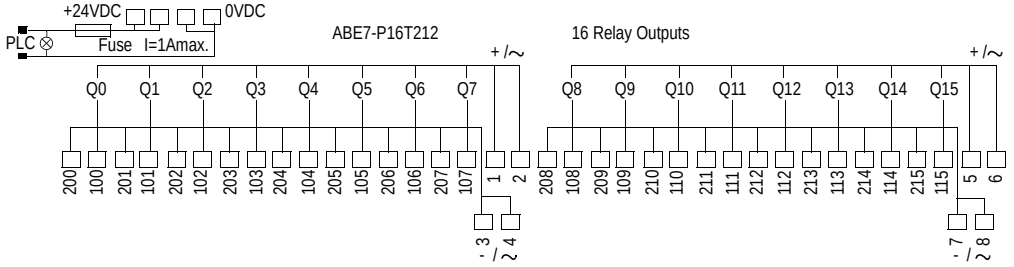
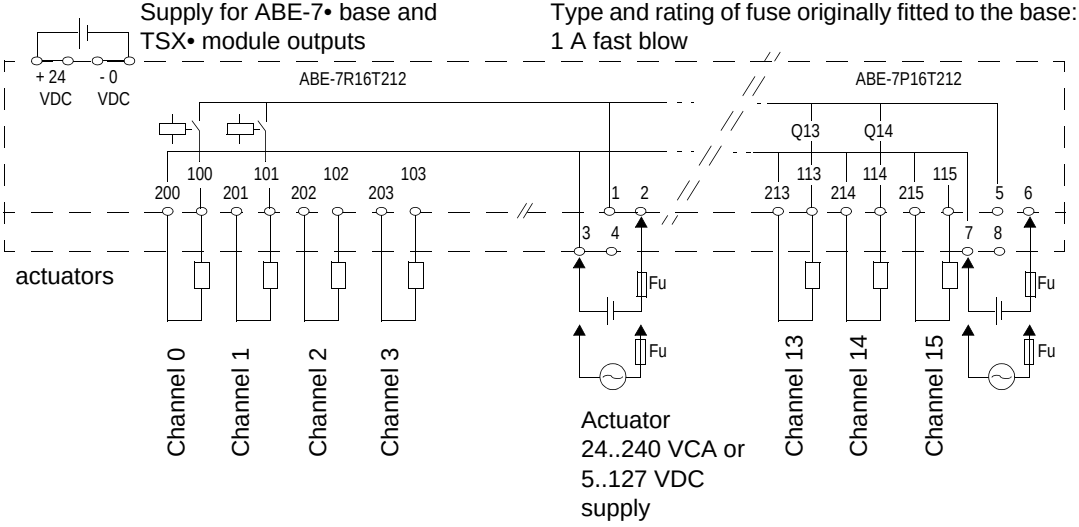


Illustration Output connection functions.



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.

31.23 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.

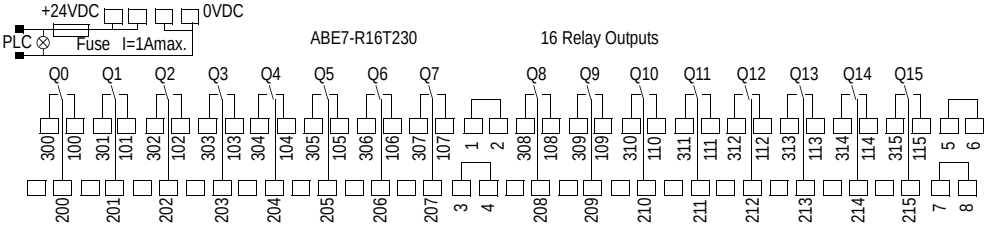
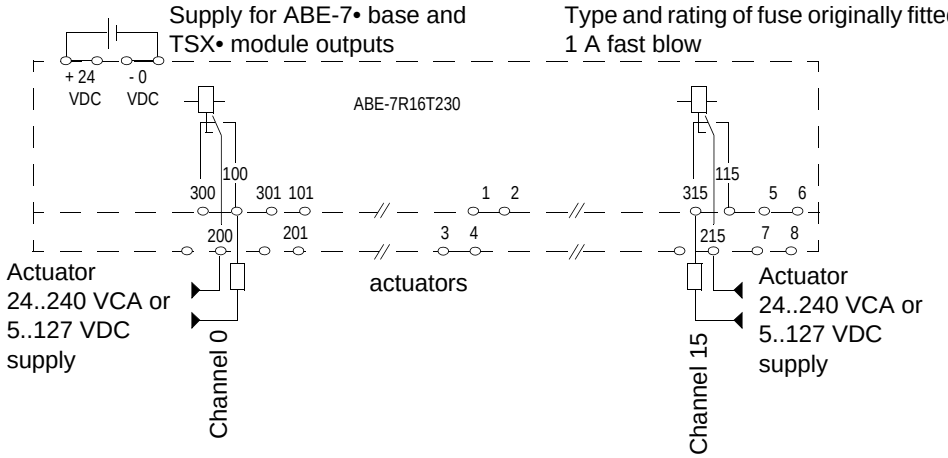


Illustration Output connection functions.



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.

31.24 TELEFAST 2 ABE-7R16T231 connection base

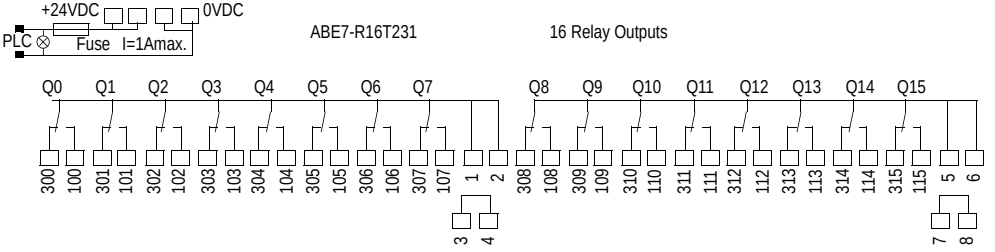
Actuator connections on ABE-7R16T231 electromechanical output relay base (size 10 mm)

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.

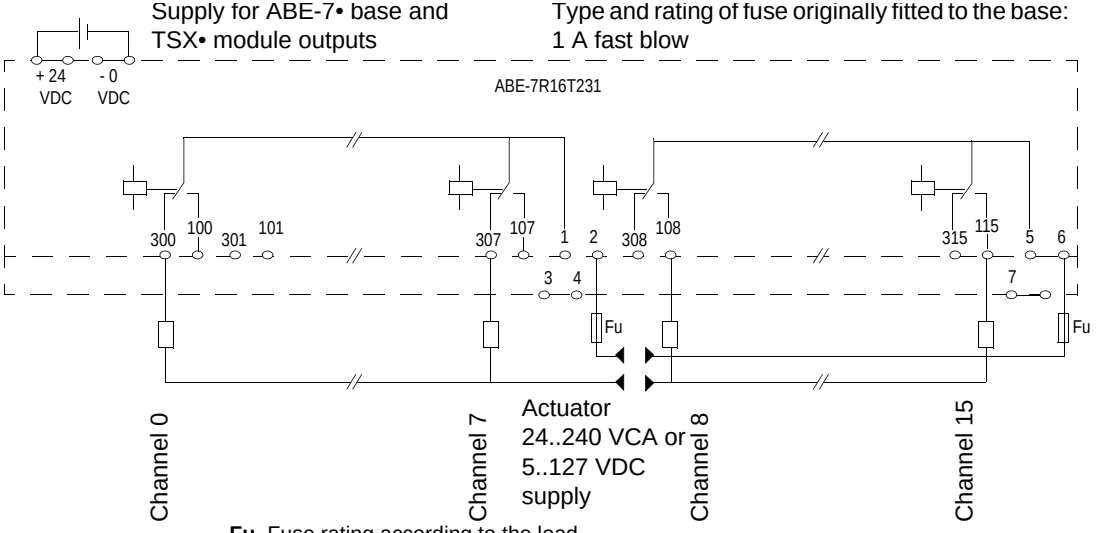
Illustration

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.

31.25 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.

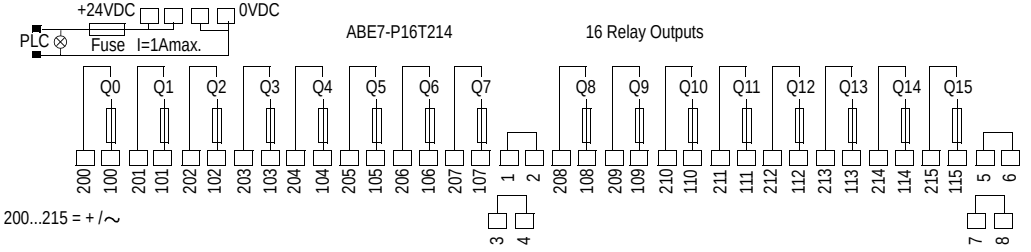
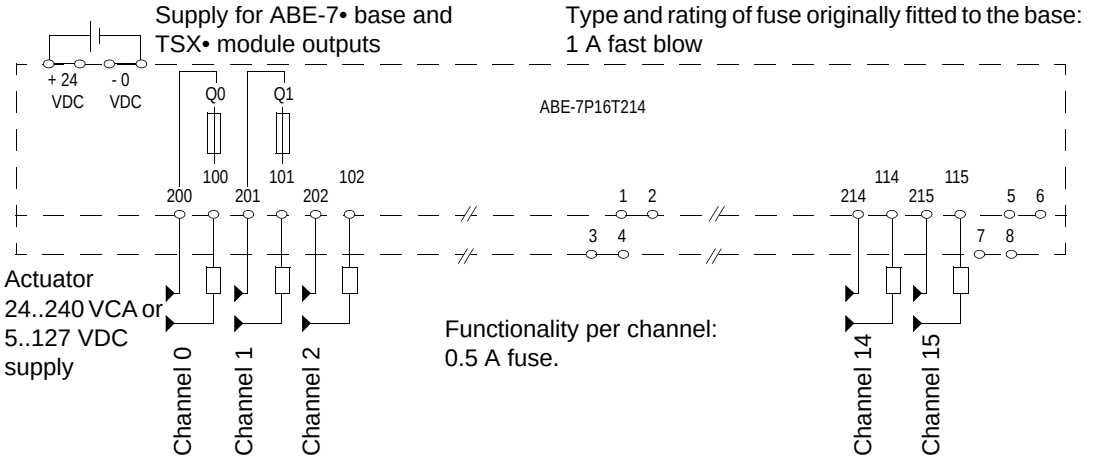


Illustration Output connection functions.



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.

31.26 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.

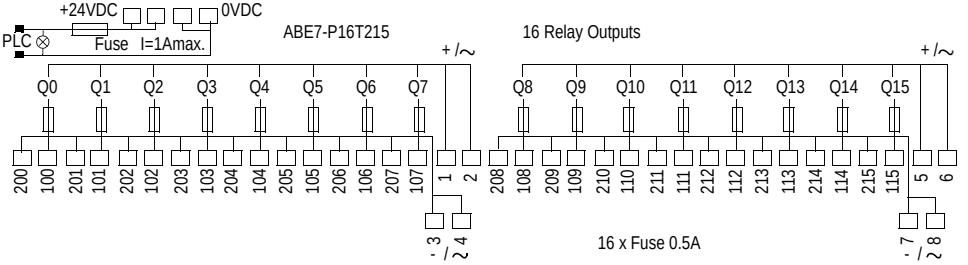
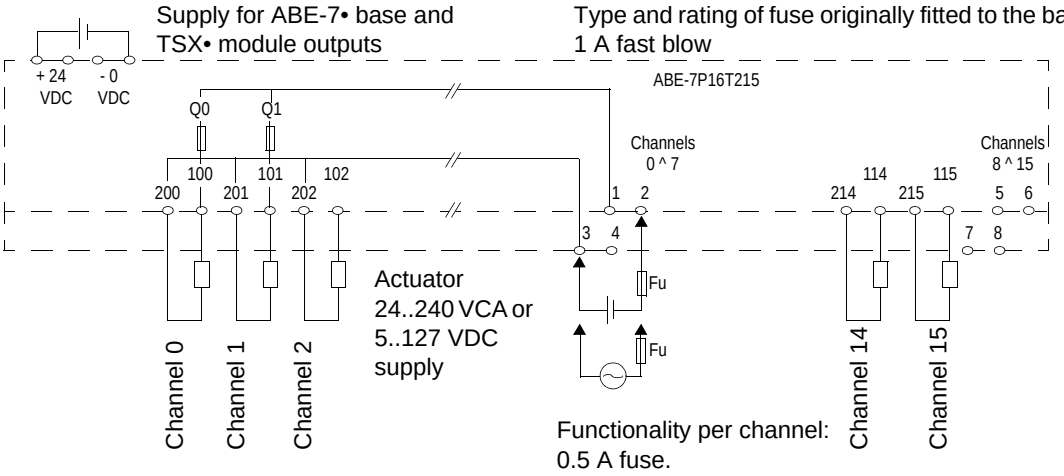


Illustration Output connection functions.



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.

31.27 TELEFAST 2 ABE-7R16T330/P16T330 connection bases

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

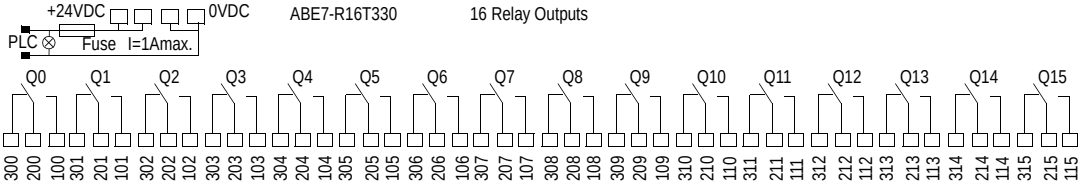
At a Glance

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.

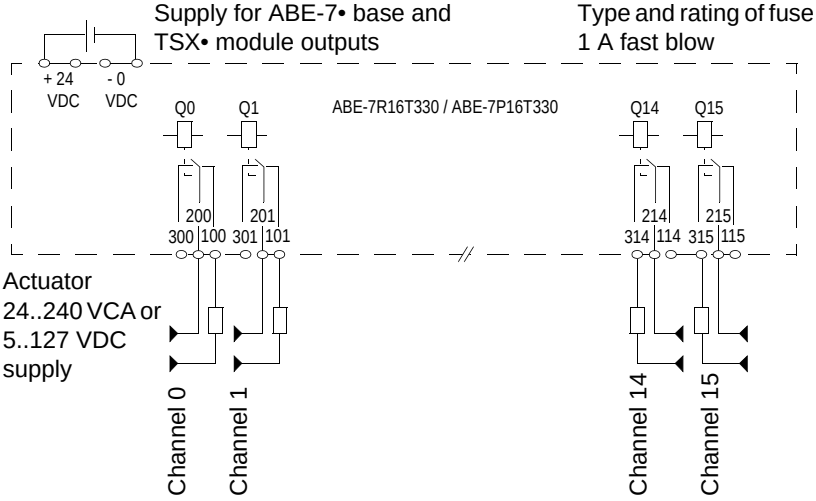
Illustration

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.

31.28 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.

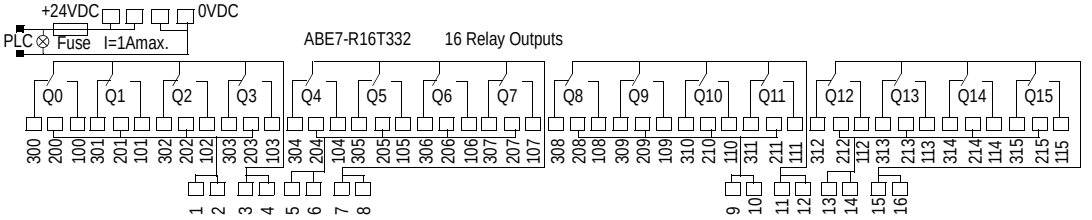
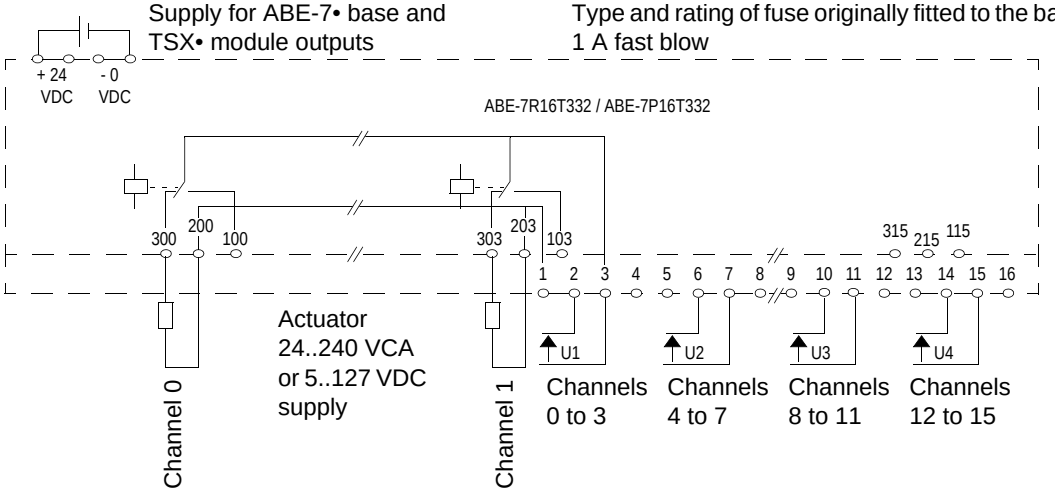


Illustration Output connection functions.



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.

31.29 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.

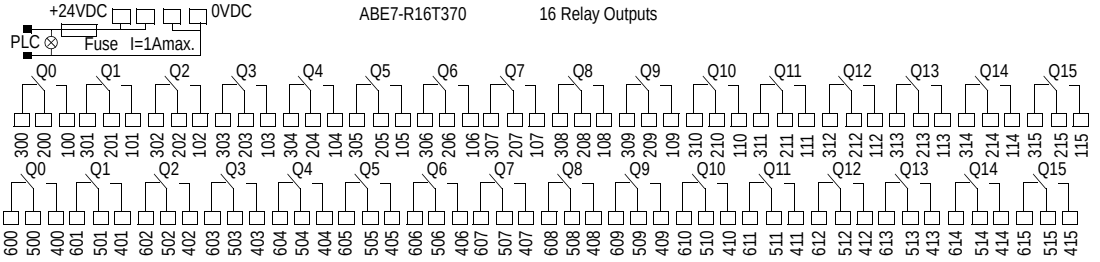
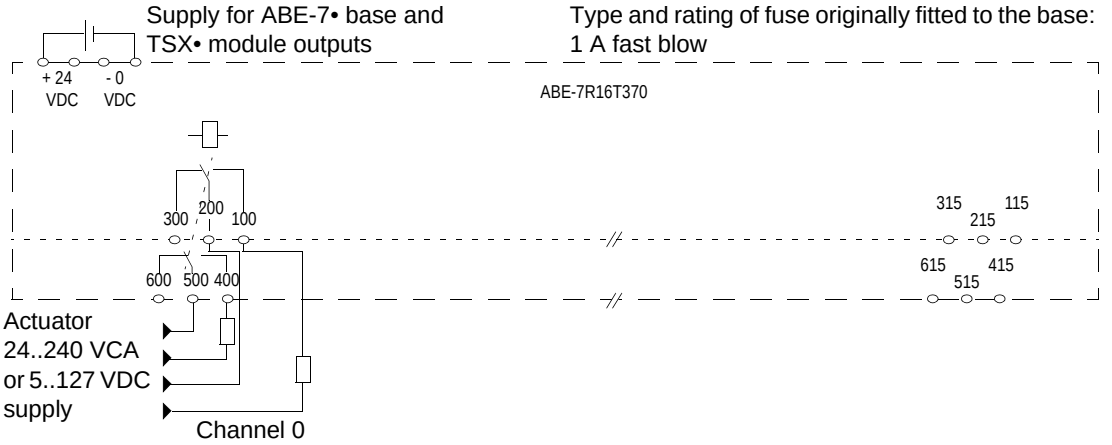


Illustration Output connection functions.



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.

31.30 TELEFAST 2 ABE-7P16T334 connection base

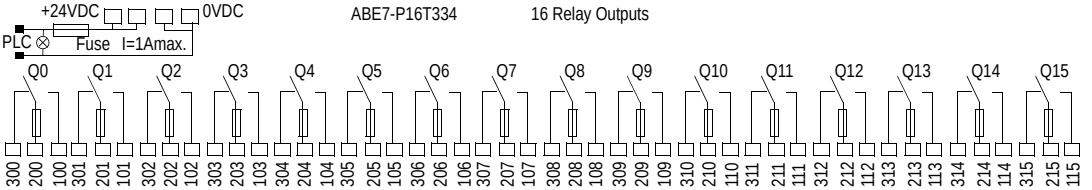
Actuator connections on ABE-7P16T334 electromechanical or static output relay bases (size 12.5 mm)

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.

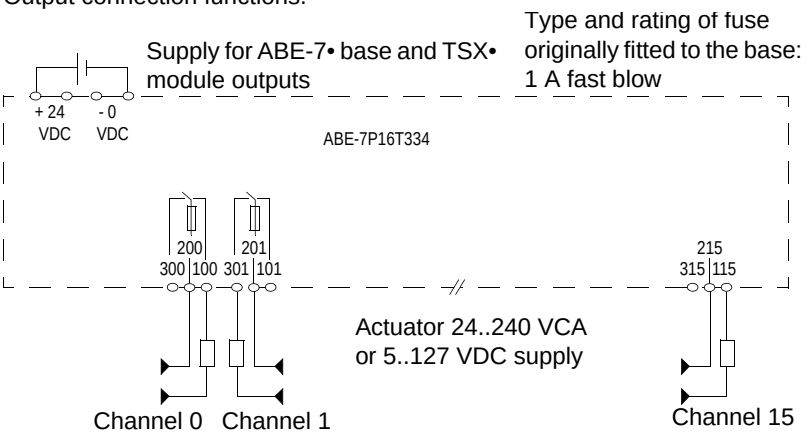
Illustration

Description of the connection terminal blocks.



Illustration

Output connection functions.



Functionality per channel:
0.5 A fuse.

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.

31.31 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.

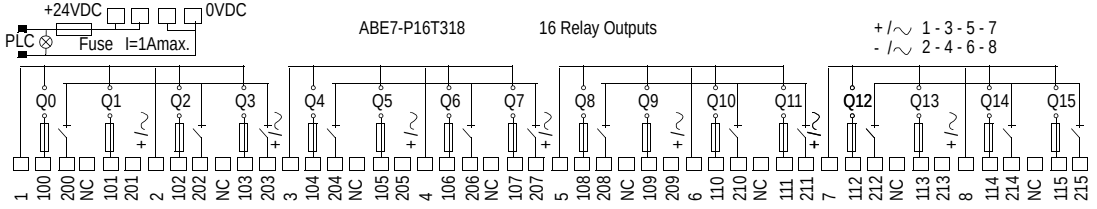
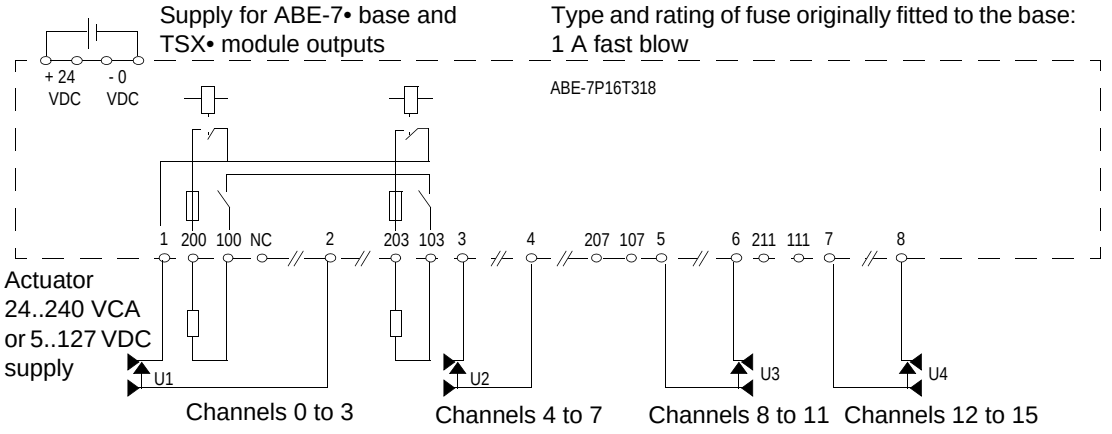


Illustration Output connection functions.



Functionality per channel:
- 2 A fuse,
- isolation of common

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.

31.32 TELEFAST 2 ABE-7P16F310 connection base

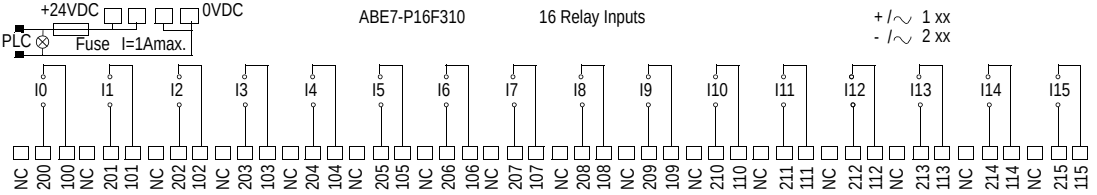
Sensor connections on ABE-7P16F310 static input relay base (width 12.5 mm)

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.

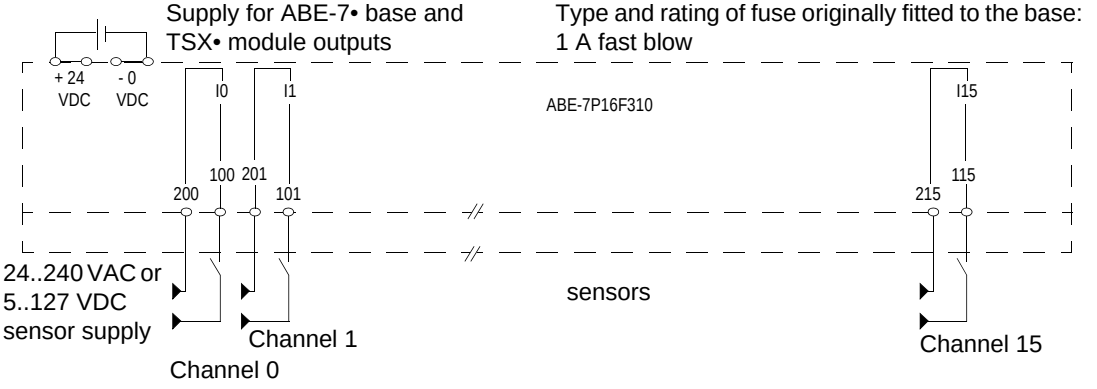
Illustration

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.

31.33 TELEFAST 2 ABE-7P16F312 connection base

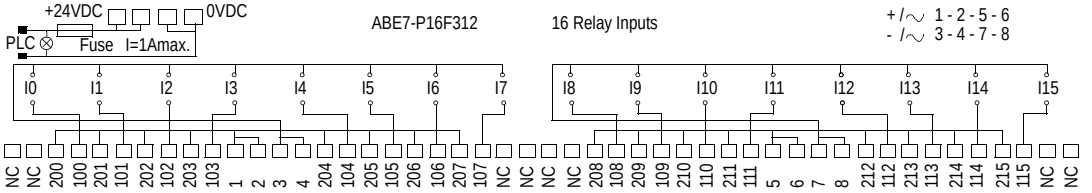
Sensor connections on ABE-7P16F312 static input relay bases (size 12.5 mm)

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.

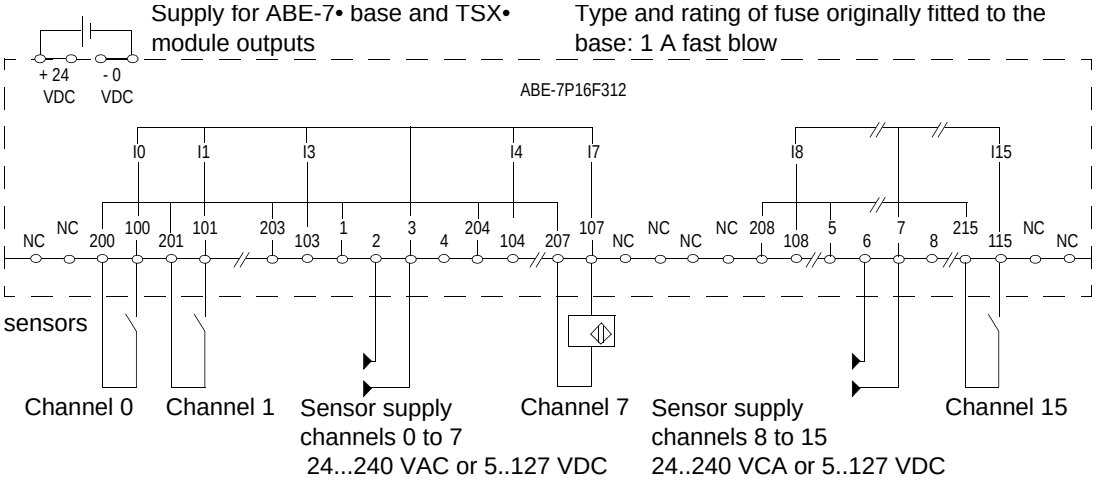
Illustration

Description of the connection terminal blocks.



Illustration

Output connection functions.



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

31.34 TELEFAST 2 connection base accessories

At a Glance

Aim of this section

This section introduces the TELEFAST 2 connection bases' range of accessories.

What's in this Section?

This section contains the following topics:

Topic	Page
TELEFAST 2 Connection Base Accessories Catalog	353
Association table for the relays on ABE-7R16Txxx, ABE-7P16Txxx and ABE-7P16Fxxx bases.	356
Characteristics of the removable ABR-7xxx electromechanical output relays	358
Characteristics of the removable ABS-7Exx static input relays	359
Characteristics of the removable ABS-7Sxx static output relays	360

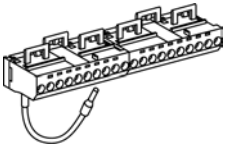
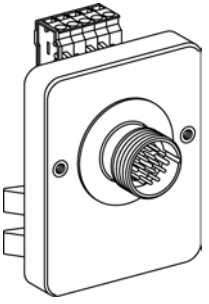
TELEFAST 2 Connection Base Accessories Catalog

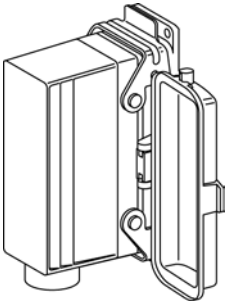
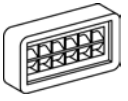
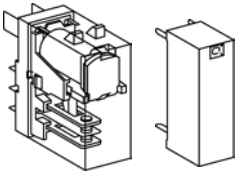
At a Glance

This is an overview of the TELEFAST 2 connection base accessories catalog for discrete I/O modules.

Catalog

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

Product reference	Illustration	Description
Additional shunt terminal block		
ABE-7BV10		Terminal block fitted with 10 screw terminal blocks
ABE-7BV20		Terminal block fitted with 20 screw terminal blocks
Adapter base		
ABE-7ACC02		Enables the connection of 16 channels in 2 x 8-channel groups
Mounting kit		
ABE-7ACC01		Enables the bases to be mounted on monoblock mounting plates
Sealed cable lead-through		
ABE-7ACC84		Allows transit through cabinets without cutting the cables
Transit through cabinet		
ABE-7ACC83		40-pin connectors for 8/12 channels -> M23 cylindrical connector
ABE-7ACC82		40-pin connectors for 16 channels -> M23 cylindrical connector

Product reference	Illustration	Description
ABE-7ACC80		40-pin connectors for 32 channels -> HARTING type connector
ABE-7ACC81		Plug-in connector for ABE-7ACC80
Removable continuity module		
ABE-7ACC20		Width 10 mm
ABE-7ACC21		Width 12.5 mm
Customer identification label marking software		
ABE-7LOGV10	-	-
5 x 20 quick-blow 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
Adhesive marker holder		
AR1-SB3		For AB1-R. / AB1-G type markers
Relays for ABE-7R16T•••, ABE-7P16T••• and ABE-7P16F••• bases		
ABR-7S••• (1)	ABE-7S3•• and ABE-7S2••	Output electromechanical relay (4)
ABS-7S••• (2)		Output static relay (4)
ABS-7E••• (3)		Input static relay (4)

(1) For electrical characteristics, see *Characteristics of the removable ABR-7xxx electromechanical output relays, p. 358*.

(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) Contingency table of relays for bases, 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			
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				

Implementation of safety modules

II

At a Glance

Overview

The following part describes implementation of the range of safety modules for Premium PLCs and of the dedicated TELEFAST 2 pre-formed cabling accessory.

What's in this Part?

This part contains the following chapters:

Chapter	Chapter Name	Page
32	General presentation of safety modules	363
33	Safety functions	367
34	General rules for implementing safety modules	375
35	Maintenance and diagnostics	403
36	TSX PAY 262 module	415
37	TSX PAY 282 module	421

General presentation of safety modules

32

At a Glance

Overview

This chapter provides a general introduction to safety modules.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
General description of safety modules	364
Physical description of the safety modules	365

General description of safety modules

General

The TSX PAY 2•2 safety modules and their accessories TSX CPP 301/•02 and TELEFAST 2 ABE-7CPA13 are used to interrupt one or several category 0 safety or emergency stop control circuits (safety components) in complete safety. The entire safety system is compliant with European standards EN 418 for emergency stops and EN 60204-1 for safety circuits.

These modules also comply with safety requirements regarding the electrical monitoring of position switches activated by protection devices.

The TSX PAY 2•2 safety modules provide:

- A safety system designed to control the emergency stop circuits of machines in complete safety. The modules are equipped with a wired logic safety block for monitoring emergency stops.
- Full diagnostics of the safety system readable from the status of the position switches and push-buttons of the emergency stop input sequence, the reactivation input, the feedback loop, the control of both output circuits, and the safety system power supply status. All this information is sent to the PLC's CPU in the form of 28-bit Discrete inputs.

Note: The PLC has no effect on the safety modules, and the safety system section is connected to an external power supply.

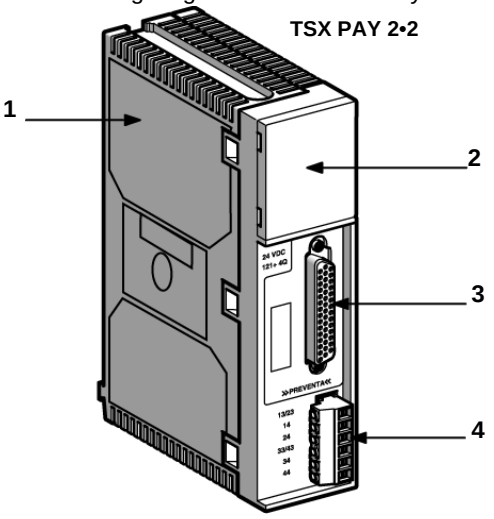
Physical description of the safety modules

Introduction

The TSX PAY 2•2 modules are in standard Premium PLC interface format. They occupy a single slot.

Illustration

The following diagram shows the safety modules:



Elements

The following table gives a description of the different elements of the safety modules:

Number	Description
1	IP20 hard casing providing support and protection for the circuit board.
2	Operating mode, fault and safety system display block
3	High Density (HD) 44-pin Sub-D connector for connecting the safety system.
4	Removable screw terminal block for connecting safety outputs

Safety functions

33

At a Glance

Overview

This chapter gives a description of every function for which the safety modules are used.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Product user functions	368
Operating modes	369
Functional diagrams	372

Product user functions

General

The TSX PAY 2•2 modules provide the following functions:

- Monitoring of emergency stop buttons and moving cover position switches for immediate halt (category 0 emergency stop in compliance with EN 418),
- Channel de-synchronization detection (> 400 ms) in automatic start-up mode,
- Cabled safety block independent of Premium PLC operating mode,
- Guaranteed safety functions, whatever the safety system component failure, via:
  - 2 safety output circuits,
  - double contact inputs for ES PB or PS,
- Wiring of a (+) channel of an input x and of the (-) channel to another input (x+12) with a double contact,
- Self-checking and redundant design similar to the PREVENTA XPS-ASF range (cf. component catalog for Telemecanique safety applications),
- Restart control via auxiliary input action: reactivation input,
- Possibility of monitoring the reactivation input by action on falling edge,
- Start-up mode selection using external cabling: manual, automatic or on falling edge,
- Automatic output check by monitoring their status reading in the feedback loop,
- Automatic input channel check by constant comparison of their respective statuses,
- Full safety system diagnostics via:
  - monitoring the ES PB or PS input status readings,
  - monitoring the reactivation input reading,
  - monitoring the feedback loop reading,
  - monitoring the safety output control reading,
  - monitoring the safety system power supply status reading,
  - monitoring the external module supply,
- Possibility to choose whether external supply is monitored or not.

Operating modes

Introduction

The safety function is autonomous in relation to PLC operation.

It does not follow the PLC operating modes.

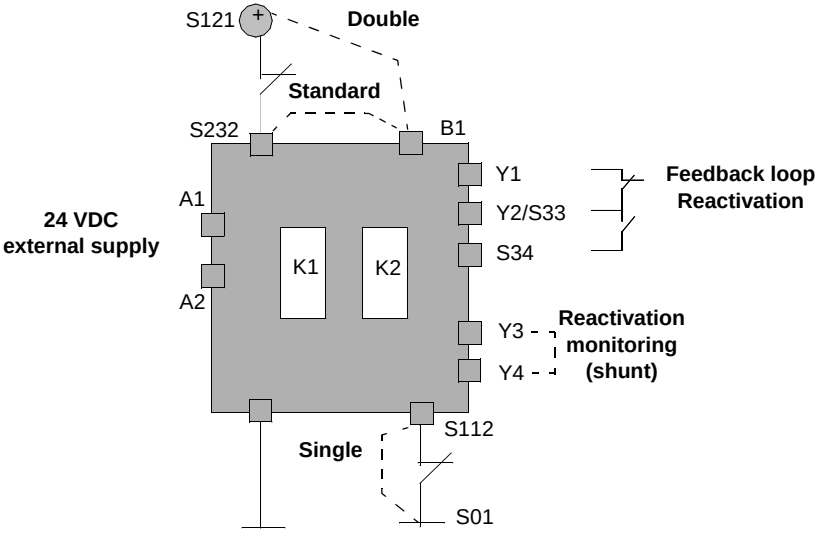
It is able to shut off power even when the PLC is off, in Stop mode or if the CPU is missing. **It is not a safety PLC**.

The only exchange between the CPU and the module is diagnostic information transferred from the module to the CPU.

The PLC is constantly informed of the status of the safety system via input data. Nevertheless, **the PLC has no control over any output**.

Diagram

The product diagram is shown below:



External supply

The 24 VDC supply is cabled between terminals A1 and A2. It must be protected by an external fuse.

Using ES PB and PS single/double contacts

The way in which the B1 terminal is wired makes it possible to choose the type of single or double ES PB:

- When B1 is linked to S121, the module will be wired with double contacts between terminals S121 and S232 for the positive pole, and between terminals S01and S112 for the negative pole,
- When B1 is linked to S232, the module will be wired with single contacts between terminals S121 and S232 for the positive pole, and with a global shunt between terminals S01and S112 for the negative pole.

Using ES PB and PS contacts

Pressing one of the emergency stop buttons or a cut in external supply leads directly to the opening of the K1 and K2 safety output circuits,

After unlocking the ES PB or closing the PS of the input sequence, a pulse to the activation input (terminals S33-S34) will allow the closing of safety output contacts (terminals 13-14, 23-24, 33-34, 43-44).

Reactivation

The safety system is reactivated when the feedback loop between terminals Y1 and Y2 is closed AND when there is a reactivation request (S24) between terminals S33 and S34.

Terminals Y3/Y4 allow one to choose whether or not this reactivation is to be monitored:

- When Y3/Y4 is open, the outputs are activated (recommended) when the PB is pressed then released (falling edge on S34),
- When Y3/Y4 is closed, the outputs are immediately activated when the PB is pressed.

Note:
- The shunt between terminals Y3-Y4 must be as short as possible,
- Do not connect anything else to these terminals.

A shunt on both Y3-Y4 and S33-S34 allows the outputs to be activated automatically as soon as the two input channels are closed. A de-synchronization time of 400 ms is allowed.

Safety output

The TSX PAY 262 module features two outputs wired between terminals 13-14 and 23-24; these two outputs can be supplied independently.

The TSX PAY 282 module features four outputs wired between terminals 13-14, 23-24, 33-34 and 43-44; these outputs are grouped together in pairs and each pair can be supplied independently.

The relays (with guided contacts) or switches connected upstream from the outputs must be inserted in the feedback loop between terminals Y1 and Y2. The device may only be switched on if those relays with safety-related functions which received a stop order have been deactivated. The feedback loop must be closed before any new start-up.

An additional external condition, managed by the API, may be inserted into the feedback loop to inhibit any reactivation in the event of a safety system fault being detected.

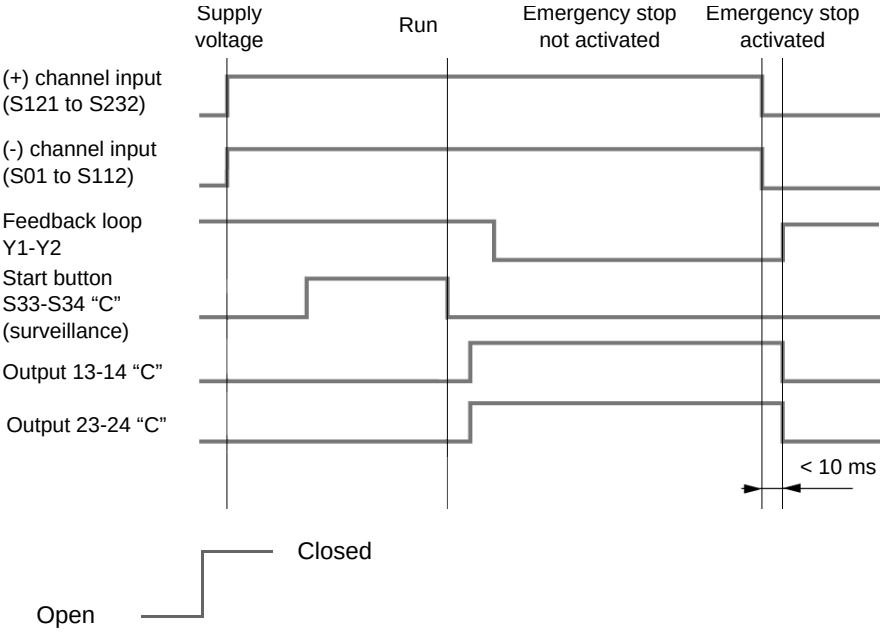
Functional diagrams

Introduction

This section provides the functional diagrams for the emergency stop functions and the protective cover with automatic start-up.

Emergency stop function

The following diagram shows the functional diagram for the emergency stop function:



"C" on closing

Depending on the wiring of Y3-Y4, reactivation is carried out on edge or on state.

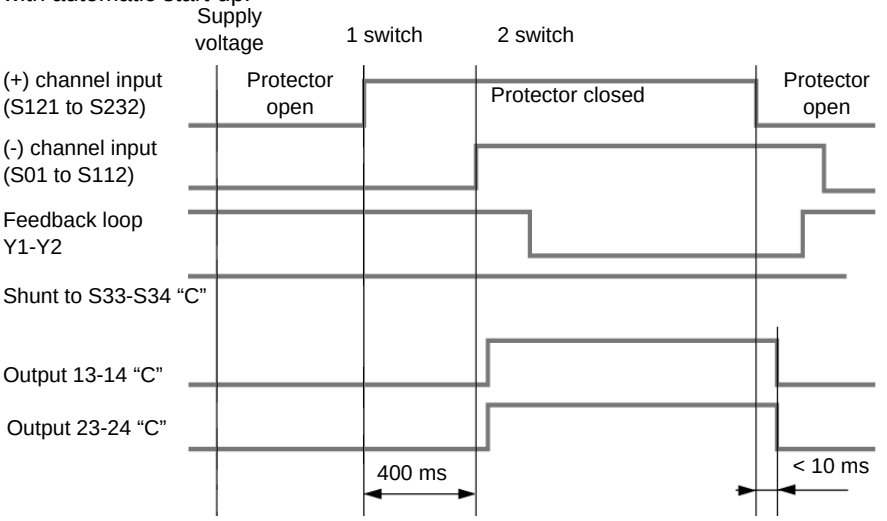
A single open ES PB contact opens the safety outputs.

Both channels must be open to allow reactivation to take place: this constitutes self checking of inputs.

Reactivation is only possible if the Y1-Y2 loop is closed: this constitutes self checking of outputs.

Protective cover function with automatic start-up

The following diagram shows the functional diagram for the protective cover function with automatic start-up:



"C" on closing

The use of the two distinct PSs (switch 1 and 2) requires the mechanical elements to respect a time delay of less than 400 ms upon closure of the 2 switches.

The manufacturer's characteristics guarantee inhibition of the command if the time is greater than 1 s. In this configuration, the automatic reset is selected.

General rules for implementing safety modules

34

At a Glance

Overview

This chapter describes the general rules for implementing safety modules.

What's in this Chapter?

This chapter contains the following sections:

Section	Topic	Page
34.1	Installation of safety modules	376
34.2	Precautions and general rules for wiring	380
34.3	Connection and wiring examples	385

34.1 Installation of safety modules

At a Glance

Overview

This section describes the installation of the module on the rack, and then provides a description of the various markings on the module.

What's in this Section?

This section contains the following topics:

Topic	Page
Fitting of safety modules	377
Identification of safety modules	378

Fitting of safety modules

Introduction

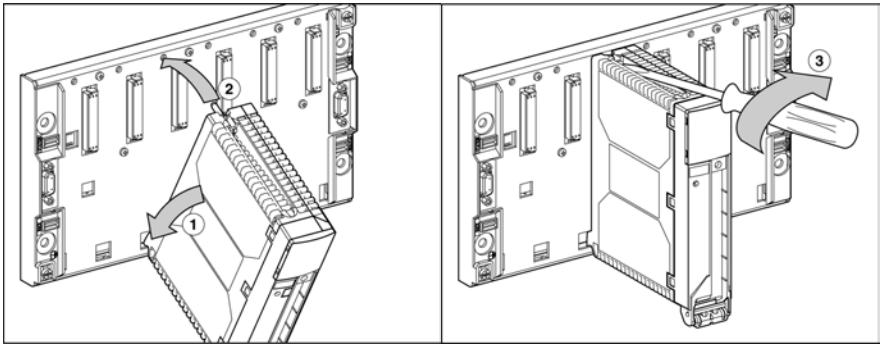
All Premium range safety modules are standard format and therefore occupy one single position in the TSX RKY••• racks.

They can be installed in any position in the rack, with the exception of the first two (PS and 00), which are reserved for the rack supply module (TSX PSY•••) and the processor module (TSX 57•••) respectively.

Note: The modules 'can be handled **without switching 'off the rack supply**, in complete safety and with no risk of damaging or disturbing the PLC. (It is, however, imperative that the module cable be unplugged in order to deactivate the safety outputs before removing the output terminal block').

Illustration

The following diagram shows the procedure for mounting the safety modules in the rack:



Description

The following table shows the procedure for installing the safety module in the rack.

Step	Action
1	Position the two locating pins situated at the rear of the module (lower section of the module) in the centering holes located in the lower section of the rack.
2	Pivot the module upwards so as to engage the backplane connector.
3	Secure the module to the rack by tightening the fastening screw located on the upper part of the module.
Note	**If the screw mentioned in step 3 is left untightened, 'the module will not remain in position in the rack.**

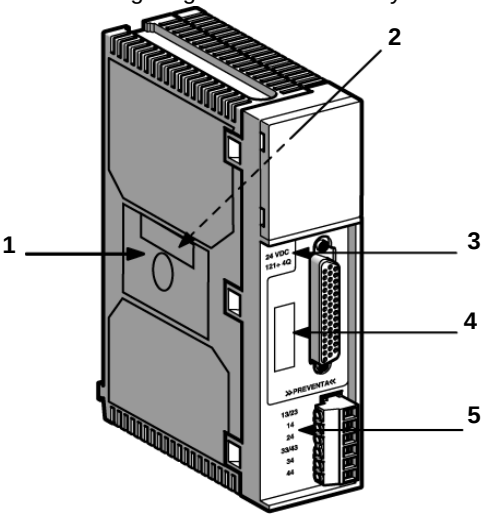
Identification of safety modules

Introduction

The modules can be identified by the markings on the cover of the front panel and on the right-hand side of the modules.

Illustration

The following diagram shows a safety module:



Elements

The following table gives a description of the different identifying elements of the safety modules:

Number	Description
1	Label giving the characteristics of the safety outputs (on left-hand side).
2	Label giving the module reference number (on right-hand side).
3	External module supply marking.
4	Unmarked area for user identification.
5	Front panel label for marking of safety outputs.

Terminal markings

Safety module terminals are marked in compliance with the following standards: DIN EN 50005 and DIN EN 50042

Function	Terminals
External module power supply	A1-A2
System contact (+)	S01-S02, S11-S12, S21-S22, S31-S32, S41-S42, S51-S52, S61-S62, S71-S72, S81-S82, S91-S92, S101-S102, S111-S112
System contact (-)	S121-S122, S131-S132,S141-S142, S151-S152, S161-S162, S171-S172, S181-S182, S191-S192, S201-S202, S211-S212, S221-S222, S231-S232
Single and double contact selection	B1
Reactivation	S33-S34
Feedback loop	Y1-Y2
Reactivation input monitoring	Y3-Y4
Safety output supply ● **TSX PAY 262** ● **TSX PAY 282**	 13-14, 23-24 13/23-14, 13/23-24, 33/43-34, 33/43-44

34.2 Precautions and general rules for wiring

At a Glance

Overview

This section outlines the recommendations and general rules for wiring.

What's in this Section?

This section contains the following topics:

Topic	Page
Wiring precautions	381
Cable dimensions and lengths	383

Wiring precautions

General

The safety system must be wired in accordance with EN60204-1. This section gives a description of the rules for 'wiring and mechanically protecting cables.

The 'entire safety system, the ES PBs or PSs, TSX PAY 2•2 modules, protection fuses and auxiliary relays are incorporated in housings with an IP54 minimum protection index as per EN954-1.

Grounding

The module has no grounding terminal on its front panel. Depending on the TSX CPP •02 cable being used, the 0 VDC can be grounded (cf. EN60204-1) directly via the TELEFAST ABE-CPA13.

Note: The TSX CPP 301 cable has no ground connection.

Protection of safety system

Errors within the safety modules can be propagated to the 'outside of the module, particularly to the 'external supply in use: short circuits within the module can cause a supply voltage avalanche 'or a supply malfunction if it is 'not protected. This is why a 1 A (gL) quick-blow fuse ' is placed in the control section of the relays, given that maximum consumption is 200 mA.

Note: This fuse, called F1, is an active element of the safety system.

The module also contains a 'current limiting device set to 750 mA in order to detect inter-channel short circuits on the ES PBs or PSs. The external supply is protected' in the event of this happening, and an error is indicated on the safety system.

In order to guarantee the safety function, it is compulsory 'to use the following:

- On input
  - double contact ES PBs or PSs,
  - the NF contacts of the guided-contact auxiliary relays in the feedback loop,
- On output
  - two or four guided-contact auxiliary relays,
  - a 4 A gL output protection fuse F2,
- On the external 'module supply: a 1 A (gL) protection fuse F1.

Protection of safety outputs

Output voltages can reach ' 230 VAC or 127 VDC.

Outputs are not protected inside the 'module, though GMOV-type (for a continual load), or RC cell-type (for an alternating load) protection is applied directly to the terminals of the load in use. These protective measures must be adapted to the load.

The 'use of guided-contact auxiliary relays and the feedback loop wiring then make it possible to detect a safety output short circuit.

A 4 A (gL) quick-blow fuse is located in the auxiliary supply circuit 'to protect the module’s safety relay contacts and the connected loads: this fuse is identical to that used in PREVENTA modules.

The fuse F2, located on the safety outputs, provides protection against short circuits and overloads. This protection avoids the melting of the safety relay contacts in TSX PAY 2•2 modules.

Cable dimensions and lengths

General points

The length of safety system wires can cause a drop in supply voltage related to the current circulating. This voltage drop is due to sum of the currents circulating on the 0 VDC feedback path of the electrical circuit. It is usual practice to double or triple the 0 VDC wires.

In order to ensure the correct operation of the safety system (reactivation of relays) and a correct reading of diagnostic information, it is important that the voltage measured between terminals A1 and A2 be greater than 19.2 V.

Cross-section of TELEFAST cables

Each TELEFAST ABE-7CPA13 terminal accepts bare wires or ones fitted with terminations, or spade or eye terminals.

The capacity of each terminal is:

- minimum: 1 x 0.28 mm^2 wire without termination,
- maximum: 2 x 1 mm^2 wires or 1 x 1.5 mm^2 wire with termination.

The maximum cross-section dimensions for wires on the terminal block are:

1 x 2.5 mm^2 wire without termination.

Calculation of cable length

The resistance of each safety system ((+) channel and (-) channel) must not exceed 75 Ohms. The maximum resistance of the channel between an ES PB or PS and the corresponding input of the module must be $\leq 6\ \Omega$.

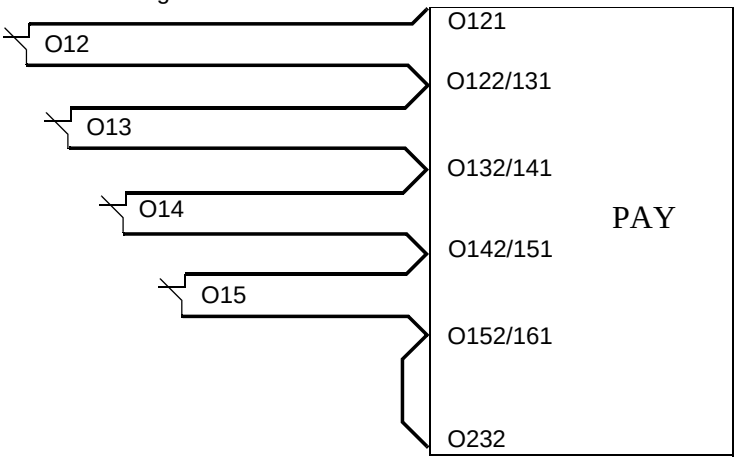
Given the length and cross-section of the cable, its resistance can be calculated as follows: $R = \rho \cdot \frac{l}{S}$

Equation parameter

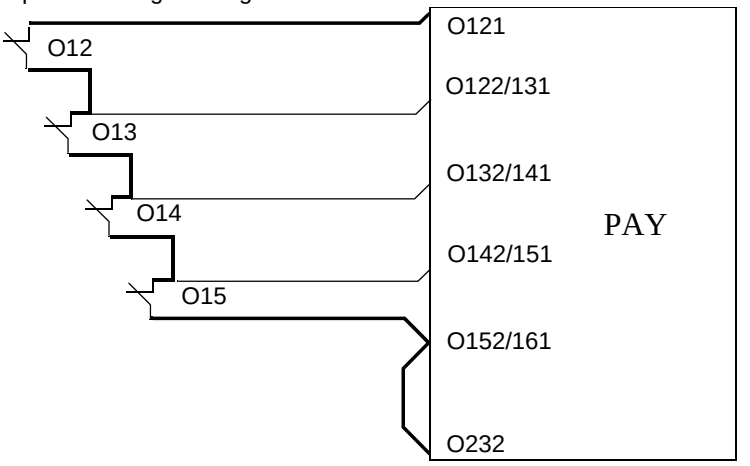
Parameter	Meaning
R	Cable resistance in Ohms
ρ	Resistivity: 1.78 x 10^{-8} Ω.m for copper
l	Cable length in m
S	Cross-section in m^2

It is possible to wire the system so as to allow a greater distance between the ES PBs or PSs and the module:

Standard wiring:



Optimized length wiring:



: Length to be taken into account for calculation of the resistance.

34.3 Connection and wiring examples

At a Glance

Overview

The following section describes how safety modules are connected to the TELEFAST 2 pre-formed cabling accessory using the TSX CPP 301 cable, and provides examples of wiring.

What's in this Section?

This section contains the following topics:

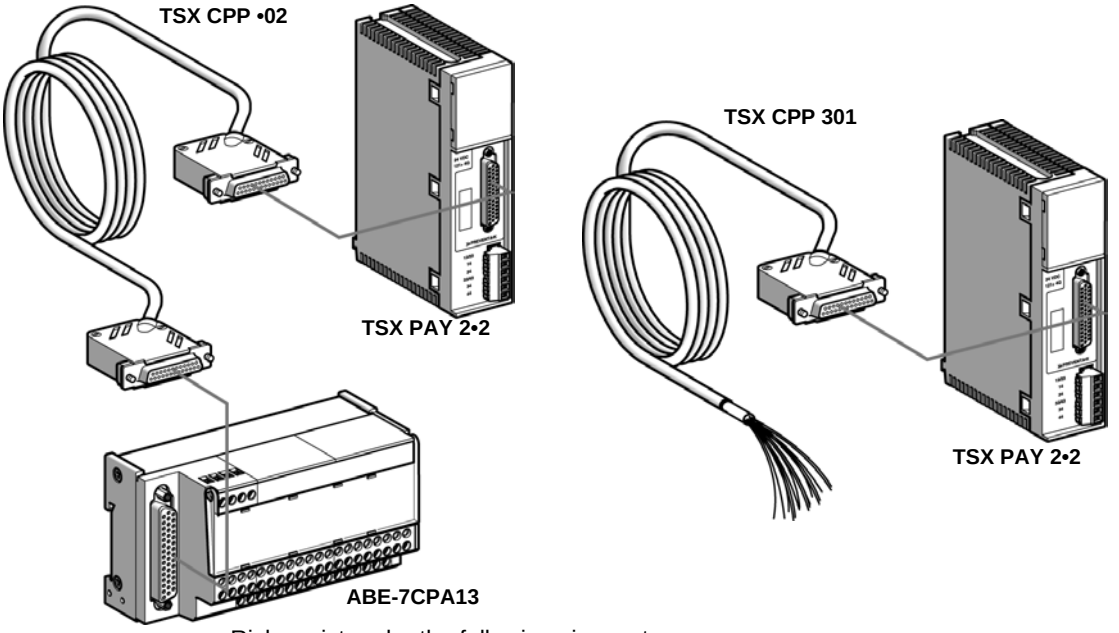
Topic	Page
The safety system	386
TELEFAST pin assignment for safety modules	387
The TSX CPP 301 cable	390
Connection of emergency stop buttons and safety switches	392
Feedback loop connection	397
Reactivation connection	398
Safety outputs	399
Modules in series	401

The safety system

General

Either of the following may be used for cabling:

- the TSX CPP •02 cable with the TELEFAST ABE-7CPA13 connector,
- the TSX CPP 301 cable with loose thread ends.



Risks exist under the following circumstances:

- modifications are made to the wiring diagrams, either by changing connections or adding components where these are insufficiently integrated into the safety circuit.
- the user does not respect the requirements of safety standards in terms of commissioning, operating, adjusting and maintaining the machine. It is imperative to maintain and check equipment on a yearly basis.
- the module is handled without having' shut off the power supply.

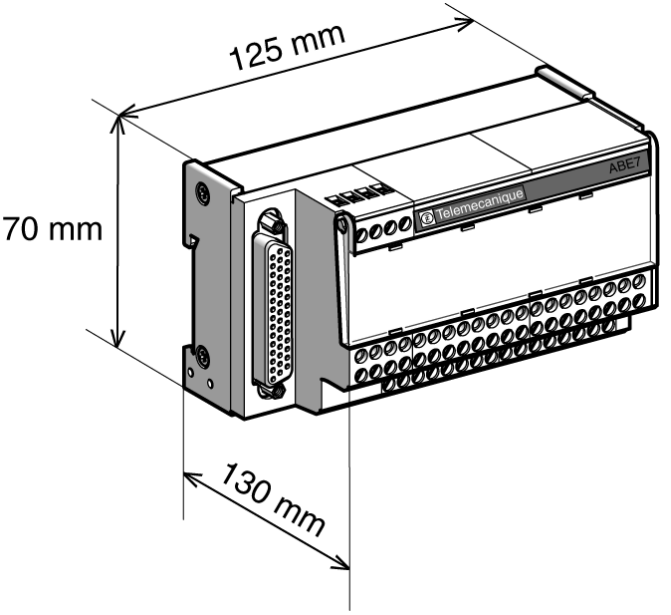
TELEFAST pin assignment for safety modules

General points

The TELEFAST ABE-7CPA13 described below is of "wire to wire"-type with no electronic components. This is used solely with TSX PAY 2•2 safety modules.

It facilitates implementation and wiring of the safety system to a machine.

It transforms a Sub-D connector into a terminal block connector.



The maximum capacity of the TELEFAST terminal block terminals is:

- with termination: 2 x 1 mm^2 wires or 1 x 1.5 mm^2 wire,
- without termination: 1 x 2.5 mm^2 wire.

The TSX CPP •02 cable

The TSX CPP •02 cable is a non-protected multiconductor cable made up of 32 conductors with EN47100-compliant colors.

Its ends are fitted with unremovable male HD 44-pin Sub-D connectors.

The cable is available in three lengths: 1, 2 or 3 m.



Note: The TSX CPP •02 module connection cable is part of the safety system. It must not be modified by the user.

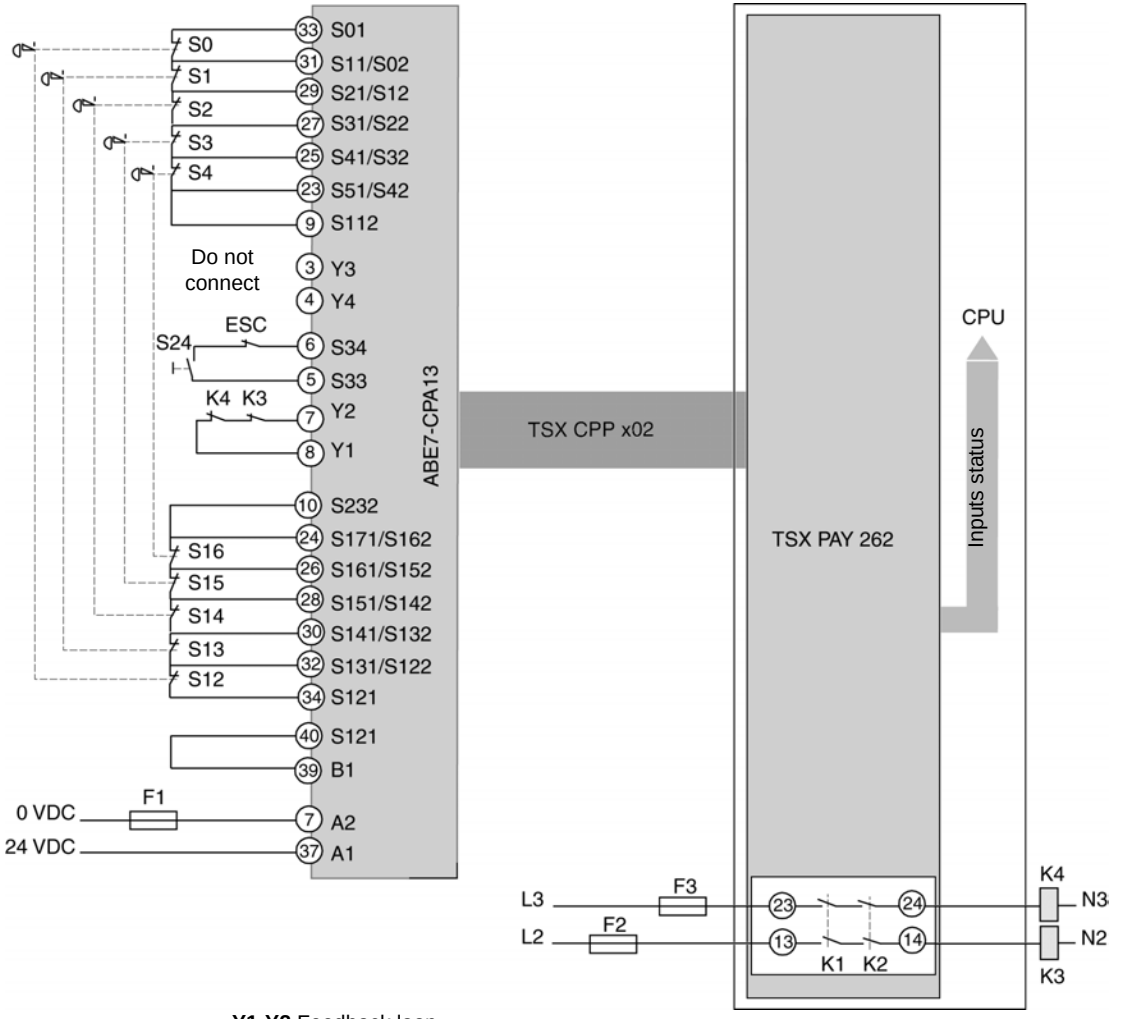
Connections

The following table offers a guide to the correspondence between connections on the safety module and those on the TELEFAST screw terminal block:

Address	TELEFAST screw terminal block	Address	TELEFAST screw terminal block
A1	37	S122/S131	32
A2/Y4	1-3	S132/141	30
B1	39	S142/S151	28
S01	33	S152/S161	26
S02/S11	31	S162/S171	24
S12/S21	29	S172/S181	22
S22/S31	27	S182/S191	20
S32/S41	25	S192/S201	18
S42/S51	23	S202/S211	16
S52/S61	21	S212/S221	14
S62/S71	19	S222/S231	12
S72/S81	17	S232	10-38
S82/S91	15	S33/Y2	5-7
S92/S101	13	S34	6
S102/S111	11	Y1	8
S112	9	Y3	4
S121	34-40	GND	2-35-36

Note: The TELEFAST ABE-7CPA13 and TSX CPP •02 cable are not supplied with the safety module.

Wiring examples Wiring 5 emergency stops with reactivation monitoring:



Y1-Y2 Feedback loop
S33-S34 Operation validation
Y3-Y4 Choice of reactivation monitoring mode
S121 to S232 Input channel contact (+)
S01 to S112 Input channel contact (-)
A1-A2 external 24 VDC supply
B1 Selection of double or single contact wiring
13-14, 23-24 Safety outputs (shared on TSX PAY 282 module)
F1, F2 and F3 1 A, 4 A and 4 A gL fuse (respectively)

The TSX CPP 301 cable

General

The TSX CPP 301 cable is a non-protected multiconductor cable made up of 32 conductors (22 gauge, 7 threads).

One of its ends is fitted with an unremovable male HD 44-pin Sub-D connector, with the other made up of semi-stripped free threads: The sheath has been cut but the conductor is not stripped.



The cable is 3 m long.

Connections

The following table shows the TSX CPP 301 cable's markings. Each thread is marked according to a color code, as per EN47100. The first color denotes the basic color of the conductor isolator, with the second denoting the color of the printed ring.

Marking	Sub-D connector pin	DIN 47100 color	Marking	Sub-D connector pin	DIN 47100 color
A1	16	Yellow/Brown	S122/S131	32	White/Blue
A2/Y4	30	White/Pink	S132/141	3	Green
B1	17	White/Gray	S142/S151	34	White/Red
S01	31	Pink/Brown	S152/S161	5	Gray
S02/S11	2	Brown	S162/S171	36	White/Black
S12/S21	33	Brown/Blue	S172/S181	7	Blue
S22/S31	4	Yellow	S182/S191	38	Gray/Green
S32/S41	35	Brown/Red	S192/S201	9	Black
S42/S51	6	Pink	S202/S211	40	Pink/Green
S52/S61	37	Brown/Black	S212/S221	11	Gray/Pink
S62/S71	8	Red	S222/S231	42	Green/Blue
S72/S81	39	Yellow/Gray	S232	13	White/Green
S82/S91	10	Violet	S33/Y2	15	White/Yellow
S92/S101	41	Yellow/Pink	S34	28	Gray/Brown
S102/S111	12	Red/Blue	Y1	44	White (1)
S112	43	Yellow/Blue	Y3	14	Brown/Green
S121	1	White (1)			
Legend:					
(1)	The white wire is used for both S121 and Y1 signals				

Note: It is not possible to transfer the ground (GND) with the TSX CPP 301 cable The TSX CPP 301 cable is not supplied with the module.

Connection of emergency stop buttons and safety switches

General points

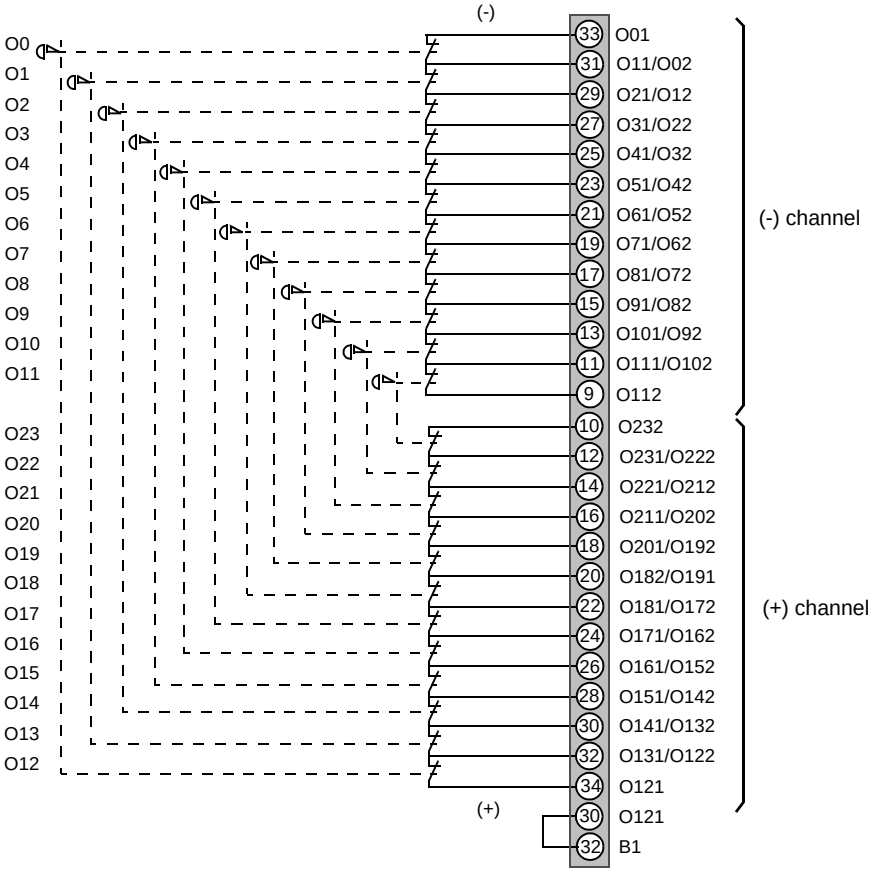
Connections for emergency stop buttons (ESB) or position switches (PS) can be wired with a single or double contact. However, only double contact wiring can provide category 3 or 4 levels of safety.

Double contacts (recommended)

Double contact wiring of inputs is suitable for applications requiring category 3 or 4 compliant levels of safety.

Short circuits between channels are detected.

ES PB or PS short circuits are detected and pinpointed.



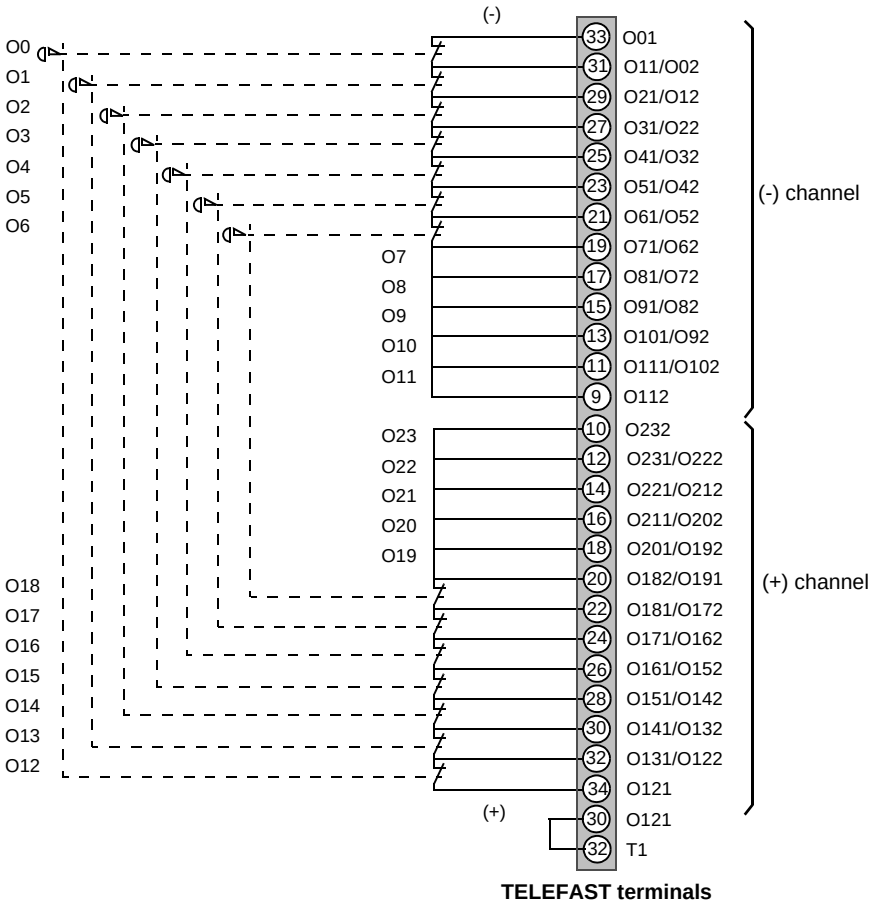
TELEFAST terminals

Note: If less than 12 double contacts are being used, the input terminals that are not in use must be bridged.

Example

Contacts S7 to S11 and S19 to S23 are not in use.

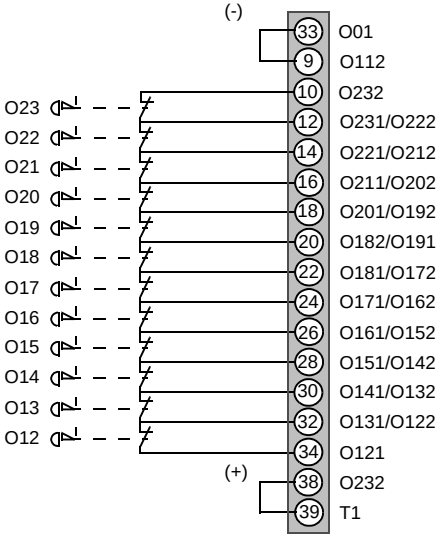
Bridge the following terminals: S71/S62 and S112; and S191/S182 to S232.



Single contact

This wiring is not suitable for applications requiring category 3 or 4 compliant levels of safety.

Not all errors are detected, nor are ES PB or PS short circuits. Here, pressing this PB will not cause the safety circuits to open (loss of the safety function).



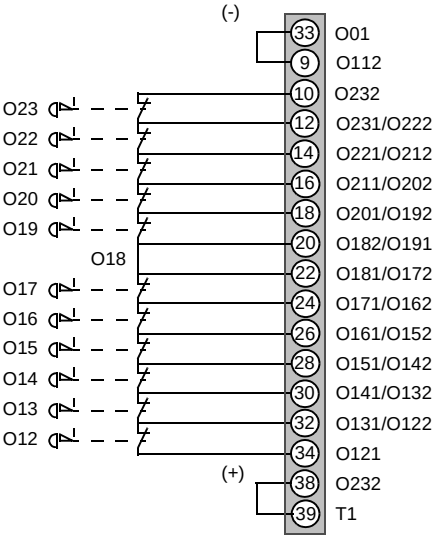
TELEFAST terminals

Note: If less than 12 contacts are being used, the input terminals that are not in use must be bridged.

Example

Contact S18 not in use.

Bridge the following terminals: S172/S181 and S182/S191.



TELEFAST terminals

Feedback loop connection

General

The category 4 immediate stop system design requires supply shut-off device redundancy and activation monitoring.

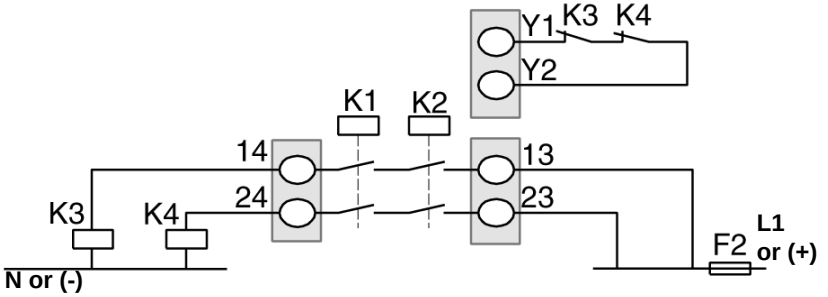
Wiring of open contacts (K3, K4) or (K3, K4, K5, K6) allows every activation request to be checked.

It is compulsory for the contacts of relays (K3, K4) or (K3, K4, K5, K6) to be mechanically linked.

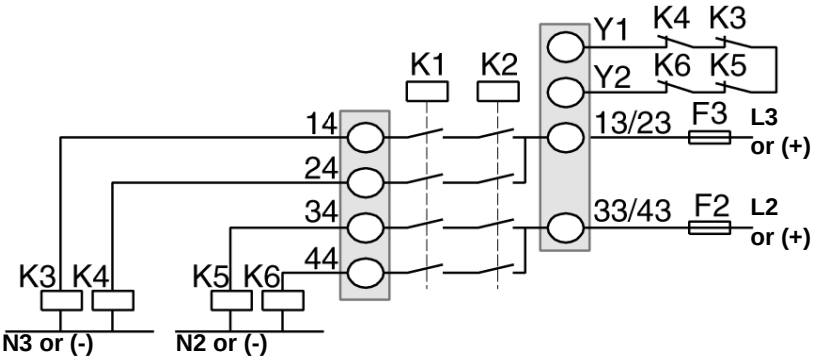
Category 3 wiring means:

- no wiring of auxiliary contacts in the feedback loop (a strap links terminals Y1 and Y2/S33),
- standard switches, with non-guided contacts, are sufficient.

2-switch set-up (category 4):



4-switch set-up (category 4):



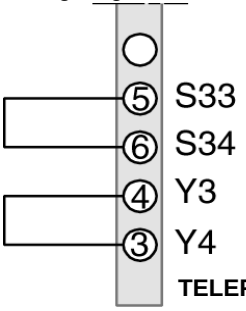
Reactivation connection

Introduction

This section shows the different ways of wiring the safety system reactivation function.

Automatic reactivation

Wiring diagram for automatic reactivation (protective cover):

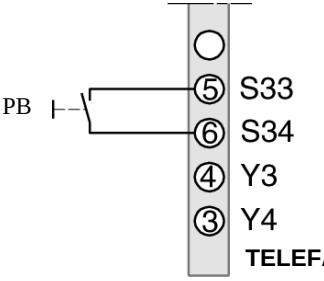


TELEFAST terminal block

Manual reactivation

Once every ES PB or PS is unlocked, it is possible to choose whether or not to monitor manual reactivation of the safety system. The different wiring diagrams for manual reactivation are shown below.

With Reactivation button monitoring (recommended):

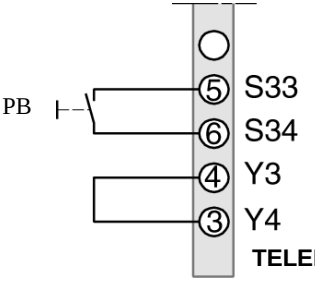


Reactivation is effective on reopening of the PB so as to avoid "auto" operation in the case of PB malfunction (permanently closed).

Y3-Y4 open

TELEFAST terminal block

Without Reactivation button monitoring:



In this case reactivation takes place on closing the PB.

TELEFAST terminal block

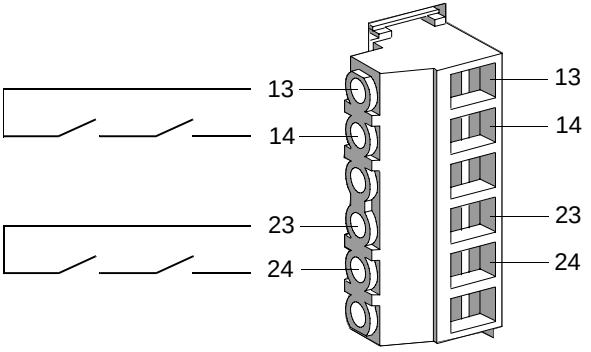
Safety outputs

General

Outputs are wired to the 6-point screw terminal block, for both the TSX PAY 262 and TSX PAY 282 modules.

TSX PAY 262 module

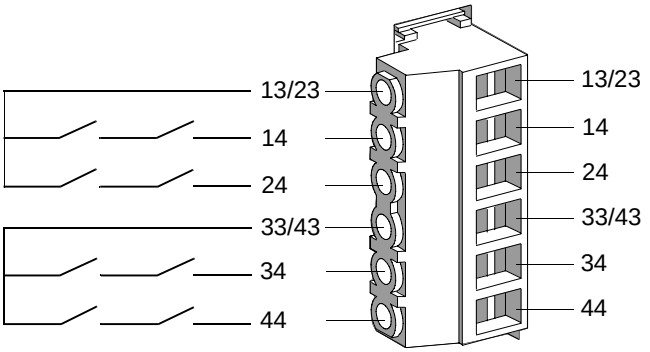
Wiring diagram for TSX PAY 262:



13 and 23 Independent supply input
14 and 24 Safety outputs

TSX PAY 282 module

Wiring diagram for TSX PAY 282:



13/23 and 33/43 Independent supply input
14, 24, 34 and 44 Safety outputs

Note: Cross-section of wires:

- with termination: 2 x 1 mm^2 wires or 1 x 1.5 mm^2 wire,
- without termination: 1 x 2.5 mm^2 wire.

Modules in series

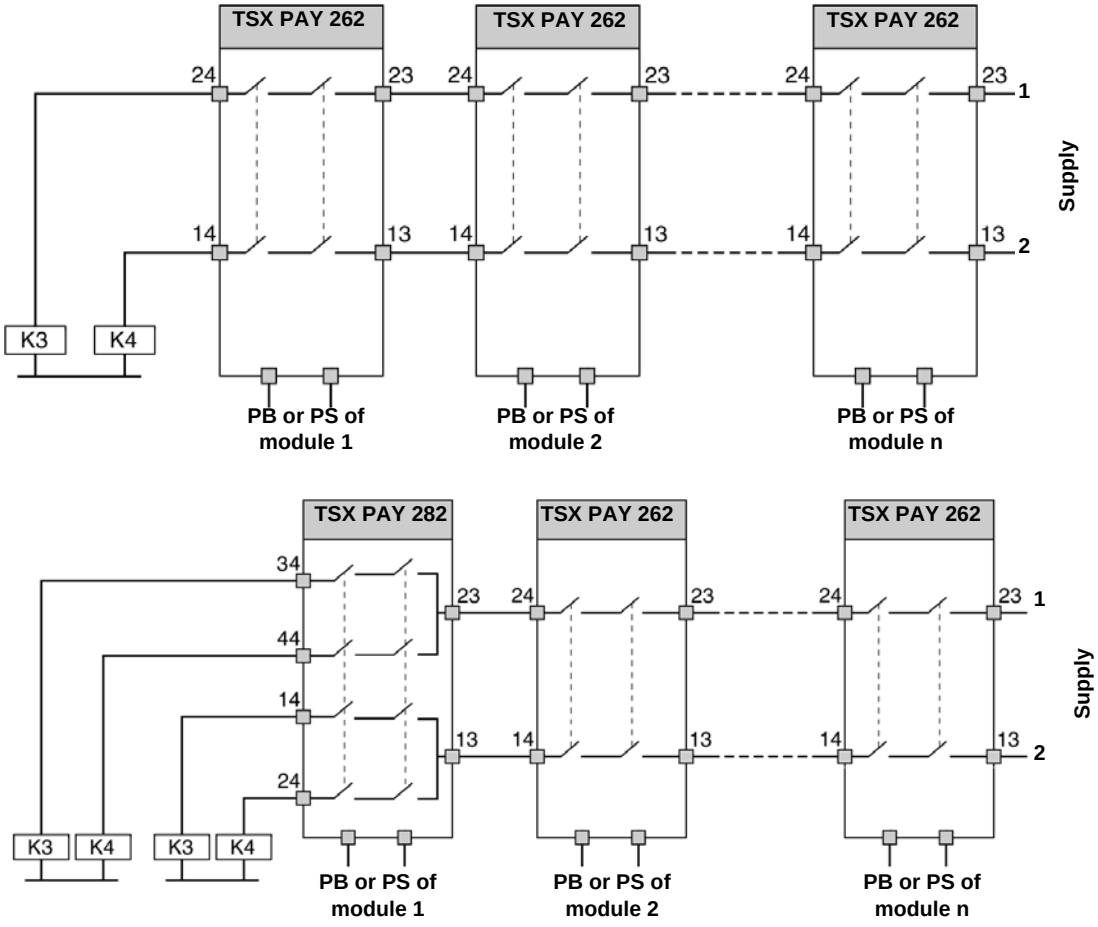
Introduction

For applications using over 12 single or double-contact inputs, it is possible to use several TSX PAY 2•2 modules.

No matter how the safety system is wired, the following must be applied:

- wiring of the safety module outputs in series,
- wiring of as many S33/S34 reactivation contacts as there are modules in series (electrically insulated contacts); the reactivation contacts cannot be connected in parallel,
- wiring of the K3/K4 feedback loop on one of the modules, and of a bridge between terminals Y1/Y2 on the other modules,
- wiring of the safety system inputs to each module independently (no connection in series).

The following diagrams show the cables for the safety module connected in series for use with 2 or 4 contactors:



Note: Attention must be paid, however, to the drop in voltage on the output system, due to the 0.1 Ohm safety relay contact resistance, which depends on the relayed current.
For a 2.5 A thermal current, there will be a 4 V drop in power with 16 safety modules and a 16 V drop with 32 safety modules in series.

Maintenance and diagnostics

35

At a Glance

Overview

The following chapter describes the faults which may occur during operation of TSX PAY 2•2 modules.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Fault detection	404
Displaying safety module faults	406
Safety module diagnostics	408
Maintenance table	410
Test procedure	412

Fault detection

Introduction

This section describes the faults that can be detected by the safety modules.

On inputs

The module is able to detect a short-circuit between the two channels ES PB and PS, in which case the bit Ix.27 signals a fault in the safety system.

The module also self-checks inputs, where used with double contacts: if the states of the ES PBs or PSs are inconsistent when they are activated, the safety outputs are opened but reactivation is no longer possible.

In order to store a fault in the memory, it is imperative to:

- maintain a permanent supply,
- activate only one ES PB at a time (ES short circuit detection).

Application solutions, which use an API output in the feedback loop and which are able to detect faults thanks to module diagnostics data, make it possible to improve the conditions under which faults are stored.

On outputs

In order to detect output faults, it is necessary to use auxiliary relays with mechanically linked contacts (cf. Télémécanique safety applications components catalogue): this constitutes self checking of outputs.

The "NF" contacts of relays K3 and K4 must be looped back into the feedback loop in series, between terminals Y1 and Y2. This wiring prevents the safety system from being reactivated when one of the two control relays (K3 or K4) sticks.

Internal module faults

In the event of the failure of an internal component, the safety modules continue to perform safety functions by opening the output contacts (K1, K2) directly, or when they are next activated (opening an ES PB or PS or powering down). If this occurs, it is impossible to close output contacts (K1, K2). It is then advisable to change the module.

Where such a fault causes over-consumption on the 24 VDC, a limit of 750 mA is imposed. In this case, the bit Ix.27, indicating the status of the safety system, switches to 0, and the fault is signaled.

Ground faults

The safety modules have been built to comply with EN60204-1, which deals specifically with short circuits to ground. Given that the 0 VDC is grounded, the consequences of one or several short circuits to ground can be:

- the short circuiting of one or more of the ES PBs to the negative pole, where double contacts are in use.
  The outputs open on activation of an ES PB or PS by opening the contact to the positive pole, with reactivation no longer being possible due to the self-checking of inputs,
- the short circuiting of the 24 VCC external supply, whether single or double contact wiring is in use.
  No supply to the safety system leading to immediate opening of the safety outputs. The A1-A2 external supply is protected by the 750 mA current limit and a fault is indicated in the safety system.

Limitations

Pressing a short circuited ES PB or PS opens the safety outputs and the self-checking means reactivation is impossible. But opening a second ES PB or PS prior to reactivation renders self-checking ineffective, as here both channels reach a consistent state.

Input self-checking is also made ineffective if a cut in external supply occurs (or is caused) following the activation of a faulty ES PB or PS, as the module is reinitialized on power-up and reactivation is possible once more.

Displaying safety module faults

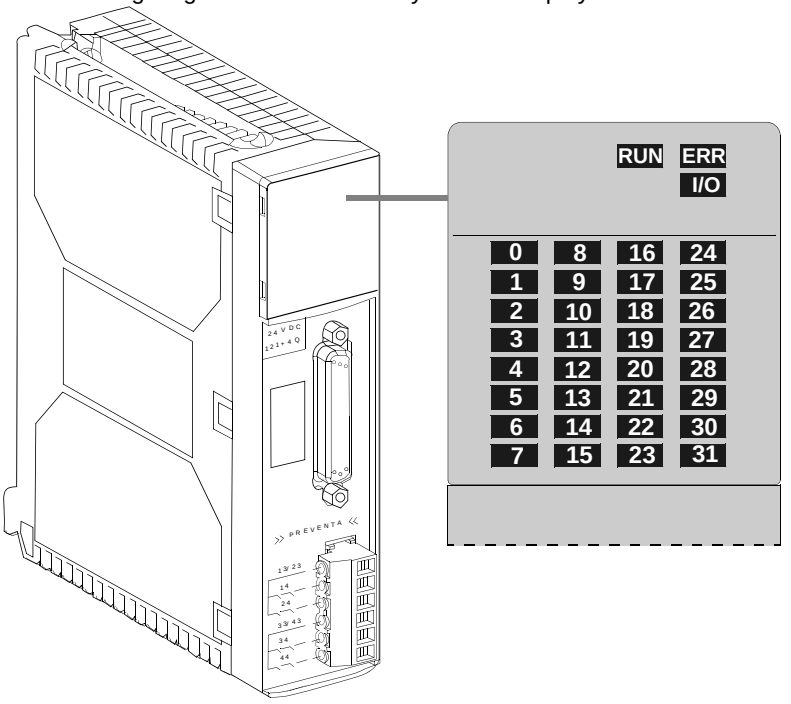
At a Glance

The safety modules are fitted with LED allowing module and channel status to be displayed. We can see :

- the module status LEDs : **RUN**, **ERR** and **I/O**,
- the channel status LEDs : **CH•**.

Illustration

The following diagram shows the safety module display screen :



Description

Depending on their status (on, flashing or off) the three LEDs located on each module provide information on the operational state of the module :

- The green **RUN** LED: indicates that the module is operational
- The red **ERR** LED: indicates an internal module fault or a fault between the module and the rest of the configuration.
- The red **I/O** LED: indicates an external fault.
- LEDs 0 to 27 indicate the status of the safety system.
  - 0 to 11 : status of ES PB or PS (-) channel contacts,
  - 12 to 23 : status of ES PB or PS (+) channel contacts,
  - 24 : reactivation input status,
  - 25 : feedback loop status,
  - 26 : safety relay control status,
  - 27 : supply present on the safety system, safety system diagnostics.
- LEDs 28 to 31 are not used.

Safety module diagnostics

At a Glance

A faulty module will be indicated by the lighting up or flashing of the **RUN**, **ERR** and **I/O** LEDs.

There are three classes of fault : external faults, internal faults and other faults.

Internal faults are the result of a safety module self-check.

External faults are linked to the safety modules' external supply.

State of module

The following table allows a failure diagnosis to be made on the basis of the three LEDs: **RUN**, **ERR** and **I/O** :

State of module	**LEDs**		
	RUN	**ERR**	**I/O**
Rack off or module fault	○	○	○
Normal operation or module not recognized if no supply	●	○	○
Faulty module	○	●	○
External supply fault	○	○	●
Module and external supply fault	○	●	●
External error: 24 VDC (<19 VDC) external supply	●	○	●
Internal fault (module faulty)	●	●	○
General fault (short circuit, etc.)	●	●	●
Legend :			
○	**LED off**		
●	**LED on**		

Safety system status

The following table enables us to determine the status of the safety system using LEDs 0 to 31 :

Display LEDs	Status	Signification
0 to 23	○ ●	ES PB or PS contact open ES PB or PS contact closed
24	○ ●	Reactivation input open **or** feedback loop open Reactivation input closed **or** feedback loop closed
25	○ ●	Feedback loop open Feedback loop closed
26	○ ●	K1 and K2 SS relays non-controlled K1 and K2 SS relays controlled
27	○ ●	SS supply fault or fault causing a short circuit between safety system channels SS supply present
28 to 31	○	LED not in use
Legend :		
○	**LED off**	
●	**LED on**	
SS	**Safety System**	

Note: An external supply fault causes the module's **I/O** LED to come on. The display block LEDs always show channel status, even if there is a fault on the channel.

it is possible for the monitoring of the external supply to be set up, in which case the display block LEDs show the real state of the ES PBs or PSs.

Maintenance table

At a Glance

The following section shows the maintenance table for safety modules.

Faults	Possible causes	Check
Unsolicited opening of safety outputs	No external supply or fuse F1 blown	Read %Ix.MOD.ERR = external fault Check I/O LED on the module Voltage >19.2 VDC between terminals A1-A2 If %Ix.27=0 then SC on SS
	ES PB or PS contact open	Read %Ix.0 to %Ix.23 Check consistency of contact status
	B1 disconnected	Check B1 linked to : ● S232 for (single contact) ● S121 for (double contact)
	Loss of relay control F2 Fuse blown	Read %Ix.26 Check F2 status and characteristics
Start-up impossible	No external supply or fuse F1 blown	Read %Ix.MOD.ERR = external fault Check I/O LED on the module Voltage >19.2 VDC between terminals A1-A2
	Emergency stop remains open	Read %Ix.0 to %Ix.23 Check consistency of contact status
	Inconsistency between double contact inputs (wires cut or faulty ES PB) : self-check	Read %Ix.0 to %Ix.23 Check consistency of contact status
	No ES PB action possible with feedback loop closed	%Ix.24=%Ix.25=1 on PB action Check PB contacts Check Y3-Y4 shunt status
	Feedback loop remains open Control impossible	Read %Ix.25 Check auxiliary relay contacts Read %Ix.26 on PB action
	Fuse F2 blown	Check F2 status and characteristics
	Output supply not functioning	Check reactivation wiring
Automatic start-up	Permanent PB activation with a closed loop	%Ix.24=%Ix.25=1 without PB action Check PB contacts
False input data	Voltage drop on cables	Voltage between terminals S01-S112 and S121-S232 > 18.2 VDC all ES PBs closed

Faults	Possible causes	Check
Legend :		
SC	Short Circuit	
SS	Safety System	
ES PB	Emergency Stop Push Button	
PS	Position Switch	

Note: If the fault persists, following wiring check, the module should be changed.

To avoid errors when replacing a product, it is recommended to mark the slot on the module label on the front panel and the TSX CPP •02 cable label. The specific red color of the TSX PAY 2•2 modules front panel allows errors to be avoided during PLC maintenance operations.

Test procedure

Introduction

Before using the installation or during a periodic check (service), it may be useful to test the module and its functions. This procedure used may be as follows:

External supply

The module has a built-in external supply check. A module is declared faulty if voltage falls below 19 VDC.

The module's I/O LED lights up to signal the supply fault.

In this situation, the module's safety system remains operational: a drop in voltage to 10 VDC also causes safety outputs to open, thus switching to the safe position.

The module is protected against polarity reversals, and contains a current limiter set to 750 mA.

In the event of the external supply check not being activated (at set-up), supply faults are not indicated.

Emergency stop input

With the outputs closed, activate every emergency stop, one at a time, in order to check that outputs switch to safety mode: LED 26 should switch from on to off.

Check safety system activation and that diagnostic data is consistent.

Feedback loop input

The feedback loop provides the module with a real image of the safety outputs; it is open when outputs are active. The device used is a guided-contact relay for controlling outputs.

- Open loop: LED 25 off,
- Closed loop: LED 25 on.

Check the status of the feedback loop in relation to the output control.

Activation of reactivation input

Activating the reactivation input between terminals S33 and S34 allows the system to be reactivated when no ES has been requested AND if the feedback loop is closed; the device used is a push button (activated on falling edge or status).

It is only possible to read the status of the reactivation input if the feedback loop is also closed.

- Open contact: LED 24 off,
- Closed contact: LEDs 24 and 25 on.

Depending on which reactivation option has been chosen, check for correct operation and check the diagnostic indicators.

Output control status

Depending on the module - TSX PAY 262 or TSX PAY 282 – two or four outputs are available between terminals 13-14, 23-24, 33-34 and 43-44. These outputs allow the contactors or pre-actuators to be controlled, and this section is isolated from the control section (reactivation).

When the reactivation conditions are satisfied (feedback loop closed AND reactivation input activated), outputs can be controlled.

- Outputs idle: LED 26 off,
- Outputs active: LED 26 on.

TSX PAY 262 module

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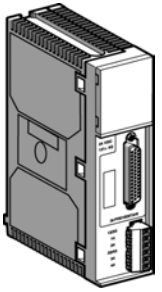
Characteristics of the TSX PAY 262 module

Introduction

This section describes the general characteristics of the TSX PAY 262 module, its input / output characteristics, operating conditions and applied standards.

General Characteristics

Table of general characteristics for the TSX PAY 262 module

Illustration	Safety module 
Safety functions **- ES PB and PS monitoring** **- moving cover monitoring** **- sensitive conveyor monitoring** **- bi-manual control** **- relay cut-off**	 Yes (1 to 12 single or double contacts) Yes (de-synchronization > 400 ms) No No 2 safety outputs
EN 954-1 category	4
External module power supply **- voltage** **- residual ripple** **- voltage limit** **- F1 fuse external supply protection (according to IEC 947-5-1)** **- maximum consumption** **- check threshold** **- maximum current call** - **safety circuit voltage** **- module protection** **- insulation**	A1-A2 terminal 24 VDC 5% -15% +20% < 1A gL 200 mA < 19 VDC 0.5 A / 5 ms 24 VDC Internal electronic fuse > 250 mA and < 1 A Over-voltage category II (2 kV), pollution degree 2
PLC supply, current consumed with internal 5 V supply	<150 mA
Module power dissipation	< 5 W
Dimensions: **H x W x D** **Weight**	 150 x 36 x 120 mm 0.43 kg
MTBF : ● **Module** ● **Relay card** ● **Mother board**	 3 x 10^{-6} failures/hour 0.5 x 10^{-6} failures/hour 2.4 x 10^{-6} failures/hour

Reactivation monitoring	Yes, by strap
Norms	EN 60204-1, EN 292, EN 418, prEN 1921, BS 2771-1, DIN VDE 0113-1, EN 954, EN 1088, EN 574 type III A, NF C 79-130, NF E 09-053
Display	28 LEDs + 3 Premium range standard status LEDs

Input characteristics

Table of input characteristics for the TSX PAY 262 module

No. of safety channels	12 single or double ES PBs
Reactivation / On button	Yes (S33-S34)
Single or double ES PB selection	Yes with external shunt (B1)
Feedback loop	Yes (Y1-Y2)
Reactivation input monitoring	Yes with external shunt (Y3-Y4)
Call current	0.5 A / 1 ms
Input / Ground insulation	500 V actual 50/60 Hz - 1 min
Input synchronization	Approx. 400 ms (< 1 s, automatic start-up)

Output characteristics

Table of output characteristics for the TSX PAY 262 module

Potential reference	No potential
Number and type of circuits	2 x normally open with independent supply
DIN EN 60947-5-1 cut-off power	AC15 / C300 : 1800 VA call 180 VA maintained Dc13 : 24 V/2.5 A L/R=100 ms
Voltage	19..250 VAC/17..127 VDC
Outputs protected by fuses (compliant with EN VDE 0660 section 200 and IEC 947-5-1	4 A gL
Maximum thermal current	2.5 A
Minimum current and voltage	30 mA and 24 VDC
ES request response time	< 10 ms
Insulation: ● **Output / Weight** ● **Test voltage** ● **Safety System / Ground**	 300 V insulation voltage compliant with VDE 0110 / section 1 2000 V actual 50/60 Hz - 1 min 300 V actual
Mechanical durability	10^6 operations
Electrical durability	10^6 operations (depending on power)
I/O system connection	By HD 44-pin Sub-D connectors. By 6-pin screw terminal block

Note: The apparatus is capable of switching low loads (24 V/30 mA). This is possible on condition that the contact has never previously switched heavy loads, as the gold layer on the contact may have been damaged.

Usage conditions

Table of operating conditions for the TSX PAY 262 module

Operating temperature : ● **Of the API** ● **Of the safety functions 1**	 0.0.60°C -10.0.60°C
Humidity without condensation	5..95%
Storage Temperature	-25.0.70°C
Resistance of insulation	> 10 MW below 500 Vdc
Dielectric strength on Sub-D compliant with IEC1131	500 V actual, 50/60 Hz, 1 min
Operational altitude	0..2000 m
Degree of protection compliant with IP IEC 529 : ● **Terminals/Unit** ● **Place of installation**	 IP20 IP54
Maximum capacity of screw terminal blocks	2 x 1 mm^2 wires with termination,

Norms

The TSX PAY 262 module has been developed to comply with the requirements of European and international standards for electronic industrial automation equipment and safety circuits.

PLC-specific recommendations	EN61131-2 (IEC 1131-2), CSA 22-2 No.142, UL508
Electrical qualities	UL746L, UL94
Electrical equipment of machinery	EN60204-1 (IEC204-1)
Emergency stop equipment	EN418
Machine safety – Related control system parts	EN954-1, PR EN954-2 EN953, EN1088 DIN VDE 0110, DIN VDE 0660 EN60947-5-1, VDE 57100 NF C63-850, IEC 664

TSX PAY 282 module

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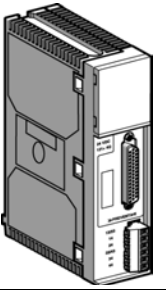
Characteristics of the TSX PAY 282 module

Introduction

This section describes the general characteristics of the TSX PAY 282 module, its input / output characteristics, operating conditions and applied standards.

General Characteristics

Table of general characteristics for the TSX PAY 282 module

Illustration	Safety module 
Safety functions **- ES PB and PS monitoring** **- moving cover monitoring** **- sensitive conveyor monitoring** **- bi-manual control** **- relay cut-off**	 Yes (1 to 12 single or double contacts) Yes (de-synchronization > 400 ms) No No 4 safety outputs
EN 954-1 category	4
External module power supply **- voltage** **- residual ripple** **- voltage limit** **- F1 fuse external supply protection (according to IEC 947-5-1)** **- maximum consumption** **- check threshold** **- maximum current call** **- safety circuit voltage** **- module protection** **- insulation**	A1-A2 terminal 24 VDC 5% -15% +20% < 1A gL 200 mA < 19 VDC 0.5 A / 5 ms 24 VDC Internal electronic fuse > 250 mA and < 1 A Over-voltage category II (2 kV), pollution degree 2
PLC supply, current consumed with internal 5 V supply	<150 mA
Module power dissipation	< 5 W
Dimensions: ● **H x W x D** ● **Weight**	 150 x 36 x 120 mm 0.49 kg
MTBF : ● **Module** ● **Relay card** ● **Mother board**	 3 x 10^{-6} failures/hour 0.5 x 10^{-6} failures/hour 2.4 x 10^{-6} failures/hour

Norms	EN 60204-1, EN 292, EN 418, prEN 1921, BS 2771-1, DIN VDE 0113-1, EN 954, EN 1088, EN 574 type III A, NF C 79-130, NF E 09-053
Display	28 LEDs + 3 Premium range standard status LEDs

Input characteristics

Table of input characteristics for the TSX PAY 282 module

No. of safety channels	12 single or double ES PBs
Reactivation / On button	Yes (S33-S34)
Single or double ES PB selection	Yes with external shunt (B1)
Feedback loop	Yes (Y1-Y2)
Reactivation input monitoring	Yes with external shunt (Y3-Y4)
Call current	0.5 A / 1 ms
Input / Ground insulation	500 V actual 50/60 Hz - 1 min
Input synchronization	Approx. 400 ms (< 1 s, automatic start-up)

Output characteristics

Table of output characteristics for the TSX PAY 282 module

Potential reference	No potential
Number and type of circuits	4 x normally open with shared supply
DIN EN 60947-5-1 cut-off power	AC15 / C300 : 1800 VA call 180 VA maintained Dc13 : 24 V/2.5 A L/R=100 ms
Voltage	19..250 VAC/17..127 VDC
Outputs protected by fuses (compliant with EN VDE 0660 section 200 and IEC 947-5-1	4 A gL
Maximum thermal current	2.5 A
Minimum current and voltage	30 mA and 24 VDC
ES request response time	< 10 ms
Insulation: ● **Output / Weight** ● **Test voltage** ● **Safety System / Ground**	 300 V insulation voltage compliant with VDE 0110 / section 1 2000 V actual 50/60 Hz - 1 min 300 V actual
Mechanical durability	10^6 operations
Electrical durability	10^6 operations (depending on power)
I/O system connection	By HD 44-pin Sub-D connectors. By 6-pin screw terminal block

Note: The apparatus is capable of switching low loads (24 V/30 mA). This is possible on condition that the contact has never previously switched heavy loads, as the gold layer on the contact may have been damaged.

Usage conditions

Table of operating conditions for the TSX PAY 282 module

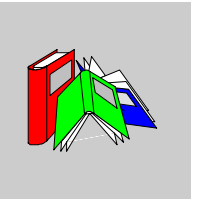
Operating temperature : ● **Of the API** ● **Of the safety functions 1**	 0.0.60°C -10.0.60°C
Humidity without condensation	5..95%
Storage Temperature	-25.0.70°C
Resistance of insulation	> 10 MW below 500 Vdc
Dielectric strength on Sub-D compliant with IEC1131	500 V actual, 50/60 Hz, 1 min
Operational altitude	0..2000 m
Degree of protection compliant with IP IEC 529 : ● **Terminals/Unit** ● **Place of installation**	 IP20 IP54
Maximum capacity of screw terminal blocks	2 x 1 mm^2 wires with termination,

Norms

The TSX PAY 282 module has been developed to comply with the requirements of European and international standards for electronic industrial automation equipment and safety circuits.

PLC-specific recommendations	EN61131-2 (IEC 1131-2), CSA 22-2 No.142, UL508
Electrical qualities	UL746L, UL94
Electrical equipment of machinery	EN60204-1 (IEC204-1)
Emergency stop equipment	EN418
Machine safety – Related control system parts	EN954-1, PR EN954-2 EN953, EN1088 DIN VDE 0110, DIN VDE 0660 EN60947-5-1, VDE 57100 NF C63-850, IEC 664

Glossary



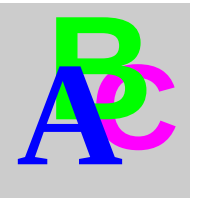
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Discr. Discrete

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