Modicon M340 Using Unity Pro

Discrete Input/Output Modules User Manual

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All pertinent state, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to help ensure compliance with documented system data, only the manufacturer should perform repairs to components.

When devices are used for applications with technical safety requirements, the relevant instructions must be followed.

Failure to use Schneider Electric software or approved software with our hardware products may result in injury, harm, or improper operating results.

Failure to observe this information can result in injury or equipment damage.

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Safety Information

Important Information

NOTICE

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of this symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

DANGER
DANGER indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

WARNING
WARNING indicates a hazardous situation which, if not avoided, **could result in** death or serious injury.

CAUTION
CAUTION indicates a hazardous situation which, if not avoided, **could result** in minor or moderate injury.

NOTICE
NOTICE is used to address practices not related to physical injury.

PLEASE NOTE

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

About the Book

At a Glance

Document Scope

This manual describes the hardware and software installation of discrete modules for Modicon M340 PLCs and X80 drops.

Validity Note

This documentation is valid for Unity Pro 10.0 or later.

Product Related Information

⚠ WARNING
UNINTENDED EQUIPMENT OPERATION The application of this product requires expertise in the design and programming of control systems. Only persons with such expertise should be allowed to program, install, alter, and apply this product. Follow all local and national safety codes and standards. **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

Part I
Hardware Installation of the Discrete I/O Modules

Subject of this Part

This part presents the range of discrete I/O modules on Modicon M340 PLCs.

What Is in This Part?

This part contains the following chapters:

Chapter 1
General Introduction

Subject of this Section

This chapter provides a general introduction to discrete input/output modules.

What Is in This Chapter?

This chapter contains the following topics:

General Description of the Modules

At a Glance

The discrete input/output modules of the Modicon M340 range are standard format modules (occupying one single position), fitted with either:

- one 20-pin terminal block or
- one or two 40-pin connectors

For modules fitted with 40-pin connector outputs, a series of products known as TELEFAST 2 *(see page 217)* is available that enables discrete input/output 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 inputs/outputs, with positive or negative logic
- modularity: 8, 16, 32, or 64 channels per module

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.

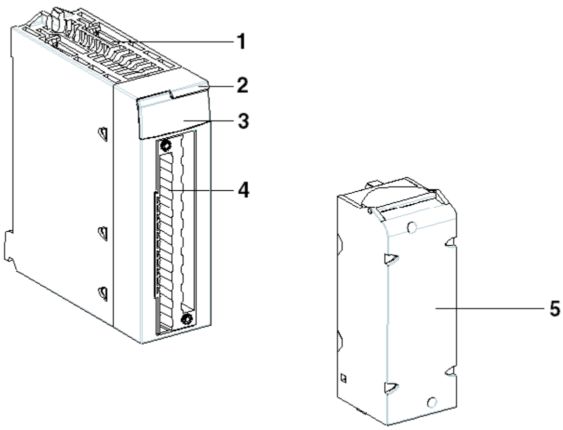
Physical Description of Discrete Modules with 20-pin Terminal Block Connection

At a Glance

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

Illustration

The diagram below shows a 20-pin discrete module and a 20-pin terminal block.



Elements

The following table describes the different elements of the discrete input/output modules with 20-pin terminal block connections.

Number	Description
1	Rigid structure which supports and protects the electronic card
2	Module reference label **Note:** A label is also visible on the right-hand side of the module.
3	Channel status display panel
4	Connector housing the 20-pin terminal block
5	20-pin terminal block, used to connect sensors or pre-actuators

NOTE: Terminal blocks are supplied separately.

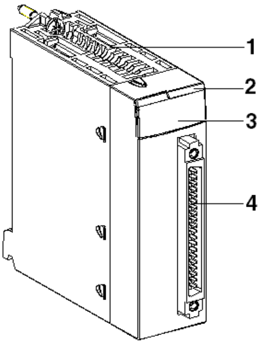
Physical Description of Discrete Modules with 40-Pin Connectors

At a Glance

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

Illustration

The diagram below shows a 40-pin discrete module.



Elements

The following table describes the different elements of the discrete input/output modules by 40-pin connectors.

Number	Description
1	Rigid structure which supports and protects the electronic card
2	Module reference labels **Note:** A label is also visible on the right-hand side of the module.
3	Channel status display panel
4	40-pin connector, used to connect sensors or pre-actuators

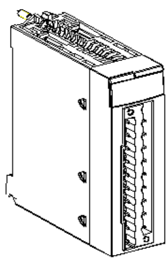
Discrete Input Modules Catalog

At a Glance

The tables below present the two catalogs of discrete input modules:
- with 20-pin terminal block
- with 40-pin connectors

Catalog of Terminal Block Input Modules

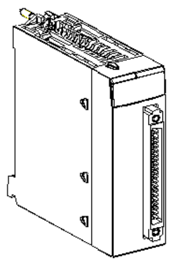
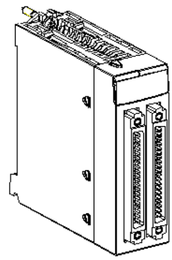
Catalog of discrete input modules with 20-pin terminal block connection.

Type of module	Inputs with 20-pin terminal block connection								
Illustration	Discrete input module 								
Number of channels	16 inputs	16 inputs	16 inputs	16 inputs		16 inputs	16 inputs	8 inputs	8 inputs
Range	24 VDC	48 VDC	125 VDC	24 VAC	24 VDC	48 VAC	100... 120 VAC	100... 120 VAC	200... 240 VAC
Insulation	Insulated inputs	Insulated inputs	Insulated inputs	Insulated inputs		Insulated inputs	Insulated inputs	channel to channel isolated inputs	Insulated inputs
IEC 61131-2 compliance	Type 3	Type 1	N/A	Type 1	N/A	Type 3	Type 3	Type 3	Type 2
Logic	Positive	Positive	Positive	N/A	Positive or Negative	N/A	N/A	N/A	N/A
Proximity sensor compatibility	2-wire DC and 3-wire PNP proximity sensor (IEC 947-5-2 standard compliant)				N/A	2-wire DC and 3-wire PNP proximity sensor (IEC 947-5-2 standard compliant)			
Response time	4 ms	4 ms	5 ms	15 ms		10 ms	10 ms	10 ms	10 ms

Type of Interface	20-pin terminal block	20-pin terminal block	20-pin terminal block	20-pin terminal block	20-pin terminal block	20-pin terminal block	20-pin terminal block	20-pin terminal block
Reference	BMX DDI 1602	BMX DDI 1603	BMX DDI 1604T	BMX DAI 1602	BMX DAI 1603	BMX DAI 1604	BMX DAI 0814	BMX DAI 0805

Catalog of 40-pin Connector Input Modules

Catalog of discrete input modules with 40-pin connectors.

Type of module	Inputs with connection via 40-pin connectors	
Illustration	Discrete input module 	Discrete input module 
Number of channels	32 inputs	64 inputs
Range	24 VDC	24 VDC
Insulation	Inputs insulated per group of 16 channels	Inputs insulated per group of 16 channels
IEC 61131-2 compliance	Type 3	Not IEC
Logic	Positive	Positive
Proximity sensor compatibility *(see Premium and Atrium using Unity Pro, Discrete I/O modules, User manual)*	2-wire proximity sensor 3-wire PNP proximity sensor	3-wire PNP proximity sensor
Response time	4 ms	4 ms
Type of Interface	1 x 40-pin connector	2 x 40-pin connectors
Reference	BMX DDI 3202 K	BMX DDI 6402 K

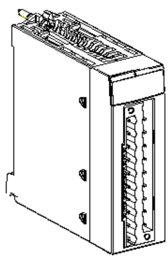
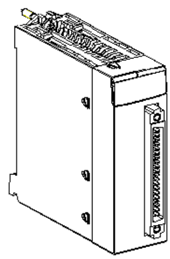
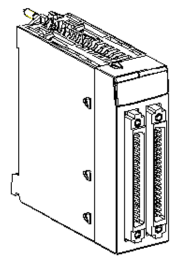
Discrete Output Modules Catalog

At a Glance

The tables below show the catalogs of static and relay output modules.

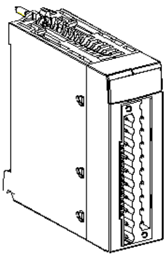
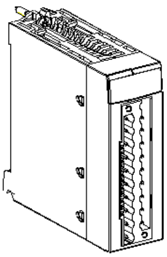
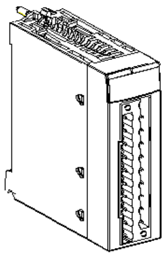
Catalog of Output Modules

Catalog of discrete static output modules with connection via 20-pin terminal blocks and 40-pin connectors.

Type of module	Static outputs with 20-pin terminal block connections		Static outputs with 40-pin connectors	
Illustration	Discrete output module 		Discrete output module 	Discrete output module 
Number of channels	16 outputs	16 outputs	32 outputs	64 outputs
Range	24 VDC	24 VDC	24 VDC	24 VDC
Insulation	Insulated outputs	Insulated outputs	Outputs insulated per group of 16 channels	
Current	0.5 A	0.5 A	0.1 A	0.1 A
Overload protection	Outputs protected against short-circuits and overloads with automatic or controlled reactivation and fast electromagnet demagnetization circuit.			
Logic	Positive	Negative	Positive	Positive
Response time	1.2 ms	1.2 ms	1.2 ms	1.2 ms
Type of Interface	20-pin terminal block	20-pin terminal block	1 x 40-pin connector	2 x 40-pin connectors
Reference	BMX DDO 1602	BMX DDO 1612	BMX DDO 3202 K	BMX DDO 6402 K

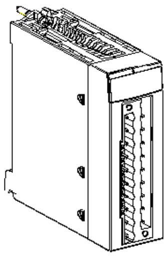
Catalog of Relay Output Modules

Catalog of discrete relay output modules with 20-pin terminal block connection.

Type of module	Relay outputs with 20-pin terminal block connections		
Illustration	Discrete output module 	Discrete output module 	Discrete output module 
Number of channels	8 outputs	8 outputs	16 outputs
Range	125 VDC	24 VDC or 24 ... 240 VAC	24 VDC or 24 ... 240 VAC
Insulation	Outputs insulated from ground	Outputs insulated from ground	Outputs insulated from ground
Type of contact	8 insulated channels	8 insulated channels	1 common per group of 8 channels
Current	0.3 A	3 A	2 A
Overload protection	No protection	No protection	No protection
Logic	Positive/negative	Positive/negative	Positive/negative
Response time	10 ms max	10 ms max	10 ms max
Type of Interface	20-pin terminal block	20-pin terminal block	20-pin terminal block
Reference	BMX DRA 0804T	BMX DRA 0805	BMX DRA 1605

Catalog of Triac Output Module

Catalog of discrete triac output module with connection via 20-pin terminal blocks.

Type of module	Triac outputs with 20-pin terminal block connections
Illustration	Discrete output module 
Number of channels	16 outputs
Range	100 ... 240 VAC
Insulation	Outputs insulated by group of 4 channels
Current	max: 0.6 A / points (with derating *(see page 26)*)
Overload protection	Snubber circuit and varistor
Logic	-
Response time	1 ms + 1/(2xF) (where F = frequency in Hz)
Type of Interface	20-pin terminal block
Reference	BMX DAO 1605

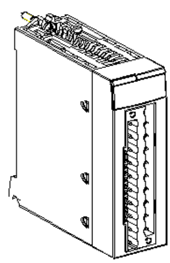
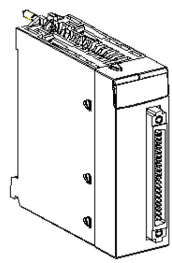
Discrete Mixed Input/Output Modules Catalog

At a Glance

The table below presents the catalog of discrete mixed input/output modules with connections by 20-pin terminal block and by 40-pin connectors.

Catalog

Catalog of discrete mixed input/output modules with connection via 20-pin terminal blocks and 40-pin connectors.

	Type of module	Mixed inputs/outputs with 20-pin terminal block connections		Mixed inputs/outputs with 40-pin terminal block connections
	Illustration	Discrete mixed input/output modules 		Discrete mixed input/output modules 
	Number of channels	8 inputs 8 outputs	8 inputs 8 outputs	16 inputs 16 outputs
Inputs	**Range**	24 VDC	24 VDC	24 VDC
	Insulation	Insulated inputs	Insulated inputs	Insulated inputs
	IEC 61131-2 compliant	Type 3	Type 3	Type 3
	Logic	Positive	Positive	Positive
	Response time	4 ms	4 ms	4 ms

Outputs	**Range**	Static outputs 24 VDC	Relay outputs 24 VDC or 24...240 VAC	Static outputs 24 VDC
	Insulation	Outputs insulated from ground	Outputs insulated from ground 1 common per group of 8 channels	Outputs insulated from ground
	Current	0.5 A	2 A	0.1 A
	IEC 61131-2 compliant	Yes	Yes	Yes
	Overload protection	Outputs are protected against overloads and short-circuits.	N/A	Outputs are protected against overloads and short-circuits.
	Logic	Positive	N/A	Positive
	Response time	1.2 ms	10 ms max	1.2 ms
	Connections	20-pin terminal block	20-pin terminal block	1 x 40-pin connector
	Reference	BMX DDM 16022	BMX DDM 16025	BMX DDM 3202 K

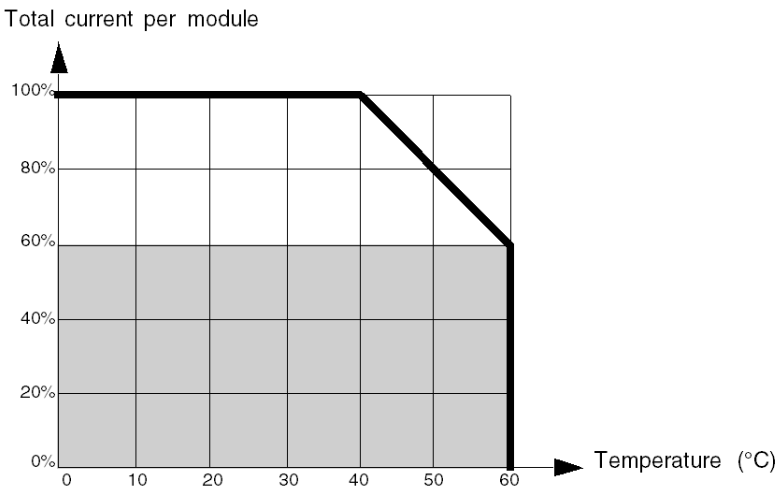
Temperature Derating

At a Glance

The characteristics are specified for a load rate of 60% of the channels.

CAUTION
OVERHEATING HAZARD
Take into account the temperature derating of the discrete I/O modules at the installation to prevent the device from overheating and/or deteriorating.
Failure to follow these instructions can result in injury or equipment damage.

If the rate is greater than 60%, the following downgrade curve must be taken into consideration.



NOTE: There is no temperature derating for relay modules. Users must therefore check that the overall consumption of the 24 VDC power supply is sufficient.

NOTE: For static outputs, temperature derating is carried out on the basis of the maximum current produced by the active outputs.

Examples

- **BMX DDO 1602**
  Suppose the BMX DDO 1602 module with sixteen 24 VDC/0.5 A outputs produces 0.5 A per channel. For an ambient temperature reading of between 0° C and 40° C, the maximum admissible current in the module is equal to 16 x 0.5 = 8 A. Above 40° C, the downgrading curve must be applied. At 60° C, the maximum current in 24 VDC must not exceed 8 x 60% = 4.8 A. This value corresponds to 10 outputs at 0.5 A or 16 outputs at 0.3 A or other combinations.

- **BMX DDO 6402**
  Suppose the BMX DDO 6402 K module with sixty-four 24 VDC/0.1 A outputs produces 0.1 A per channel. For an ambient temperature reading of between 0° C and 40° C, the maximum admissible current in the module is equal to 64 x 0.1 = 6.4 A. Above 40° C, the downgrading curve must be applied. At 60° C, the maximum current in 24 VDC must not exceed 6.4 x 60% = 3.8 A. This value corresponds to 38 outputs at 0.1 A or 64 outputs at 0.05 A or other combinations.

- **BMX DAO 1605**
  Suppose the BMX DAO 1605 module with sixteen 220 VAC outputs producing 0.3 A per channel. For an ambient temperature reading of between 0° C and 40° C, the maximum admissible current in the module is equal to 16 x 0.3 A = 4.8 A (2,4 A per 8-channel group maximum). Above 40° C, the downgrading curve must be applied. At 60° C, the maximum current in 220 Vac must not exceed 4.8 A x 0.6 = 2.9 A (1.5 A per 8-channel group maximum). This value corresponds to 10 outputs at 0.3 A or to 16 outputs at 0.18 A.

Modicon M340H (Hardened) Equipment

M340H

The Modicon M340H (hardened) equipment is a ruggedized version of M340 equipment. It can be used at extended temperatures (-25...70ºC) (-13...158ºF) and in harsh chemical environments.

This treatment increases the isolation capability of the circuit boards and their resistance to:
- condensation
- dusty atmospheres (conducting foreign particles)
- chemical corrosion, in particular during use in sulphurous atmospheres (oil, refinery, purification plant and so on) or atmospheres containing halogens (chlorine and so on)

The M340H equipment, when within the standard temperature range (0...60ºC) (32...140ºF), has the same performance characteristics as the standard M340 equipment.

At the temperature extremes (-25... 0ºC and 60... 70ºC) (-13...32ºF and 140...158ºF) the hardened versions can have reduced power ratings that impact power calculations for Unity Pro applications.

If this equipment is operated outside the -25...70ºC (-13...158ºF) temperature range, the equipment can operate abnormally.

CAUTION

UNINTENDED EQUIPMENT OPERATION

Do not operate M340H equipment outside of its specified temperature range.

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

Hardened equipment has a conformal coating applied to its electronic boards. This protection, when associated with appropriate installation and maintenance, allows it to be more robust when operating in harsh chemical environments.

Chapter 2
General Rules for Installing the Modules

Subject of this Section

This chapter presents the general rules for installing discrete input/output modules.

What Is in This Chapter?

This chapter contains the following topics:

Fitting of the Modules

At a Glance

The discrete input/output modules are powered by the bus of the rack. The modules may be handled without turning off power supply to the rack, without damage or disturbance to the PLC.

Fitting operations (installation, assembly and disassembly) are described below.

Installation Precautions

The discrete modules may be installed in any of the positions in the rack except for the first two (marked PS and 00) which are reserved for the rack's power supply module (BMX CPS ••••) and the processor (BMX P34 ••••) respectively. Power is supplied by the bus at the bottom of the rack (3.3 V and 24 V).

Before installing a module, you must take off the protective cap from the module connector located on the rack.

DANGER

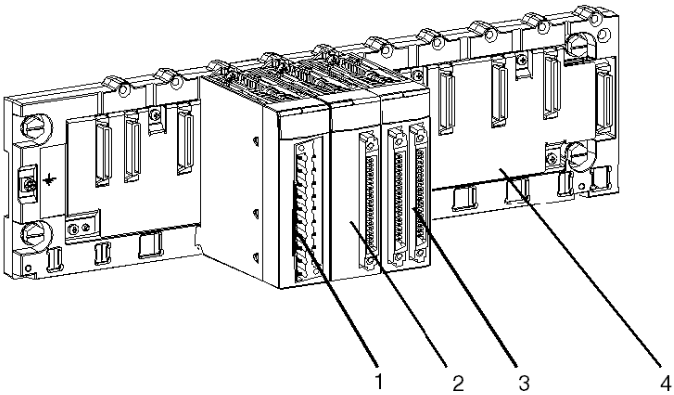
HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Disconnect the power to the sensors and pre-actuators and disconnect the terminal block to carry out assembly and disassembly of the modules.

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

Installation

The diagram below shows discrete input/output modules mounted on the rack.

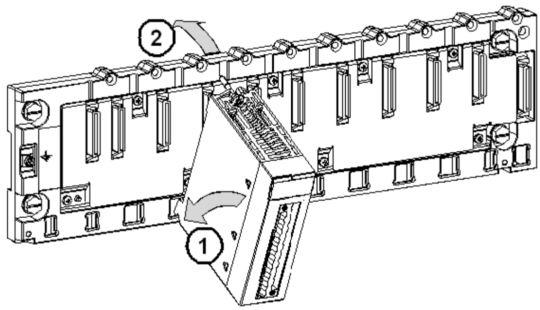
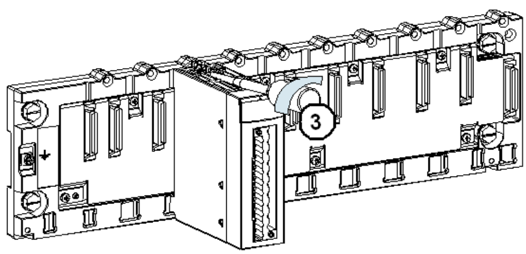


The following table describes the different elements which make up the assembly below.

Number	Description
1	20-pin terminal block module
2	40-pin connector module
3	2 x 40-pin connector module
4	Standard rack

Installing the Module on the Rack

The following table shows the procedure for mounting the discrete input/output modules in the rack.

Step	Action	Illustration
1	Position the locating pins situated at the rear of the module (on the bottom part) in the corresponding slots in the rack. **Remark**: Before positioning the pins, make sure you have removed the protective cover *(see Modicon M340 Using Unity Pro, Processors, Racks, and Power Supply Modules, Setup Manual)*.	Steps 1 and 2 
2	Swivel the module towards the top of the rack so that the module sits flush with the back of the rack. It is now set in position.	
3	Tighten the retaining screw to ensure that the module is held in place on the rack. Tightening torque: Max. 1.5 N•m (1.11 lb-ft).	Step 3 

Fitting the 20-Pin Terminal Block

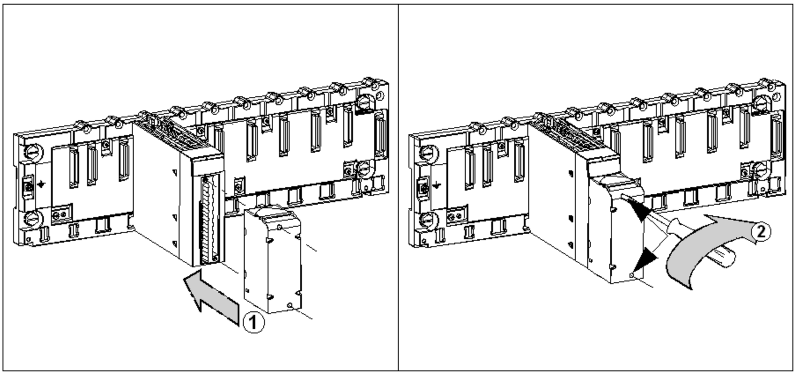
At a Glance

All the discrete input/output modules with 20-pin terminal block connections require the terminal block to be connected to the module. These fitting operations (assembly and disassembly) are described below.

CAUTION
EQUIPMENT DAMAGE
Do not plug an AC terminal block into a DC module. This will cause damage to the module.
Failure to follow these instructions can result in injury or equipment damage.

Installing the 20-Pin Terminal Block

The following table shows the procedure for assembling the 20-pin terminal block onto a discrete input/output module.



Assembly Procedure

Step	Action
1	Once the module is in place on the rack, install the terminal block by inserting the terminal block encoder (the rear lower part of the terminal) into the module's encoder (the front lower part of the module), as shown above.
2	Fix the terminal block to the module by tightening the 2 mounting screws located on the lower and upper parts of the terminal block. Tightening torque: 0.4 N•m (0.30 lb-ft).

NOTE: If the screws are not tightened, there is a risk that the terminal block will not be properly fixed to the module.

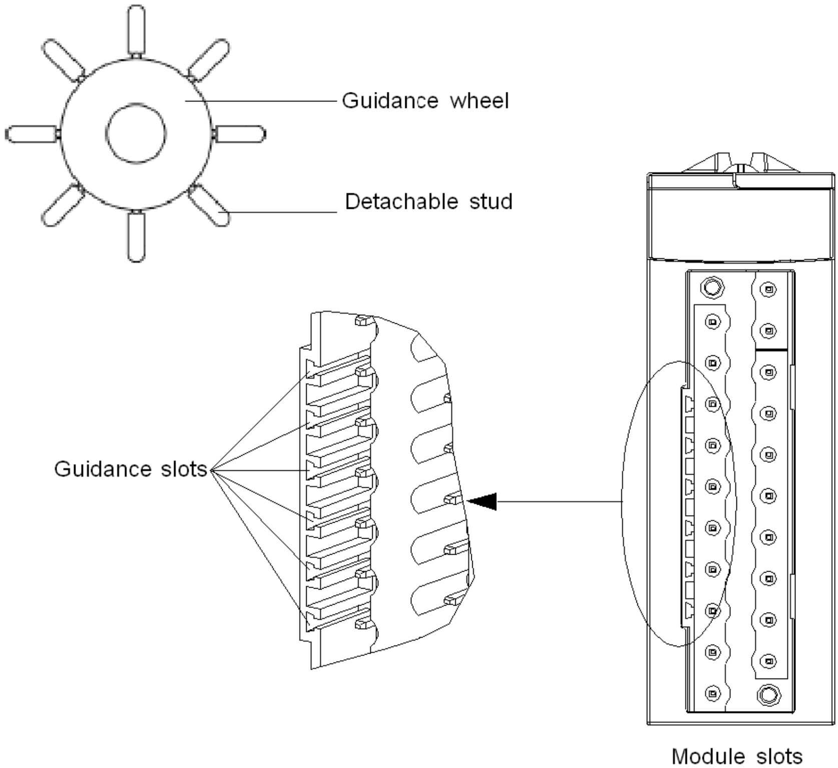
Coding the 20-Pin Terminal Block

When a 20-pin terminal block is installed on a module dedicated to this type of terminal block, you can code the terminal block and the module using studs. The purpose of the studs is to prevent the terminal block from being mounted on another module. Incorrect insertion can then be avoided when replacing a module.

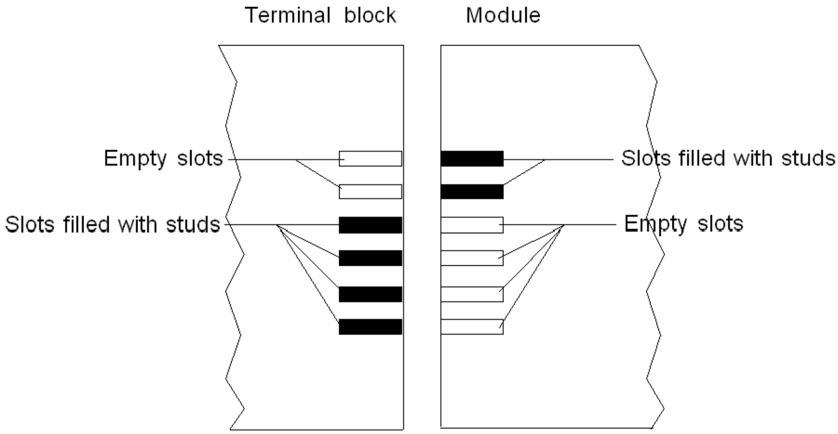
Coding is done by the user with the STB XMP 7800 guidance wheel's studs. You can only fill the 6 slots in the middle of the left side (as seen from the wiring side) of the terminal block, and can fill the module's 6 guidance slots on the left side.

To fit the terminal block to the module, a module slot with a stud must correspond to an empty slot in the terminal block, or a terminal block with a stud must correspond to an empty slot in the module. You can fill up to and including either of the 6 available slots as desired.

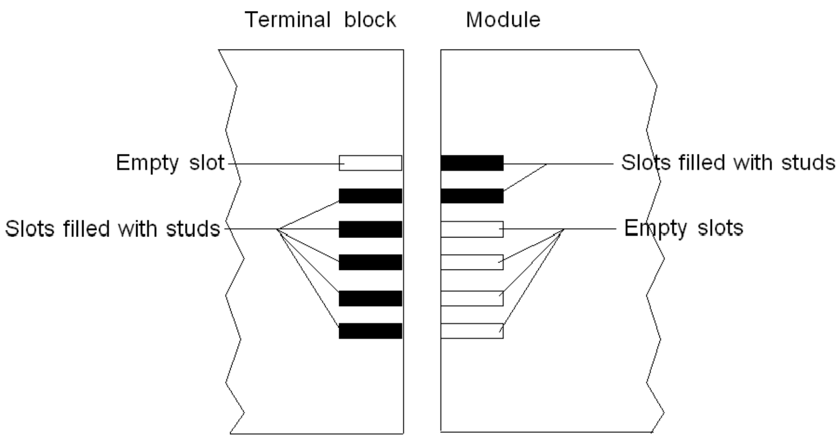
The diagram below shows a guidance wheel as well as the slots on the module used for coding the 20-pin terminal blocks.



The diagram below shows an example of a coding configuration that makes it possible to fit the terminal block to the module.



The diagram below shows an example of coding configuration with which it is not possible to fit the terminal block to the module.



DANGER

HAZARD OF ELECTRICAL SHOCK, EXPLOSION OR ARC FLASH

Terminal blocks must be connected or disconnected with sensor and pre-actuator voltage switched off.

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

WARNING

UNEXPECTED BEHAVIOUR OF APPLICATION

Code the terminal block as described above to prevent the terminal block from being mounted on another module.

Plugging the wrong connector could cause unexpected behaviour of the application.

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

CAUTION

DESTRUCTION OF THE MODULE

Code the terminal block as described above to prevent the terminal block from being mounted on another module.

Plugging the wrong connector could cause the module to be destroyed.

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

NOTE: The module connector have indicators which show the proper direction to use for terminal block installation.

Presentation for Choosing Power Supplies for Sensors and Pre-Actuators

At a Glance

The different choices of power supply for sensors and pre-actuators linked to discrete input/output modules require certain usage precautions to be observed.

External Direct Current Power Supplies

⚠ WARNING

UNEXPECTED EQUIPMENT OPERATION

When using an external 24 VDC direct current power supply, use either:

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

Rectified power supplies with no filtering are prohibited.

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

Ni-Cad Battery Power Supplies

Ni-Cad battery power supplies can be used to power sensors and pre-actuators and all associated inputs/outputs 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 input/output 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 imposes the following restrictions:
  - 80% of inputs/outputs at 1° C to 30° C
  - 50% of inputs/outputs at 1° C to 60° C

CAUTION
OVERHEATING HAZARD Take into account the temperature derating of the discrete I/O modules at the installation to prevent the device from overheating and/or deteriorating. **Failure to follow these instructions can result in injury or equipment damage.**

Wiring Precautions

At a Glance

Discrete inputs/outputs feature protective measures which ensure a high resistance to industrial environmental conditions. Nevertheless, the rules described below must be followed.

External Power Supplies for Sensors and Pre-Actuators

Use quick-blow fuses to protect external sensor and pre-actuator power supplies associated with discrete input/output modules against short-circuits and overloads.

For 40-pin connector discrete input/output modules, link the sensor/pre-actuator power supply to each connector, except in the event where the corresponding channels are not in use and are not assigned to any task.

DANGER

IMPROPER GROUNDING HAZARD

Install the 24V supply according to applicable codes. The 0V terminals of the 24V power supplies must be connected to metallic ground and safety ground as close as possible to the supply. This is to ensure personnel safety in the event of a power phase coming into contact with the 24V supply.

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

NOTE: If an input/ouput module is present on the PLC, connect the sensor and pre-actuator power supply to the power supply of the module otherwise, an external power supply error occurs causing the input/output LED to flash.

Inputs

Recommendations for use concerning the inputs of discrete modules are as follows:
- **for 24 VDC inputs and line coupling with an alternating current network:**

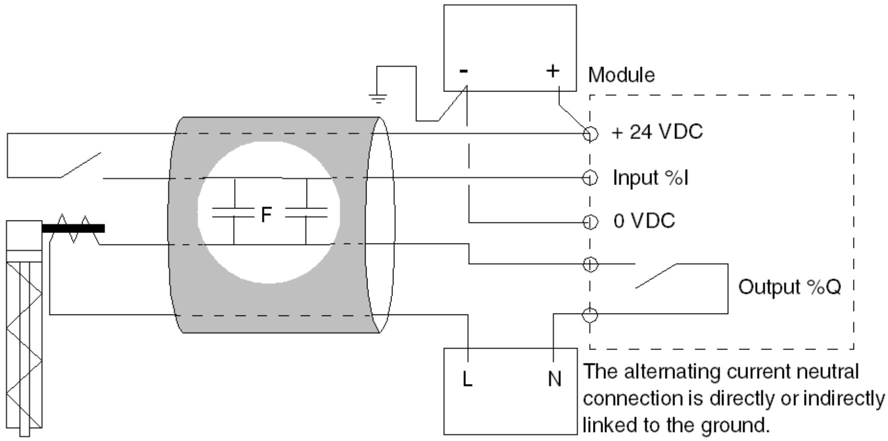
WARNING

UNEXPECTED EQUIPMENT OPERATION

- Avoid excessive coupling between AC cables and cables relaying signals intended for direct current inputs.
- Follow the cable routing rules.

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

This case (excessive coupling) is illustrated in the following circuit diagram.

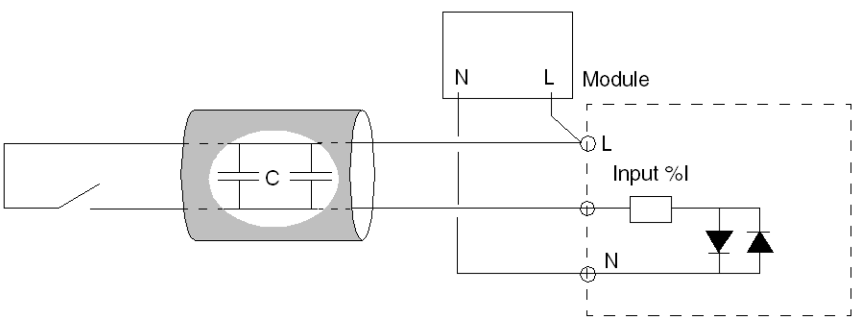


When the input contact is open, the alternating currents may induce a current in the input which might cause it to be set to 1.
For a 240 VCA/50 Hz line coupling, do not exceed the line capacity values given in the summary table at the end of this section. For a coupling with a different voltage, use the following formula

$$Capacitance\ \text{tolerated} = (\text{Capacity at 240VCA x 240}) / (\text{Line voltage})$$

.

- **for 24 to 240 VAC inputs and line coupling:**
  When the line that controls the input is open, the current passes according to the coupling capacity of the cable (see circuit diagram below).



Do not exceed the line capacity values given in the summary table below.

The following summary table shows the acceptable line capacity values.

Module	Maximum coupling capacity
24 to 125 VDC inputs	
BMX DDI 1602 BMX DDI 1603 BMX DDI 1604T BMX DDM 16022 BMX DDM 16025	45 nF (1)
BMX DDI 3202 K BMX DDI 6402 K BMX DDM 3202 K	25 nF (1)
24 to 140 VAC inputs	
BMX DAI 0805	50 nF
BMX DAI 1602	50 nF
BMX DAI 1603	60 nF
BMX DAI 0814 BMX DAI 1604	70 nF

(1) max. admissible coupling capacity with a 240 VAC / 50 Hz line

Example: A standard cable of 1 m in length has a coupling capacity that falls within 100 and 150 pF.

Outputs

For the outputs of discrete I/O modules, follow the recommendations described here.

⚠ WARNING

UNEXPECTED EQUIPMENT OPERATION

Use wires of a sufficient diameter to avoid drops in voltage, overheating, and unexpected equipment operation.

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

Cable Routing

⚠ WARNING
UNEXPECTED EQUIPMENT OPERATION
Observe the precautions below for the wiring system.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

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

- in order to reduce the number of alternating couplings, separate the power circuit cables (power supplies, power switches, etc.) from input cables (sensors) and output cables (pre-actuators) both inside and outside the equipment
- outside the equipment, place the cables leading to inputs/outputs in covers that make them easily distinguishable from those containing wires relaying high energy levels. Place them in separate metal cableways which are grounded. Route these various cables at least 100 mm (4 in.) apart

How to Connect Discrete I/O Modules: Connecting 20-Pin Terminal Block Modules

At a Glance

There are three types of 20-pin terminal blocks:

- BMX FTB 2010 screw clamp terminal blocks
- BMX FTB 2000 caged terminal blocks
- BMX FTB 2020 spring terminal blocks

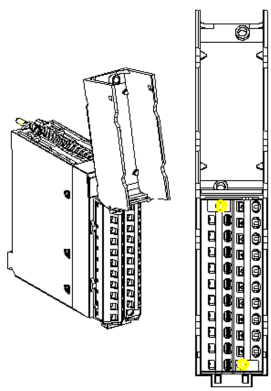
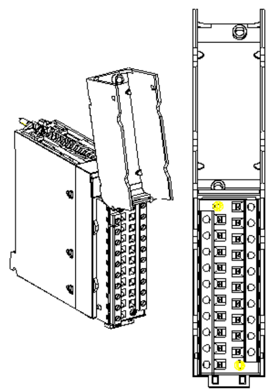
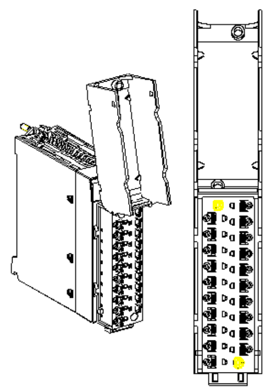
Cable Ends and Contacts

Each terminal block can accommodate:

- bare wires
- wires with DZ5-CE type cable ends: 

Description of the 20-Pin Terminal Blocks

The table below shows the description of the three types of 20-pin terminal blocks.

		BMX FTB 2010 screw clamp terminal blocks	**BMX FTB 2000 caged terminal blocks**	**BMX FTB 2020 spring terminal blocks**
Illustration				
Number of wires		1 or 2	1	1
Wire gauges	minimum	AWG 22 (0.34 mm^2)	AWG 22 (0.34 mm^2)	AWG 22 (0.34 mm^2)
	maximum	AWG 15 (1.5 mm^2)	AWG 18 (1 mm^2)	AWG 18 (1 mm^2)

	BMX FTB 2010 screw clamp terminal blocks	BMX FTB 2000 caged terminal blocks	BMX FTB 2020 spring terminal blocks
Wiring constraints	Screw clamps have slots that accept: ● flat-tipped screwdrivers with a diameter of 5 mm, ● posidriv n° 1 cross-tipped screwdrivers. Screw clamp terminal blocks have captive screws. On the supplied blocks, these screws are not tightened.	Caged terminal blocks have slots that accept: flat-tipped screwdrivers with a diameter of 3 mm, Caged terminal blocks have captive screws. On the supplied blocks, these screws are not tightened.	The wires are connected by pressing on the button located next to each pin. To press on the button, you have to use a flat-tipped screwdriver with a maximum diameter of 3 mm.
Maximum screw tightening torque	0.5 N•m (0.37 lb-ft).	0.5 N•m (0.37 lb-ft).	N/A

DANGER

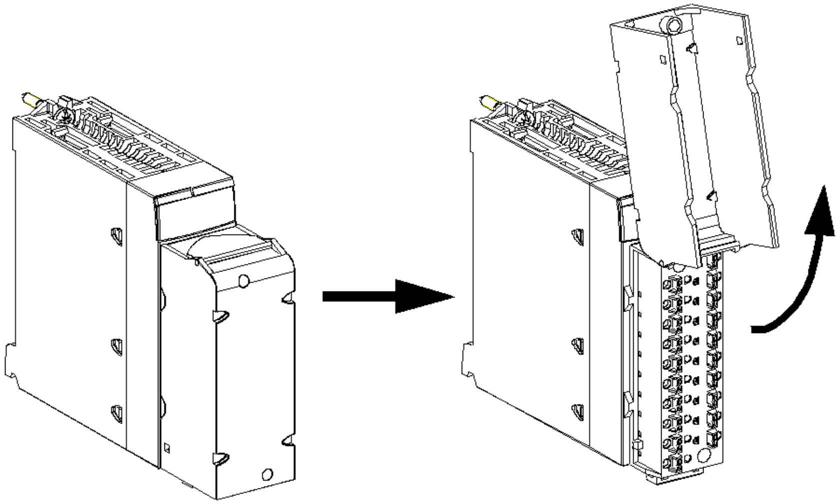
RISK OF ELECTRIC SHOCK, ARC FLASH OR EXPLOSION

Terminal block must be connected or disconnected with sensor and pre-actuator voltage switched off.

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

Connection of 20-Pin Terminal Blocks

The following diagram shows the method for opening the 20-pin terminal block door so that it can be wired.

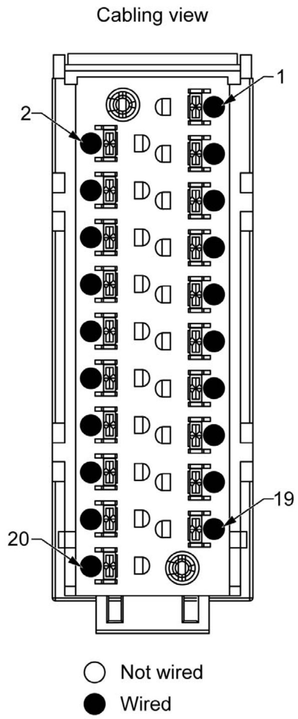


The connection cables for 20-pin terminal blocks come in three different lengths:
- 3 meters: BMX FTW 301
- 5 meters: BMX FTW 501
- 10 meters: BMX FTW 1001

NOTE: The connection cable is installed and held in place by a cable clamp positioned below the 20-pin terminal block.

Connection of BMX FTW ••1 Cables

The following diagram shows the connection of the BMX FTW ••1 cable:



Connector

1	White
2	Brown
3	Green
4	Yellow
5	Gray
6	Pink
7	Blue
8	Red
9	Black
10	Purple
11	Gray - Pink
12	Red - Blue
13	White - Green
14	Brown - Green
15	White - Yellow
16	Yellow - Brown
17	White - Gray
18	Gray - Brown
19	White - Pink
20	Pink - Brown

BMX FTW ●●1

Labeling of 20-Pin Terminal Blocks

The labels for the 20-pin terminal blocks are supplied with the module. They are to be inserted in the terminal block cover by the customer.

Each label has two sides:

- One side that is visible from the outside when the cover is closed. This side features the commercial product references, an abbreviated description of the module, as well as a blank section for customer labeling.
- One side that is visible from the inside when the cover is open. This side shows the terminal block connection diagram.

How to Connect Discrete Input/Output Modules: Connecting 40-Pin Connector Modules

Introduction

40-pin connector modules are connected to sensors, pre-actuators, or terminals using a cable designed to enable trouble-free direct wire to wire transition of the module's inputs/outputs.

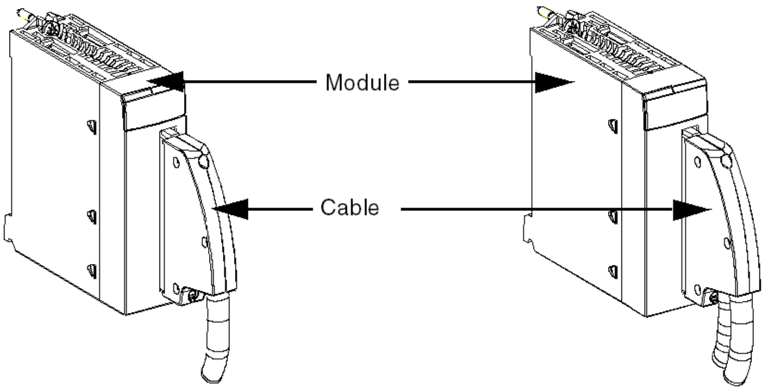
DANGER

HAZARD OF ELECTRIC SHOCK, ARC FLASH OR EXPLOSION

40-pin connectors must be connected or disconnected with sensor and pre-actuator voltage switched off.

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

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



WARNING

UNEXPECTED EQUIPMENT OPERATION

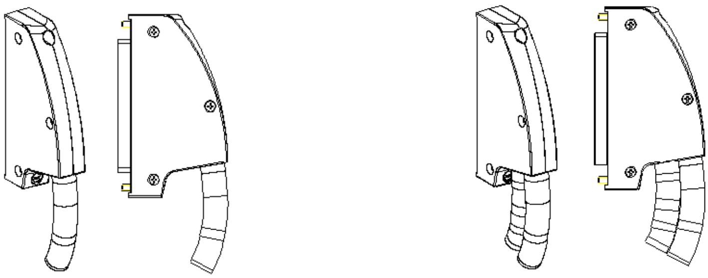
During the installation process, ensure that the connectors are identified with the corresponding modules so that incorrect connection cannot occur. Plugging the wrong connector into a module will result in unexpected equipment operation.

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

BMX FCW • Connection Cables

They are made up of:

- at one end, a compound-filled 40-pin connector from which extend 1 or 2 cable sheaths, each containing 20 wires with a cross-sectional area of 0.34 mm^2 (AWG 24)



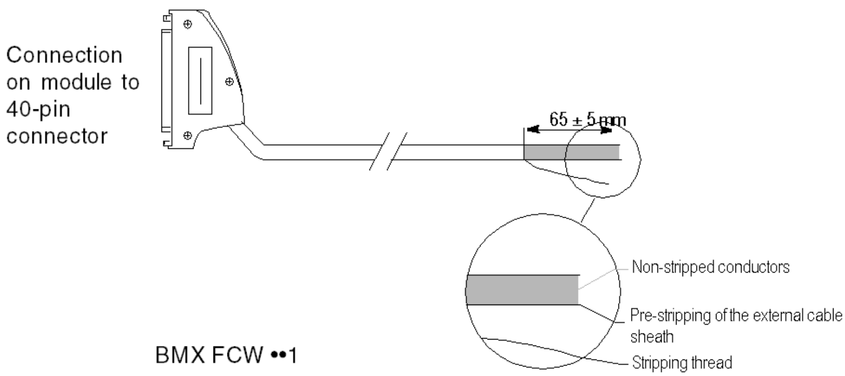
BMX FCW ••1 BMX FCW ••3

- at the other end, free wire ends color coded

The cables with 1 cable sheath containing 20 wires designed to connect the 40-pin connectors to the sensors or pre-actuators come in 3 different lengths:

- 3 meters: BMX FCW 301
- 5 meters: BMX FCW 501
- 10 meters: BMX FCW 1001

The figure below shows the BMX FCW ••1 cables.

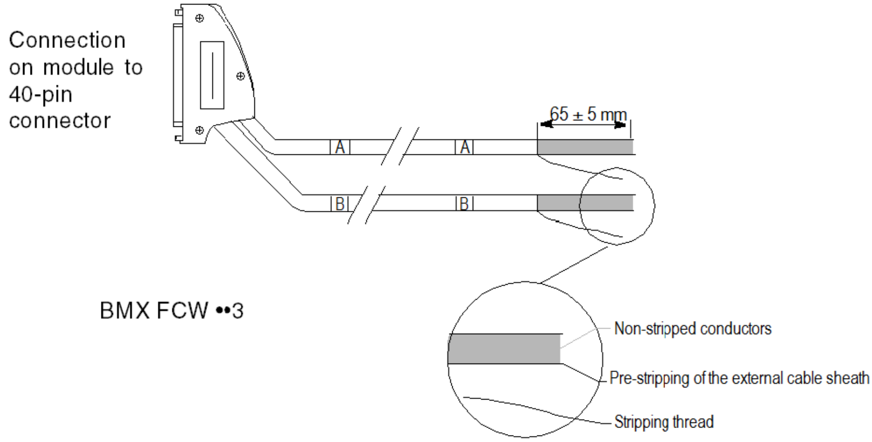


BMX FCW ••1

The cables with 2 cable sheaths containing 20 wires designed to connect the 40-pin connectors to the sensors or pre-actuators come in 3 different lengths:

- 3 meters: BMX FCW 303
- 5 meters: BMX FCW 503
- 10 meters: BMX FCW 1003

The figure below shows the BMX FCW ••3 cables.



NOTE: A strand of nylon incorporated in the cable allows the cable sheath to be stripped with ease.

NOTE: The maximum torque for tightening BMX FCW •••• cable connection screws is 0.8 N•m (0.59 lb-ft).

⚠ WARNING

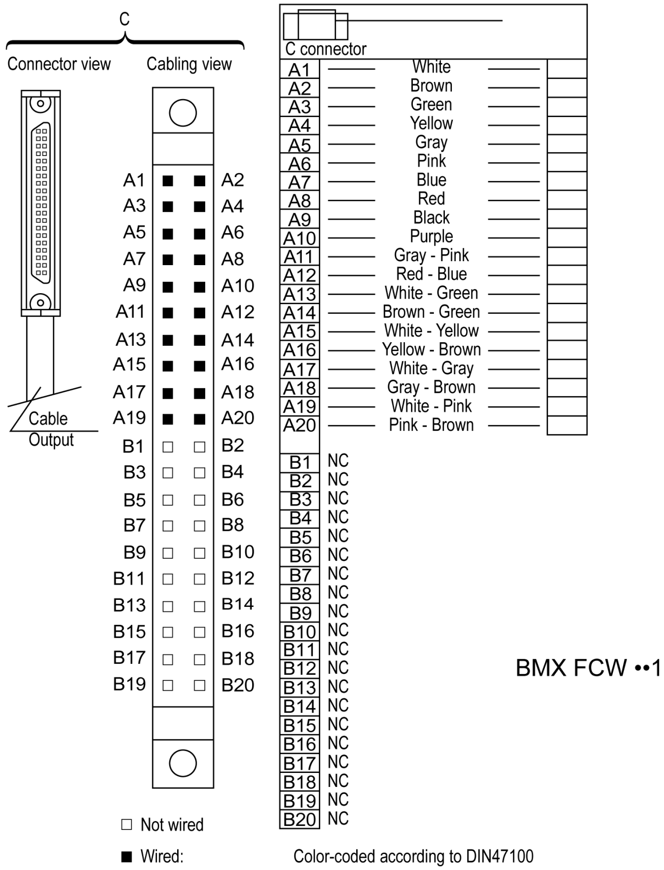
UNEXPECTED EQUIPMENT OPERATION

Do not exceed the maximum tightening torque. Excessive torque may result in wire breakage, resulting in poor or intermittent connection.

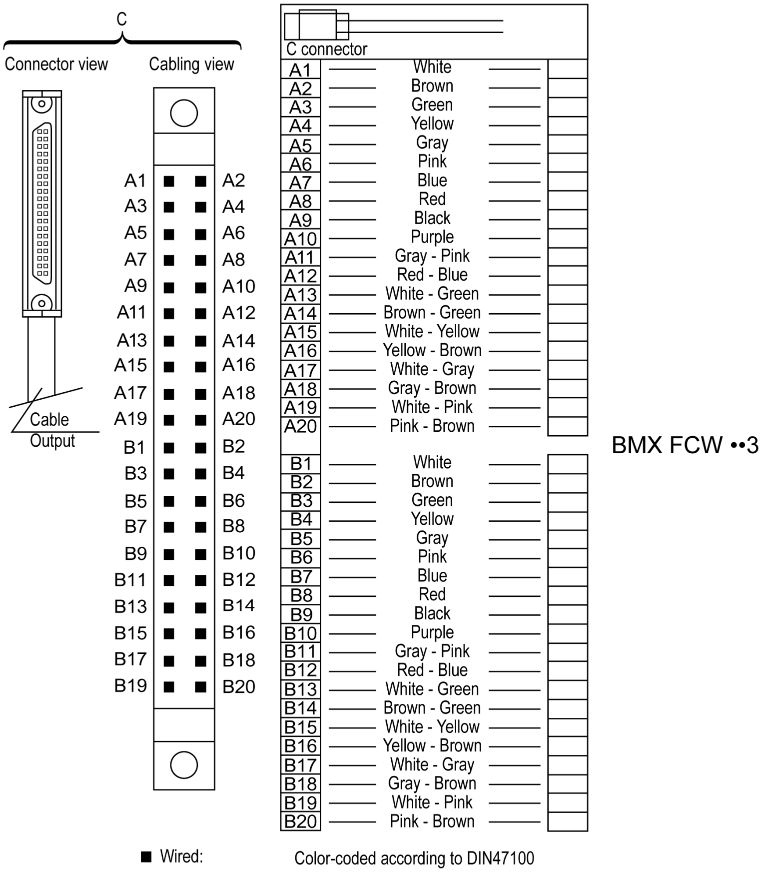
Failure to follow these instructions can result in death, serious injury, or equipment damage.

Connection of BMX FCW • Cables

The diagram below shows the connection of BMX FCW ••1 cables:



The diagram below shows the connection of BMX FCW ••3 cables:



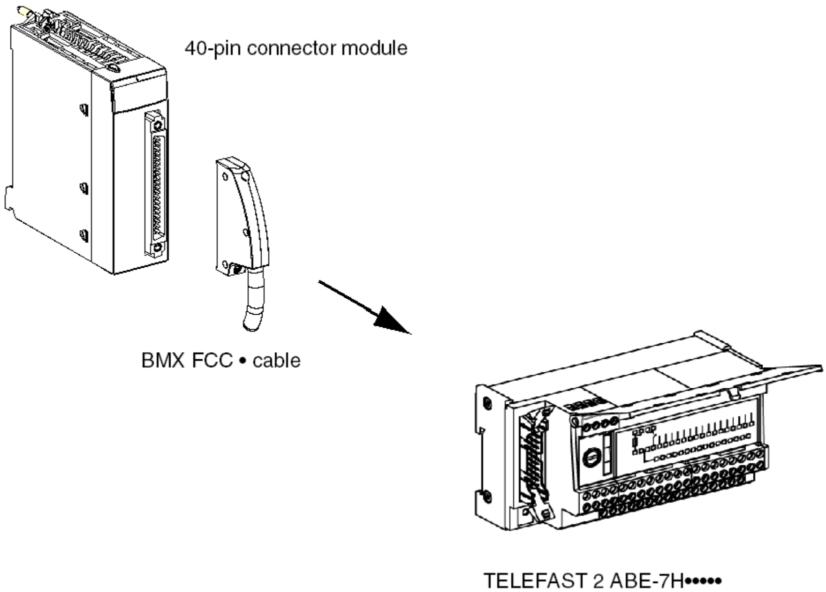
How to Connect Discrete Input/Output Modules: Connecting 40-Pin Connector Modules to TELEFAST Interfaces

At a Glance

The inputs/outputs of discrete 40-pin connector modules are connected to TELEFAST quick-wiring connection and adaptation interfaces using specific cables for 40-pin to HE10 connectors.

Illustration

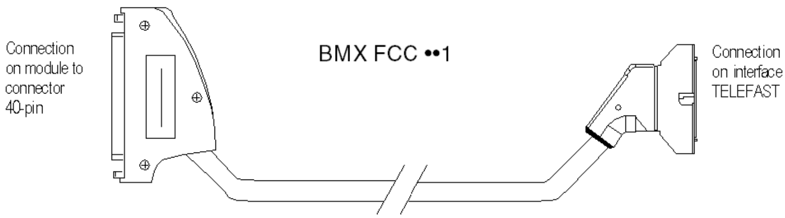
The drawing below shows the connection of a discrete 40-pin connector module to a TELEFAST interface.



BMX FCC • Connection Cables

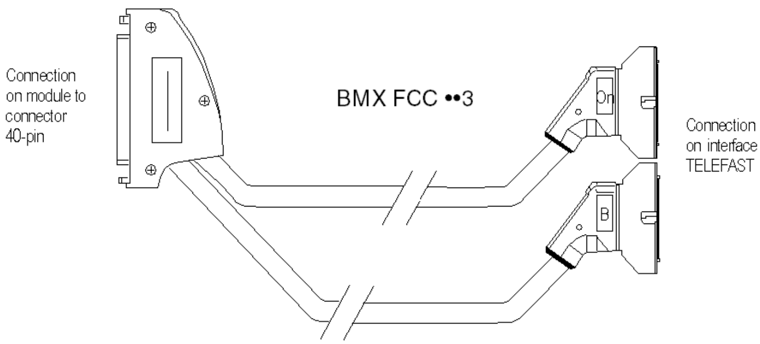
The cables designed for connecting 40-pin connectors to 1xHE10 come in 6 different lengths:

- 0.5 meters, 20 wires: BMX FCC 051
- 1 meter, 20 wires: BMX FCC 101
- 2 meters, 20 wires: BMX FCC 201
- 3 meters, 20 wires: BMX FCC 301
- 5 meters, 20 wires: BMX FCC 501
- 10 meters, 20 wires: BMX FCC 1001



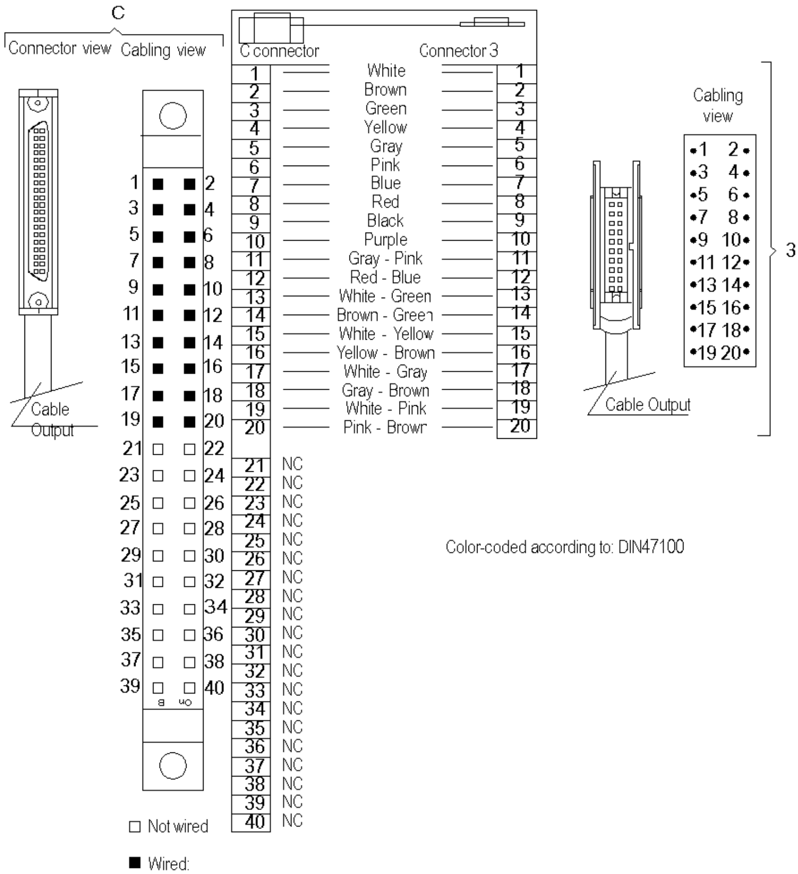
The cables designed for connecting 40-pin connectors to 2xHE10 come in 6 different lengths:

- 0.5 meters, 20 wires: BMX FCC 053
- 1 meter, 20 wires: BMX FCC 103
- 2 meters, 20 wires: BMX FCC 203
- 3 meters, 20 wires: BMX FCC 303
- 5 meters, 20 wires: BMX FCC 503
- 10 meters, 20 wires: BMX FCC 1003

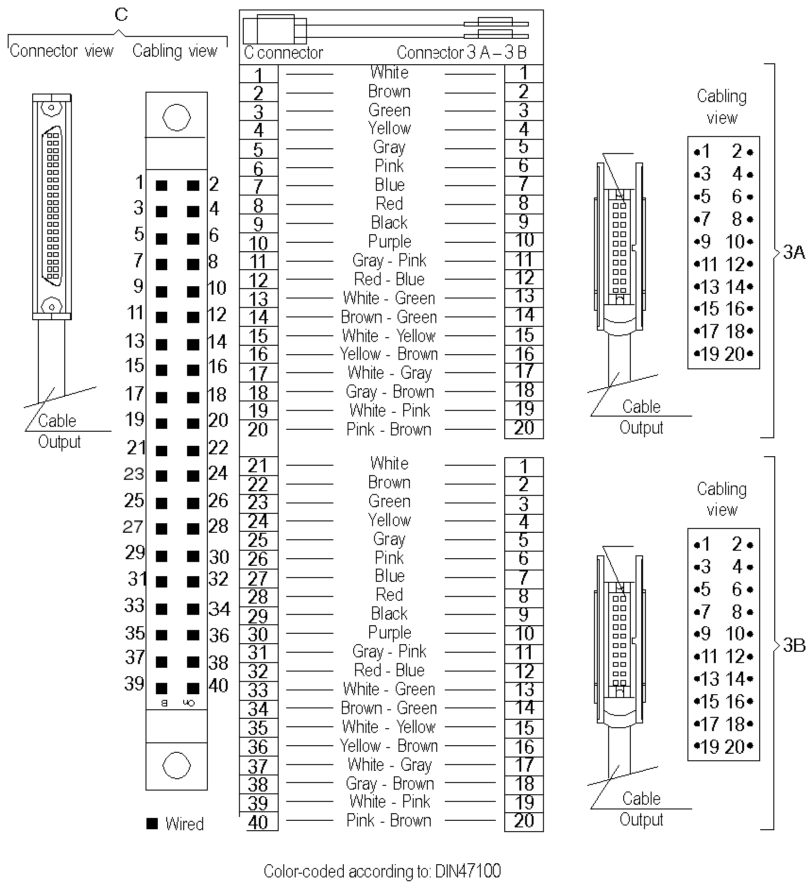


Connection of BMX FCC • Cables

The diagram below shows the connection of BMX FCC ••1 cables.



The diagram below shows the connection of BMX FCC ••3 cables.



NOTE: The maximum torque for tightening BMX FCC • cable connection screws is 0,5 N•m (0.37 lb-ft).

⚠ WARNING

UNEXPECTED EQUIPMENT OPERATION

Do not exceed the maximum tightening torque. Excessive torque may result in wire breakage, resulting in poor or intermittent connection.

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

Sensor/Input Compatibility and Pre-actuator/Output Compatibility

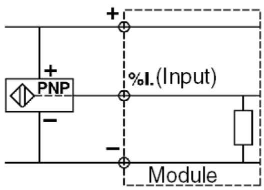
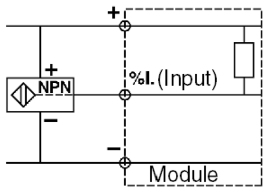
At a Glance

The compatibility between sensors and discrete module inputs depends on the type of sensor used.

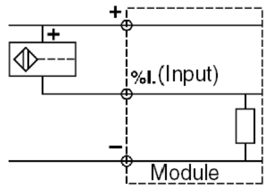
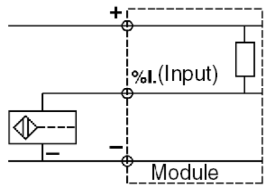
Similarly, the compatibility between pre-actuators and discrete module outputs depends on the type of pre-actuator used.

Sensor/Input Compatibility

The following table presents the compatibility between 3-wire sensors and 24 VDC and 48 VDC inputs.

3-wire sensors and IEC 61131-2 compliant type 3 positive logic (sink) inputs: all 3-wire PNP inductive or capacitive proximity sensors and photo-electric detectors which have an operating voltage of 24 VDC and 48 VDC are compatible with all positive logic inputs.	
3-wire sensors and negative logic (source) inputs: all 3-wire NPN inductive or capacitive proximity sensors and photo-electric detectors which have an operating voltage of 24 VDC and 48 VDC are compatible with all negative logic inputs.	

The following table presents the compatibility between 2-wire sensors and 24 VDC and 48 VDC inputs.

2-wire sensors and IEC 61131-2 compliant type 1 positive logic (sink) inputs: all proximity sensors or other 2-wire sensors with an operating voltage of 24 VDC and 48 VDC and with the characteristics described in the next table are compatible with all positive logic 24 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 are compatible with all negative logic 24 VDC inputs.	

Compatibility between 2-wire sensors and 24/48 VDC and 120 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 type 1 and type 3 compliant 110..120 VAC inputs.

The following table provides a summary of compatibility between sensors and discrete input/output module inputs.

Types of proximity sensor	**Types of input**			
	24 VDC Positive logic	**48 VDC Type 1 Positive logic**	**24 VDC Type 3 Positive logic**	**24/48 VDC Negative logic**
All PNP-type 3-wire (DC) proximity sensors	X	X	X	-
All NPN-type 3-wire (DC) proximity sensors	-	-	-	X
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	-	X	X	-

Types of proximity sensor	Types of input			
	24 VDC Positive logic	**48 VDC Type 1 Positive logic**	**24 VDC Type 3 Positive logic**	**24/48 VDC Negative logic**
Telemecanique or other brand 2-wire (DC) proximity sensors with the following characteristics: ● Voltage drop in closed state ≤4 V ● Minimum switched current ≤1 mA ● Residual current in open state ≤0.5 mA	X	X	X	-

Types of proximity sensor	Types of input		
	24 VAC Type 1	48 VAC Type 3	100-120 VAC Type 3
2-wire (AC/DC) proximity sensor (see note)	X	X	X
2-wire (AC) proximity sensor	X	X	X
Note: 24 VDC inputs can be used in positive (sink) or negative (source) logic but are not IEC compliant.			

X compatible
- not compatible
AC AC voltage operation
DC DC voltage operation
AC/DC AC or DC voltage operation

Compatibility of Pre-Actuators with Outputs

Compatibility of DC Pre-actuators with Outputs:

Comply with the output’s maximum current and maximum switching frequency as specified in the module characteristics.

NOTE: Where low consumption pre-actuators are used, special attention must be paid to the leakage current of the idle output, to ensure that the maximum current is correctly calculated:
$I_{max} = I_{nominal} + I_{leakage}$
Given that:
$I_{nominal}$ = Current required to operate by the pre-actuator
$I_{leakage}$ = Maximum leakage current in idle output state

Compatibility of Tungsten Filament Lamps and Static Outputs (Static Current):

For outputs with protection against short circuits, the maximum power of the tungsten filament lamps specified in the module characteristics must comply. 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 Relay 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.

CAUTION
SHORTENED RELAY LIFE Ensure that currents switched by the relay outputs do not exceed the relay ratings. Excessive currents will shorten relay life. **Failure to follow these instructions can result in injury or equipment damage.**

Chapter 3
Discrete Input/Output Module Diagnostic Processing

Subject of this Section

This section explains the processing of hardware detected faults related to discrete input/output modules.

What Is in This Chapter?

This chapter contains the following topics:

General Protective Measures

At a Glance

Some general protective measures are integrated into the channels of discrete input/ouput direct current modules.

DC Outputs

Every static 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**. Events such as these cause the output to be deactivated (tripped) and the event to be indicated on the display on the front panel of the module (the LED corresponding to the channel flashes, the **I/O** LED comes on).
- **Reversal of polarity**. An event 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.
- **Inductive overvoltage**. Each output is individually protected against inductive overvoltage 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 VDC and 48 VDC inputs are of constant current type. The input current is constant for a voltage greater than:

- 15 V for 24 VDC inputs
- 25 V for the 48 VDC inputs

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

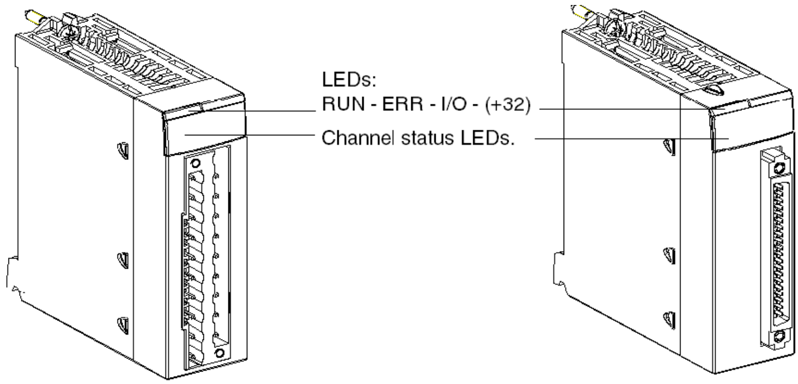
Module and Channel Status Display

At a Glance

The discrete I/O modules are equipped with a display block featuring LEDs that displays the module's channels status the overall module status.

Illustration

The figure below shows the position of the channel status display LEDs as well as the 3 (or 4) module status 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.

LEDs	● Continually Lit	⊗ Flashing	○ Off
RUN (green)	module operating normally	N/A	module inoperative or off
ERR (red)	internal event: Module analysis needed	Communication loss between the discrete module and the CPU	no detected internal error
I/O (red)	external event: overload, short circuit, sensor/pre-actuator voltage error	Terminal block incorrectly wired	no detected external error
+32 Green	selection of channels 32 to 63	N/A	selection of channels 0 to 31
Channel status	channel at 1	channel error, overload or short circuit	channel at 0

NOTE: The **+32** LED is only present on the 64-channel modules. It is enabled/disabled with a push-button located on the top of the module. By default, the first 32 channels are displayed.

NOTE: For a mixed input/output module, the first line of channel status LEDs represents the inputs (for example, for a mixed 16 input/16 output module, LEDs 0 to 15 represent the inputs and LEDs 16 to 31 represent the outputs).

NOTE: After the sensor power outage, the I/O (red) LED of the following modules switch on and the last recorded position of the sensor is displayed by the input channel status LED's.
The following list gives the 24 VDC modules:

- BMX DDI 1602
- BMX DDI 3202
- BMX DDI 6402
- BMX DDM 16022
- BMX DDM 3202
- BMX DDM 16025

⚠ WARNING

CHANNEL LED INFORMATION NOT MATCHING SENSORS POSITION

After a sensor power outage:

- The I/O error LED is on
- Do not take into account the input LEDs information (they show the last recorded position of the sensors, not their real positions)
- Check the real positions on the sensors.

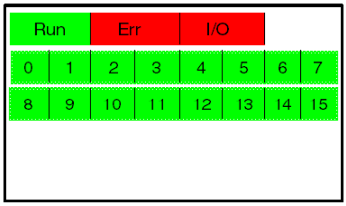
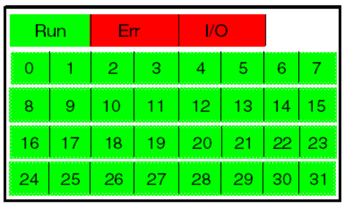
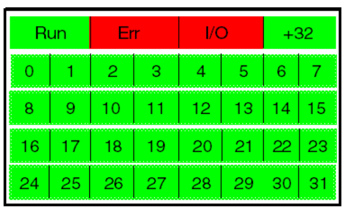
Failure to follow these instructions can result in death, serious injury, or equipment damage.

Display Panels

When a voltage is present on an input or output, the corresponding LED is lit.

Display of internal or external events is only effective once the module has been configured. After powering-up or a cold start, all the LEDs flash twice (for 2 seconds) to show that the module is operational. When an event is detected, the channel status is recorded until the cause of the event is cleared.

There are several display blocks depending on the type of discrete I/O module.

Modules	**Display Panel illustration**	**Description**
BMX DDI 1602 BMX DDI 1603 BMX DDI 1604T BMX DAI 0814 (1) BMX DAI 1602 BMX DAI 1603 BMX DAI 1604 BMX DDO 1602 BMX DDO 1612 BMX DRA 0804T (1) BMX DRA 0805 (1) BMX DRA 1605 BMX DAO 1605 BMX DAI 0805		These modules have: ● 3 module status LEDs: **RUN** - **ERR** - **I/O** ● 16 channel status LEDs
BMX DDI 3202 K BMX DDO 3202 K BMX DDM 3202 K BMX DDM 16022 (2) BMX DDM 16025 (2)		These modules have: ● 3 module status LEDs: **RUN** - **ERR** - **I/O** ● 32 channel status LEDs
BMX DDI 6402 K BMX DDO 6402 K		These modules have: ● 3 module status LEDs: **RUN** - **ERR** - **I/O** ● a **+32** LED to display channels 32 to 63 ● 32 channel status LEDs ● a switch to display channels 32 to 63

(1) The BMX DAI 0814, BMX DRA 0804T, BMX DRA 0805 and BMX DAI 0805 are 8-channel modules (channel 0 to 7).

(2) The BMX DDM 16022 and BMX DDM 16025 mixed input/output modules have 2 groups of 8 channels. The input group is represented by channels 0 to 7 and the output group is represented by channels 16 to 23.

Diagnostics

At a Glance

The diagnostics function detects any conditions that may affect module operation. Three diagnostic groups can be identified:

- internal events
- external events
- other events

Internal Events

Internal events concern all internal module conditions and all communication loss occurrences that prevent a discrete input/output module from operating correctly.

A communication loss can be caused by:

- a hardware detected fault at rack bus level
- a processor malfunction or power cable circuit open or short
- a power cable circuit open or short

External Events

External events include:

- **Overload and Short-Circuit**: Static output modules contain a device for checking the load status. In the event of an overload or short-circuit of one or more outputs, they are tripped to open circuit. The status will be shown on the front panel of the module - the LEDs corresponding to the tripped 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 for correct operation of the module's input channels. When sensor voltage is less than or equal to the defined threshold, the status is shown by the **I/O** LED lighting up on front panel of the module.
- **Pre-actuator Voltage Error**: All 24 VDC and 48 VDC transistor output modules contain a device for checking the pre-actuator voltage of all module channels. This device checks that pre-actuator and module power supply voltages are of a sufficiently high level for correct operation of the module's output channels. This voltage must be greater than 18 V (24 VDC supply) or 36 V (48 VDC supply) for modules with direct current static outputs. In the event of pre-actuator voltage being less than or equal to this threshold, the error is shown 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 64-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 of the group affected by the error (i.e. groups of 8 or 16 channels for a terminal block module and the group of 16 channels for a 32 or 64-channel connector module) to be set to inactive.

NOTE: Relay output modules do not contain pre-actuator voltage checking devices.

Other Events

The other errors category includes loss of power to the modules.

Description

The following table can be used to determine the module's status on the basis of the LEDs located on the discrete input/output modules' display panel.

State of module		LEDs		
		RUN (green)	**ERR (red)**	**I/O (red)**
Normal operation		●	○	○
Internal events	Module analysis needed	○	●	○
	CPU communication interruption	●	⊗	○
External events	Overload, short circuit, sensor/pre-actuator voltage error	●	○	●
Configuration	Self-test of the module at start-up	⊗	⊗	⊗
	Not configured module	○	⊗	○
Other events	Module loss of power	○	○	○

State of module	LEDs		
	RUN (green)	**ERR (red)**	**I/O (red)**
Key:			
●	LED on		
⊗	LED flashing		
○	LED off		

NOTE: After the sensor power outage, the I/O (red) LED of the following modules switch on and the last recorded position of the sensor is displayed by the input channel status LED's.
The following list gives the 24 VDC modules:
- BMX DDI 1602
- BMX DDI 3202
- BMX DDI 6402
- BMX DDM 16022
- BMX DDM 3202
- BMX DDM 16025

⚠ WARNING

CHANNEL LED INFORMATION NOT MATCHING SENSORS POSITION

After a sensor power outage:
- The I/O error LED is on
- Do not take into account the input LEDs information (they show the last recorded position of the sensors, not their real positions)
- Check the real positions on the sensors.

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

Checking the Connection

At a Glance

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

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

⚠ WARNING
UNEXPECTED EQUIPMENT OPERATION Active outputs can activate machine movements. All power must be turned off before this check is carried out: **1.** remove power fuses from the motor controls **2.** turn off the power of hydraulic and pneumatic units **3.** 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

After this, it is possible to check the connection of the Discrete I/O modules:

- **without a terminal**: activate each sensor and check whether the corresponding input LED changes. If it remains unchanged, check the wiring and correct operation of the sensor.
- **with a terminal** (more in-depth check on the connection of the inputs/outputs). An application with configured I/Os in the PLC is required, even if it is empty (in that case, do not declare any module in the ‘FAST task’).
  - This check can be carried out with the PLC in **RUN** mode, from a PC equipped with Unity Pro software giving access to debug functions.
  - This check can also be carried out with an entire application loaded in the memory. In this case, stop the processing of the program by de-activating the MAST, FAST and event *(see Premium and Atrium using Unity Pro, Discrete I/O modules, User manual)*tasks by setting system bits %S30, %S31, and %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.

Chapter 4
BMX DDI 1602 Input Modules

Subject of this Section

This section presents the BMX DDI 1602 module, its characteristics, and explains how it is connected to the various sensors.

What Is in This Chapter?

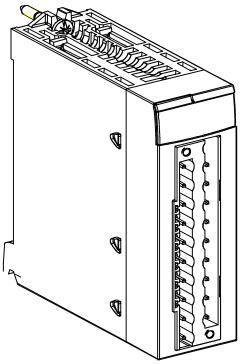
This chapter contains the following topics:

Introduction

Function

The BMX DDI 1602 module is a 24 VDC discrete module connected via a 20-pin terminal block. It is a positive logic (or sink) module: its 16 input channels receive current from the sensors.

Illustration



Characteristics

General Characteristics

This table presents the general characteristics for the **BMX DDI 1602** and BMX DDI 1602H *(see page 28)* modules:

BMX DDI 1602 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	> 2 mA (for U ≥ 11 V)
	At 0	Voltage	5 V
		Current	< 1.5 mA
	Sensor supply (including ripple for standard module)		19...30 V (possible up to 34 V, limited to 1 hour/day)
Input impedance	At nominal U		6.8 kΩ
Response time	Typical		4 ms
	Maximum		7 ms
Reliability	MTBF for continuous operation in hours at ambient temperature (30° C) (86° F)		738 749
Reverse polarity			Protected
IEC 1131-2 compliance			Type 3
2-wire / 3-wire proximity sensor compatibility *(see Premium and Atrium using Unity Pro, Discrete I/O modules, User manual)*			IEC 947-5-2
Dielectric strength			1500 V actual, 50 / 60 Hz for 1 min.
Resistance of insulation			>10 MΩ (below 500 VDC)
Type of input			Current sink
Paralleling of inputs (1)			Yes
Sensor voltage: monitoring threshold	OK		> 18 VDC
	Error		< 14 VDC
Sensor voltage: monitoring response time at 24 V (-15% ... +20%)	On appearance		1 ms < T < 3 ms
	On disappearance		8 ms < T < 30 ms

Power consumption 3.3 V	Typical	76 mA
	Maximum	107 mA
Sensor supply consumption	Typical	46 mA
	Maximum	73 mA
Power dissipation		2.5 W max.
Temperature derating of BMX DDI 1602		None

(1) This characteristic is used to connect several inputs to the same module in parallel or to different modules for input redundancy.

NOTE: For the **BMX DDI 1602H**, the maximum value of the sensor power supply must not exceed 26.4 V when operated at 70° C (158° F).

⚠ WARNING

OVERHEATING MODULE

Do not operate the **BMX DDI 1602H** at 70° C (158° F) if the sensor power supply is greater than 26.4 V or less than 21.1 V.

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

Fuses

Internal	None
External	Fast blow fuse of 0.5 A

⚠ CAUTION

LOSS OF INPUT FUNCTION

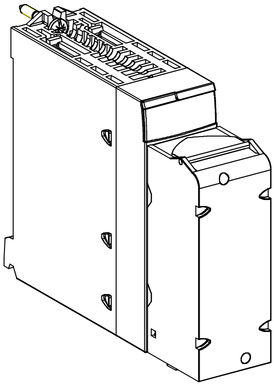
Install the correct rating and type of fuse.

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

Connecting the Module

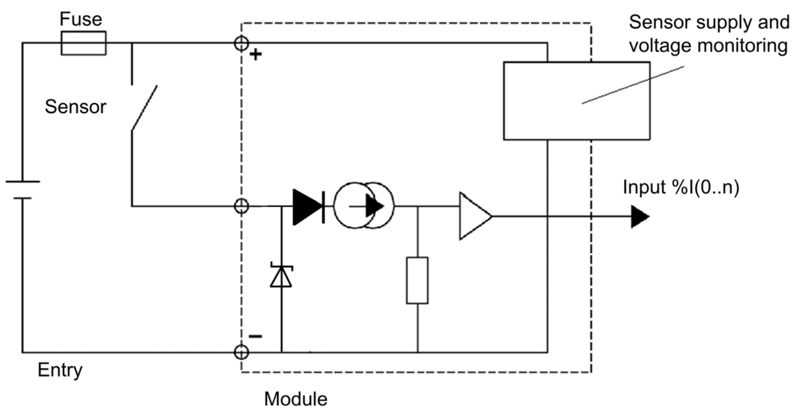
At a Glance

The BMX DDI 1602 module is fitted with a removable 20-pin terminal block for the connection of sixteen input channels.



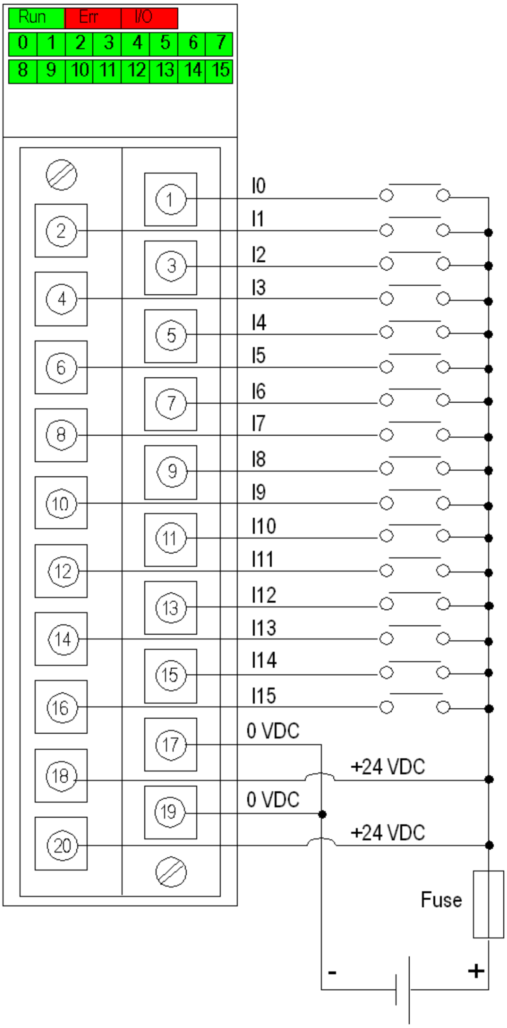
Input Circuit Diagram

The following diagram shows the circuit of a direct current input (positive logic).



Module Connection

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



power supply: 24 VDC
fuse: fast blow fuse of 0.5A

Chapter 5
BMX DDI 1603 Input Modules

Subject of this Section

This section presents the BMX DDI 1603 module, its characteristics, and explains how it is connected to the various sensors.

What Is in This Chapter?

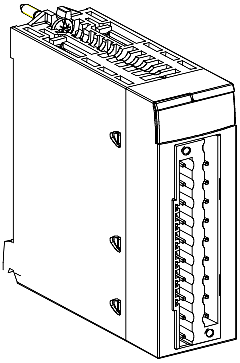
This chapter contains the following topics:

Introduction

Function

The BMX DDI 1603 module is a 48 VDC discrete module connected via a 20-pin terminal block. It is a positive logic (or sink) module: its 16 input channels receive current from the sensors.

Illustration



Characteristics

General Characteristics

This table presents the general characteristics for the **BMX DDI 1603** and BMX DDI 1603H *(see page 28)* modules:

BMX DDI 1603 Module			48 VDC positive logic inputs
Nominal input values		Voltage	48 VDC
		Current	2.5 mA
Threshold input values	At 1	Voltage	≥ 34 V
		Current	> 2 mA (for U ≥ 34 V)
	At 0	Voltage	10 V
		Current	< 0.5 mA
	Sensor supply (including ripple)		36...60 V
Input impedance	At nominal U		19.2 kΩ
Response time	Typical		4 ms
	Maximum		7 ms
Reliability	MTBF for continuous operation in hours at ambient temperature (30° C) (86° F)		738 749
Reverse polarity			Protected
IEC 1131-2 compliance			Type 1
2-wire / 3-wire proximity sensor compatibility *(see Premium and Atrium using Unity Pro, Discrete I/O modules, User manual)*			IEC 947-5-2
Dielectric strength			1 500 V actual, 50 / 60 Hz for 1 min.
Resistance of insulation			>10 MΩ (below 500 VDC)
Type of input			Current sink
Paralleling of inputs (1)			Yes
Sensor voltage: monitoring threshold	OK		> 36 VDC
	Error		< 24 VDC

Sensor voltage: monitoring response time at 24 V (-15% ... +20%)	On appearance	1 ms < T < 3 ms
	On disappearance	8 ms < T < 30 ms
Power consumption 3.3 V	Typical	76 mA
	Maximum	107 mA
Sensor supply consumption	Typical	47 mA
	Maximum	60 mA
Power dissipation		3.6 W max.
Temperature derating of BMX DDI 1603		None

(1) This characteristic is used to connect several inputs to the same module in parallel or to different modules for input redundancy

NOTE: For the **BMX DDI 1603H**, the maximum value of the sensor power supply must not exceed 52.8 V when operated at 70° C (158° F).

⚠ WARNING

OVERHEATING MODULE

Do not operate the **BMX DDI 1603H** at 70° C (158° F) if the sensor power supply is greater than 52.8 V or less than 42.2 V.

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

Fuses

Internal	None
External	Fast blow fuse of 0.5 A

⚠ CAUTION

LOSS OF INPUT FUNCTION

Install the correct type of fuse with the correct rating.

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

DANGER

HAZARD OF ELECTRICAL SHOCK, EXPLOSION OR ARC FLASH

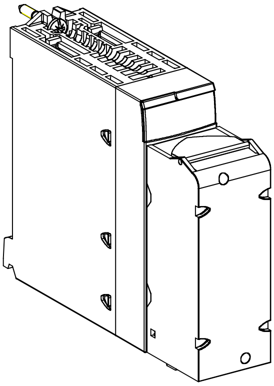
Switch off the sensor and pre-actuator voltages before connecting or disconnecting the module.

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

Connecting the Module

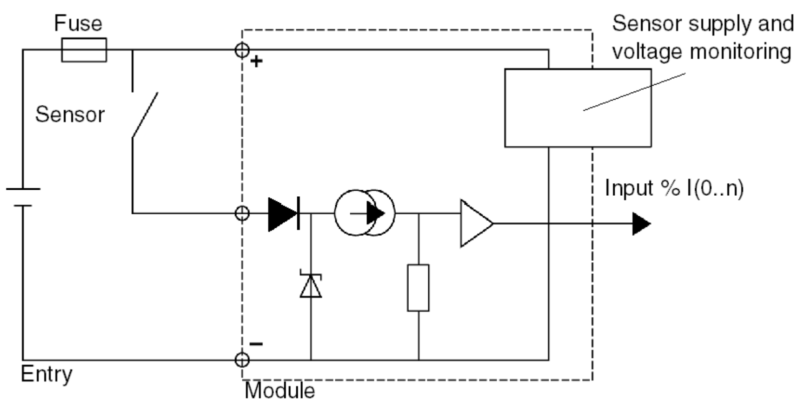
At a Glance

The BMX DDI 1603 module is fitted with a removable 20-pin terminal block for the connection of sixteen input channels.



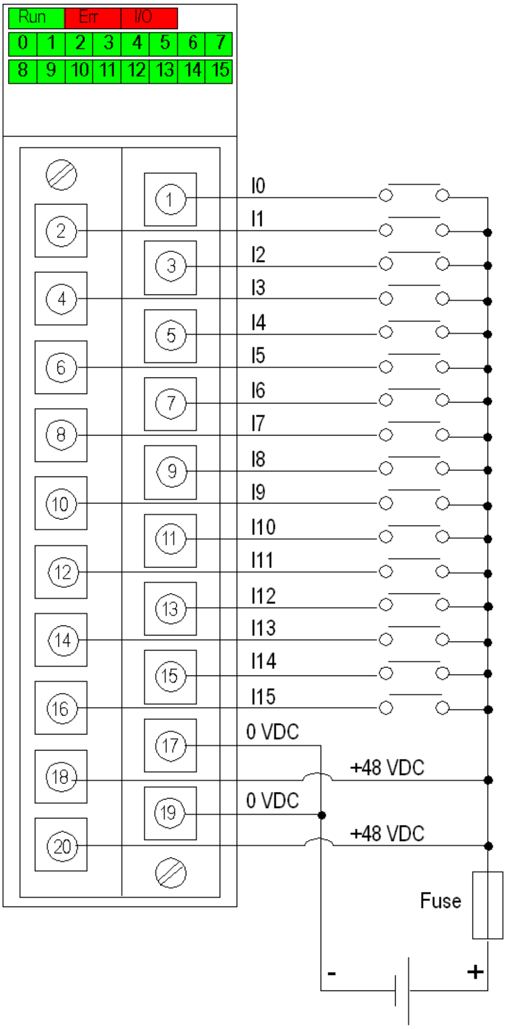
Input Circuit Diagram

The following diagram shows the circuit of a direct current input (positive logic).



Module Connection

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



power supply: 48 VDC
fuse: fast blow fuse of 0.5A

Chapter 6
BMX DDI 1604T Input Modules

Subject of this Section

This section presents the BMX DDI 1604T module, its characteristics, and explains how it is connected to the various sensors.

NOTE: There is no H version of this module.

What Is in This Chapter?

This chapter contains the following topics:

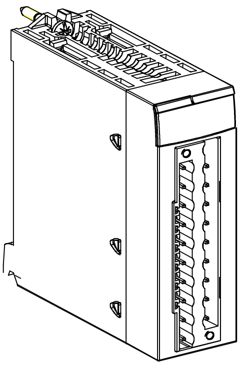
Introduction

Function

The BMX DDI 1604T module is a 125 VDC discrete module connected via a 20-pin terminal block. It is a positive logic (or sink) module: its 16 input channels receive current from the sensors.

NOTE: BMX DDI 1604T provides an extended temperature range, as listed in the General Characteristics *(see page 87)* topic of this chapter.

Illustration



Characteristics

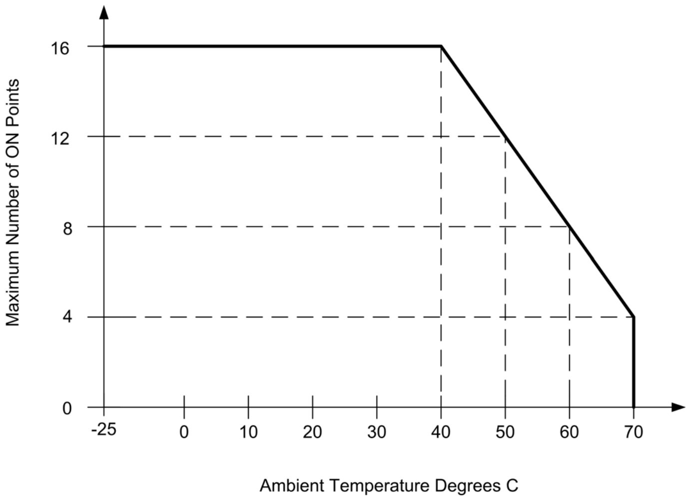
General Characteristics

This table presents the general characteristics for the **BMX DDI 1604T** module:

BMX DDI 1604T Module			125 VDC positive logic inputs
Nominal input values		Voltage	125 VDC
		Current	2.4 mA
Threshold input values	At 1	Voltage	≥ 88 VDC
		Current	> 2 mA (for U ≥ 88 V)
	At 0	Voltage	36 VDC
		Current	< 0.5 mA
	Sensor supply (including ripple for standard module)		88...150 V (156 V including ripple)
Input impedance	At nominal U		50 kΩ
Response time	Typical		5 ms
	Maximum		9 ms
Reliability	MTBF for continuous operation in hours at ambient temperature (30° C) (86° F)		888 402
Reverse polarity			Protected
Dielectric strength			2500 VDC for 1 min.
Resistance of insulation			>10 MΩ (below 500 VDC)
Type of input			Current sink
Paralleling of inputs			Yes
Sensor voltage: monitoring threshold	I/O LED off		> 100 VDC
	I/O LED on		< 80 VDC
Sensor voltage: monitoring response time at 125 VDC (-20% ... +20%)	On appearance		8 ms < T < 30 ms
	On disappearance		1 ms < T < 5 ms
Power consumption 3.3 V	Typical		76 mA
	Maximum		107 mA
Sensor supply consumption 4-channel at 70° C	Typical		1.85 W
	Maximum		2.85 W
Sensor supply consumption 8-channel at 60° C	Typical		3.07 W
	Maximum		4.61 W

Sensor supply consumption 12-channel at 50° C	Typical	4.29 W
	Maximum	6.37 W
Sensor supply consumption 16-channel at -25...40° C	Typical	5.51 W
	Maximum	8.13 W
Power dissipation		3.2 W max. at 70° C
		5.0 W max. at 60° C
		6.7 W max. at 50° C
		8.5 W max. at 40° C
Input operating voltage range		88...150 VDC
Maximum input voltage		156 VDC (including ripple)
Operating temperature range		-25° C...+70° C

The following graph shows the temperature derating of BMX DDI 1604T.



NOTE: For the **BMX DDI 1604T**, the maximum value of the sensor power supply must not exceed 150 V when operated at 70° C (158° F).

⚠ WARNING

OVERHEATING MODULE

Do not operate the **BMX DDI 1604T** at 70° C (158° F) if the sensor power supply is greater than 150 V or less than 100 V.

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

Fuses

Internal	None
External	Fast blow fuse of 0.5 A

Acquire and install the proper fuse.

⚠ CAUTION

LOSS OF INPUT FUNCTION

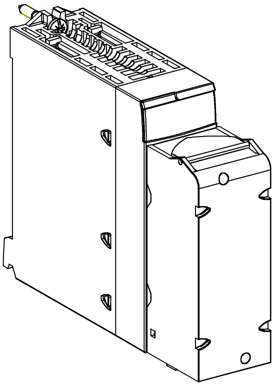
Install the correct rating and type of fuse.

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

Connecting the Module

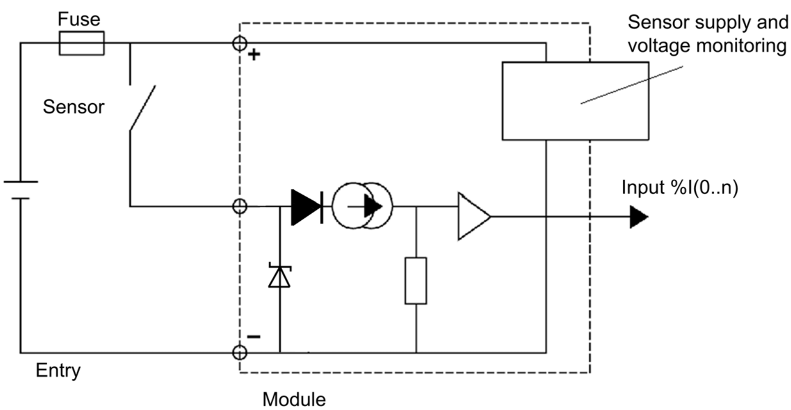
At a Glance

The BMX DDI 1604T module is fitted with a removable 20-pin terminal block for the connection of sixteen input channels.



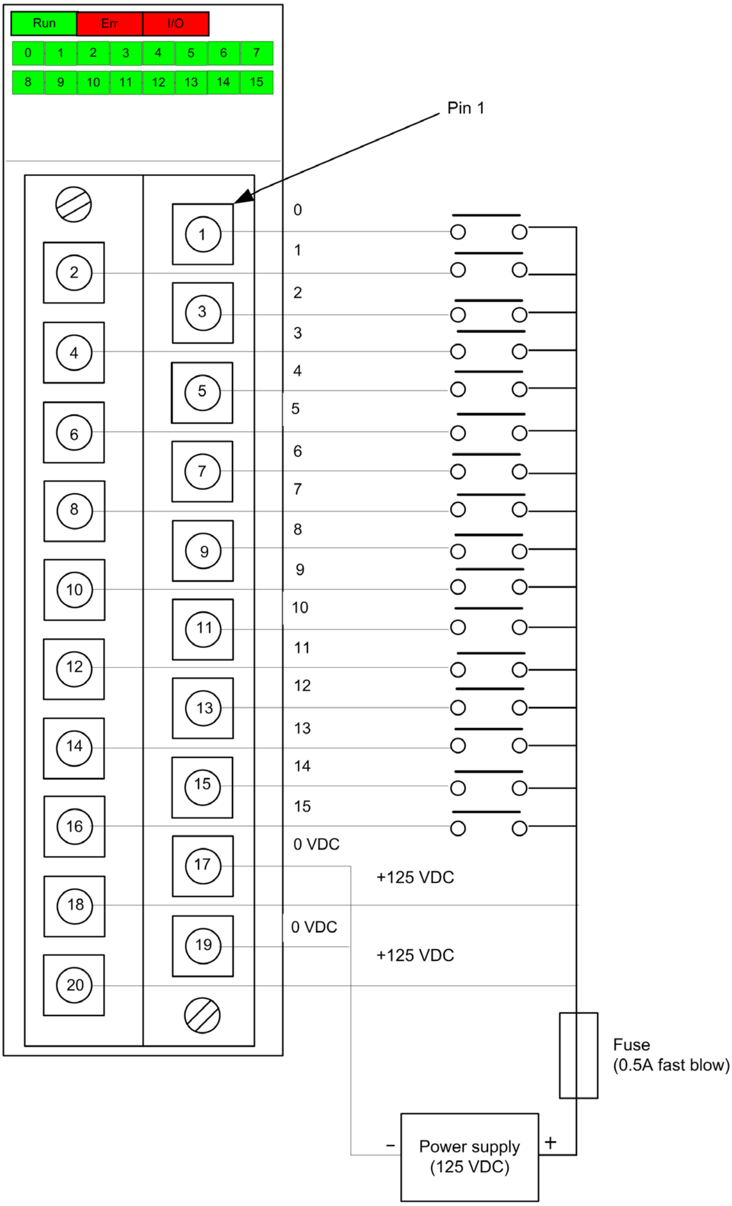
Input Circuit Diagram

The following diagram shows the circuit of a direct current input (positive logic).



Module Connection

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



Chapter 7
BMX DAI 1602 Input Modules

Subject of this Section

This section presents the BMX DAI 1602 module, its characteristics, and explains how it is connected to the various sensors.

What Is in This Chapter?

This chapter contains the following topics:

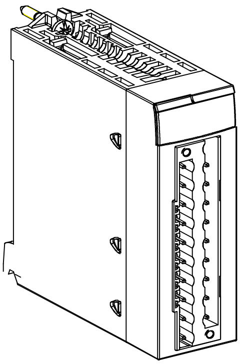
Introduction

Function

The BMX DAI 1602 module is a 24 VAC discrete module connected via a 20-pin terminal block. This module has 16 input channels that operate on alternating current.

This module can also be used with 24 VDC, with positive or negative logic.

Illustration



Characteristics

General Characteristics

This table presents the general characteristics for the **BMX DAI 1602** and BMX DAI 1602H *(see page 28)* modules:

BMX DAI 1602 Module			24 VAC inputs
Nominal input values		Voltage	24 VAC
		Current	3 mA
		Frequency	50/60Hz
Threshold input values	At 1	Voltage	≥ 15 V
		Current	≥ 2 mA
	At 0	Voltage	≤5 V
		Current	≤1 mA
	Frequency		47 Hz to 63 Hz
	Sensor supply (including ripple)		20...26 V
	Peak of current on enabling (at nominal U)		5 mA
Input impedance	At nominal U and f = 55 Hz		6 kΩ
Type of input			Resistive
Response time	Activation		15 ms
	Deactivation		20 ms
IEC 1131-2 compliance			Type 1
Reliability	MTBF for continuous operationin hours at ambient temperature (30° C) (86° F)		1 307 702
2-wire / 3-wire proximity sensor compatibility *(see Premium and Atrium using Unity Pro, Discrete I/O modules, User manual)*			IEC 947-5-2
Dielectric strength			1500 V actual, 50 / 60 Hz for 1 min.
Resistance of insulation			>10 MΩ (below 500 VDC)

Sensor voltage: monitoring threshold	OK	> 18 V
	Error	< 14 V
Sensor voltage: monitoring response time at 24 V (-15% ... +20%)	On appearance	20 ms < T < 50 ms
	On disappearance	5 ms < T < 15 ms
Power consumption 3.3 V	Typical	76 mA
	Maximum	107 mA
Sensor supply consumption	Typical	1.45 mA
	Maximum	1.8 mA
Power dissipation		3 W max.
Temperature derating for BMX DAI 1602		None

NOTE: Over its extended -25...70° C (-13...158° F) temperature range, the **BMX DAI 1602H** characteristics are the same as the **BMX DAI 1602** characteristics in the table.

Fuses

Internal	None
External	Fast blow fuse of 0.5 A

⚠ CAUTION

LOSS OF INPUT FUNCTION

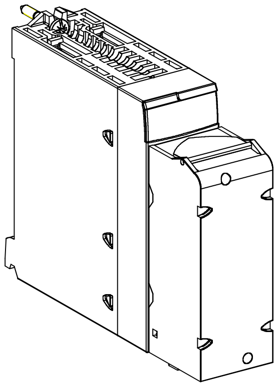
Install the correct type of fuse with the correct rating.

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

Connecting the Module

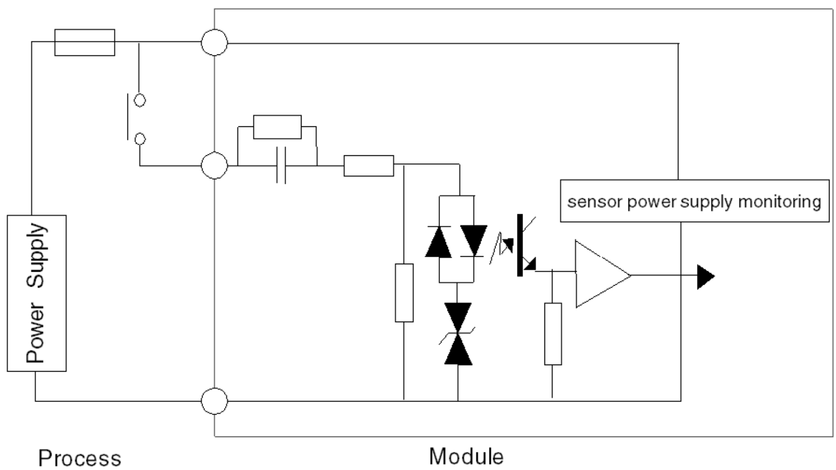
At a Glance

The BMX DAI 1602 module is fitted with a removable 20-pin terminal block for the connection of sixteen input channels.



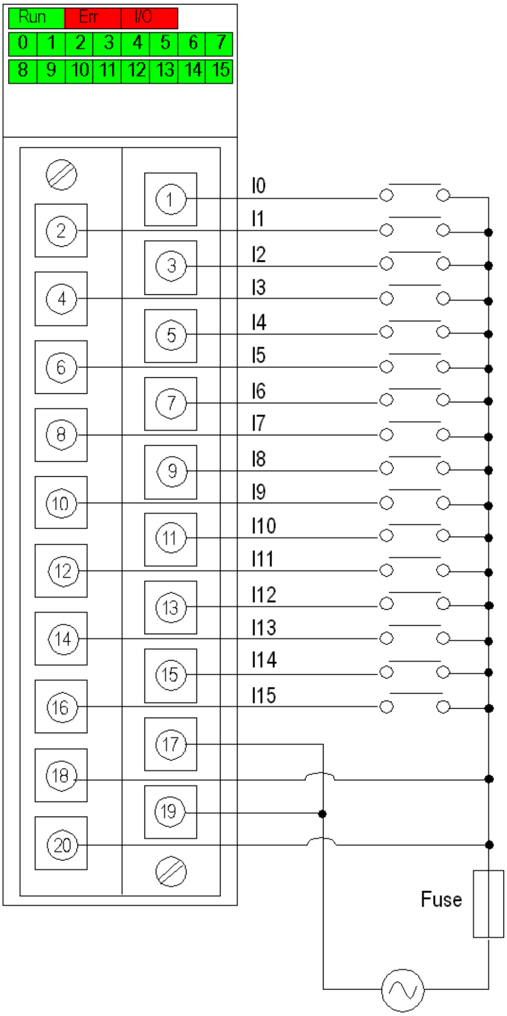
Input Circuit Diagram

The following diagram shows the circuit of an alternating current input.



Module Connection (AC Power Supply)

The following diagram shows the connection of the module to the sensors, using an AC power supply.

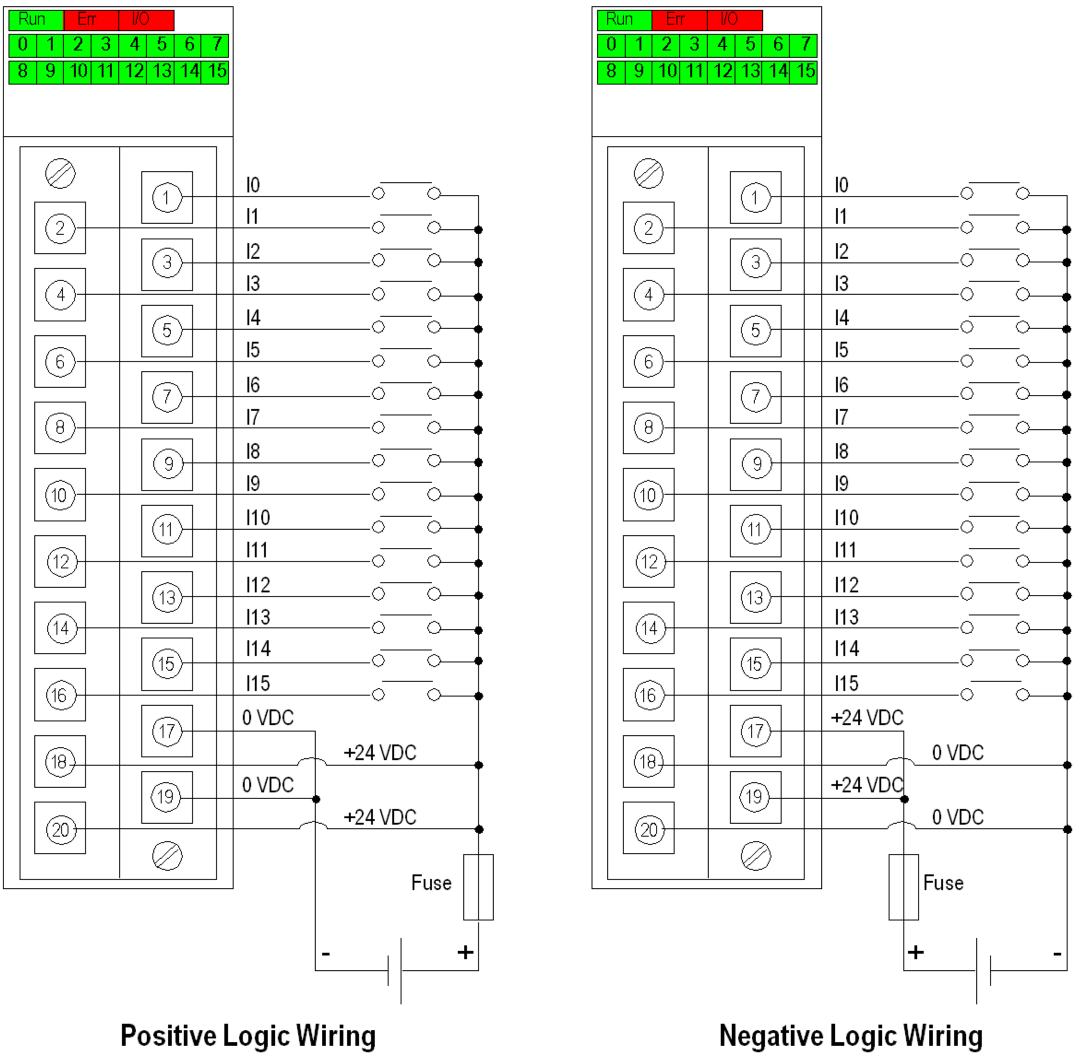


power supply: 24 VAC
fuse: fast blow fuse of 0.5A

Module Connection (DC Power Supply)

This module can also be used with 24 VDC, with positive or negative logic.

The following diagram shows the connection of the module to the sensors, using a DC power supply.



power supply: 24 VDC
fuse: fast blow fuse of 0.5A

Chapter 8
BMX DAI 1603 Input Modules

Subject of this Section

This section presents the BMX DAI 1603 module, its characteristics, and explains how it is connected to the various sensors.

What Is in This Chapter?

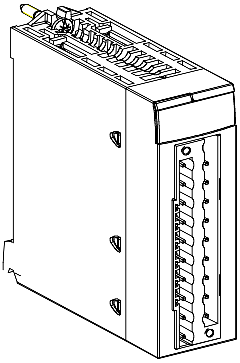
This chapter contains the following topics:

Introduction

Function

The BMX DAI 1603 module is a 48 VAC discrete module connected via a 20-pin terminal block. This module has 16 input channels that operate on alternating current.

Illustration



Characteristics

General Characteristics

This table presents the general characteristics for the BMX DAI 1603 and BMX DAI 1603H *(see page 28)* modules:

BMX DAI 1603 Module			48 VAC inputs
Nominal input values		Voltage	48 VAC
		Current	5 mA
		Frequency	50/60Hz
Threshold input values	At 1	Voltage	≥ 34 V
		Current	≥ 2 mA
	At 0	Voltage	≤10 V
		Current	≤1 mA
	Frequency		47 Hz to 63 Hz
	Sensor supply (including ripple)		40...52 V
	Peak of current on enabling (at nominal U)		95 mA
Input impedance	At nominal U and f = 55 Hz		9 kΩ
Type of input			Capacitive
Response time	Activation		10 ms
	Deactivation		20 ms
IEC 1131-2 compliance			Type 3
Reliability	MTBF for continuous operation in hours at ambient temperature (30° C) (86° F)		1 303 645
2-wire / 3-wire proximity sensor compatibility *(see page 56)*			IEC 947-5-2
Dielectric strength			1500 V actual, 50 / 60 Hz for 1 min.
Resistance of insulation			>10 MΩ (below 500 VDC)

Sensor voltage: monitoring threshold	OK	> 36 V
	Error	< 24 V
Sensor voltage: monitoring response time at 24 V (-15% ... +20%)	On appearance	20 ms < T < 50 ms
	On disappearance	5 ms < T < 15 ms
Power consumption 3.3 V	Typical	76 mA
	Maximum	107 mA
Sensor supply consumption	Typical	466 mA
	Maximum	846 mA
Power dissipation		4 W max.
Temperature derating for BMX DAI 1603		None

NOTE: Over its extended -25...70° C (-13...158° F) temperature range, the **BMX DAI 1603H** characteristics are the same as the **BMX DAI 1603** characteristics in the table.

Fuses

Internal	None
External	Fast blow fuse of 0.5 A

⚠ CAUTION

LOSS OF INPUT FUNCTION

Install the correct type of fuse with the correct rating.

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

⚠ ⚠ DANGER

HAZARD OF ELECTRICAL SHOCK, EXPLOSION OR ARC FLASH

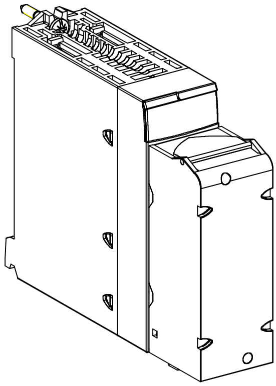
Switch off the sensor and pre-actuator voltages before connecting or disconnecting the module.

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

Connecting the Module

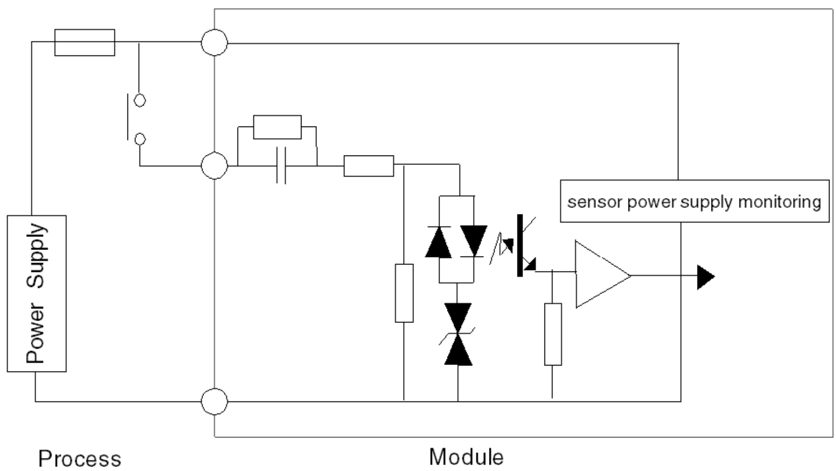
At a Glance

The BMX DAI 1603 module is fitted with a removable 20-pin terminal block for the connection of sixteen input channels.



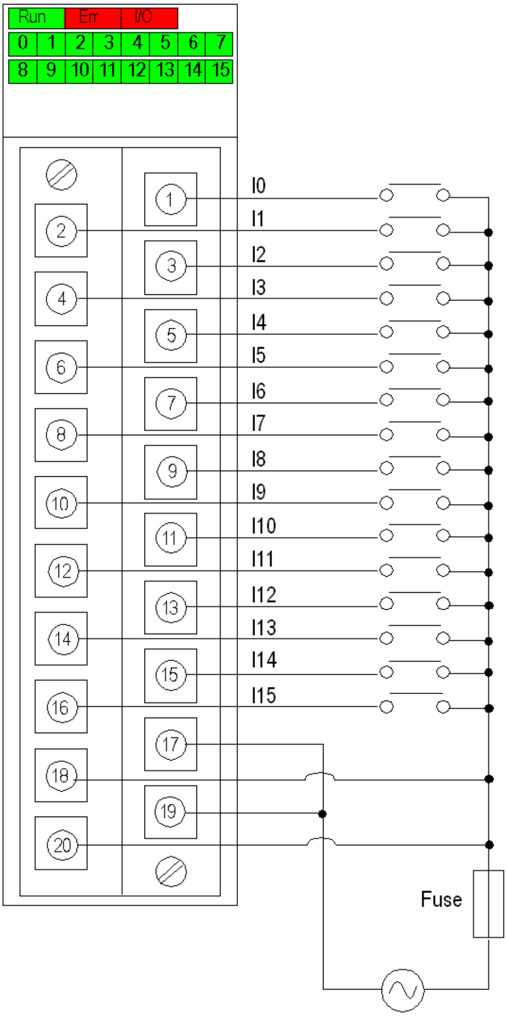
Input Circuit Diagram

The following diagram shows the circuit of an alternating current input.



Module Connection

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



power supply: 48 VAC
fuse: fast blow fuse of 0.5A

Chapter 9
BMX DAI 1604 Input Modules

Subject of this Section

This section presents the BMX DAI 1604 module, its characteristics, and explains how it is connected to the various sensors.

What Is in This Chapter?

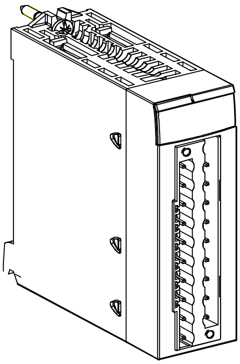
This chapter contains the following topics:

Introduction

Function

The BMX DAI 1604 module is a 100...120 VAC discrete module connected via a 20-pin terminal block. This module has 16 input channels that operate on alternating current.

Illustration



Characteristics

General Characteristics

This table presents the general characteristics for the BMX DAI 1604 and BMX DAI 1604H *(see page 28)* modules:

BMX DAI 1604 Module			100...120 VAC inputs
Nominal input values		Voltage	100...120 VAC
		Current	5 mA
		Frequency	50/60Hz
Threshold input values	At 1	Voltage	≥ 74 V
		Current	≥ 2.5 mA
	At 0	Voltage	≤20 V
		Current	≤1 mA
	Frequency		47 Hz to 63 Hz
	Sensor supply (including ripple)		85...132 V
	Peak of current on enabling (at nominal U)		240 mA
Input impedance	at nominal U and f = 55 Hz		13 kΩ
Type of input			Capacitive
Response time	Activation		10 ms
	Deactivation		20 ms
IEC 1131-2 compliance			Type 3
Reliability	MTBF for continuous operation in hours at ambient temperature (30° C) (86° F)		1 303 067
2-wire / 3-wire proximity sensor compatibility *(see Premium and Atrium using Unity Pro, Discrete I/O modules, User manual)*			IEC 947-5-2
Dielectric strength			1500 V actual, 50 / 60 Hz for 1 min.
Resistance of insulation			>10 MΩ (below 500 VDC)

Sensor voltage: monitoring threshold	OK	> 82 V
	Error	< 40 V
Sensor voltage: monitoring response time at 24 V (-15% ... +20%)	on appearance	20 ms < T < 50 ms
	on disappearance	5 ms < T < 15 ms
Power consumption 3.3 V	typical	76 mA
	maximum	107 mA
Sensor supply consumption	typical	228 mA
	maximum	510 mA
Power dissipation		3.8 W max.
Temperature derating for BMXDAI1604		None

NOTE: Over its extended -25...70° C (-13...158° F) temperature range, the **BMX DAI 1604H** characteristics are the same as the **BMX DAI 1604** characteristics in the table.

Fuses

Internal	None
External	Fast blow fuse of 0.5 A

⚠ CAUTION

LOSS OF INPUT FUNCTION

Install the correct type of fuse with the correct rating.

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

⚠ DANGER

HAZARD OF ELECTRICAL SHOCK, EXPLOSION OR ARC FLASH

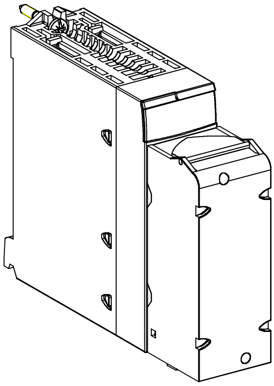
Switch off the sensor and pre-actuator voltages before connecting or disconnecting the module.

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

Connecting the Module

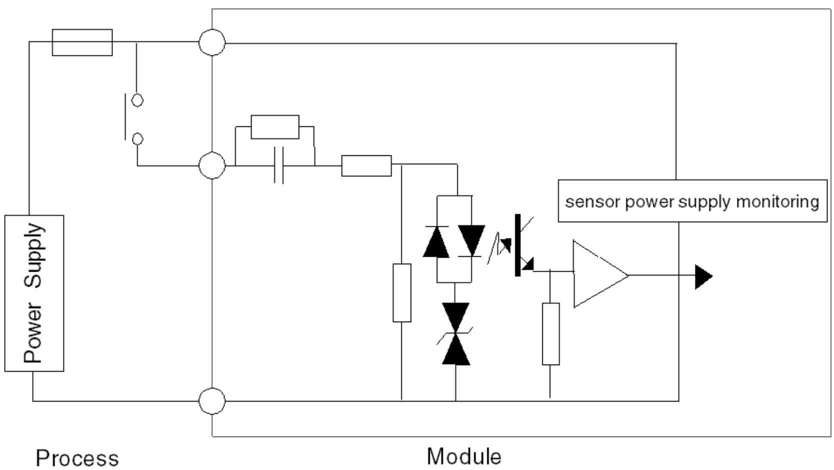
At a Glance

The BMX DAI 1604 module is fitted with a removable 20-pin terminal block for the connection of sixteen input channels.



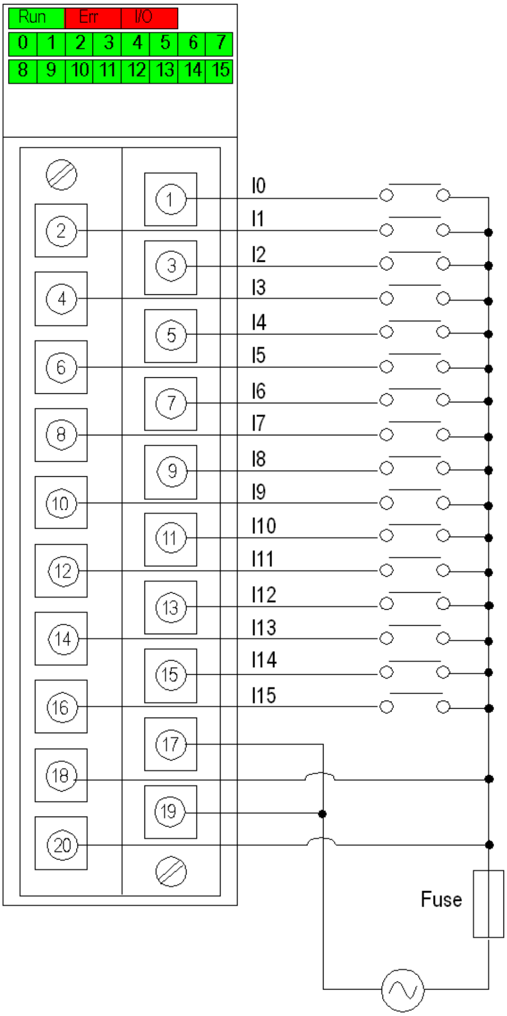
Input Circuit Diagram

The following diagram shows the circuit of an alternating current input.



Module Connection

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



power supply: 100...120 VAC
fuse: fast blow fuse of 0.5A

Chapter 10
BMX DAI 0805 Input Modules

Subject of this Section

This section presents the BMX DAI 0805 module, its characteristics, and explains how it is connected to the various sensors.

What Is in This Chapter?

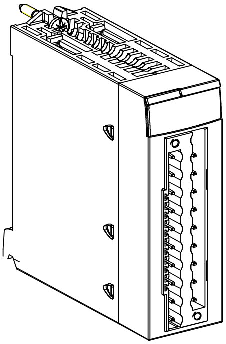
This chapter contains the following topics:

Introduction

Function

The BMX DAI 0805 module is a 200...240 VAC discrete module connected via a 20-pin terminal block. This module has 8 input channels that operate on alternating current.

Illustration



Characteristics

General Characteristics

This table presents the general characteristics for the BMX DAI 0805 and BMX DAI 0805H *(see page 28)* module:

BMX DAI 0805 Module			200...240 VAC inputs
Nominal input values		Voltage	200...240 VAC
		Current	10.40 mA (for U=220 V at 50 Hz)
		Frequency	50/60Hz
Threshold input values	At 1	Voltage	≥ 159 V
		Current	> 6 mA (for U=159)
	At 0	Voltage	≤40 V
		Current	≤4 mA
	Frequency		47 Hz to 63 Hz
	Sensor supply (including ripple)		170...264 V
	Peak of current on enabling (at nominal U)		480 mA
Input impedance	at nominal U and f = 55 Hz		21 kΩ
Type of input			Capacitive
Response time	Activation		10 ms
	Deactivation		20 ms
IEC 61131 compliance			Type 2
Reliability	MTBF for continuous operation in hours at ambient temperature (30° C) (86° F)		1 730 522
2-wire / 3-wire proximity sensor compatibility *(see Premium and Atrium using Unity Pro, Discrete I/O modules, User manual)*			IEC 947-5-2
Dielectric strength			1500 V rms, 50 / 60 Hz for 1 min.
Resistance of insulation			>10 MΩ (below 500 VDC)

Sensor voltage: monitoring threshold	OK	> 164 V
	Error	< 80 V
Sensor voltage: monitoring response time	on appearance	20 ms < T < 50 ms
	on disappearance	5 ms < T < 15 ms
Power consumption 3.3 V	typical	76 mA
	maximum	126 mA
Sensor supply consumption	typical	93.60 mA
	maximum	154.80 mA
Power dissipation		4.73 W max.
Temperature derating for BMXDAI0805		None

NOTE: Over its extended -25...70° C (-13...158° F) temperature range, the BMX DAI 0805H *(see page 28)* characteristics are the same as the BMX DAI 0805 characteristics.

Fuses

CAUTION

LOSS OF INPUT FUNCTION

Install the correct type of fuse with the correct rating.

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

DANGER

HAZARD OF ELECTRICAL SHOCK, EXPLOSION OR ARC FLASH

Switch off the sensor and pre-actuator voltages before connecting or disconnecting the module.

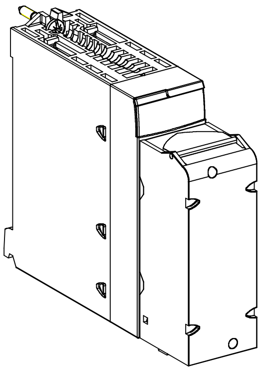
Failure to follow these instructions will result in death or serious injury.

Internal	None
External	Fast blow fuse of 0.5 A

Connecting the Module

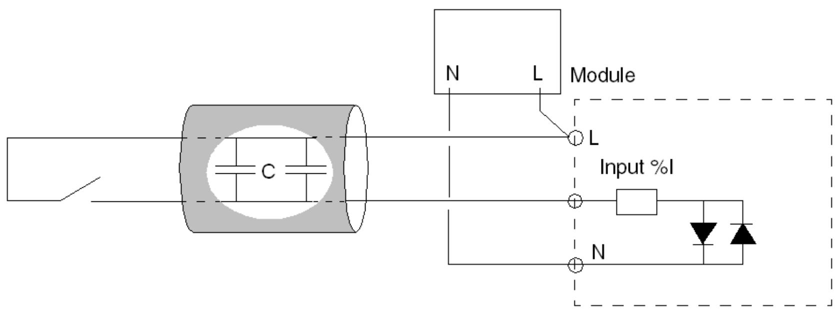
At a Glance

The BMX DAI 0805 module is fitted with a removable 20-pin terminal block for the connection of eight input channels.



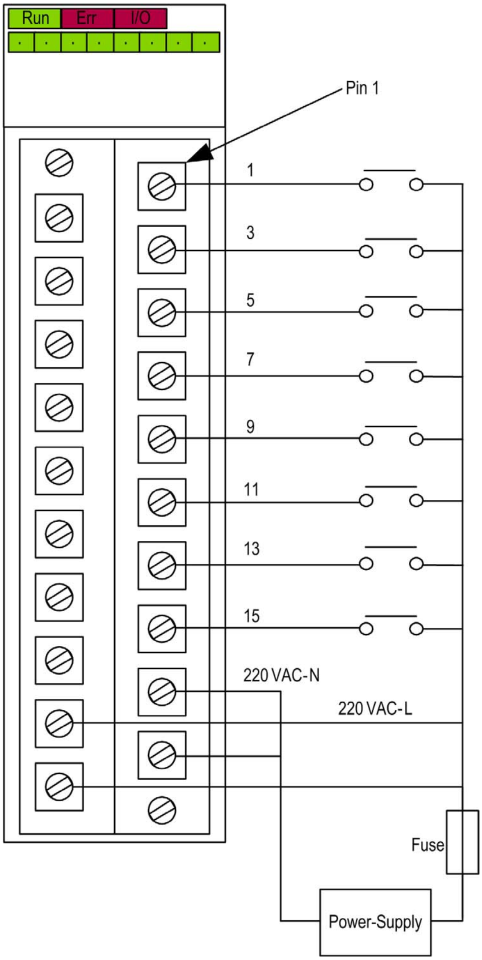
Input Circuit Diagram

The following diagram shows the circuit of an alternating current input.



Module Connection

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



power supply: 200...240 VAC
fuse: fast blow fuse of 0.5A

Chapter 11
BMX DAI 0814 Input Module

Subject of this Section

This section presents the BMX DAI 0814 module, its characteristics, and explains how it is connected to the various sensors.

What Is in This Chapter?

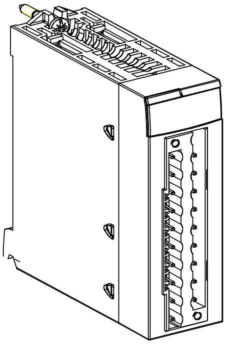
This chapter contains the following topics:

Introduction

Function

The BMX DAI 0814 module is a 100...120 Vac discrete module connected via a 20-pin terminal block. The module has 8 isolated input channels that operate on alternating current.

Illustration



Characteristics

General Characteristics

This table presents the general characteristics for the BMX DAI 0814 module:

BMX DAI 0814 module characteristics			
Nominal input values		Voltage	100...120 Vac
		Current	5 mA
		Frequency	50/60Hz
Threshold input values	At 1	Voltage	≥ 74 V
		Current	≥ 2.5 mA
	At 0	Voltage	≤20 V
		Current	≤1 mA
	Frequency		47 Hz to 63 Hz
	Sensor supply (including ripple)		85...132 V
	Peak of current on enabling (at nominal U)		240 mA
Input impedance	at nominal U and f = 55 Hz		13 kΩ
Type of input			Capacitive
Response time	Activation		10 ms
	Deactivation		20 ms
IEC 61131-2 compliance			Type 3
Reliability	MTBF for continuous operation in hours at ambient temperature (30° C) (86° F)		1700000
Power consumption 3.3 V	typical		61 mA
	maximum		112 mA
2-wire / 3-wire proximity sensor compatibility *(see Premium and Atrium using Unity Pro, Discrete I/O modules, User manual)*			IEC 947-5-2
Dielectric strength	Channel to Bus		1780 V actual, 50 / 60 Hz for 1 min.
	Channel to Channel		1780 V actual, 50 / 60 Hz for 1 min.
Resistance of insulation	Channel to Bus		>10 MΩ (below 500 VDC)
	Channel to Channel		>10 MΩ (below 500 VDC)
Power dissipation			2.35 W max.
Temperature derating for BMX DAI 0814			None

Fuses

Internal	None
External	Fast blow fuse of 0.25 A

CAUTION

LOSS OF INPUT FUNCTION

Install the correct type of fuse with the correct rating.

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

DANGER

HAZARD OF ELECTRICAL SHOCK, EXPLOSION OR ARC FLASH

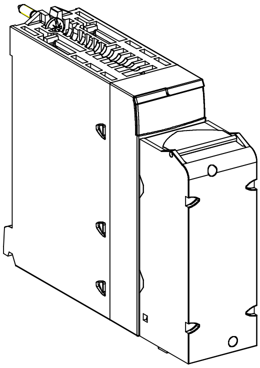
Switch off the sensor and pre-actuator voltages before connecting or disconnecting the module.

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

Connecting the Module

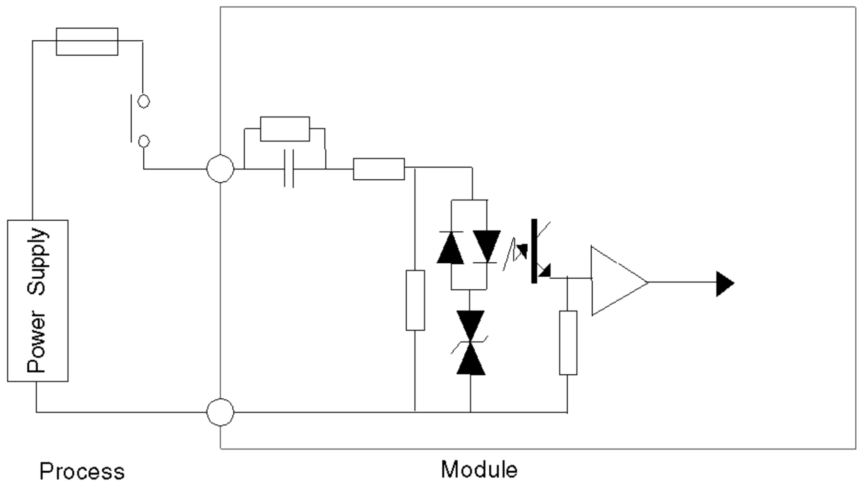
At a Glance

The BMX DAI 0814 module is fitted with a removable 20-pin terminal block for the connection of eight input channels.



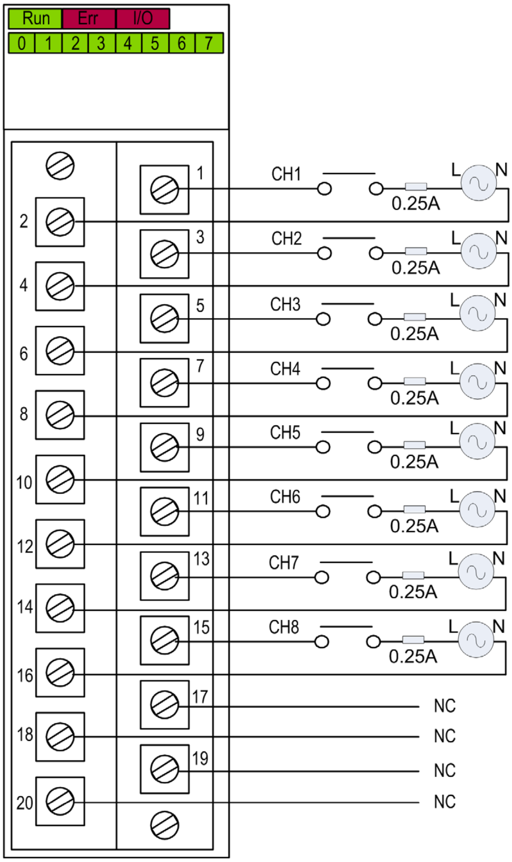
Input Circuit Diagram

The following diagram shows the circuit of an alternating current input.



Module Connection

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



power supply: 100...120 VAC
fuse: fast blow fuse of 0.25A
NC not connected

Chapter 12
BMX DDI 3202 K Input Modules

Subject of this Section

This section presents the BMX DDI 3202 K module, its characteristics and explains how it is connected to the various sensors.

What Is in This Chapter?

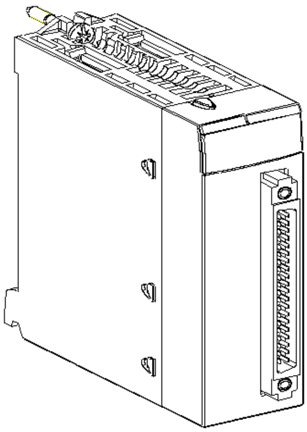
This chapter contains the following topics:

Introduction

Function

The BMX DDI 3202 K module is a 24 VDC discrete module connected via a 40-pin connector. It is a positive logic (or sink) module: its 32 input channels receive current from the sensors.

Illustration



Characteristics

General Characteristics

This table presents the general characteristics for the **BMX DDI 3202 K** module.

BMX DDI 3202 K Module			24 VDC positive logic inputs
Nominal input values		Voltage	24 VDC
		Current	2.5 mA
Threshold input values	At 1	Voltage	≥ 11 V
		Current	> 2 mA (for U ≥ 11 V)
	At 0	Voltage	5 V
		Current	< 1.5 mA
	Sensor supply (including ripple)		19..30 V (possible up to 34 V, limited to 1 hour/day)
Input impedance	at nominal U		9.6 kΩ
Response time	typical		4 ms
	maximum		7 ms
Reverse polarity			Protected
IEC 1131-2 compliance			Type 3
2-wire / 3-wire proximity sensor compatibility *(see Premium and Atrium using Unity Pro, Discrete I/O modules, User manual)*			IEC 947-5-2
Dielectric strength	Primary/Secondary		1500 V actual, 50 / 60 Hz for 1 min.
	Between channel groups		500 VDC
Resistance of insulation			>10 MΩ (below 500 VDC)
Type of input			Current sink
Paralleling of inputs			No
Reliability	MTBF in hours at ambient temperature (30° C) (86° F)		696 320
Sensor voltage: monitoring threshold	OK		> 18 VDC
	Error		< 14 VDC

Sensor voltage: monitoring response time at 24 V (-15% ... +20%)	on appearance	1 ms < T < 3 ms
	on disappearance	8 ms < T < 30 ms
Power consumption 3.3 V	typical	121 mA
	maximum	160 mA
Sensor supply consumption	typical	92 mA
	maximum	145 mA
Power dissipation		3.9 W max.
Temperature derating		None

Fuses

Internal	None
External	1 fast blow fuse of 0.5 A for each 16-channel group

⚠ CAUTION

LOSS OF INPUT FUNCTION

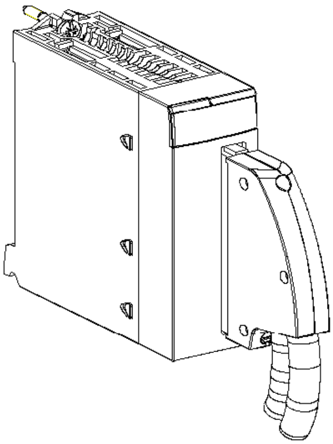
Install the correct rating and type of fuse.

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

Connecting the Module

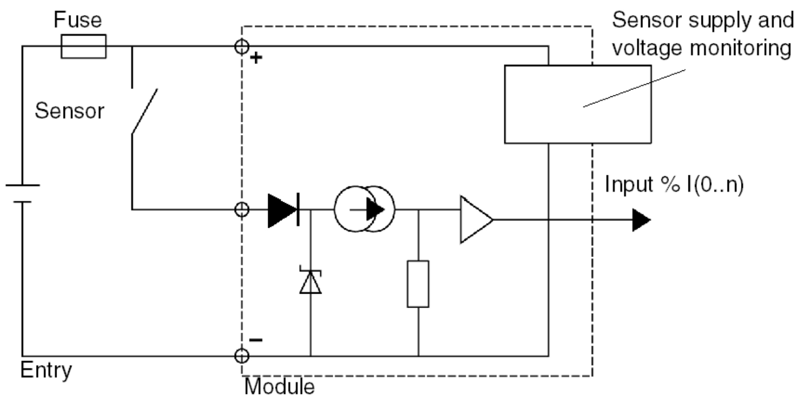
At a Glance

The BMX DDI 3202 K module is fitted with a 40-pin connector for the connection of thirty-two input channels.



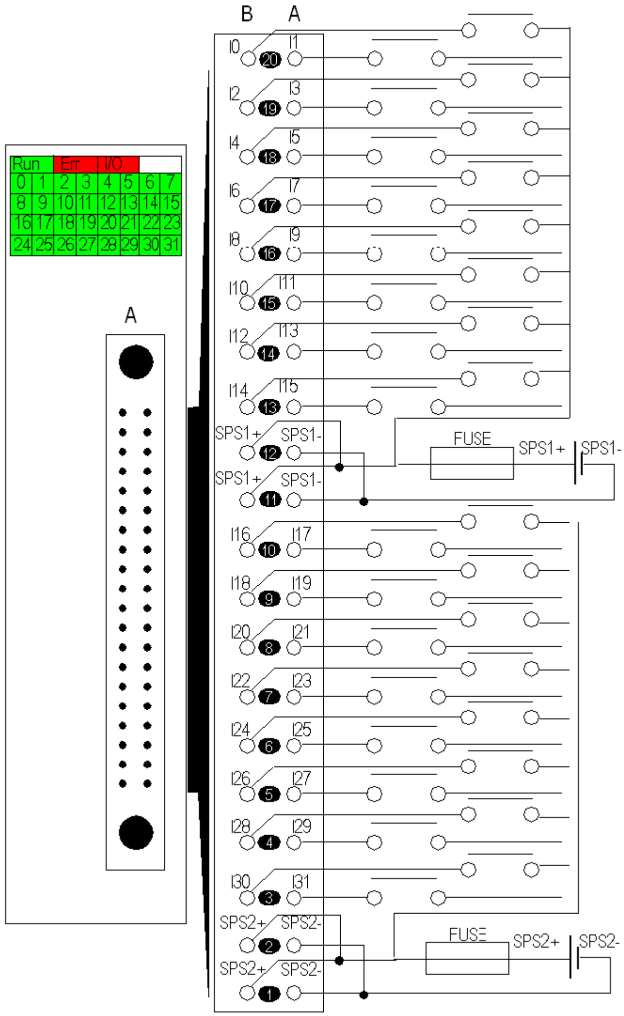
Input Circuit Diagram

The following diagram shows the circuit of a direct current input (positive logic).



Module Connection

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



power supply: 24 VDC
fuse: fast blow fuse of 0.5 A for each 16-channel group
SPS: sensor power supply

Chapter 13
BMX DDI 6402 K Input Modules

Subject of this Section

This section presents the BMX DDI 6402 K module, its characteristics, and explains how it is connected to the various sensors.

What Is in This Chapter?

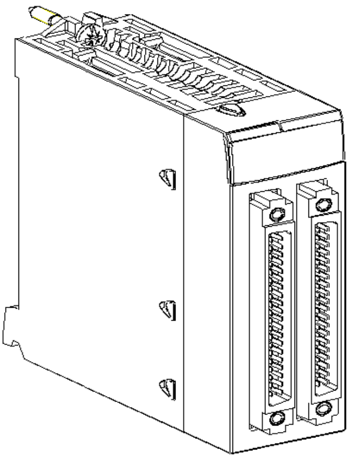
This chapter contains the following topics:

Introduction

Function

The BMX DDI 6402 K module is a 24 VDC discrete module connected via two 40-pin connectors. It is a positive logic (or sink) module: its 64 input channels receive current from the sensors.

Illustration



Characteristics

General Characteristics

This table presents the general characteristics for the **BMX DDI 6402 K** module.

BMX DDI 6402 K Module			24 VDC positive logic inputs
Nominal input values		Voltage	24 VDC
		Current	1 mA
Threshold input values	At 1	Voltage	≥ 15 V
		Current	> 1 mA (for U ≥ 15 V)
	At 0	Voltage	5 V
		Current	< 0.5 mA
	Sensor supply (including ripple)		19...30 V (possible up to 34 V, limited to 1 hour/day)
Input impedance	at nominal U		24 kΩ
Response time	typical		4 ms
	maximum		7 ms
Reverse polarity			Protected
IEC 1131-2 compliance			Not IEC
2-wire / 3-wire proximity sensor compatibility *(see Premium and Atrium using Unity Pro, Discrete I/O modules, User manual)*			No compatibility (only 1 contact per sensor allowed)
Dielectric strength	Primary/Secondary		1500 V actual, 50 / 60 Hz for 1 min
	Between channel groups		500 VDC
Resistance of insulation			>10 MΩ (below 500 VDC)
Type of input			Current sink
Paralleling of inputs			No
Reliability	MTBF for contiunos operation in hours at ambient temperature (30° C) (86° F)		342 216
Sensor voltage: monitoring threshold	OK		> 18 V
	Error		< 14 V

Sensor voltage: monitoring response time at 24 V (-15% ... +20%)	on appearance	1 ms < T < 3 ms
	on disappearance	8 ms < T < 30 ms
Power consumption 3.3 V	typical	160 mA
	maximum	226 mA
Sensor supply consumption	typical	96 mA
	maximum	125 mA
Power dissipation		4.3 W max.
Temperature derating for BMX DDI 6402 K		None

Fuses

Internal	None
External	1 fast blow fuse of 0.5 A for each 16-channel group

⚠ CAUTION

LOSS OF INPUT FUNCTION

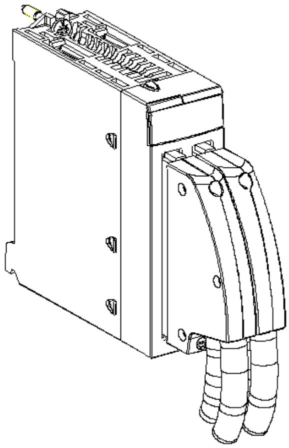
Install the correct rating and type of fuse.

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

Connecting the Module

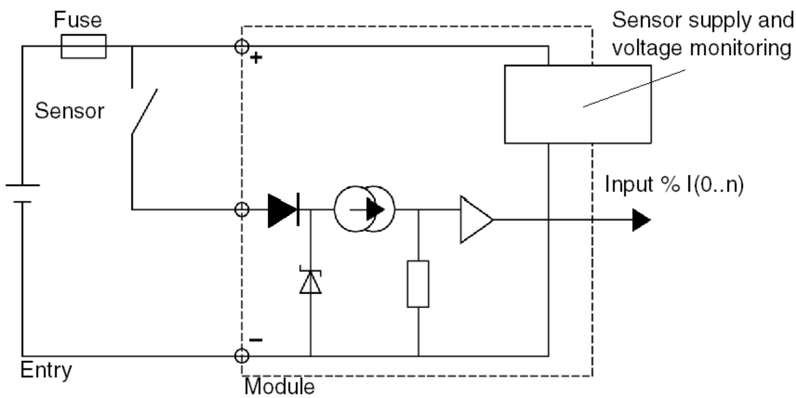
At a Glance

The BMX DDI 6402 K module is fitted with two 40-pin connectors for the connection of sixty-four input channels.



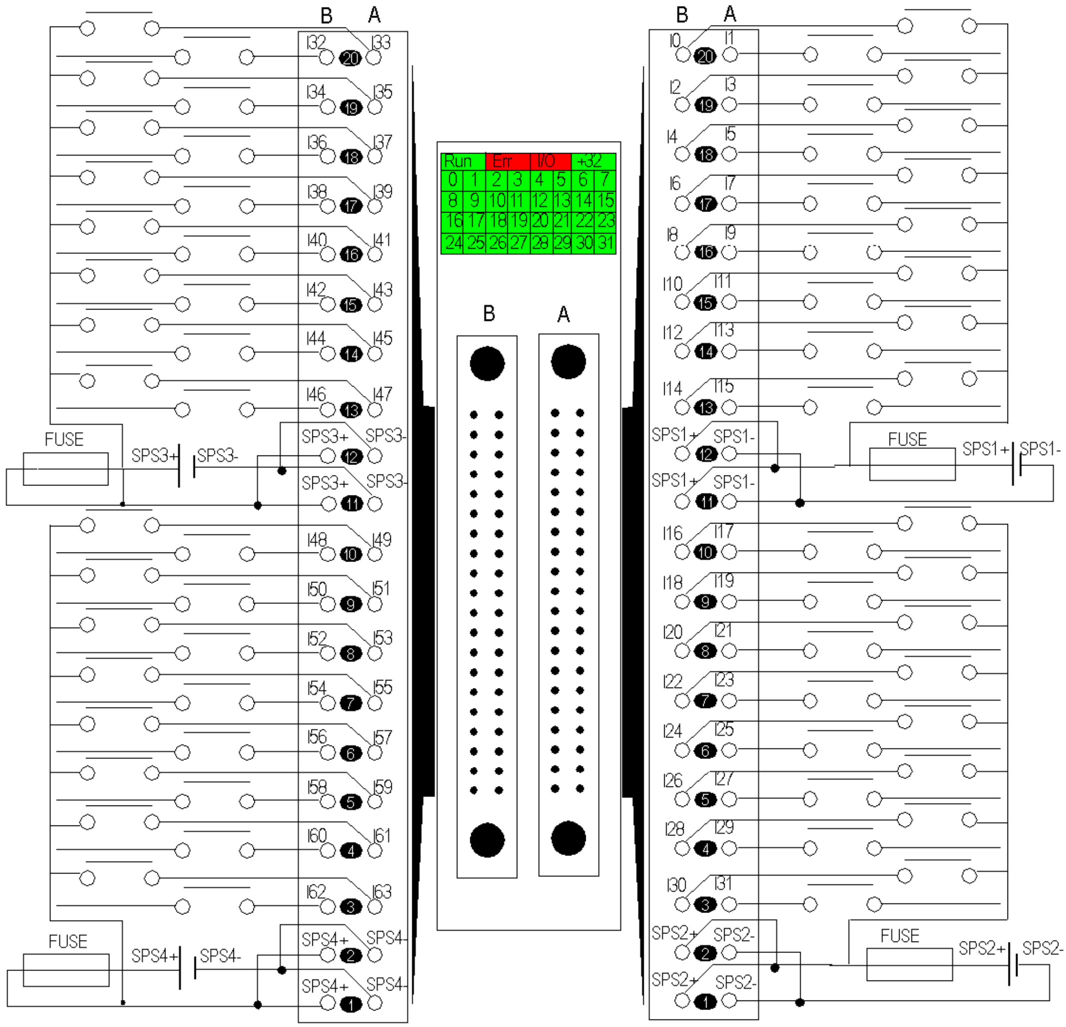
Input Circuit Diagram

The following diagram shows the circuit of a direct current input (positive logic).



Module Connection

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



power supply: 24 VDC
fuse: fast blow fuse of 0.5 A for each 16-channel group
SPS: sensor power supply

Chapter 14
BMX DDO 1602 Static Output Modules

Subject of this Section

This section presents the BMX DDO 1602 module, its characteristics, and explains how it is connected to the pre-actuators.

What Is in This Chapter?

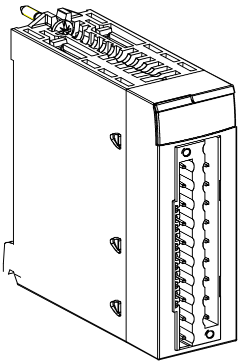
This chapter contains the following topics:

Introduction

Function

The BMX DDO 1602 module is a 24 VDC discrete module connected via a 20-pin terminal block.
It is a positive logic (or source) module: its 16 output channels provide current to the pre-actuators.

Illustration



Characteristics

General Characteristics

This table presents the general characteristics for the **BMX DDO 1602** and BMX DDO 1602H *(see page 28)* modules:

BMX DDO 1602 Module		24 VDC positive logic static outputs
Nominal values	Voltage	24 VDC
	Current	0.5 A
Threshold values	Voltage (including ripple)	19...30 V (34 V possible for 1 hour/day)
	Current/channel	0.625 A
	Current/module	10 A
Power of tungsten filament lamp	Maximum	6 W
Leakage current	At 0	< 0.5 mA
Voltage drop	At 1	< 1.2 V
Load impedance	minimum	48 Ω
Response time (1)		1.2 ms
Reliability	MTBF for continuous operation in hours at ambient temperature (30° C) (86° F)	392 285
Frequency of switching to inductive load		$0.5 / LI^2$ Hz
Paralleling of outputs		Yes (maximum of 2)
Compatibility with IEC 1131-2 DC direct inputs		Yes (type 3 and not IEC)
Built-in protection	against over voltage	Yes, by Transil diode
	against inversions	Yes, by inverted diode (2)
	against short-circuits and overloads	Yes, by current limiter and electric circuit-breaker 1.5 In < Id < 2 In
Pre-actuator voltage: monitoring threshold	OK	> 18 V
	Error	< 14 V
Pre-actuator voltage: monitoring response time	on appearance	8 ms < T < 30 ms
	on disappearance	1 ms < T < 3 ms

Power consumption 3.3 V	typical	79 mA
	maximum	111 mA
24 V pre-actuator consumption (excluding load current)	typical	23 mA
	maximum	32 mA
Power dissipation		4 W max.
Dielectric strength	Output / ground or output / internal logic	1500 V actual, 50 / 60 Hz for 1 min.
Resistance of insulation		>10 MΩ (below 500 VDC)
Temperature derating *(see Premium and Atrium using Unity Pro, Discrete I/O modules, User manual)* **for BMX DDO 1602**		None

(1) All outputs are equipped with fast demagnetization circuits for electromagnets. Electromagnet discharge time < L/R.
(2) Provide a fuse to the +24 V pre-actuator supply

NOTE: For the **BMX DDO 1602H**, the maximum pre-actuator power supply must not exceed 26.4 V and the output current value must not exceed 0.55 A at 70° C (158° F).

Fuses

Internal	None
External	1 fast blow fuse of 6.3 A

CAUTION

LOSS OF OUTPUT FUNCTION

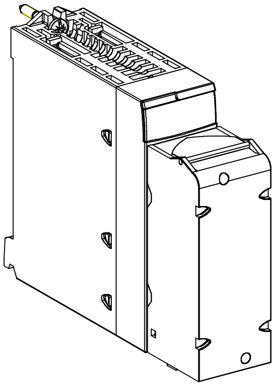
Install the correct rating and type of fuse.

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

Connecting the Module

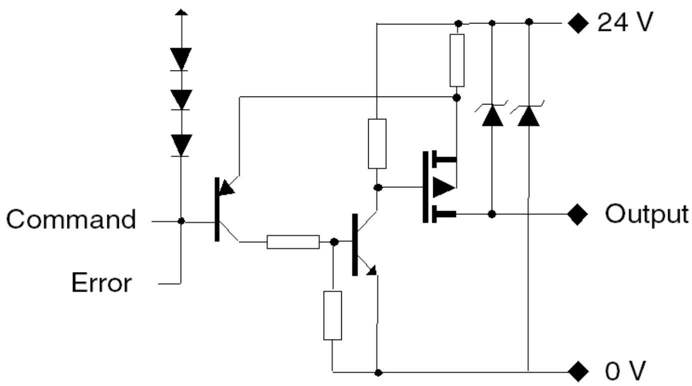
At a Glance

The BMX DDO 1602 module is fitted with a removable 20-pin terminal block for the connection of sixteen output channels.



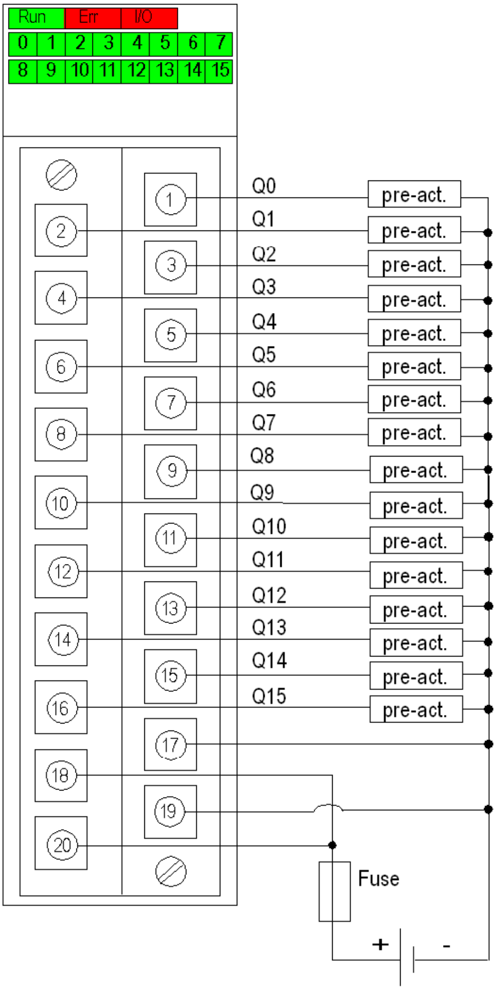
Output Circuit Diagram

The following diagram shows the circuit of a direct current output (positive logic).



Module Connection

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



power supply: 24 VDC
fuse: fast blow fuse of 6.3 A
pre-act: pre-actuator

Chapter 15
BMX DDO 1612 Static Output Modules

Subject of this Section

This section presents the BMX DDO 1612 module, its characteristics, and explains how it is connected to the pre-actuators.

What Is in This Chapter?

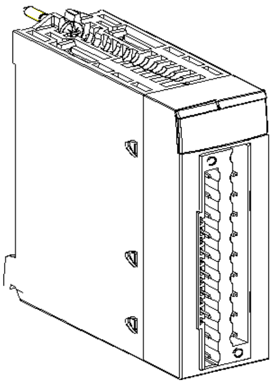
This chapter contains the following topics:

Introduction

Function

The BMX DDO 1612 module is a 24 VDC discrete module connected via a 20-pin terminal block. It is a negative logic (or sink) module: its 16 output channels receive current from the pre-actuators.

Illustration



Characteristics

General Characteristics

This table presents the general characteristics for the **BMX DDO 1612** and BMX DDO 1612H *(see page 28)* modules:

BMX DDO 1612 Module		24 VDC negative logic static outputs
Nominal values	Voltage	24 VDC
	Current	0.5 A
Threshold values	Voltage (including ripple)	19...30 V (34 V possible for 1 hour/day)
	Current/channel	0.625 A
	Current/module	10 A
Power of tungsten filament lamp	Maximum	6 W
Leakage current	At 0	< 0.5 mA
Residual voltage	At 1	< 1.2 V
Load impedance	minimum	48 Ω
Response time (1)		1.2 ms
Reliability	MTBF for continuous operation in hours at ambient temperature (30° C) (86° F)	403 804
Frequency of switching to inductive load		0.5 / LI^2 Hz
Paralleling of outputs		Yes (maximum of 3)
Compatibility with DC inputs		Yes (source and not IEC inputs)
Built-in protection (2)	against over voltage	Yes, by Transil diode
	against reverse polarity	Yes, by reverse-mounted diode
	against short-circuits and overloads	Yes, by current limiter and electric circuit-breaker 1.5 In < Id < 2 In
Pre-actuator voltage: monitoring threshold	OK	> 18 V
	Error	< 14 V
Pre-actuator voltage: monitoring response time	on appearance	8 ms < T < 30 ms
	on disappearance	1 ms < T < 3 ms

Power consumption 3.3 V	typical	79 mA
	maximum	111 mA
24 V pre-actuator consumption (Excluding load current)	typical	23 mA
	maximum	32 mA
Power dissipation		2.26 W max.
Dielectric strength	Output / ground or output / internal logic	1500 V rms, 50 / 60 Hz for 1 min.
Resistance of insulation		>10 MΩ (below 500 VDC)
Temperature darting *(see Premium and Atrium using Unity Pro, Discrete I/O modules, User manual)* for BMX DDO 1612		None

(1) All outputs are equipped with fast demagnetization circuits for electromagnets. Electromagnet discharge time < L/R.
(2) Provide a fuse to the +24 V pre-actuator supply

NOTE: For the **BMX DDO 1612H**, the maximum pre-actuator power supply must not exceed 26.4 V and the output current value must not exceed 0.55 A at 70° C (158° F).

Fuses

Internal	None
External	1 fast blow fuse of 6.3 A

⚠ CAUTION

LOSS OF OUTPUT FUNCTION

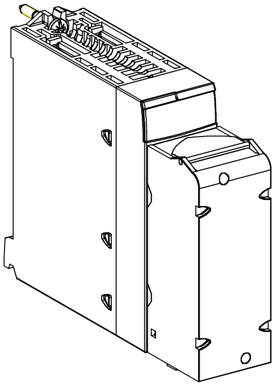
Install the correct rating and type of fuse.

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

Connecting the Module

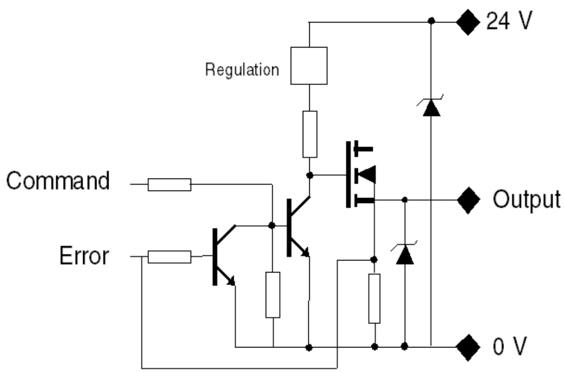
At a Glance

The BMX DDO 1612 module is fitted with a removable 20-pin terminal block for the connection of sixteen output channels.



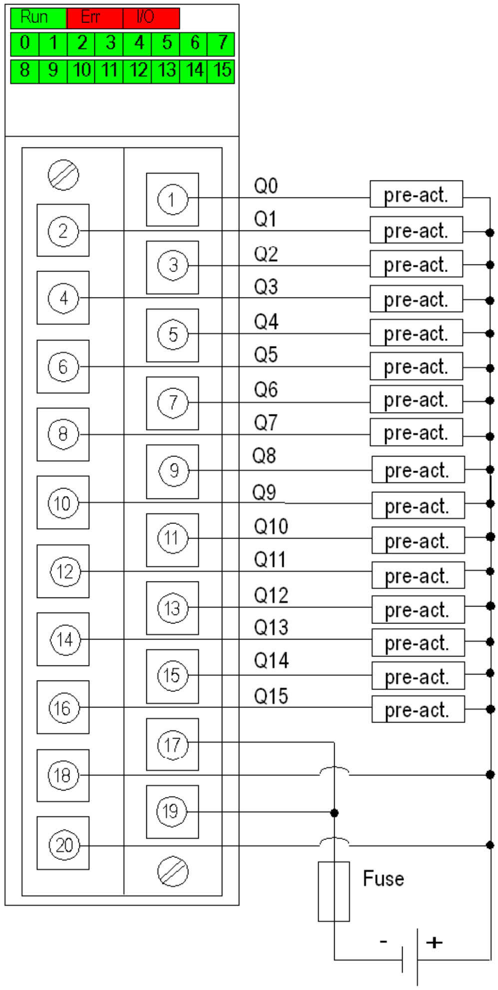
Output Circuit Diagram

The following diagram shows the circuit of a direct current output (negative logic).



Module Connection

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



power supply: 24 VDC
fuse: fast blow fuse of 6.3 A
pre-act: pre-actuator

Chapter 16
BMX DRA 0804T Relay Output Modules

Subject of this Section

This section presents the BMX DRA 0804T module, its characteristics, and explains how it is connected to the pre-actuators.

NOTE: There is no H version of this module.

What Is in This Chapter?

This chapter contains the following topics:

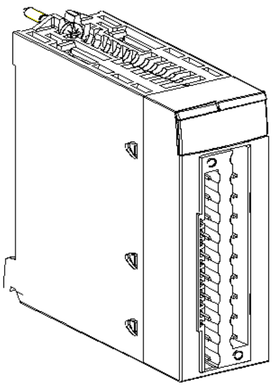
Introduction

Function

The BMX DRA 0804T module is a 125 VDC discrete relay module connected via a 20-pin terminal block. Its 8 relay output channels operate on direct current.

NOTE: BMX DRA 0804T provides an extended temperature range, as listed in the General Characteristics *(see page 151)* topic of this chapter.

Illustration



Characteristics

General Characteristics

This table presents the general characteristics for the **BMX DRA 0804T** module:

BMX DRA 0804T Module			Relay outputs for direct current
Threshold service voltage	Direct		100...150 VDC
Maximum switching current			0.3 A
Direct current load in resistive mode	Voltage		125 VDC
Response time	Activation		< 10 ms
	Deactivation		< 10 ms
Surge current maximum	10 A capacitive		t = 10ms
Built-in protection	Against inductive over voltage in DC modes		None. Fit a discharge diode on each output.
	against short-circuits and overloads		None. Fit a fast-blow fuse on each channel or channel group.
Reliability	MTBF for continuous operation in hours at ambient temperature (30° C) (86° F)		2 683 411
Power dissipation			3.17 W maximum
Field to Bus (Dielectric strength)			2000 V actual, 50 / 60 Hz for 1 min.
Resistance of insulation			>10 MΩ below 500 VDC
Power supply consumption	3.3 V	Typical	61 mA
		Maximum	112 mA
	24 V relay	Typical	104 mA
		Maximum	117 mA
Temperature derating for BMX DRA 0804T			None
Point to point isolation			1780 VAC rms
Output current			0.3 A at 125 VDC (resistive load) 100,000 ops. minimum
			0.1 A (L/R = 10 ms) 100,000 ops. minimum
Operating temperature range			-25° C...+70° C
Mechanical operations			20,000,000 minimum

Fuses

Internal	None
External	1 fast blow fuse of 0.5 A, 250 VDC for each relay

Acquire and install the proper fuse for every relay line.

CAUTION

LOSS OF OUTPUT FUNCTION

Install the correct rating and type of fuse.

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

DANGER

HAZARD OF ELECTRICAL SHOCK, EXPLOSION OR ARC FLASH

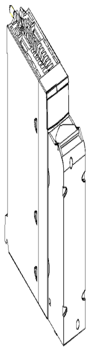
Switch off the sensor and pre-actuator voltages before connecting or disconnecting the module.

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

Connecting the Module

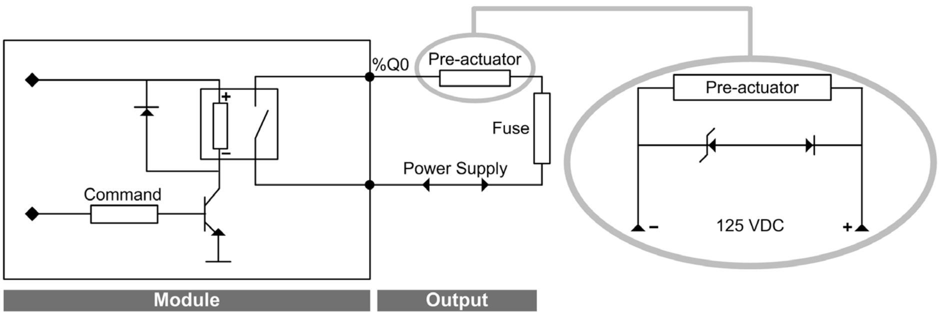
At a Glance

The BMX DRA 0804T module is fitted with a removable 20-pin terminal block for the connection of eight relay output channels.



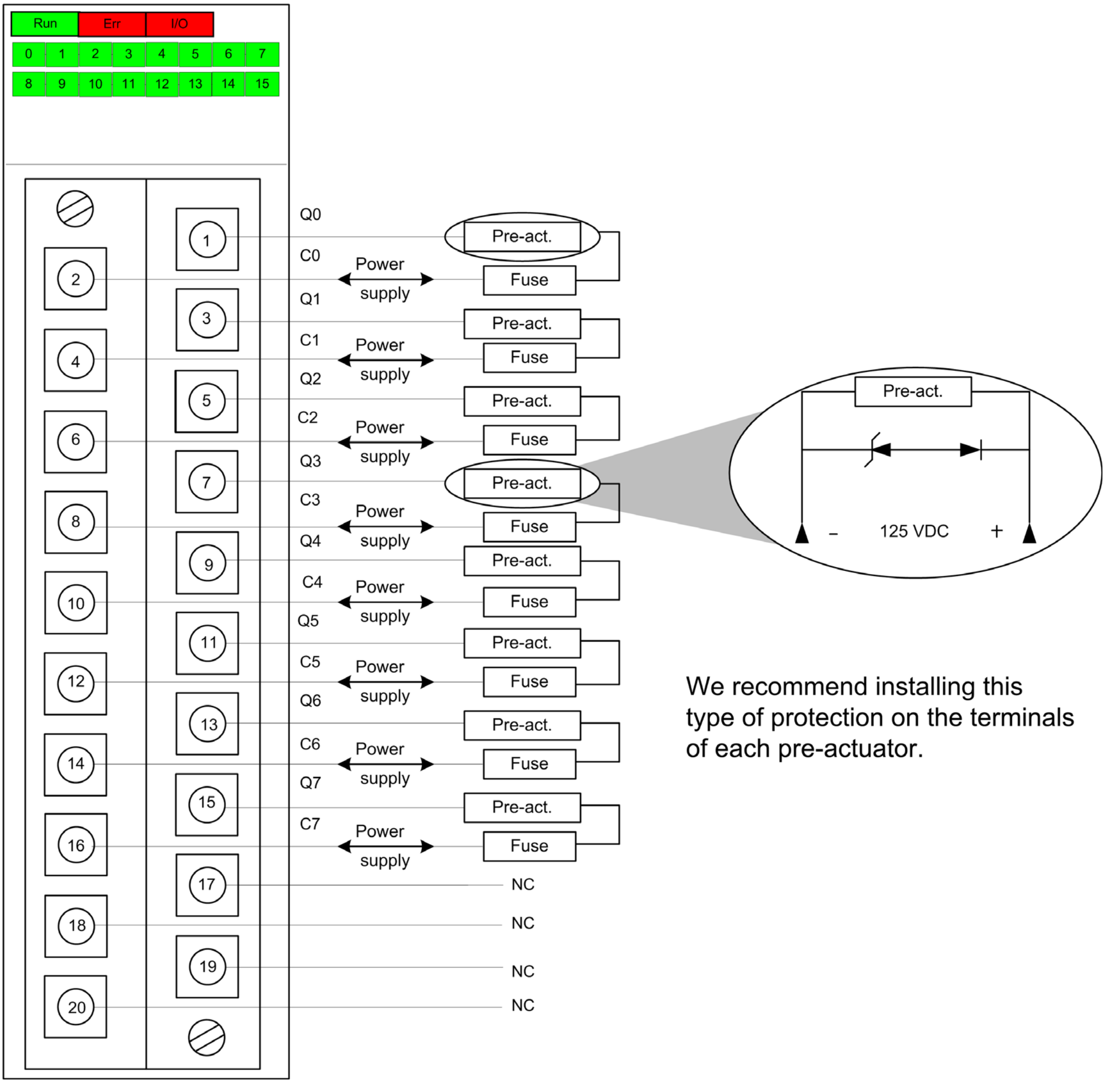
Output Circuit Diagram

The following diagram shows the circuit of a relay output. Note the enlargement of the pre-actuator. It is recommended to install this type of protection on the terminals of each pre-actuator.



Module Connection

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



power supply: 125 VDC (100...150 VDC)
fuse: 1 fast blow fuse of 0.5 A, 250 VDC for each relay
NC: not connected

NOTE: A Zener Diode voltage of 47V or slightly higher is recommended.

Chapter 17
BMX DRA 0805 Relay Output Modules

Subject of this Section

This section presents the BMX DRA 0805 module, its characteristics, and explains how it is connected to the pre-actuators.

What Is in This Chapter?

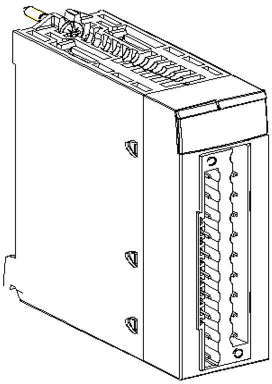
This chapter contains the following topics:

Introduction

Function

The BMX DRA 0805 module is a 24 VDC or 24...240 VAC discrete module connected via a 20-pin terminal block. Its 8 relay output channels operate either on alternating current or direct current.

Illustration



Characteristics

General Characteristics

This table presents the general characteristics for the BMX DRA 0805 and BMX DRA 0805H *(see page 28)* modules:

BMX DRA 0805 Module		Relay outputs for alternating and direct current			
Threshold service voltage	Direct	10 to 34 VDC			
	Alternating	19 to 264 VAC			
Thermal current		3 A			
Minimum switching load		5 VDC / 1 mA			
Alternating current load in resistive mode (AC12)	Voltage	24 VAC	48 VAC	100...120 VAC	200...240 VAC
	Power	50 VA(5)	50 VA(6) 110 VA(4)	110 VA(6) 220 VA(4)	220 VA(6)
	Maximum Power of Hardened module at 70° C (158° F)	30 VA(5)	30 VA(6) 66 VA(4)	66 VA(6) 132 VA(4)	132 VA(6)
Alternating current load in inductive mode (AC15)	Voltage	24 VAC	48 VAC	100...120 VAC	200...240 VAC
	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)
	Maximum Power of Hardened module at 70° C (158° F)	14.4 VA(4)	6 VA(10) 14.4 VA(8)	6 VA(11) 30 VA(7) 66 VA(2)	6 VA(11) 30 VA(9) 66 VA(6) 132 VA(1)
Direct current load in resistive mode (DC12)	Voltage	24 VDC			
	Power	24 W (6) 40 W (3)			
	Maximum Power of Hardened module at 70° C (158° F)	14.4 W (6) 24 W (3)			
Direct current load in inductive mode (DC13) (L:R=60 ms)	Voltage	24 VDC			
	Power	10 W (8) 24 W (6)			
	Maximum Power of Hardened module at 70° C (158° F)	6 W (8) 14.4 W (6)			
Response time	Activation	< 10 ms			
	Deactivation	< 8 ms			

Built-in protection	Against inductive over voltage in AC modes		None. Fit an RC circuit or a ZNO type over voltage limiter in parallel on each output appropriate to the voltage in use.
	Against inductive over voltage in DC modes		None. Fit a discharge diode on each output.
	against short-circuits and overloads		None. Fit a fast-blow fuse on each channel or channel group.
Reliability	MTBF for continuous operation in hours at ambient temperature (30° C) (86° F)		2 119 902
Power dissipation			2.7 W max.
Dielectric strength			2000 V actual, 50 / 60 Hz for 1 min.
Resistance of insulation			>10 MΩ below 500 VDC
Power supply consumption	3.3 V	Typical	79 mA
		Maximum	111 mA
	24 V relay (12)	Typical	51 mA
		Maximum	56 mA
Temperature derating for BMX DRA 0805			None

(1) 0.1 x 10^6 cycles
(2) 0.15 x 10^6 cycles
(3) 0.3 x 10^6 cycles
(4) 0.5 x 10^6 cycles
(5) 0.7 x 10^6 cycles
(6) 1 x 10^6 cycles
(7) 1.5 x 10^6 cycles
(8) 2 x 10^6 cycles
(9) 3 x 10^6 cycles
(10) 5 x 10^6 cycles
(11) 10 x 10^6 cycles
(12) per channel at 1

Fuses

Internal	None
External	1 fast blow fuse of 3 A for each relay

CAUTION

LOSS OF OUTPUT FUNCTION

Install the correct rating and type of fuse.

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

DANGER

HAZARD OF ELECTRICAL SHOCK, EXPLOSION OR ARC FLASH

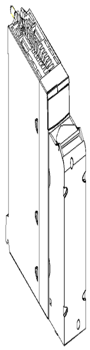
Switch off the sensor and pre-actuator voltages before connecting or disconnecting the module.

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

Connecting the Module

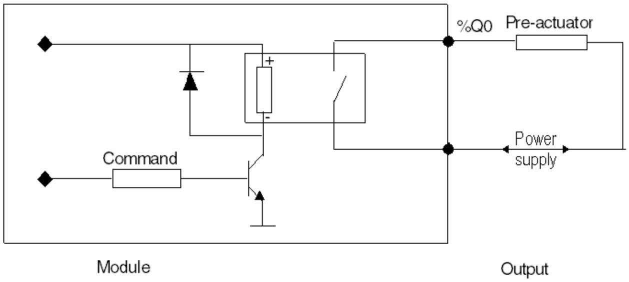
At a Glance

The BMX DRA 0805 module is fitted with a removable 20-pin terminal block for the connection of eight relay output channels.



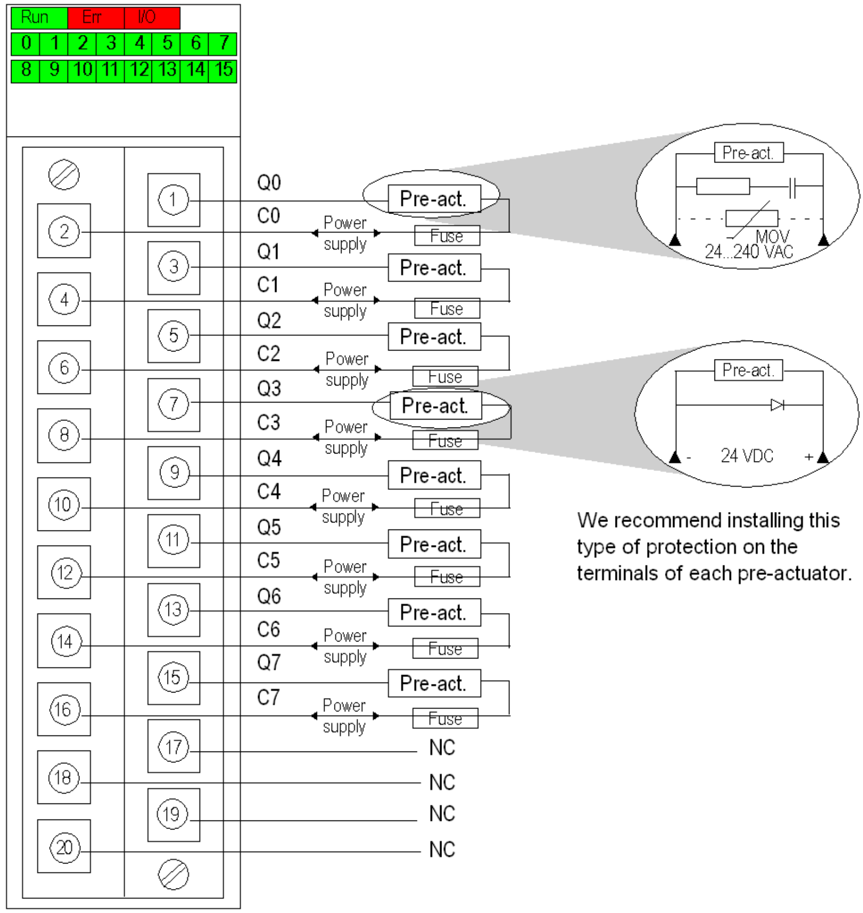
Output Circuit Diagram

The following diagram shows the circuit of a relay output.



Module Connection

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



power supply: 24 VDC or 24...240 VAC
fuse: 1 fast blow fuse of 3 A for each relay
NC: not connected

Chapter 18
BMX DRA 1605 Relay Output Modules

Subject of this Section

This section presents the BMX DRA 1605 module, its characteristics, and explains how it is connected to the pre-actuators.

What Is in This Chapter?

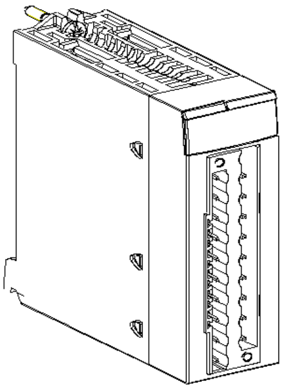
This chapter contains the following topics:

Introduction

Function

The BMX DRA 1605 module is a 24 VDC or 24...240 VAC discrete module connected via a 20-pin terminal block. Its 16 non-isolated relay output channels operate either on alternating current or direct current.

Illustration



Characteristics

General Characteristics

This table presents the general characteristics for the BMX DRA 1605 and BMX DRA 1605H *(see page 28)* modules:

BMX DRA 1605 Module		Relay outputs for alternating and direct current			
Threshold service voltage	Direct	24 VDC / 2 A (resistive load)			
	Alternating	19 to 264 VAC / 2 A, Cos φ = 1			
Minimum switching load		5 VDC / 1 mA.			
Maximum switching load		264 VAC / 125 VDC			
Mechanical service life	Number of switching	20 million or more			
Alternating current load in resistive mode (AC12)	Voltage	24 VAC	48 VAC	100...120 VAC	200...240 VAC
	Power	50 VA(2)	50 VA(1) 80 VA(2)	80 VA(1) 200 VA(2)	200 VA(1)
Alternating current load in inductive mode (AC15)	Voltage	24 VAC	48 VAC	100...120 VAC	200...240 VAC
	Power	36 VA(1) 72 VA(1) 120 VA(2)	36 VA(1) 72 VA(1) 120 VA(2)	36 VA(1) 72 VA(1) 120 VA(2)	36 VA(1) Cos φ = 0,35 72 VA(1) Cos φ = 0,7 120 VA(2) Cos φ = 0,35 240 VA(2) Cos φ = 0,7
Direct current load in resistive mode (DC12)	Voltage	24 VDC	48 VDC		
	Power	24 W (2)	24 W(4)		
Direct current load in inductive mode (DC13)	Voltage	24 VDC	48 VDC		
	Power (L/R = 7 ms)	3 W(1) 10 W(2)	3 W(1) 10 W(2)		
	Power (L/R = 20 ms)	24 W(3)	24 W(3)		
Response time	Activation	< 8 ms			
	Deactivation	< 10 ms			
On-line module change		Possible			
Built-in protection	Against alternating current inductive over voltage	None. Fit an RC circuit or a ZNO type over voltage limiter in parallel on each output appropriate to the voltage in use.			
	Against direct current inductive over voltage	None. Fit a discharge diode on each output.			
	Against short-circuits and overloads	None. Fit a fast-blow fuse on each channel or channel group.			
Maximum switching frequency		3 600 cycles per hour			
Power dissipation		3 W max			
Dielectric strength		2000 V actual, 50 / 60 Hz for 1 min.			

<table>
<tr><td>Resistance of insulation</td><td></td><td></td><td>> 10 MΩ (below 500 VDC)</td></tr>
<tr><td>Noise immunity</td><td></td><td></td><td>In noise simulation below 1500 V actual, noise width of 1s and frequency of 25 to 60 Hz</td></tr>
<tr><td>Reliability</td><td colspan="2">MTBF for continuous operation in hours at ambient temperature (30° C) (86° F)</td><td>1 357 810</td></tr>
<tr><td rowspan="4">Power supply consumption</td><td rowspan="2">3.3 V</td><td>Typical</td><td>79 mA</td></tr>
<tr><td>Maximum</td><td>111 mA</td></tr>
<tr><td rowspan="2">24 V relay (5)</td><td>Typical</td><td>89 mA</td></tr>
<tr><td>Maximum</td><td>100 mA</td></tr>
<tr><td colspan="3">Temperature derating</td><td>None</td></tr>
</table>

(1) 3 x 10^5 cycles
(2) 1 x 10^5 cycles
(3) 7 x 10^3 cycles
(4) 5 x 10^4 cycles
(5) per channel at 1

NOTE: These characteristics are available also for the BMX DRA 1605H in the temperature range -25...60° C (-13...140° F). At 70° C (158° F), the maximum power must not exceed 24 VA per channel.

Fuses

Internal	None
External	1 fast blow fuse of 12 A for each 8-channel group

⚠ CAUTION

LOSS OF OUTPUT FUNCTION

Install the correct rating and type of fuse.

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

⚠ ⚠ DANGER

HAZARD OF ELECTRICAL SHOCK, EXPLOSION OR ARC FLASH

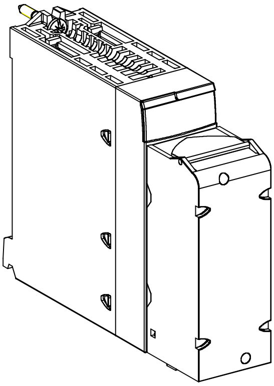
Switch off the sensor and pre-actuator voltages before connecting or disconnecting the module.

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

Connecting the Module

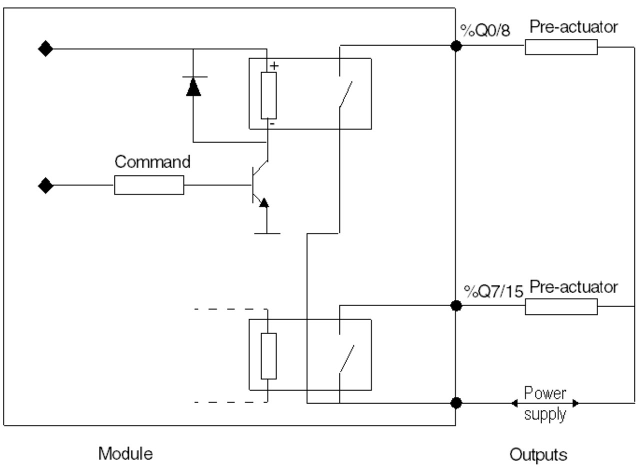
At a Glance

The BMX DRA 1605 module is fitted with a removable 20-pin terminal block for the connection of sixteen non-isolated relay output channels.



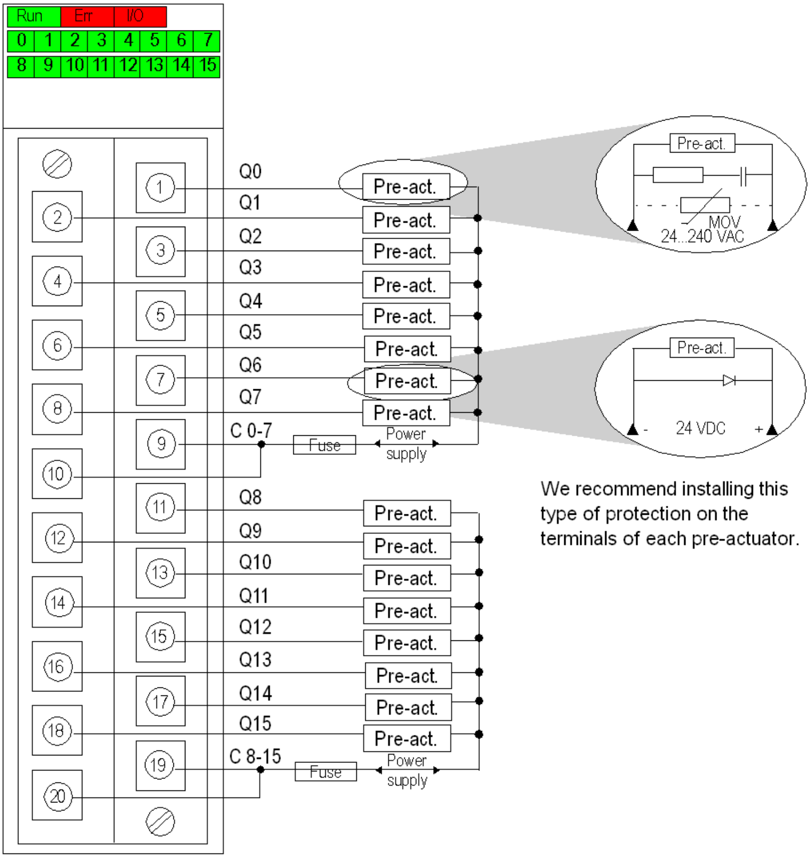
Output Circuit Diagram

The following diagram shows the circuit of relay outputs.



Module Connection

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



power supply: 24 VDC or 24...240 VAC
fuse: 1 fast blow fuse of 12 A for each 8-channel group

Chapter 19
BMX DDO 3202 K Static Output Modules

Subject of this Section

This section presents the BMX DDO 3202 K module, its characteristics, and explains how it is connected to the pre-actuators.

What Is in This Chapter?

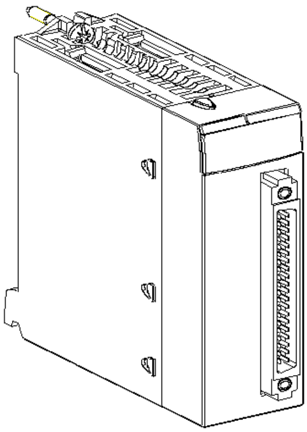
This chapter contains the following topics:

Introduction

Function

The BMX DDO 3202 K module is a 24 VDC discrete module connected via a 40-pin connector. It is a positive logic (or source) module: its 32 output channels provide current to the pre-actuators.

Illustration



Characteristics

General Characteristics

This table presents the general characteristics for the **BMX DDO 3202 K**.

BMX DDO 3202 K Module		24 VDC positive logic static outputs
Nominal values	Voltage	24 VDC
	Current	0.1 A
Threshold values	Voltage (including ripple)	19...30 V (34 V possible for 1 hour/day)
	Current/channel	0.125 A
	Current/module	3.2 A
Power of tungsten filament lamp	Maximum	1.2 W
Leakage current	At 0	100 µA for U = 30 V
Voltage drop	At 1	< 1.5 V for I = 0.1 A
Load impedance	Minimum	220 Ω
Response time (1)		1.2 ms
Max. overload time before internal damage		15 ms
Reliability	MTBF for continuos operation in hours at ambient temperature (30° C) (86° F)	312 254
Frequency of switching to inductive load		0.5 / LI^2 Hz
Paralleling of outputs		Yes (maximum of 3)
Compatibility with IEC 1131-2 DC direct inputs		Yes (type 3 or not IEC)
Built-in protection	Against overvoltage	Yes, by Transil diode
	Against inversions	Yes, by inverted diode (2)
	Against short-circuits and overloads	Yes, by current limiter and electric circuit-breaker 0.125 A < Id < 0.185 A
Pre-actuator voltage: monitoring threshold	OK	> 18 V
	Error	< 14 V
Pre-actuator voltage: monitoring response time	On appearance	1 ms < T < 3 ms
	On disappearance	8 ms < T < 30 ms
Power consumption 3.3 V	Typical	125 mA
	Maximum	166 mA

24 V pre-actuator consumption (excluding load current)	Typical	46 mA
	Maximum	64 mA
Power dissipation		3.6 W max.
Dielectric strength	Output / ground or output / internal logic	1500 V actual, 50 / 60 Hz for 1 min
	Between channel groups	500 VDC
Resistance of insulation		>10 MΩ (below 500 VDC)
Temperature derating *(see Premium and Atrium using Unity Pro, Discrete I/O modules, User manual)*		None

(1) All outputs are equipped with fast demagnetization circuits for electromagnet. Electromagnet discharge time < L/R.
(2) Provide a fuse to the +24 V pre-actuator supply

Fuses

Internal	None
External	1 fast blow fuse of 2 A for each 16-channel group

⚠ CAUTION

LOSS OF INPUT FUNCTION

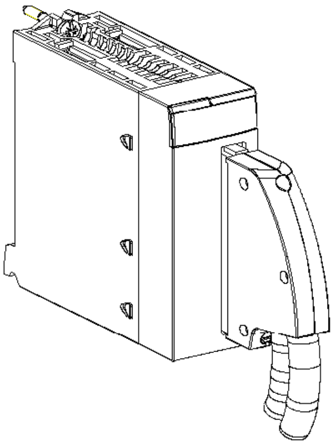
Install the correct rating and type of fuse.

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

Connecting the Module

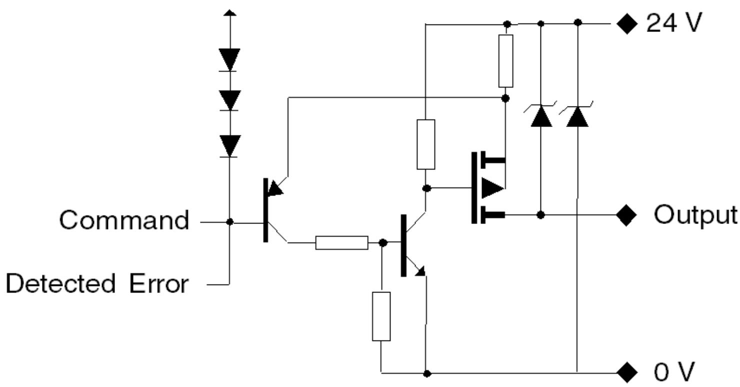
At a Glance

The BMX DDO 3202 K module is fitted with a 40-pin connector for the connection of thirty-two output channels.



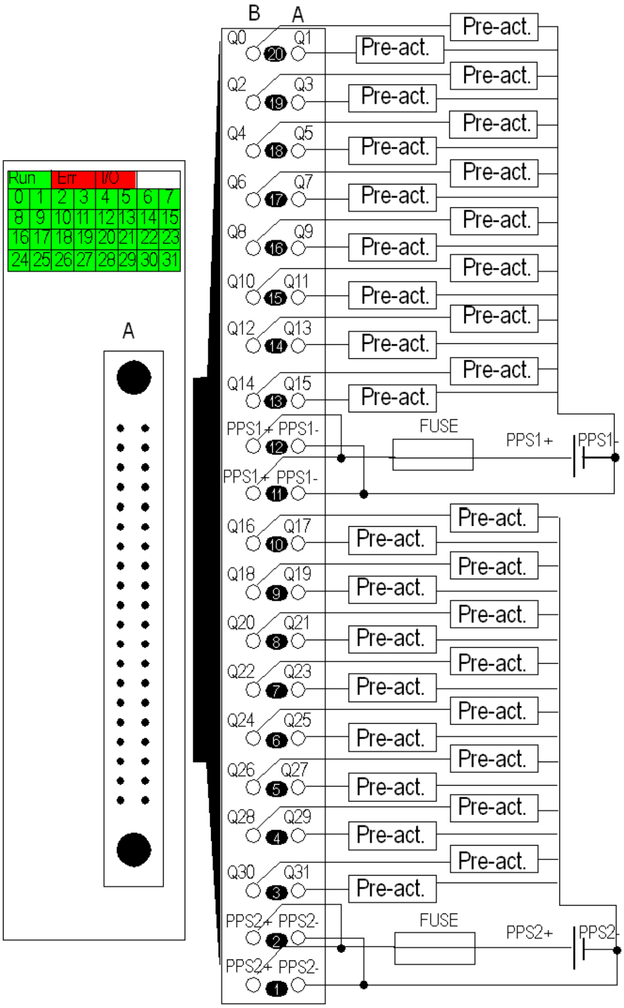
Output Circuit Diagram

The following diagram shows the circuit of a direct current output (positive logic).



Module Connection

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



power supply: 24 VDC
fuse: fast blow fuse of 2 A for each 16-channel group
pre-act: pre-actuator
PPS: pre-actuator power supply

Chapter 20
BMX DDO 6402 K Static Output Modules

Subject of this Section

This section presents the BMX DDO 6402 K module, its characteristics, and explains how it is connected to the pre-actuators.

What Is in This Chapter?

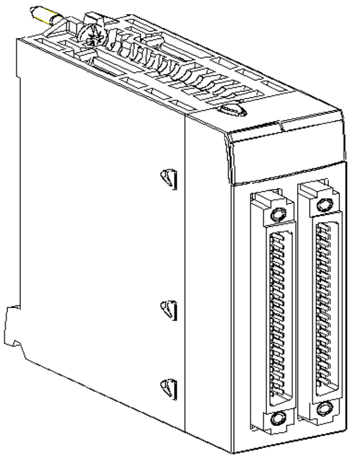
This chapter contains the following topics:

Introduction

Function

The BMX DDO 6402 K module is a 24 VDC discrete module connected via two 40-pin connectors. It is a positive logic (or source) module: its 64 output channels provide current to the pre-actuators.

Illustration



Characteristics

General Characteristics

This table presents the general characteristics for the **BMX DDO 6402 K** module.

BMX DDO 6402 K module.		24 VDC positive logic static outputs
Nominal values	Voltage	24 VDC
	Current	0.1 A
Threshold values	Voltage (including ripple)	19..30 V (34 V possible for 1 hour/day)
	Current/channel	0.125 A
	Current/module	6.4 A
Power of tungsten filament lamp	Maximum	1.2 W
Leakage current	At 0	100 μA for U = 30 V
Voltage drop	At 1	< 1.5 V for I = 0.1 A
Load impedance	Minimum	220 Ω
Response time (1)		1.2 ms
Max. overload time before internal damage		15 ms
Reliability	MTBF for continuos operation in hours at ambient temperature (30° C) (86° F)	159 924
Frequency of switching to inductive load		$0.5 / LI^2$ Hz
Paralleling of outputs		Yes (maximum of 3)
Compatibility with IEC 1131-2 DC direct inputs		Yes (type 3 and not IEC)
Built-in protection	Against overvoltage	Yes, by Transil diode
	Against inversions	Yes, by inverted diode (2)
	Against short-circuits and overloads	Yes, by current limiter and electric circuit-breaker 0.125 A < Id < 0.185 A
Pre-actuator voltage: monitoring threshold	OK	> 18 V
	Error	< 14 V
Pre-actuator voltage: monitoring response time	On appearance	8 ms < T < 30 ms
	On disappearance	1 ms < T < 3 ms
Power consumption 3.3 V	Typical	160 mA
	Maximum	226 mA

24 V pre-actuator consumption (excluding load current)	Typical	92 mA
	Maximum	127 mA
Power dissipation		6.85 W max.
Dielectric strength	Output / ground or output / internal logic	1500 V actual, 50 / 60 Hz for 1 min
	Between channel groups	500 VDC
Resistance of insulation		>10 MΩ (below 500 VDC)
Temperature derating *(see Premium and Atrium using Unity Pro, Discrete I/O modules, User manual)*		Apply the temperature derating curve *(see page 26)*

(1) All outputs are equipped with fast demagnetization circuits for electromagnet. Electromagnet discharge time < L/R.
(2) provide a 2 A fuse to the +24 V pre-actuator supply

Fuses

Internal	None
External	1 fast blow fuse of 2 A for each 16-channel group

CAUTION

LOSS OF INPUT FUNCTION

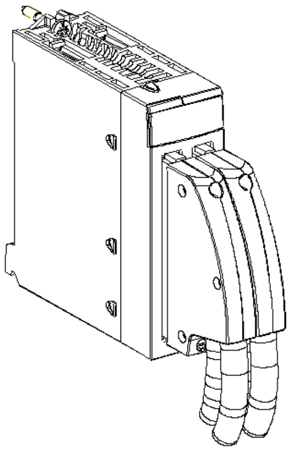
Install the correct rating and type of fuse.

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

Connecting the Module

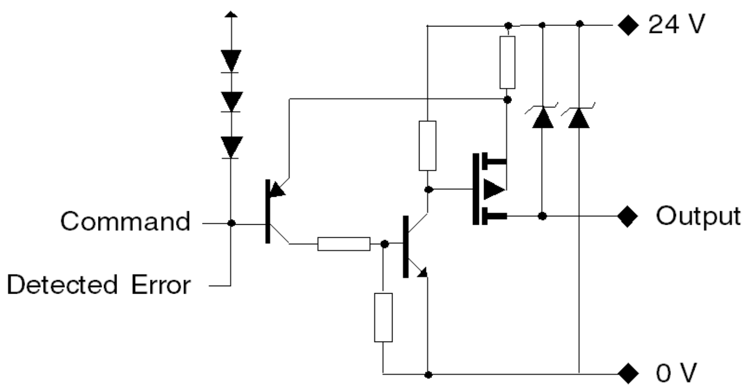
At a Glance

The BMX DDO 6402 K module is fitted with two 40-pin connectors for the connection of sixty-four output channels.



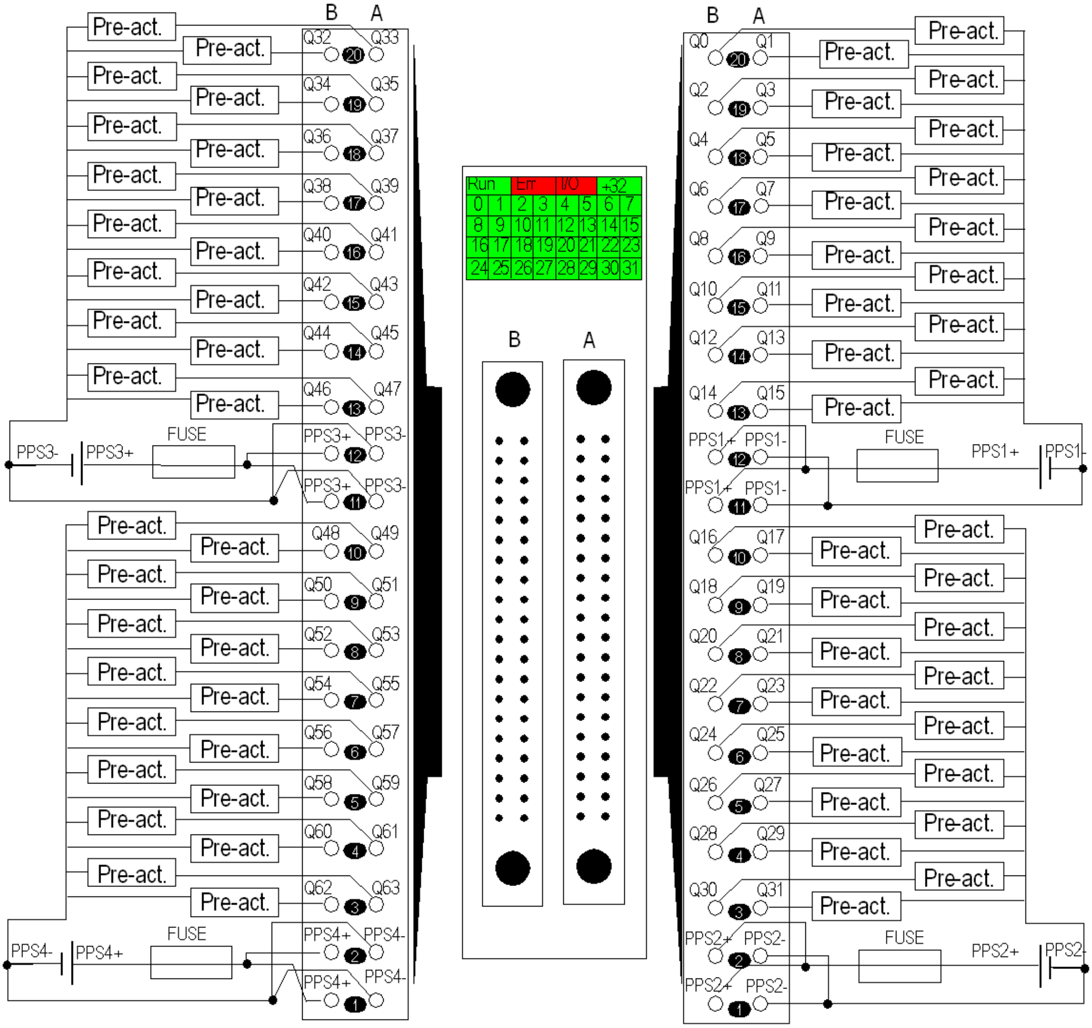
Output Circuit Diagram

The following diagram shows the circuit of a direct current output (positive logic).



Module Connection

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



power supply: 24 VDC
fuse: fast blow fuse of 2 A for each 16-channel group
pre-act: pre-actuator
PPS: pre-actuator power supply

Chapter 21
BMX DAO 1605 Triac Output Modules

Subject of this Section

This section presents the BMX DAO 1605 module, its characteristics, and explains how it is connected to the pre-actuators.

What Is in This Chapter?

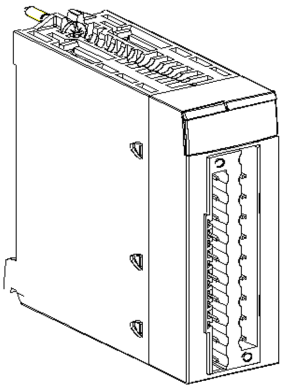
This chapter contains the following topics:

Introduction

Function

The BMX DAO 1605 module is a 100...240 VAC discrete module connected via a 20-pin terminal block. Its 16 triac output channels operate on alternating current.

Illustration



Characteristics

General Characteristics

This table presents the general characteristics for the **BMX DAO 1605** and BMX DAO 1605H *(see page 28)* modules:

BMX DAO 1605 Module		100...240 VAC triac outputs
Nominal values	**Voltage**	100...240 VAC
	Current	0.6 A / points
Threshold values	**Voltage**	100 mA at 24 VAC 25 mA at 100...240 VAC
	Current/channel	0.6 A
	Current/module	2.4 A max/common (4.8 A max for all commons)
Maximum inrush current		20 A / cycle or less
Leakage current	**At state 0**	≤3 mA (for 240 VAC, 60 Hz) ≤1.5 mA (for 120 VAC, 60 Hz)
Residual voltage	**At state 1**	≤1.5 mA
Response time		1 ms + 1/(2xF)
Built-in protection	**Against inductive over voltage in AC modes**	None. Fit an RC circuit or a ZNO type over voltage limiter in parallel on each output appropriate to the voltage in use
	Against inductive over voltage	None. Fit a discharge diode on each output.
	against short-circuits and overloads	None. Fit a fast-blow fuse on each channel or channel group.
Command type		Zero crossing
Output protection		no protection
Dielectric maximum Voltage		2 830 VAC rms/3 cycles (Altitude: 2 000 m = 6 557.38 ft)
Insulation Resistance		≥ 10 MΩ (by insulation resistance meter)
Noise immunity		By noise simulator of noise voltage, 1 µs noise width and 1 500 Vp-p 25...60 Hz noise frequency
Power consumption 3.3 V	Typical	79 mA
	Maximum	111 mA
Temperature derating for BMX DAO 1605		Apply the temperature derating curve *(see page 26)*

NOTE: The characteristics in this table apply to the **BMX DAO 1605H** in the temperature range -25...60° C (-13...140° F). At 70° C (158° F), the maximum threshold current must not exceed 0.24 A per channel and the maximum module current must not exceed 1.9 A.

Fuses

Internal	None
External	1 fast blow fuse of 3 A for each 4-channel group

CAUTION

LOSS OF OUTPUT FUNCTION

Install the correct rating and type of fuse.

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

DANGER

HAZARD OF ELECTRICAL SHOCK, EXPLOSION OR ARC FLASH

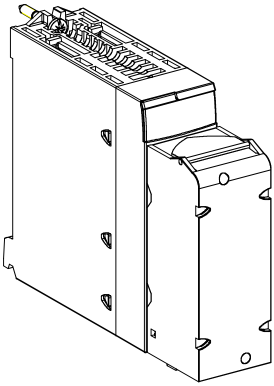
Switch off the sensor and pre-actuator voltage before connecting or disconnecting the module.

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

Connecting the Module

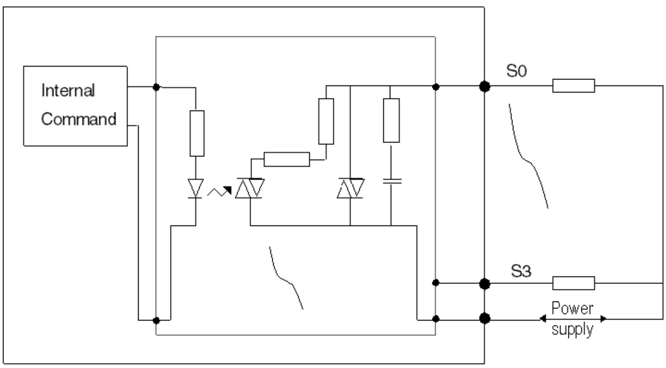
At a Glance

The BMX DAO 1605 module is fitted with a removable 20-pin terminal block for the connection of sixteen triac output channels.



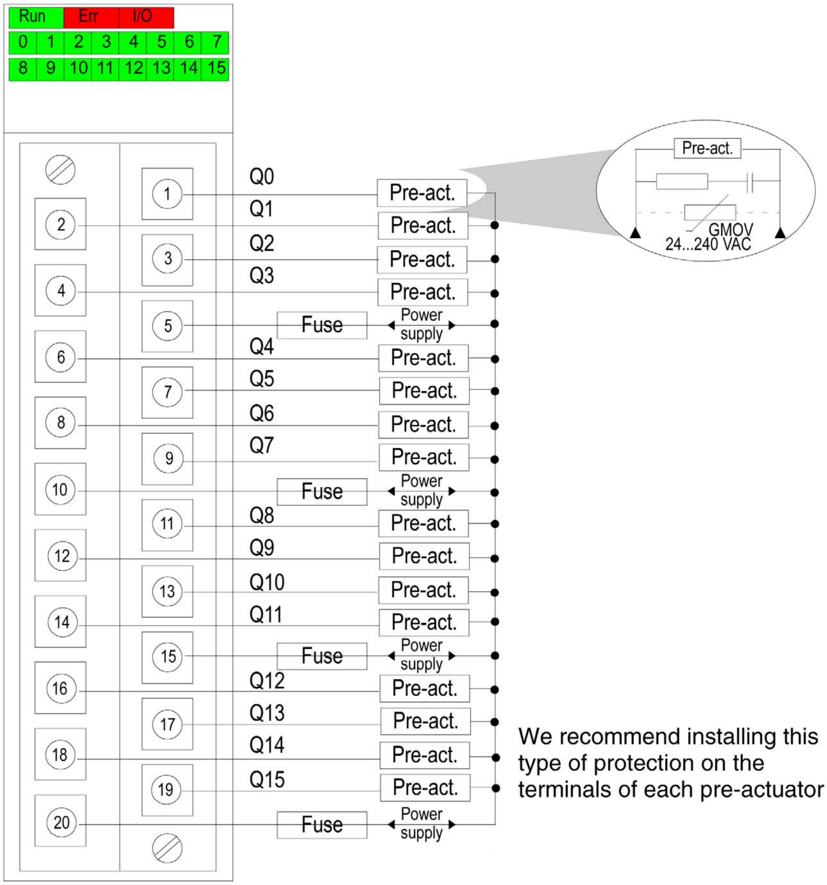
Output Circuit Diagram

The following diagram shows the circuit of a alternating current triac output.



Module Connection

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



power supply: 100...240 VAC
fuse: 1 fast blow fuse of 3 A for each 4-channel group

Chapter 22
BMX DDM 16022 Mixed Static Input/Output Module

Subject of this Section

This section presents the BMX DDM 16022 module, its characteristics, and explains how it is connected to the sensors and pre-actuators.

What Is in This Chapter?

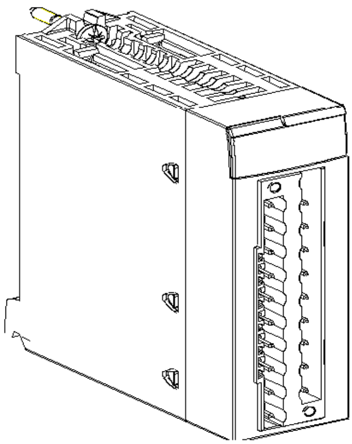
This chapter contains the following topics:

Introduction

Function

The BMX DDM 16022 module is a 24 VDC discrete module connected via a 20-pin terminal block. It is a positive logic module: its 8 input channels receive current from the sensors (sink) and its 8 output channels provide current to the pre-actuators (source).

Illustration



Characteristics

General Input Characteristics

The following table shows the general characteristics of the **BMX DDM 16022** and BMX DDM 16022H *(see page 28)* module inputs:

BMX DDM 16022 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 for U ≥ 11 V
	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/day)
Input impedance	At nominal U		6.8 kΩ
Response time	Typical		4ms
	Maximum		7ms
IEC 1131-2 compliance			Type 3
Reverse polarity			Protected
2-wire / 3-wire proximity sensor compatibility *(see Premium and Atrium using Unity Pro, Discrete I/O modules, User manual)*			IEC 947-5-2
Reliability	MTBF for continuos operation in hours at ambient temperature (30° C) (86° F)		427 772
Dielectric strength	Primary/secondary		1500 V actual, 50 / 60 Hz for 1 min.
	Between input/output groups		500 VCC
Resistance of insulation			>10 MΩ (below 500 VDC)
Type of input			Current sink
Paralleling of inputs			No
Sensor voltage: monitoring threshold	OK		> 18 V
	Error		< 14 V

Sensor voltage: monitoring response time at 24 V (-15% ... +20%)	On appearance	8 ms < T < 30 ms
	On disappearance	1 ms < T < 3 ms
Power consumption 3.3 V	Typical	79 mA
	Maximum	111 mA
24 V pre-actuator consumption (excluding load current)	Typical	59 mA
	Maximum	67 mA
Power dissipation		3.7 W max.
Temperature derating *(see Premium and Atrium using Unity Pro, Discrete I/O modules, User manual)* for BMX DDM 16022		None

NOTE: These characteristics are available also for the **BMX DDM 16022H** in the temperature range -25..60° C (-13...140° F). At +70° C (158° F), the maximum voltage value of input Sensor supply must not exceed 26.4 V.

⚠ WARNING

LOSS OF INPUT FUNCTION

Do not operate the **BMX DDM 16022H** at 70° C (158° F) if the sensor power supply is greater than 29.0 V or less than 21.1 V. Overheating the module can cause the loss of the input function.

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

Input Fuses

Internal	None
External	1 fast blow fuse of 0.5 A for the input group

⚠ CAUTION

LOSS OF INPUT FUNCTION

Install the correct rating and type of fuse.

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

General Output Characteristics

The following table shows the general characteristics of the **BMX DDM 16022** and BMX DDM 16022H *(see page 28)* module outputs.

BMX DDM 16022 Module		24 VDC positive logic static outputs
Nominal values	Voltage	24 VDC
	Current	0.5 A
Threshold values	Voltage (including ripple)	19...30 V (34 V possible for 1 hour/day)
	Current/channel	0.625 A
	Current/module	5 A
Power of tungsten filament lamp	Maximum	6 W
Leakage current	At 0	< 0.5 mA
Voltage drop	At 1	< 1.2 V
Load impedance	Minimum	48 Ω
Response time (1)		1.2 ms
Max. overload time before internal damage		15 ms
Reliability	MTBF for continuos operation in hours at ambient temperature (30° C) (86° F)	427 772
Frequency of switching to inductive load		$0.5 / LI^2$ Hz
Paralleling of outputs		Yes (maximum of 2)
Compatibility with IEC 1131-2 DC direct inputs		Yes (type 3 and not IEC)
Built-in protection	Against over voltage	Yes, by Transil diode
	Against inversions	Yes, by inverted diode (2)
	Against short-circuits and overloads	Yes, by current limiter and electric circuit-breaker 1.5 In < Id < 2 In
Pre-actuator voltage: monitoring threshold	OK	> 18 V
	Error	< 14 V
Pre-actuator voltage: monitoring response time at 24 V (-15% ... +20%)	On appearance	8 ms < T < 30 ms
	On disappearance	1 ms < T < 3 ms
Power consumption 3.3 V	Typical	79 mA
	Maximum	111 mA
24 V pre-actuator consumption (excluding load current)	Typical	59 mA
	Maximum	67 mA
Power dissipation		3.7 W max.

Dielectric strength	Output / ground or output / internal logic	1500 V actual, 50 / 60 Hz for 1 min.
Resistance of insulation		>10 MΩ (below 500 VDC)
Temperature derating *(see Premium and Atrium using Unity Pro, Discrete I/O modules, User manual)* for BMX DDM 16022		None

(1) All outputs are equipped with fast demagnetization circuits for electromagnets. Electromagnet discharge time < L/R.
(2) Provide a 2 A fuse to the +24 V pre-actuator supply

NOTE: The characteristics in this table also apply to the **BMX DDM 16022H** in the temperature range -25...60° C (-13...140° F).
At 70° C (140° F):
- The maximum voltage of the pre-actuator power supply must not exceed 26.4 V.
- The maximum output current must not exceed 0.55 A.

⚠ WARNING

LOSS OF OUTPUT FUNCTION

Do not operate the **BMX DDM 16022H** at 70° C (158° F) if the pre-actuator power supply is greater than 29.0 V or less than 21.1 V. Overheating the module can cause the loss of the output function.

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

Output Fuses

Internal	None
External	1 fast blow fuse of 6.3 A for the output group

⚠ CAUTION

LOSS OF OUTPUT FUNCTION

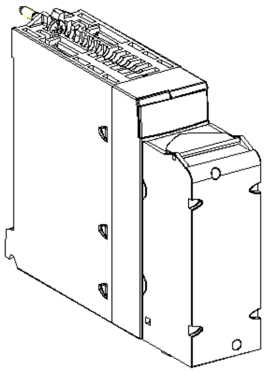
Install the correct rating and type of fuse.

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

Connecting the Module

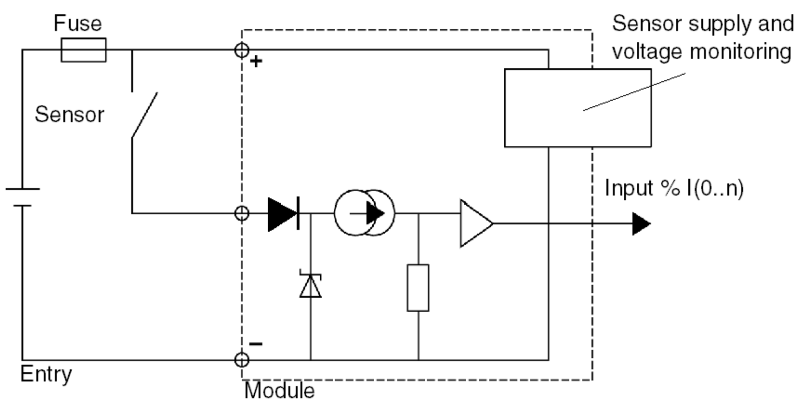
At a Glance

The BMX DDM 16022 module is fitted with a removable 20-pin terminal block for the connection of eight input channels and eight output channels.



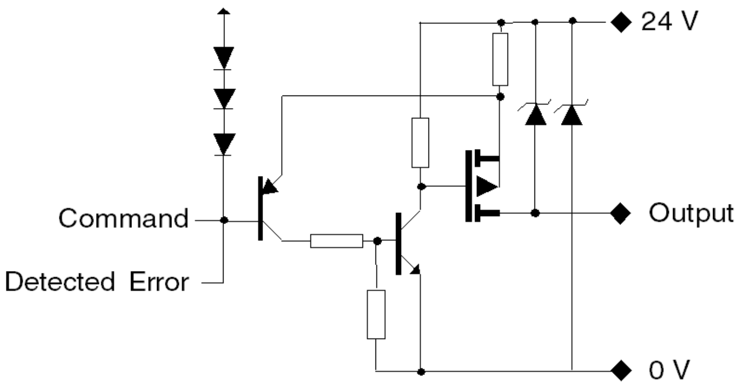
Input Circuit Diagram

The following diagram shows the circuit of a direct current input (positive logic).



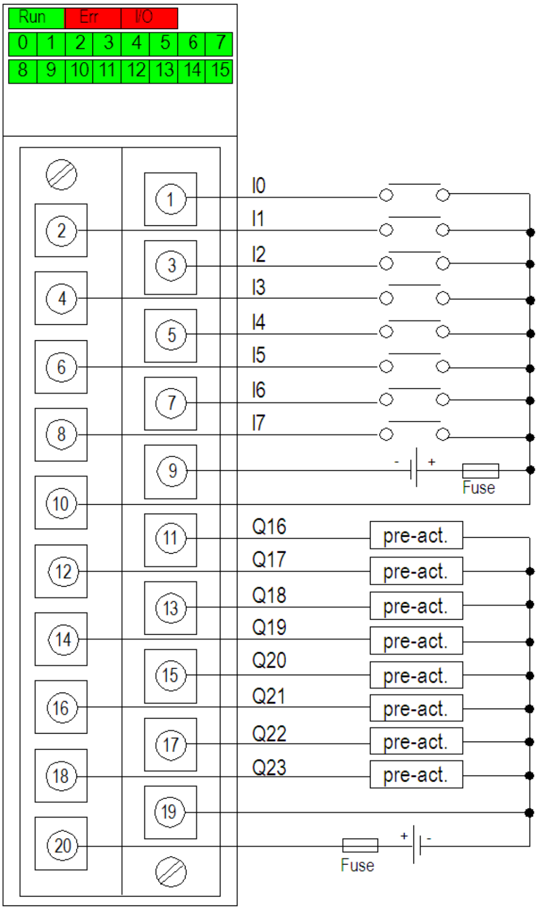
Output Circuit Diagram

The following diagram shows the circuit of a direct current output (positive logic).



Module Connection

The following diagram shows the connection of the module to the sensors and pre-actuators.



power supply: 24 VDC
input fuse: fast blow fuse of 0.5 A
output fuse: fast blow fuse of 6.3 A
pre-act: pre-actuator

Chapter 23
BMX DDM 16025 Mixed Relay Input/Output module

Subject of this Section

This section presents the BMX DDM 16025 module, its characteristics, and explains how it is connected to the sensors and pre-actuators.

What Is in This Chapter?

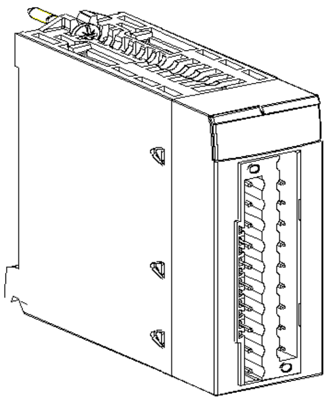
This chapter contains the following topics:

Introduction

Function

The BMX DDM 16025 module is a 24 VDC discrete module connected via a 20-pin terminal block. It is a positive logic module: its 8 input channels receive current from the sensors (sink). The 8 isolated relay outputs operate either on direct current (24 VDC) or alternating current (24...240 VAC).

Illustration



Characteristics

General Input Characteristics

The following table shows the general characteristics of the **BMX DDM 16025** and BMX DDM 16025H *(see page 28)* module inputs:

<table>
<tr><td colspan="3">BMX DDM 16025 Module</td><td>Eight 24 VDC positive logic inputs</td></tr>
<tr><td colspan="2" rowspan="2">Nominal input values</td><td>Voltage</td><td>24 VDC</td></tr>
<tr><td>Current</td><td>3.5 mA</td></tr>
<tr><td rowspan="5">Threshold input values</td><td rowspan="2">At 1</td><td>Voltage</td><td>≥ 11 V</td></tr>
<tr><td>Current</td><td>≥ 2 mA for U ≥ 11 V</td></tr>
<tr><td rowspan="2">At 0</td><td>Voltage</td><td>5 V</td></tr>
<tr><td>Current</td><td>< 1.5 mA</td></tr>
<tr><td colspan="2">Sensor supply (including ripple)</td><td>19...30 V (possibly up to 34 V, limited to 1 hour/day)</td></tr>
<tr><td>Input impedance</td><td colspan="2">At nominal U</td><td>6.8 kΩ</td></tr>
<tr><td rowspan="2">Response time</td><td colspan="2">Typical</td><td>4 ms</td></tr>
<tr><td colspan="2">Maximum</td><td>7 ms</td></tr>
<tr><td colspan="3">IEC 1131-2 compliance</td><td>Type 3</td></tr>
<tr><td colspan="3">Reverse polarity</td><td>Protected</td></tr>
<tr><td colspan="3">2-wire / 3-wire proximity sensor compatibility (see Premium and Atrium using Unity Pro, Discrete I/O modules, User manual)</td><td>IEC 947-5-2</td></tr>
<tr><td>Reliability</td><td colspan="2">MTBF for continuous operation in hours at ambient temperature (30° C) (86° F)</td><td>835 303</td></tr>
<tr><td rowspan="2">Dielectric strength</td><td colspan="2">Primary/secondary</td><td>1500 V actual, 50 / 60 Hz for 1 min.</td></tr>
<tr><td colspan="2">Between input/output groups</td><td>500 VDC</td></tr>
<tr><td colspan="3">Resistance of insulation</td><td>>10 MΩ (below 500 VDC)</td></tr>
<tr><td colspan="3">Type of input</td><td>Current sink</td></tr>
<tr><td colspan="3">Paralleling of inputs</td><td>No</td></tr>
<tr><td rowspan="2">Sensor voltage: monitoring threshold</td><td colspan="2">OK</td><td>> 18 V</td></tr>
<tr><td colspan="2">Error</td><td>< 14 V</td></tr>
</table>

Sensor voltage: monitoring response time at 24V (-15% ... +20%)	On appearance	8 ms < T < 30 ms
	On disappearance	1 ms < T < 3 ms
Power consumption 3.3 V	Typical	35 mA
	Maximum	50 mA
24 V pre-actuator consumption (excluding load current)	Typical	79 mA
	Maximum	111 mA
Power dissipation		3.1 W max.
Temperature derating *(see Premium and Atrium using Unity Pro, Discrete I/O modules, User manual)* for BMX DDM 16025		None

NOTE: For the **BMX DDM 16025H**, at 70° C (158° F) the maximum pre-actuator power supply must not exceed 26.4 V.

⚠ WARNING

LOSS OF INPUT FUNCTION

Do not operate the **BMX DDI 16025H** at 70° C (158° F) if the sensor power supply is greater than 29.0 V or less than 21.1 V. Overheating the module can cause the loss of the input function.

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

Input Fuses

Internal	None
External	1 fast blow fuse of 0.5 A for the input group

⚠ CAUTION

LOSS OF INPUT FUNCTION

Install the correct rating and type of fuse.

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

General Output Characteristics

The following table shows the general characteristics of the **BMX DDM 16025** and BMX DDM 16025H *(see page 28)* module outputs:

BMX DDM 16025 Module		Eight 24 VDC/24-240 VAC relay outputs
Nominal values	Switching direct voltage	24 VDC resistive load
	Switching direct current	2 A resistive load
	Switching alternating voltage	220 VAC, Cos $\Phi = 1$
	Switching alternating current	2 A, Cos $\Phi = 1$
Minimum switching load	Voltage / Current	5 VDC / 1 mA.
Maximum switching load	Voltage	264 VAC / 125 VDC
On-line module change		Possibility
Response time	Activation	≤8 ms
	Deactivation	≤10 ms
Mechanical service life	Number of switching	20 million or more
Reliability	MTBF for continuous operation in hours at ambient temperature (30° C) (86° F)	835 303
Max. switching frequency	Cycles per hour	3 600
Electrical service life		Switching voltage / current
		200 VAC / 1.5 A, 240 VAC / 1 A, Cos $\Phi = 0.7$ (1)
		200 VAC / 0.4 A, 240 VAC / 0.3 A, Cos $\Phi = 0.7$ (2)
		200 VAC / 1 A, 240 VAC / 0.5 A, Cos $\Phi = 0.35$ (1)
		200 VAC / 0.3 A, 240 VAC / 0.15 A, Cos $\Phi = 0.35$ (2)
		200 VAC / 1.5 A, 240 VAC / 1 A, Cos $\Phi = 0.7$ (1)
		200 VAC / 0.4 A, 240 VAC / 0.3 A, Cos $\Phi = 0.7$ (2)
Noise immunity		In noise simulation, 1500 V actual, width 1s and 25 to 60 Hz
Power consumption 3.3 V	Typical	79 mA
	Maximum	111 mA

24 V pre-actuator consumption	Typical	36 mA
	Maximum	58 mA
Power dissipation		3.1 W max.
Dielectric strength	Max. voltage	2830 VAC rms / cycles
Resistance of insulation		10 MΩ
Temperature derating *(see Premium and Atrium using Unity Pro, Discrete I/O modules, User manual)* for BMX DDM 16025		None

(1) 1 x 10^5 cycles
(2) 3 x 10^5 cycles

NOTE: For the **BMX DDM 16025H**, at 70° C (158° F) the maximum pre-actuator power supply must not exceed 24 VA.

⚠ WARNING

LOSS OF OUTPUT FUNCTION

Do not operate the **BMX DDI 16025H** at 70° C (158° F) if the pre-actuator power supply is greater than 28.8 V or less than 19.2 V. Overheating the module can cause the loss of the input function.

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

Output Fuses

Internal	None
External	1 fast blow fuse of 12 A for the output group

⚠ CAUTION

LOSS OF INPUT FUNCTION

Install the correct rating and type of fuse.

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

⚠ ⚠ DANGER

HAZARD OF ELECTRICAL SHOCK, EXPLOSION OR ARC FLASH

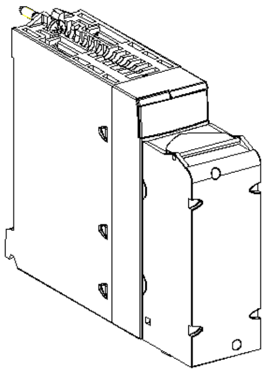
Switch off the sensor and pre-actuator voltages before connecting or disconnecting the module.

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

Connecting the Module

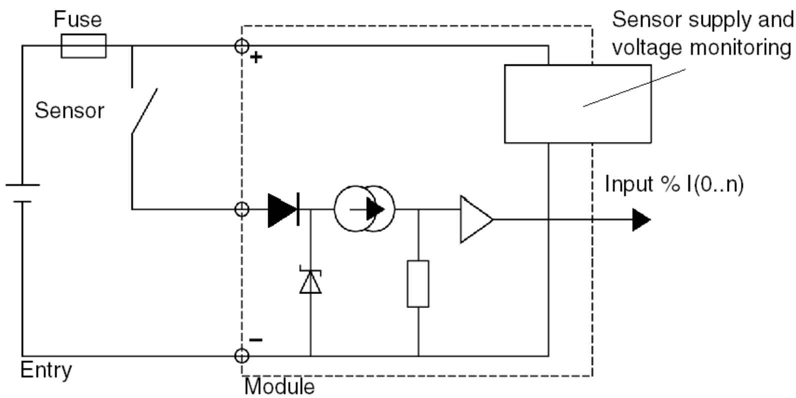
At a Glance

The BMX DDM 16025 module is fitted with a removable 20-pin terminal block for the connection of eight input channels and eight isolated relay output channels.



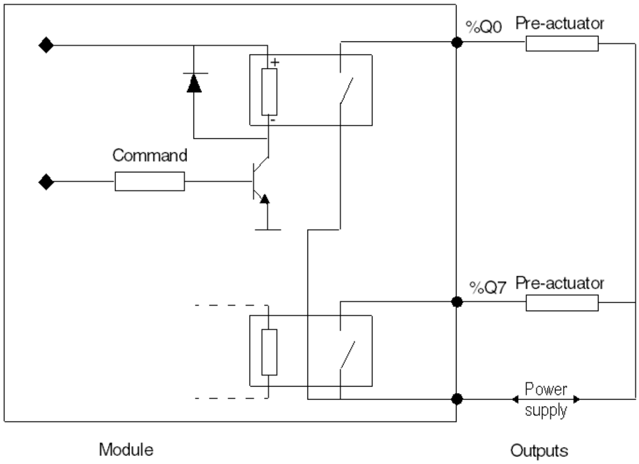
Input Circuit Diagram

The following diagram shows the circuit of a direct current input (positive logic).



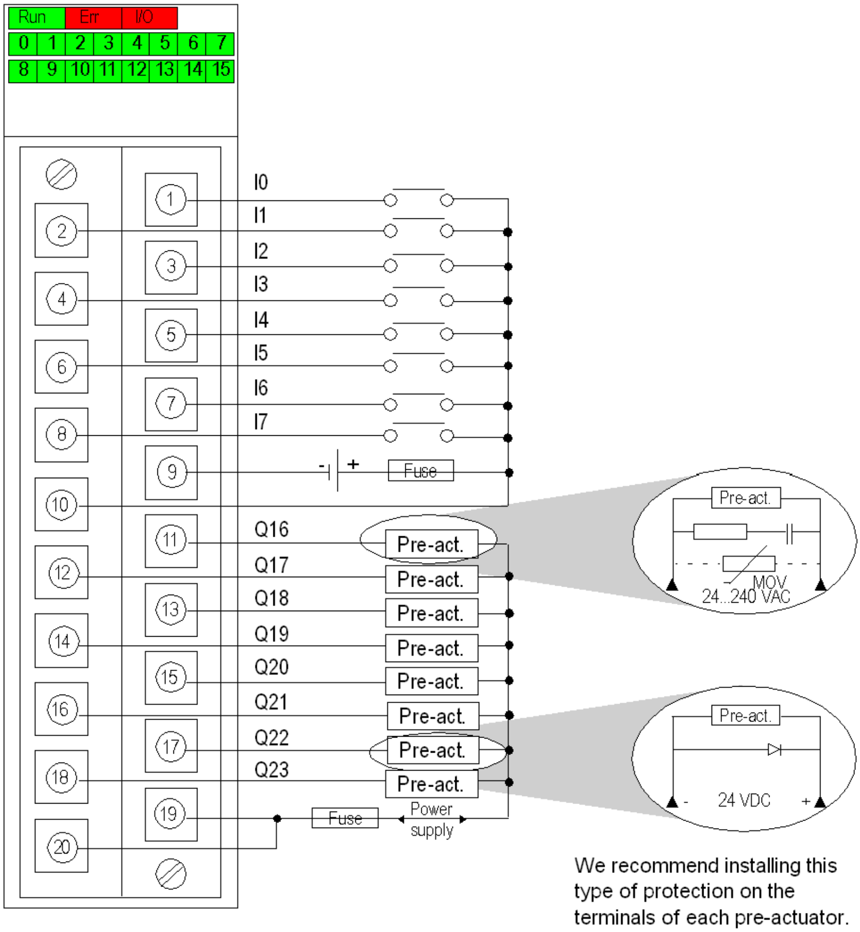
Output Circuit Diagram

The following diagram shows the circuit of relay outputs.



Module Connection

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



input power supply: 24 VDC
output power supply: 24 VDC or 24...240 VAC
input fuse: 1 fast blow fuse of 0.5 A
output fuse: 1 fast blow fuse of 12 A
pre-act: pre-actuator

Chapter 24
BMX DDM 3202 K Mixed Static Input/Output Module

Subject of this Section

This section presents the BMX DDM 3202 K module, its characteristics, and explains how it is connected to the sensors and pre-actuators.

What Is in This Chapter?

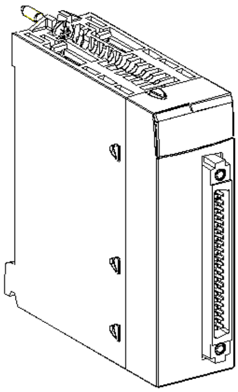
This chapter contains the following topics:

Introduction

Function

The BMX DDM 3202 K module is a 24 VDC discrete module connected via a 40-pin connector. It is a positive logic module: its 16 input channels receive current from the sensors (sink) and its 16 output channels provide current to the pre-actuators (source).

Illustration



Characteristics

General Input Characteristics

The following table shows the general characteristics of the **BMX DDM 3202 K** module inputs:

BMX DDM 3202 K module.			24 VDC positive logic inputs
Nominal input values		Voltage	24 VDC
		Current	2.5 mA
Threshold input values	At 1	Voltage	≥ 11 V
		Current	≥ 2 mA for U ≥ 11 V
	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/day)
Input impedance	At nominal U		9.6 kΩ
Response time	Typical		4ms
	Maximum		7ms
IEC 1131-2 compliance			Type 3
Reverse polarity			Protected
2-wire / 3-wire proximity sensor compatibility *(see Premium and Atrium using Unity Pro, Discrete I/O modules, User manual)*			IEC 947-5-2
Reliability	MTBF for continuos operation in hours at ambient temperature (30° C) (86° F)		650 614
Dielectric strength	Primary/secondary		1500 V actual, 50 / 60 Hz for 1 min.
	Between input/output groups		500 VDC
Resistance of insulation			>10 MΩ (below 500 VDC)
Type of input			Current sink
Paralleling of inputs			No
Sensor voltage: monitoring threshold	OK		> 18 V
	Error		< 14 V

Sensor voltage: monitoring response time at 24 V (-15% ... +20%)	On appearance	8 ms < T < 30 ms
	On disappearance	1 ms < T < 3 ms
Power consumption 3.3 V	Typical	125 mA
	Maximum	166 mA
24 V pre-actuator consumption (excluding load current)	Typical	69 mA
	Maximum	104 mA
Power dissipation		4 W max.
Temperature darting for BMX DDM 3202 K *(see Premium and Atrium using Unity Pro, Discrete I/O modules, User manual)*		None

Input Fuses

Internal	None
External	1 fast blow fuse of 0.5 A for the input group

⚠ CAUTION

LOSS OF INPUT FUNCTION

Install the correct rating and type of fuse.

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

General Output Characteristics

The following table shows the general characteristics of the **BMX DDM 3202 K** module outputs.

BMX DDM 3202 K module.		24 VDC positive logic static outputs
Nominal values	Voltage	24 VDC
	Current	0.1 A
Threshold values	Voltage (including ripple)	19..30 V (34 V possible for 1 hour/day)
	Current/channel	0.125 A
	Current/module	3.2 A
Power of tungsten filament lamp	Maximum	1.2 W
Leakage current	at 0	100 µA for U = 30 V
Voltage drop	at 1	< 1.5 V for I = 0.1 A

Load impedance	Minimum	220 Ω
Response time (1)		1.2 ms
Max. overload time before internal damage		15 ms
Reliability	MTBF for continuos operation in hours at ambient temperature (30° C) (86° F)	650 614
Frequency of switching to inductive load		0.5 / LI^2 Hz
Paralleling of outputs		Yes (maximum of 3)
Compatibility with IEC 1131-2 DC direct inputs		Yes (type 3 and not IEC)
Built-in protection	Against over voltage	Yes, by Transil diode
	Against inversions	Yes, by inverted diode (2)
	Against short-circuits and overloads	Yes, by current limiter and electric circuit-breaker 0.125 A < Id < 0.185 A
Pre-actuator voltage: monitoring threshold	OK	> 18 V
	Error	< 14 V
Pre-actuator voltage: monitoring response time at 24 V (-15% ... +20%)	On appearance	8 ms < T < 30 ms
	On disappearance	1 ms < T < 3 ms
Power consumption 3.3 V	Typical	125 mA
	Maximum	166 mA
24 V pre-actuator consumption (excluding load current)	Typical	69 mA
	Maximum	104 mA
Power dissipation		4 W max.
Dielectric strength	Output / ground or output / internal logic	1500 V actual, 50 / 60 Hz for 1 min.
Resistance of insulation		>10 MΩ (below 500 VDC)
Temperature derating *(see Premium and Atrium using Unity Pro, Discrete I/O modules, User manual)*		None

(1) All outputs are equipped with fast demagnetization circuits for electromagnet. Electromagnet discharge time < L/R.

(2) Provide a 2 A fuse to the +24 V pre-actuator supply

Output Fuses

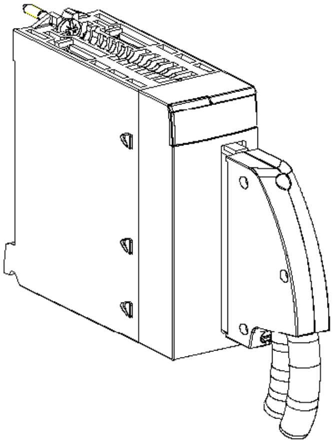
Internal	None
External	1 fast blow fuse of 2 A for the output group

⚠ CAUTION
LOSS OF INPUT FUNCTION Install the correct rating and type of fuse. **Failure to follow these instructions can result in injury or equipment damage.**

Connecting the Module

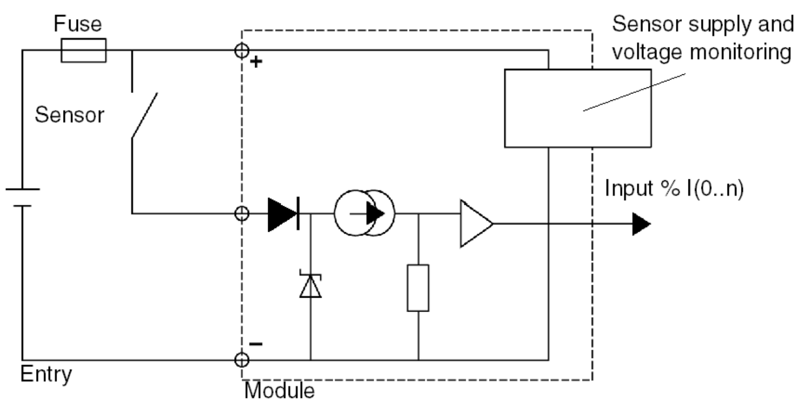
At a Glance

The BMX DDM 3202 K module is fitted with a 40-pin connector for the connection of sixteen input channels and sixteen output channels.



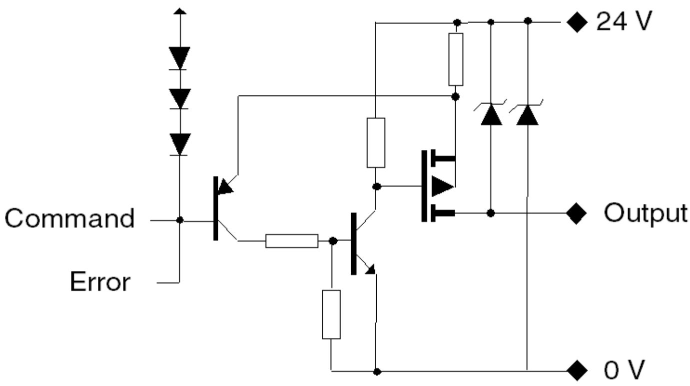
Input Circuit Diagram

The following diagram shows the circuit of a direct current input (positive logic).



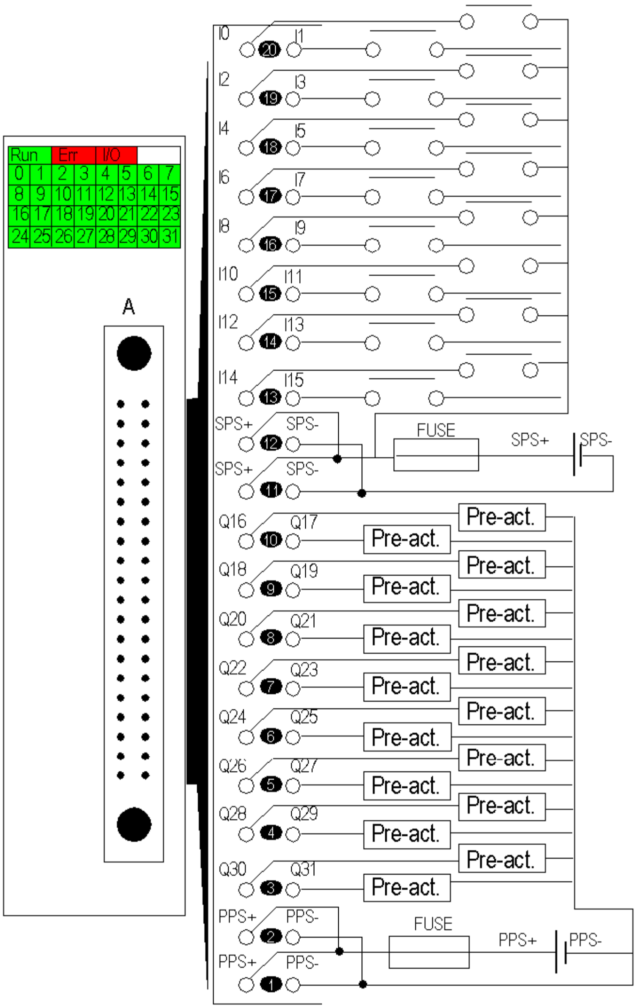
Output Circuit Diagram

The following diagram shows the circuit of a direct current output (positive logic).



Module Connection

The following diagram shows the connection of the module to the sensors and pre-actuators.



power supply: 24 VDC
input fuse: fast blow fuse of 0.5 A
output fuse: fast blow fuse of 2 A
pre-act: pre-actuator
SPS: sensor power supply
PPS: pre-actuator power supply

Chapter 25
TELEFAST 2 Connection Interface Links for the Discrete I/O Modules

Aim of this Chapter

This chapter describes the TELEFAST 2 interface links for the discrete input/output modules.

What Is in This Chapter?

This chapter contains the following sections:

Section 25.1
Introduction to the TELEFAST 2 Connection Interfaces for Discrete I/O

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 Is in This Section?

This section contains the following topics:

General Overview of TELEFAST 2 Connection Interfaces for Discrete I/O Modules

At a Glance

The TELEFAST 2 system is a group of products which enableS discrete input and output modules to be quickly connected to operational components. It replaces 20-pin terminal blocks, thus doing away with single wire connections.

The TELEFAST 2 system, which consists of connection bases for interfaces and connection cables, can only be connected to modules which are fitted with 40-pin connectors.

Several base types can be identified:

- connection interface bases for 8/12/16-channel discrete inputs/outputs
- bases for connection and adaptation interfaces for inputs with 16 isolated channels
- bases for connection and adaptation interfaces for static outputs with 8 and 16 channels
- bases for connection and adaptation interfaces relating to relay outputs with 8 and 16 channels
- bases for 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, with 16 channels
- input bases for 12.5-mm wide static relays

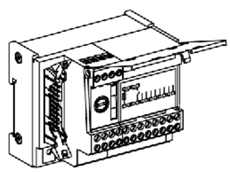
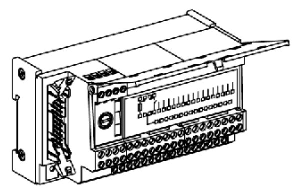
TELEFAST 2 Connection Bases Catalog

At a Glance

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

Catalog

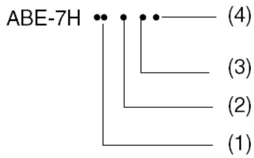
The table below shows the catalog of connection interface bases for 8/12/16-channel discrete I/Os.

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 8/12/16-channel discrete I/Os.**						
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

(1) for inputs
(2) for outputs

Illustration

The principle for identifying the connection interface bases for 8/12/16-channel discrete I/Os is as follows.



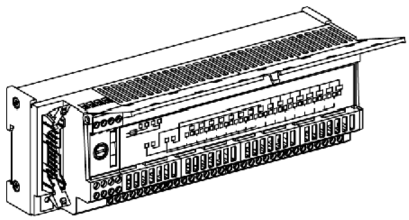
Description

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

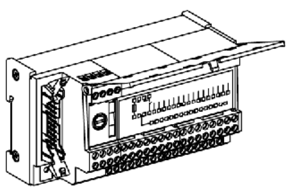
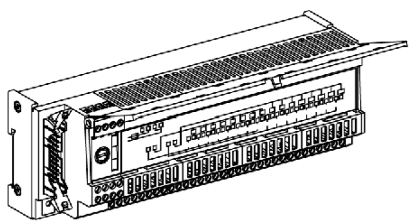
Number	Description
(1)	**08** = 8-channel base **12** = 12-channel base **16** = 16-channel base
(2)	Primary function: ● **R** = simple connection ● **S** = isolator/channel ● **F** = fuse/channel
(3)	**1** = with 1 screw terminal per channel on 1 level **2** = with 2 screw terminals per channel on 2 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 LED display per channel **odd number** = with LED display per channel

Catalog

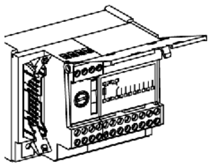
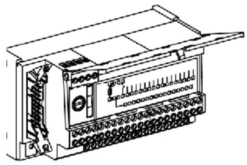
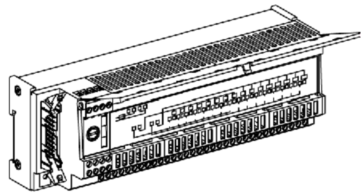
The table below shows the catalog of bases for connection and adaptation interfaces for inputs with 16 isolated channels.

ABE-7S•• reference	**16E2B1**	**16E2E1**	**16E2E0**	**16E2F0**	**16E2M0**
Base types	**Bases for connection and adaptation interfaces for inputs with 16 isolated channels.**				
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

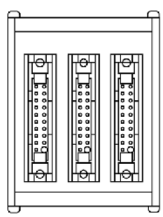
The table below shows the catalog of bases for connection and adaptation interfaces for static outputs with 8 and 16 channels.

ABE-7S•• reference	**08S2B0**	**08S2B1**	**16S2B0**	**16S2B2**
Base types	**Bases for connection and adaptation interfaces for static outputs with 8 and 16 channels.**			
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.

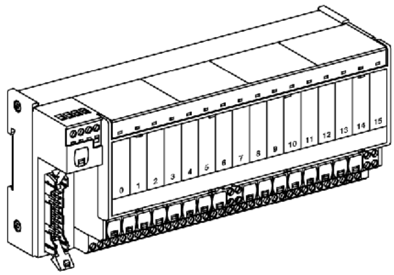
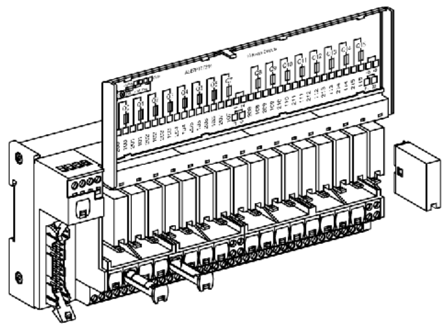
The table below shows the catalog of bases for connection and adaptation interfaces for relay outputs with 8 and 16 channels.

ABE-7R•• reference	**08S111**	**08S210**	**16S111**	**16S210**	**16S212**
Base types	**Bases for connection and adaptation interfaces for relay outputs with 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.

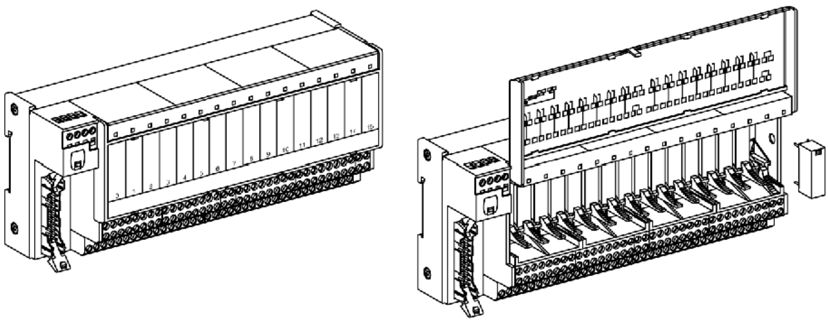
The table below displays the catalog entry showing the connection base for the adapter splitting 16 channels into 2 x 8 channels.

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

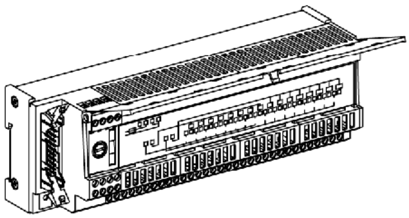
The table below shows the catalog of output adaptation interface bases with or without removable electromechanical or static relays with 16 channels.

ABE-7•• reference	**R16T210**	**P16T210**	**P16T214**	**R16T212**	**P16T212**	**P16T215**	**P16T318**
Base types	**Output adaptation interface bases with or without removable electromechanical or static relays with 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 10-mm wide electro-mechanical relay	10-mm wide relay not provided	10-mm wide relay not provided, 1 fuse/channel	with 10-mm wide electro-mechanical relay	10-mm wide relay not provided	10-mm 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 with 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 with 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 10-mm wide electro-mechanical relay	with 12.5-mm wide electro-mechanical relay	12.5-mm wide relay, not provided	12.5-mm wide relay, not provided, 1 fuse/ channel	with 10-mm wide electro-mechanical relay	12.5-mm wide electro-mechanical relay	12.5-mm wide relay, not provided	12.5-mm wide electro-mechanical 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 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.

	BMX DDI 3202 K **BMX DDM 3202 K**	**BMX DDI 6402 K**	**BMX DDO 3202 K** **BMX DDM 3202 K**	**BMX DDO 6402 K**
	1 connector	**2 connectors**	**1 connector**	**2 connectors**
Connection bases				
8 channels				
ABE-7H08R••	X (1)	X (1)	X (1)	X (1)
ABE-7H08S21	X (1)	X (1)	X (1)	X (1)
12 channels				
ABE-7H12R••	-	-	-	-
ABE-7H12S21	-	-	-	-
16 channels				
ABE-7H16R••	X	X	X	X
ABE-7H16S21	X	X	X	X
ABE-7H16R23	X	X	-	-
ABE-7H16F43	-	-	X	X
ABE-7H16S43	X	X	-	-
Input adapter connection bases				
16 channels				
ABE-7S16E2••	X	X	-	-
ABE-7P16F3••	X	X	-	-
Output adapter connection bases				
8 channels				
ABE-7S08S2••	-	-	X (1)	X (1)
ABE-7R08S•••	-	-	X (1)	X (1)

	BMX DDI 3202 K **BMX DDM 3202 K**	**BMX DDI 6402 K**	**BMX DDO 3202 K** **BMX DDM 3202 K**	**BMX DDO 6402 K**
	1 connector	**2 connectors**	**1 connector**	**2 connectors**
16 channels				
ABE-7R16S•••	-	-	X	X
ABE-7R16T•••	-	-	X	X
ABE-7P16T•••	-	-	X	X
(1) with 16 to 2 x 8 channel adapter ABE-7ACC02				

X compatible
- non-compatible

Section 25.2
Connection Principles for the TELEFAST 2 Interfaces for Discrete I/O

Aim of this section

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

What Is in This Section?

This section contains the following topics:

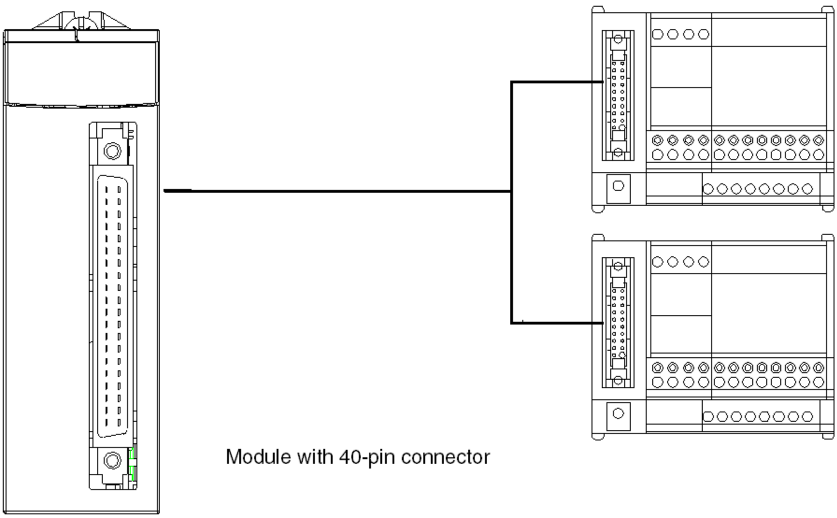
Connecting a Discrete Input/Output Module to a TELEFAST 2 Base Interface

At a Glance

A discrete input/output module with a 40-pin connector can be connected to the TELEFAST 2 connection base with a connection cable *(see Premium and Atrium using Unity Pro, Discrete I/O modules, User manual)*.

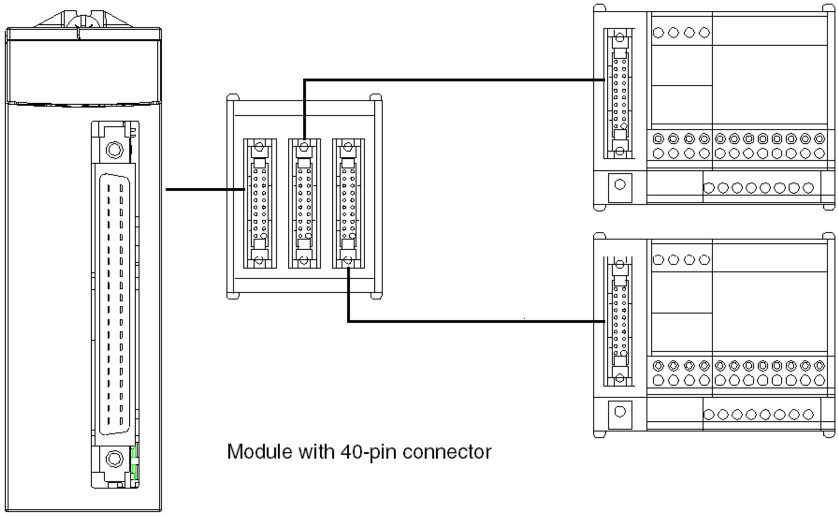
Illustration

The following diagram shows the connection of a discrete input/output module with a 40-pin connector to a **TELEFAST 2** connection base.



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.



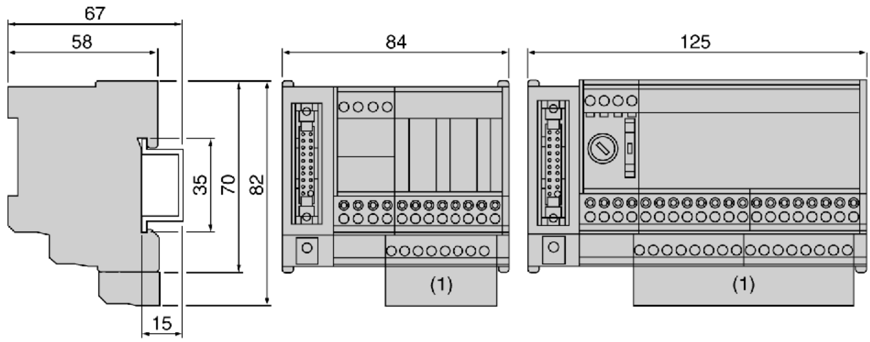
Dimensions and Mounting of the TELEFAST 2 Connection Bases

At a Glance

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

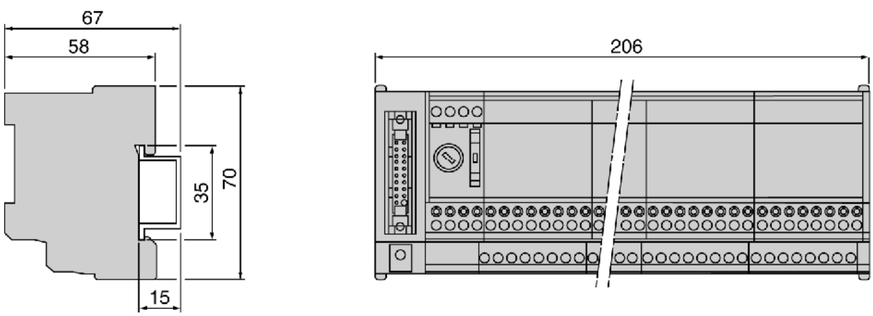
Illustration

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

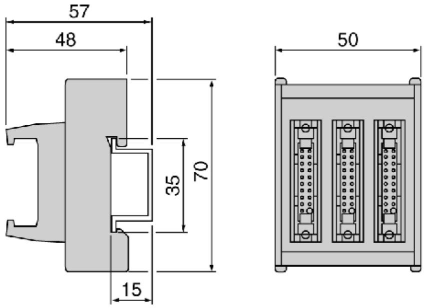


(1) Dimension with additional shunt terminal block ABE-7BV20 or ABE-7BV10.

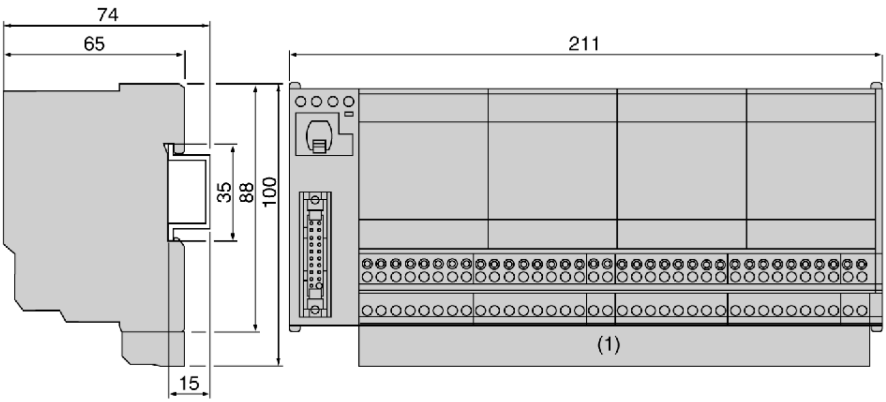
The illustration below shows the dimensions (in mm) of the products: ABE-7H16S43, ABE-7S16E2••, ABE-7S08S2B1, ABE-7S16S2B•, ABE-7H16F43•, ABE-7R16S21.



The illustration below shows the dimensions (in mm) of the product ABE-7ACC02.



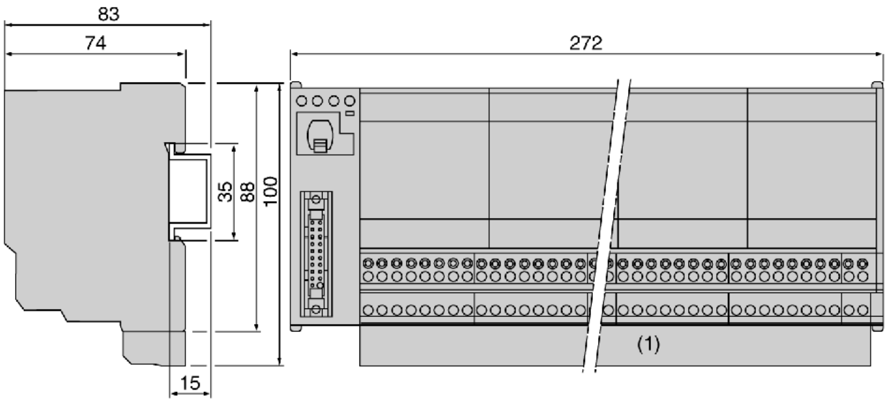
The illustration below shows the dimensions (in mm) of the products: ABE-7R16T2•• and ABE-7P16T2••.



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 (in mm) of the products: ABE-7R16T3•• and 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 35-mm wide DIN mounting rails.

⚠ WARNING
UNEXPECTED EQUIPMENT OPERATION Install the input adaptation bases ABE-7S16E2E1 and static output adaptation bases ABE-7S••S2B• lengthways and horizontally to prevent the device from overheating and unexpected operation. **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

Section 25.3
TELEFAST 2 ABE-7H08R10/08R11 and ABE-7H16R10/16R11 Connection Bases

Sensor and Pre-actuator Connections on the ABE-7H08R10/R11 and ABE-7H16R10/R11 Bases

At a Glance

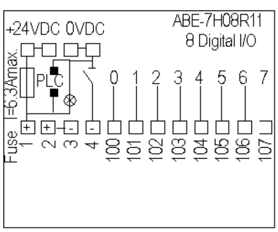
This is an overview of the sensor and pre-actuator connections on TELEFAST 2 bases.

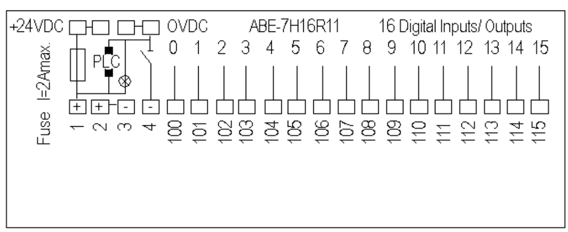
NOTE: The bases are manufactured with a general-purpose, quick-blow fuse rated 6.3 A. To guarantee optimum protection, this fuse should be rated according to the application (connection to input or output functions) and the maximum current allowable in the base.
Type and rating of fuse to be fitted to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

- input functions: 0.5 A quick-blow
- output functions:
  - 2 A quick-blow on the ABE-7H16R•• base
  - 6.3 A quick-blow on the ABE-7H08R•• base

Illustration

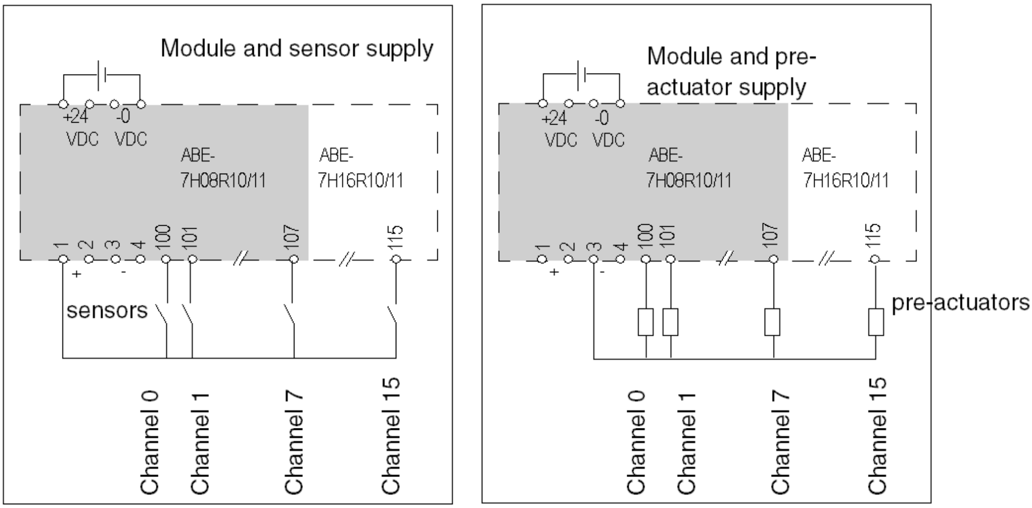
Description of the connection terminal blocks.





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 pre-actuators:

- onto terminals 3 or 4: pre-actuators to the ‘-’ of the supply (positive logic outputs)

Section 25.4
TELEFAST 2 ABE-7H12R10/12R11 Connection Bases

Sensor and Pre-actuator Connections on the ABE-7H12R10/R11 Bases

At a Glance

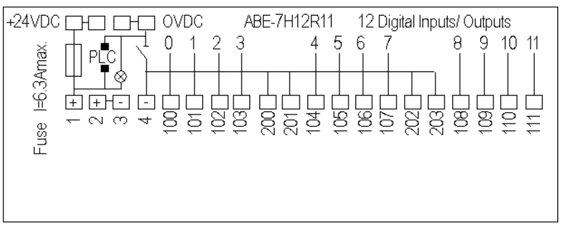
This is an overview of the sensor and pre-actuator connections on TELEFAST 2 bases.

NOTE: The bases are manufactured with a general-purpose, quick-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: 0.5 A quick-blow
- output functions: 6.3 A quick-blow on the ABE-7H12R ••base

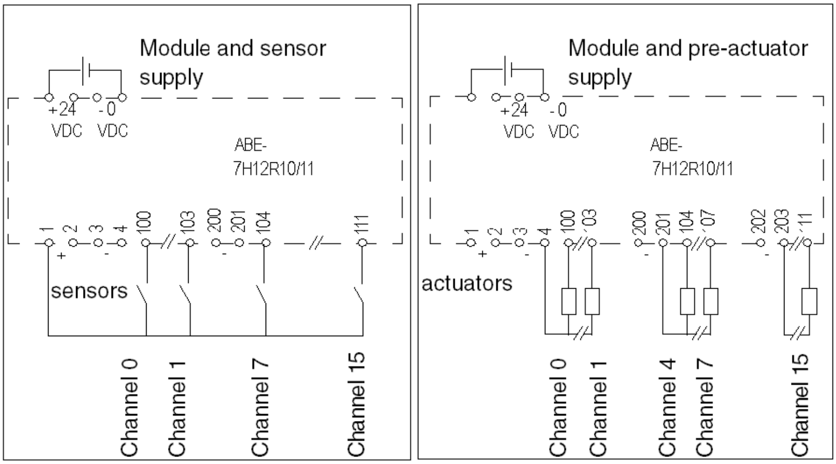
Illustration

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 pre-actuators:

- several terminals linked to the '-' polarity (3, 4, 200, 201, 202, and 203) allowing sharing in groups of 4 or 2 channels (positive logic outputs)

Section 25.5
TELEFAST 2 ABE-7H08R21 and ABE-7H16R20/16R21/16R23 Connection Bases

Sensor and Pre-actuator Connections on the ABE-7H08R21 and ABE-7H16R20/R21/R23 Bases for Type 2 Inputs

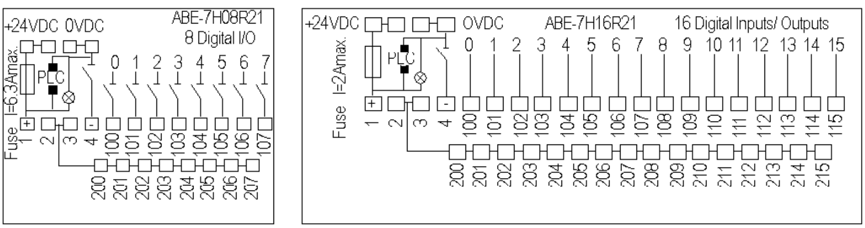
At a Glance

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

NOTE: The bases are manufactured with a general-purpose, quick-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: 0.5 A quick-blow
- output functions:
  - 2 A quick-blow on the ABE-7H16R•• base
  - 6.3 A quick-blow on the ABE-7H08R•• base

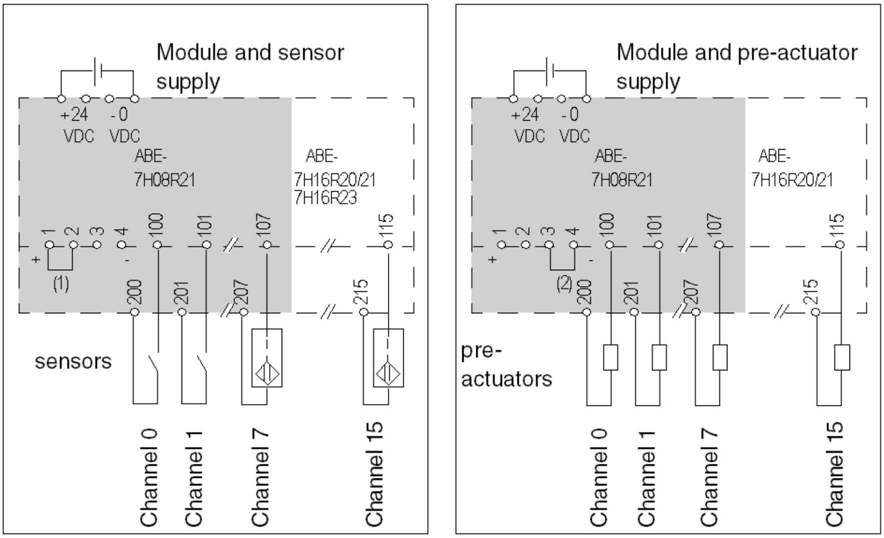
Illustration

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 pre-actuators:

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

Section 25.6
TELEFAST 2 ABE-7H12R20/12R21 Connection Bases

Sensor and Pre-actuator Connections on the ABE-7H12R20/12R21 Bases

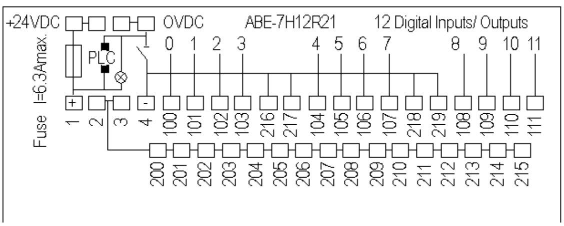
At a Glance

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

NOTE: The bases are manufactured with a general-purpose, quick-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: 0.5 A quick-blow
- output functions: 6.3 A quick-blow on the ABE-7H12R•• base

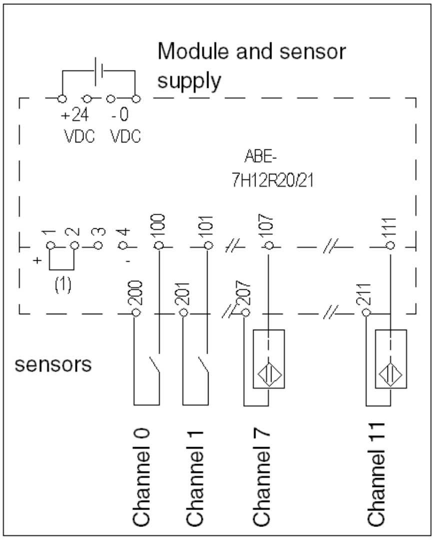
Illustration

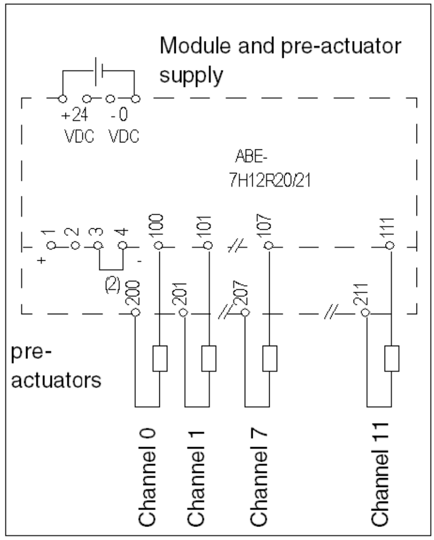
Description of the connection terminal blocks.



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 pre-actuators:

- In order to create the shared supply for the pre-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

Section 25.7
TELEFAST 2 ABE-7H08S21/16S21 Connection Bases

Sensor and Pre-actuator Connections on ABE-7H08S21/16S21 Bases with One Isolator per Channel

At a Glance

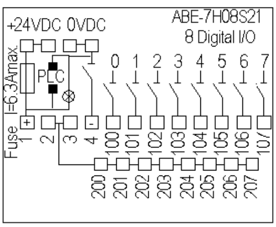
This is an overview of the sensor and pre-actuator connections on TELEFAST 2 bases.

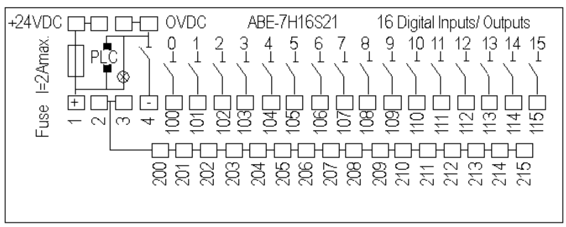
NOTE: The bases are manufactured with a general-purpose, quick-blow fuse rated 2 A. To guarantee optimum protection, this fuse should be rated according to the application (connection to input or output functions) and the maximum current allowable in the base.
Type and rating of fuse to be fitted to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

- input functions: 0.5 A quick-blow
- output functions:
  - 2 A quick-blow on the ABE-7H16S21 base
  - 6.3 A quick blow on the ABE-7H08S21 base

Illustration

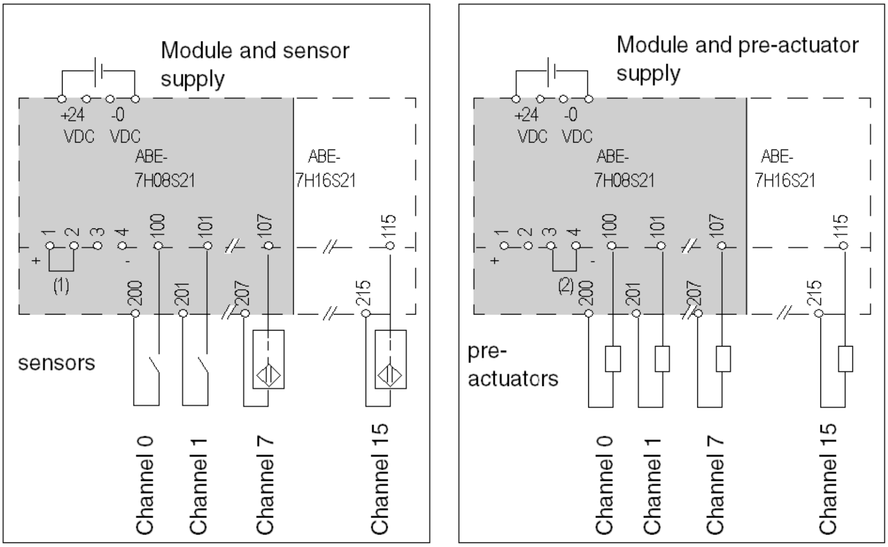
Description of the connection terminal blocks.





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 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).

Section 25.8
TELEFAST 2 ABE-7H12S21 Connection Base

Sensor and Pre-actuator Connections on the ABE-7H12S21 Base with 1 Isolator per Channel

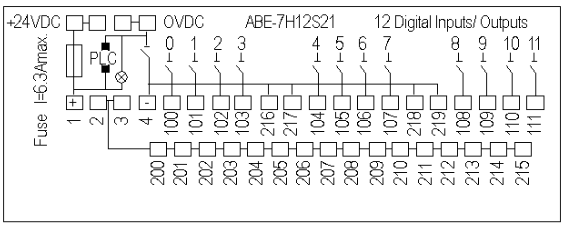
At a Glance

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

NOTE: The base is manufactured with a general-purpose, quick-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: 0.5 A quick-blow
- output functions: 6.3A quick-blow on the ABE-7H12S21 base

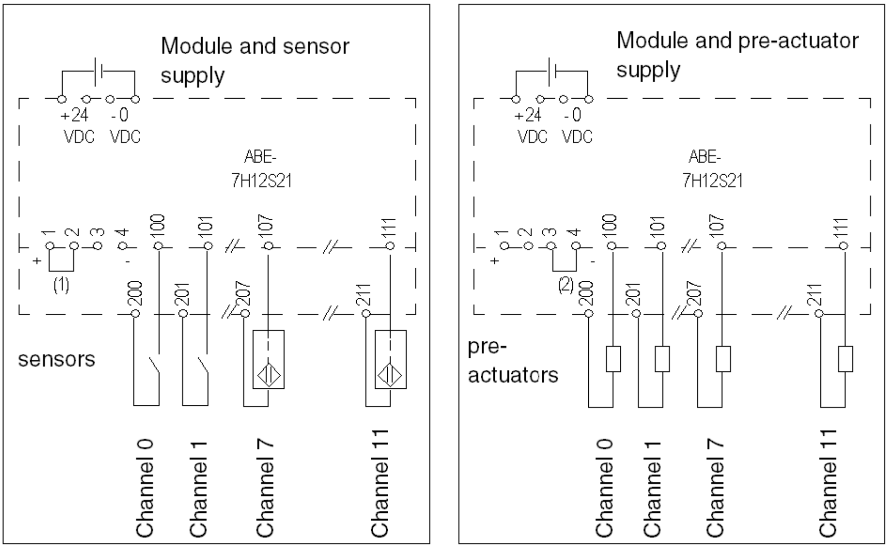
Illustration

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 pre-actuators:

- In order to create the shared supply for the pre-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.

Section 25.9
TELEFAST 2 ABE-7H16R30/16R31 Connection Bases

Sensor and Pre-actuator Connections on the ABE-7H16R30/R31 Bases

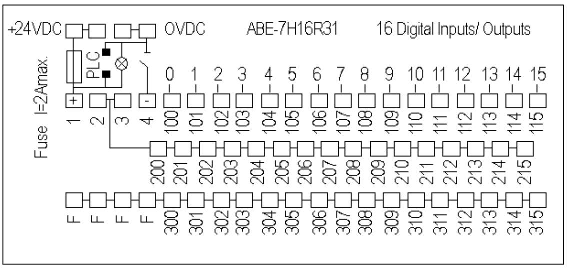
At a Glance

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

NOTE: The bases are manufactured with a general-purpose, quick-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 quick-blow

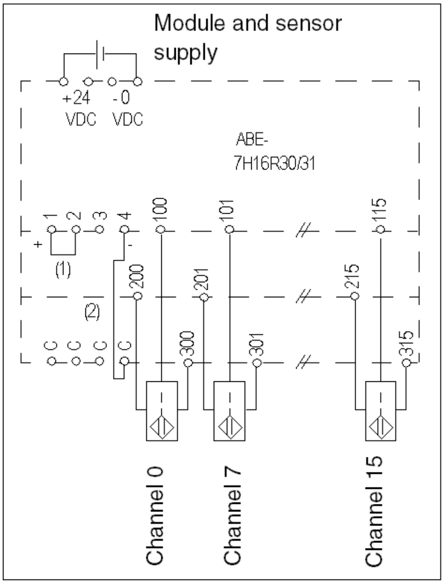
Illustration

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.

Section 25.10
TELEFAST 2 ABE-7H12R50 Connection Base

Sensor and Pre-actuator Connections on the ABE-7H12R50 Bases

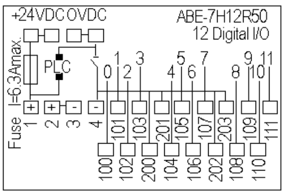
At a Glance

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

NOTE: The base is manufactured with a general-purpose, quick-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: 0.5 A quick-blow
- output functions: 6.3 A quick-blow on the ABE-7H12R50 base

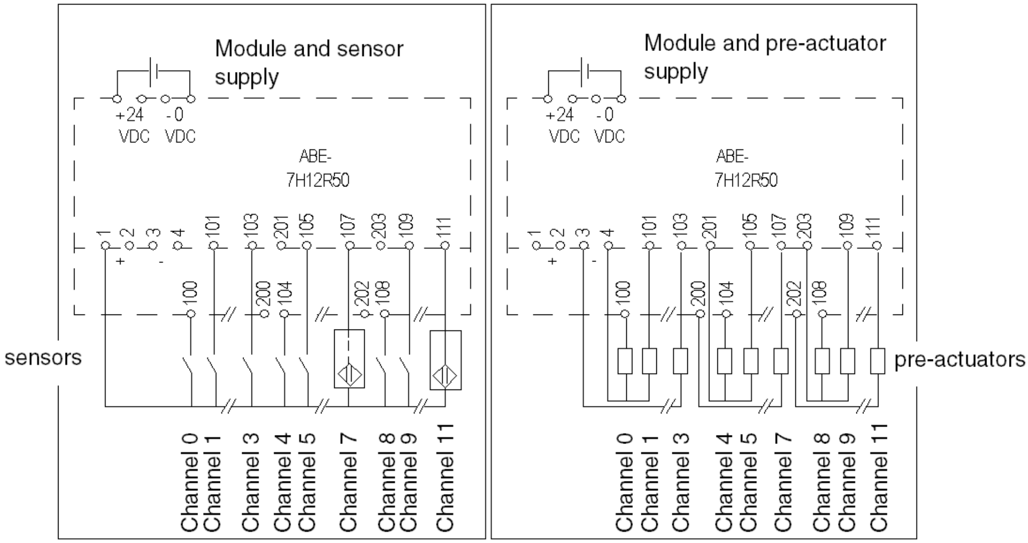
Illustration

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 pre-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)

Section 25.11
TELEFAST 2 ABE-7H16R50 Connection Base

Sensor and Actuator Connections on the ABE-7H16R50 Base

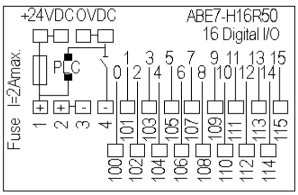
At a Glance

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

NOTE: The base is manufactured 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

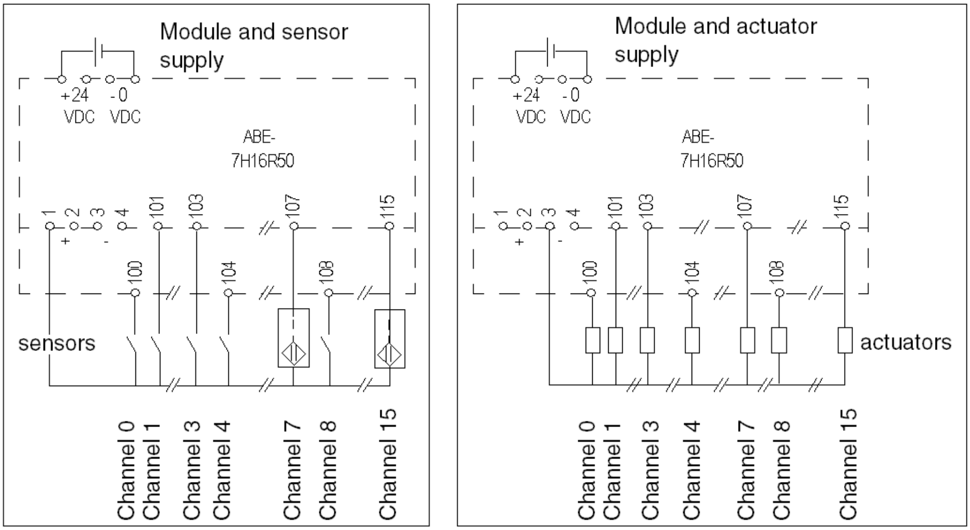
Illustration

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)

Section 25.12
TELEFAST 2 ABE-7H16F43 Connection Base

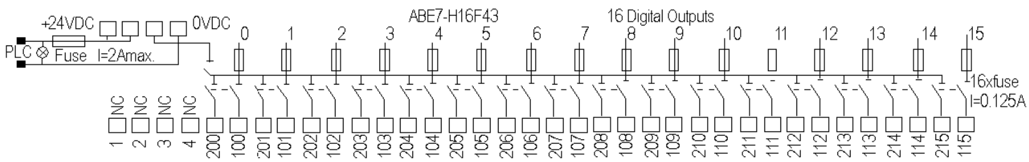
Actuator Connections on ABE-7H16F43 Output Base with One Fuse and One isolator per Channel

At a Glance

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

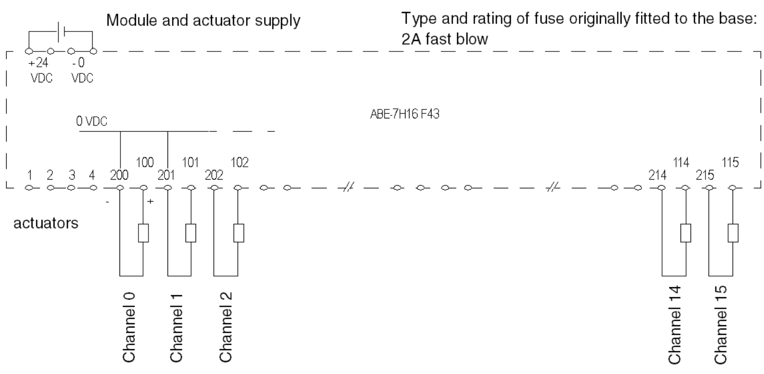
Illustration

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.

Section 25.13
TELEFAST 2 ABE-7H16S43 Connection Base

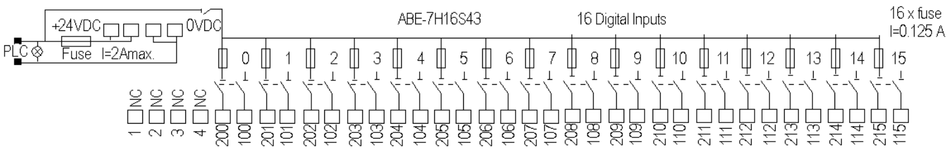
Sensor Connections on ABE-7H16S43 Output Base with One Fuse and One Isolator per Channel

At a Glance

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

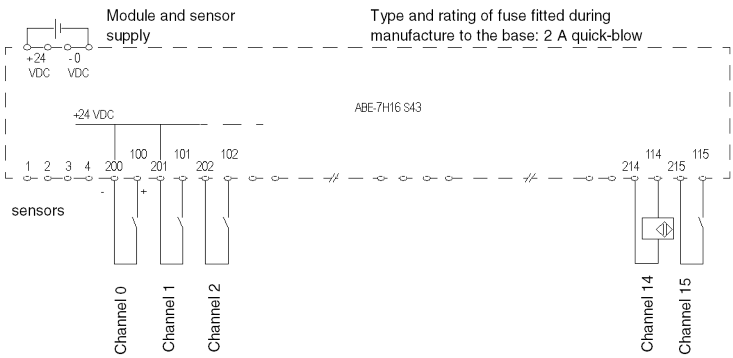
Illustration

Description of the connection terminal blocks.



Illustration

Input function connections.



Functionality per channel:

- 0.125 A fuse fitted during manufacture
- isolator cuts the ‘+’ and the channel signal simultaneously

NOTE: Terminals 200...215 are connected to the ‘+’ polarity of the supply.

Section 25.14
TELEFAST 2 Connection Base Accessories

Aim of this Section

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

What Is in This Section?

This section contains the following topics:

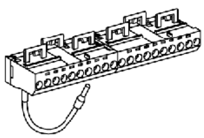
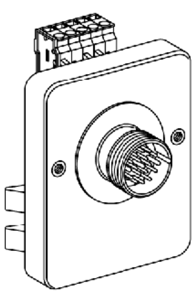
TELEFAST 2 Connection Base Accessories Catalog

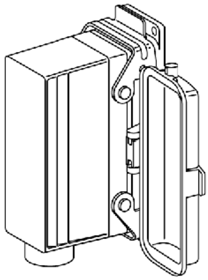
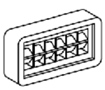
At a Glance

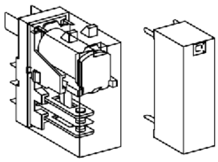
This is an overview of the TELEFAST 2 connection base accessories catalog for discrete I/O modules.

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

Product reference	Illustration	Description
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, page 261*.
(2) For electrical characteristics, see *Characteristics of the Removable ABS-7Sxx Static Output Relays, page 263*.
(3) For electrical characteristics, see *Characteristics of the Removable ABS-7Exx Static input Relays, page 262*.
(4) Contingency table of relays for bases, see *Association Table for the Relays on ABE-7R16Txxx, ABE-7P16Txxx and ABE-7P16Fxxx Bases, page 259*.

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	X	-	-	-	X	-	-	-
	S23 1OF	X (1)	X	-	-	-	-	-	-
12.5 mm	S33 1OF	-	-	X	-	-	X	X	-
	S37 2OF	-	-	-	X	-	-	-	-
Static relays from ABS-S•• output									
10 mm	C2E	X (1)	-	-	-	X	-	-	-
	A2M	X (1)	-	-	-	X	-	-	-
12.5 mm	C3BA	-	-	X (1)	-	-	X (2)	X	-
	C3E	-	-	X (1)	-	-	X	X	-
	A3M	-	-	X (1)	-	-	X	X	-
Static relays from ABS-7E•• input									
12.5 mm	C3AL	-	-	-	-	-	-	-	X
	C3B2	-	-	-	-	-	-	-	X
	C3E2	-	-	-	-	-	-	-	X
	A3E5	-	-	-	-	-	-	-	X
	A3F5	-	-	-	-	-	-	-	X
	A3F6	-	-	-	-	-	-	-	X
	A3M5	-	-	-	-	-	-	-	X
	A3M6	-	-	-	-	-	-	-	X

Bases ABE-7••		**equipped with electromagnetic relays**				**not equipped with relays**			
		R16T21•	**R16T23•**	**R16T33•**	**R16T370**	**P16T21•**	**P16T33•**	**P16T318**	**P16F31•**
ABE-7••• continuity block									
10 mm	ACC20	X	-	-	-	X	-	-	-
12.5 mm	ACC21	-	-	X	-	-	X	X	-
(1) relays can be in line **(2)** except on **ABE-7P16T334**									

X compatible
- not compatible

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			

(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				

Part II
Discrete Input/Output Modules Software Implementation

Subject of this Part

This part describes the application-specific discrete functions for Modicon M340 PLCs and describes their implementation with the Unity Pro software.

What Is in This Part?

This part contains the following chapters:

Chapter 26
General Introduction to the Application-Specific Discrete Function

Overview

Introduction

The software installation of the application-specific modules is carried out from various Unity Pro editors in both online and offline modes.

If you do not have a processor to connect to, Unity Pro allows you to carry out an initial test using the simulator. In this case there are differences in the installation *(see page 268)*.

The following order of installation phases is recommended but it is possible to change the order of certain phases (for example, starting with the configuration phase).

Installation Phases with Processor

The following table shows the various phases of installation with the processor.

<table>
<tr><th>Phase</th><th>Description</th><th>Mode</th></tr>
<tr><td>Declaration of variables</td><td>Declaration of IODDT-type variables for the application-specific modules and variables of the project</td><td>Offline / Online</td></tr>
<tr><td>Programming</td><td>Project programming</td><td>Offline / Online</td></tr>
<tr><td rowspan="3">Configuration</td><td>Declaration of modules</td><td rowspan="3">Offline</td></tr>
<tr><td>Module channel configuration</td></tr>
<tr><td>Entry of configuration parameters</td></tr>
<tr><td>Association</td><td>Association of IODDTs with the channels configured (variable editor)</td><td>Offline / Online</td></tr>
<tr><td>Generation</td><td>Project generation (analysis and editing of links)</td><td>Offline</td></tr>
<tr><td>Transfer</td><td>Transfer project to PLC</td><td>Online</td></tr>
<tr><td rowspan="2">Adjustment Debugging</td><td>Project debugging from debug screens, animation tables</td><td rowspan="2">Online</td></tr>
<tr><td>Modifying the program and adjustment parameters</td></tr>
<tr><td>Documentation</td><td>Building documentation file and printing miscellaneous information relating to the project</td><td>Offline / Online</td></tr>
<tr><td rowspan="2">Operation/Diagnostic</td><td>Displaying miscellaneous information necessary for supervisory control of the project</td><td rowspan="2">Online</td></tr>
<tr><td>Diagnostic of project and modules</td></tr>
</table>

Implementation Phases with Simulator

The following table shows the various phases of installation with the simulator.

Phase	Description	Mode
Declaration of variables	Declaration of IODDT-type variables for the application-specific modules and variables of the project	Offline / Online
Programming	Project programming	Offline / Online
Configuration	Declaration of modules	Offline
	Module channel configuration	
	Entry of configuration parameters	
Association	Association of IODDTs with the modules configured (variable editor)	Offline / Online
Generation	Project generation (analysis and editing of links)	Offline
Transfer	Transfer project to simulator	Online
Simulation	Program simulation without inputs/outputs	Online
Adjustment Debugging	Project debugging from debug screens, animation tables	Online
	Modifying the program and adjustment parameters	

Note: The simulator is only used for the discrete or analog modules.

Chapter 27
Configuration

Subject of this Section

This section describes the configuration of application-specific discrete modules for implementation.

What Is in This Chapter?

This chapter contains the following sections:

Section 27.1
Configuration of a Discrete Module: General Points

Subject of this Section

This section describes the basic operations required to configure a discrete module in a Modicon M340 local rack and in X80 drop.

What Is in This Section?

This section contains the following topics:

Discrete Module Configuration Screen in Modicon M340 local rack

At a Glance

The configuration screen is a graphic tool designed for configuring *(see Unity Pro, Operating Modes)* a module selected in a rack. It displays the parameters defined for this module's channels, and enables their modification in offline mode and on-line mode (function available for Unity Pro versions greater than 3.0).

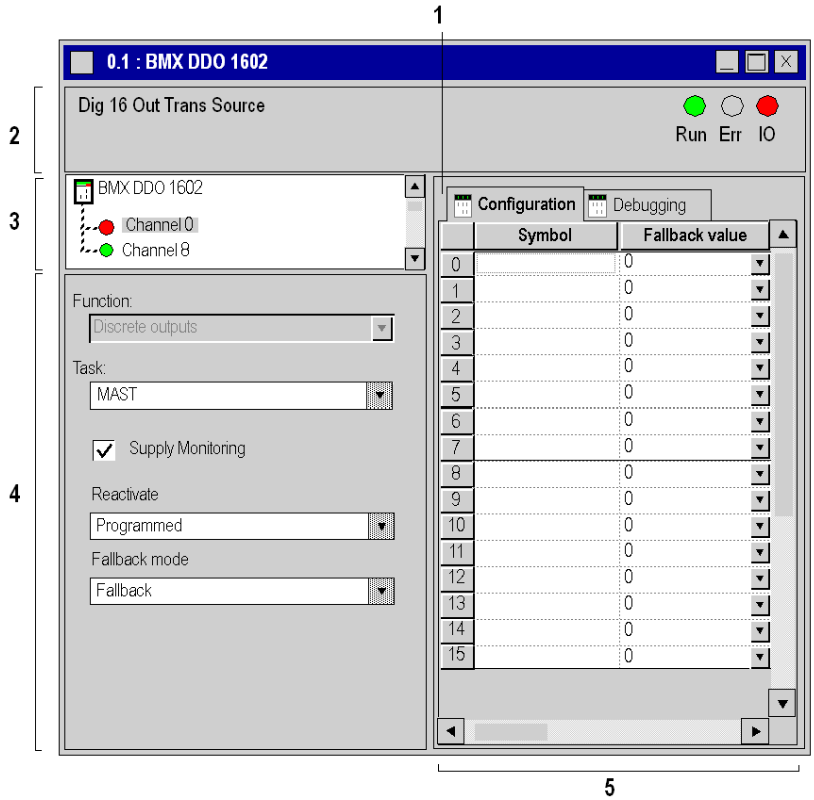
It also provides access to the debug screen (in on-line mode only).

NOTE: It is not possible to configure a module by programming using direct language objects %KW *(see page 298)*; these words are accessible in read only format.

NOTE: With Unity Pro 6.1 or later and Modicon M340 firmware 2.4 or later, you can access the modules either via topological or State RAM addresses.
Please refer to *Memory Tab (see Unity Pro, Operating Modes)* and *Topological/State RAM Addressing of Modicon M340 Discrete Modules (see page 319)*.

Illustration

This screen enables the display and modification of parameters in offline mode, as well as debug in online mode.



Description

The next table shows the various elements of the configuration screen and their functions.

Address	Element	Function
1	Tabs	The tab in the foreground indicates the mode in progress (**Configuration** in this example). Every mode can be selected using the respective tab. The **Debug** mode is only accessible in online mode.
2	**Module** area	Specifies the abbreviated heading of the module. In online mode, this area also includes the three LEDs: **Run**, **Err** and **IO**.

3	**Channel** area	Allows you:
		● by clicking on the reference number, to display the tabs:
		  ● **Description** which gives the characteristics of the device
		  ● **I/O Objects,** *(see Unity Pro, Operating Modes)* which is used to pre-symbolize the input/output objects
		  ● **Fault** which shows the device status (in on-line mode)
		● to select a channel
		● to display the **Symbol**, name of the channel defined by the user (using the variable editor)

4	**General parameters** area	Allows you to select the associated function and task in groups of 8 channels: ● **Function**: defines the configuration/de-configuration of the channel group selected (other than groups 0 to 7) ● **Task**: defines the task (**MAST**, **FAST**) in which channel default exchange objects will be exchanged The check box **Supply monitoring** defines the active or inactive state of the external power supply monitoring (available only on some discrete modules). The **Reset** and **Fallback** mode drop-down menus enable you to configure the output reset and output fallback mode (available only on some discrete modules).
5	**Configuration** zone	Enables the configuration of parameters for the various channels. This field includes various items, displayed according to the selected discrete module. The **Symbol** column displays the symbol associated with the channel when it has been defined by the user (using the variable editor).

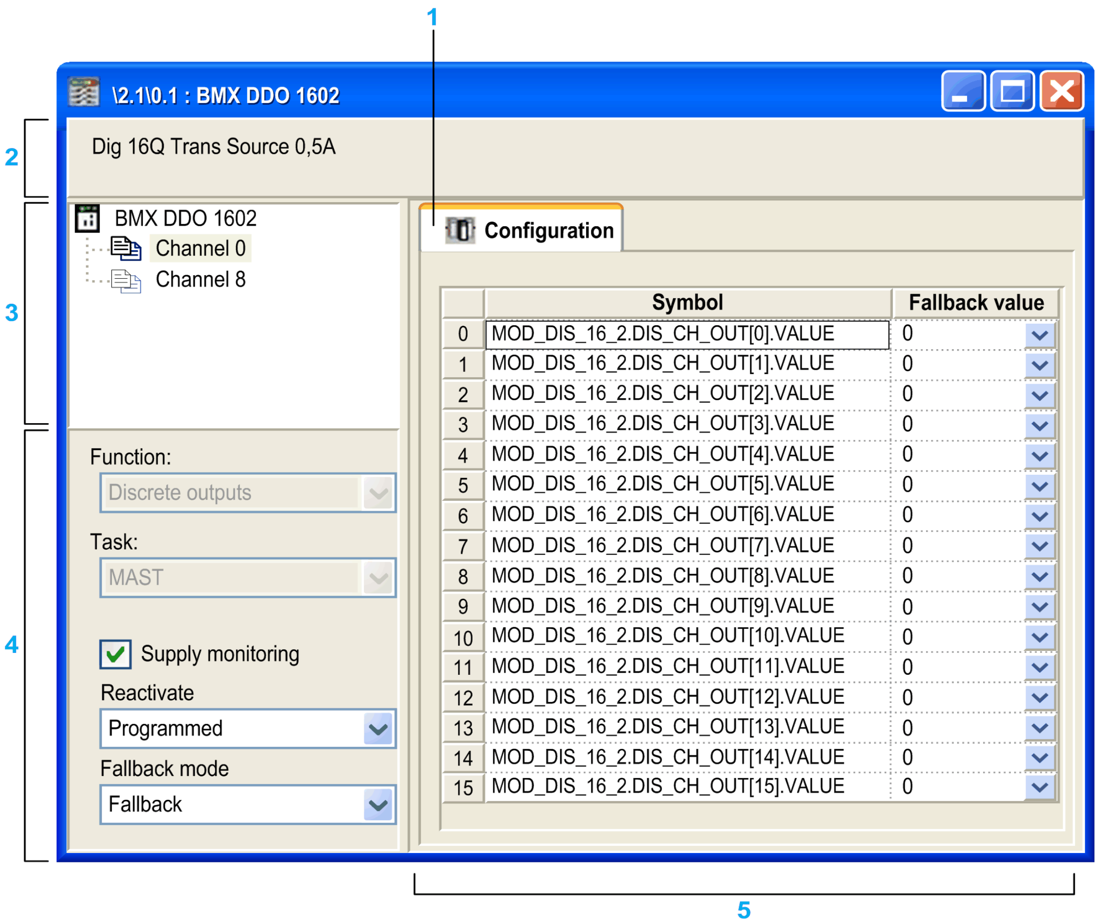
Discrete Module Configuration Screen in X80 Drop

At a Glance

The various available screens for the discrete modules are:
- **Configuration** screen
- **Type**

Illustration

This screen shows the configuration screen:



Description

This table shows the various elements of the configuration screen and their functions.

Address	Element	Function
1	Tabs	The tab in the foreground indicates the mode in progress (**Configuration** in this example). Every mode can be selected using the respective tab: ● **Overview** ● **Configuration** ● **Device DDT** which gives the Device DDT *(see page 300)* **name** and **type**of the device
2	**Module** area	Specifies the abbreviated heading of the module.
3	**Channel** area	Allows you: ● by clicking on the reference number, to display the tabs: ● **Description** which gives the characteristics of the device ● to select a channel ● to display the **Symbol**, name of the channel defined by the user (using the variable editor) **NOTE:** All channel are activated and a channel cannot be de-activated to **None**.
4	**General parameters** area	Allows you to select the associated function and task in groups of 8 channels: ● **Function**: defines the configuration/de-configuration of the channel group selected (other than groups 0 to 7) ● **Task**: defines the (**MAST**) task in which channel default exchange objects are exchanged The check box **Supply monitoring** defines the active or inactive state of the external power supply monitoring for the 16-channel group selected (available only on 16, 32 and 64 channel discrete modules). In a user application the `WRITE_CMD`(in a X80 drop) or the `WRITE_CMD_QX`(in an EIO drop) can also defines the active or inactive state of the external power supply monitoring and overrides the **Supply monitoring** setting. `WRITE_CMD_QX`only works over the first 8 channels (0...7, 16...23, 32...39 and 48...55) of the 16 channel groups, but affects all 16 channels of the group. `WRITE_CMD`works over any of the 16 channels of a channel group and affects all 16 channels of the group. `WRITE_CMD`also allows reactivation of tripped outputs. The **Reactivate** and **Fallback mode** drop-down menus enable you to configure the output reset and output fallback mode (available only on some discrete modules).
5	**Configuration** zone	Enables the configuration of parameters for the various channels. This field includes various items, displayed according to the selected discrete module. The **Symbol** column displays the symbol associated with the channel when it has been defined by the user (using the variable editor).

Section 27.2
Discrete Input and Output Channel Parameters

Subject of this Section

This section presents the various parameters of input and output channels for discrete modules.

What Is in This Section?

This section contains the following topics:

Discrete Input Parameters on the Rack

At a Glance

The discrete input module includes different parameters per channel. The channels are divided into blocks of 8 or 16 consecutive channels.

Parameters

The following table displays the parameters available for each in-rack discrete input module.

Reference Module	Number of inputs	Associated task (8-channel group)	Function (8-channel group)	Supply monitoring (16-channel group)
BMX DDI 1602	16	**Mast** / Fast	**Discrete inputs** / None	**Active** / Inactive
BMX DDI 1604	16	**Mast** / Fast	**Discrete inputs** / None	**Active** / Inactive
BMX DAI 0805	8	**Mast** / Fast	**Discrete inputs**	**Active** / Inactive
BMX DAI 0814	8	**Mast** / Fast	**Discrete inputs**	–
BMX DAI 1604	16	**Mast** / Fast	**Discrete inputs** / None	**Active** / Inactive
BMX DDI 3202 K	32	**Mast** / Fast	**Discrete inputs** / None	**Active** / Inactive
BMX DDI 6402 K	64	**Mast** / Fast	**Discrete inputs** / None	**Active** / Inactive
BMX DDM 16022	8 (inputs)	**Mast** / Fast	**Discrete inputs**	**Active** / Inactive
BMX DDM 16025	8 (inputs)	**Mast** / Fast	**Discrete inputs**	**Active** / Inactive
BMX DDM 3202 K	16 (inputs)	**Mast** / Fast	**Discrete inputs** / None	**Active** / Inactive
BMX DDI 1603	16	**Mast** / Fast	**Discrete input** / None	**Active**/ Inactive
BMX DAI 1602	16	**Mast** / Fast	**Discrete** / None	**Active** / Inactive
BMX DAI 1603	16	**Mast** / Fast	**Discrete** / None	**Active** / Inactive

NOTE: Parameters indicated in bold characters are part of the default configuration.

NOTE: The BMX DDM 16022 and BMX DDM 16025 discrete mixed input/output modules have 2 groups of 8 channels. The input group is represented by channels 0 to 7 and the output group is represented by channels 16 to 23.

Discrete Output Parameters for 8-Channel Modules in Rack

At a Glance

The discrete output modules include several parameters per channel. The channels are divided into blocks of 8 or 16 consecutive channels.

Parameters

The following table displays the parameters available for each of the discrete output module with more than 8 channels in the rack.

		8-channel group				16-channel group	Channel by channel
Reference Module	**Number of outputs**	**Reset**	**Associated task**	**Fallback mode**	**Function**	**Supply monitoring**	**Fallback value**
BMX DDO 1602	16	**Programmed** / Automatic	**Mast** / Fast	**Fallback** / Maintenance	**Discrete outputs** / None	**Active** / Inactive	**0** / 1
BMX DDO 1612	16	**Programmed**/ Automatic	**Mast** / Fast	**Fallback**/ Maintenance	**Discrete output** / None	**Active** / Inactive	**0** / 1
BMX DAO 1605	16	**Programmed**/ Automatic	**Mast** / Fast	**Fallback**/ Maintenance	**Discrete output** / None	**Active** / Inactive	**0** / 1
BMX DDO 3202 K	32	**Programmed** / Automatic	**Mast** / Fast	**Fallback** / Maintenance	**Discrete outputs** / None	**Active** / Inactive	**0** / 1
BMX DDO 6402 K	64	**Programmed** / Automatic	**Mast** / Fast	**Fallback** / Maintenance	**Discrete outputs** / None	**Active** / Inactive	**0** / 1
BMX DRA 0804T	8	-	**Mast** / Fast	**Fallback** / Maintenance	**Discrete outputs**	-	**0** / 1
BMX DRA 0805	8	-	**Mast** / Fast	**Fallback** / Maintenance	**Discrete outputs**	-	**0** / 1
BMX DRA 1605	16	-	**Mast** / Fast	**Fallback** / Maintenance	**Discrete outputs** / None	-	**0** / 1
BMX DDM 16022	8 (outputs)	**Programmed** / Automatic	**Mast** / Fast	**Fallback** / Maintenance	**Discrete outputs** / None	**Active** / Inactive	**0** / 1

		8-channel group				16-channel group	Channel by channel
Reference Module	**Number of outputs**	**Reset**	**Associated task**	**Fallback mode**	**Function**	**Supply monitoring**	**Fallback value**
BMX DDM 16025	8 (outputs)	-	**Mast** / Fast	**Fallback** / Maintenance	**Discrete outputs** / None	**Active** / Inactive	**0** / 1
BMX DDM 3202 K	16 (outputs)	**Programmed** / Automatic	**Mast** / Fast	**Fallback** / Maintenance	**Discrete outputs** / None	**Active** / Inactive	**0** / 1

NOTE: The parameters in bold correspond to the parameters configured by default.

NOTE: The BMX DDM 16022 and BMX DDM 16025 discrete mixed input/output modules have 2 groups of 8 channels. The input group is represented by channels 0 to 7 and the output group is represented by channels 16 to 23.

Section 27.3
Configuration of Discrete Module Parameters

Subject of this Section

This section presents general rules for implementing various configuration parameters for discrete input/output channels.

What Is in This Section?

This section contains the following topics:

How to Modify the Task Parameter

At a Glance

This parameter defines the processor task where input acquisitions and output updates are performed.

The task is defined for 8 consecutive channels in the case of on-rack discrete modules.

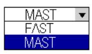
The possible choices are as follows:

- **MAST** task
- **FAST** task

NOTE: Modifying the Task parameter is only possible in off-line mode.

Procedure

The following table shows how to define the type of task assigned to module channels.

Step	Action
1	Open the desired module configuration screen.
2	Click on the **Task** button of the drop-down menu to assign a task to the group you wish. **Result**: The following list appears. 
3	Choose the desired task.
4	Confirm the modification with the **Edit** →**Validate** menu command.

How to Modify the External Power Supply Error Monitoring Parameter

At a Glance

This parameter defines the status (activation or deactivation) of external power supply error monitoring.

It runs in groups of 16 consecutive channels.

Monitoring is active by default (box checked).

Procedure

The following table shows how to disable or enable the external power supply monitoring function.

Step	Action
1	Open the desired module configuration screen.
2	Check the **Supply monitor** box in the **General Parameters** area. **Result** : The **I/O editor** window appears. Click **OK**.
3	Validate the change by clicking **Edit** →**Validate**.

How to Modify the Fallback Mode Parameter

At a Glance

This parameter defines the fallback mode adopted by outputs when the PLC switches to **STOP** due to:

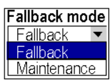
- a processor error
- a rack connection error
- an inter-rack cable connection error

The modes are as follows:

Mode	Meaning
Fallback	Channels are set to 0 or 1 according to the defined fallback value for the corresponding 8-channel group.
Maintenance	The outputs remain in the status they were in before switching to **Stop**.

Procedure

The following table shows the procedure for defining the fallback mode to be assigned to a channel group.

Step	Action
1	Open the desired module configuration screen.
2	For the desired channel group, click on the arrow of the **Fallback mode** drop-down menu. **Result** : The following list appears. 
3	Select the desired fallback mode.
4	For **Fallback** mode, configure each channel of the selected group. To do this, click on the drop-down menu arrow of the channel to be configured, located in the **Fall Back Value** column.
5	Click on the desired value (0 or 1).
6	Confirm the modification with the **Edit** →**Validate** menu command.

How to Modify the Output Reset Parameter

At a Glance

This parameter defines the reactivation mode of disconnected outputs.

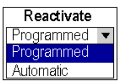
The modes are as follows.

Mode	Meaning
Programmed	Reactivation is executed with a command from the PLC application or through the appropriate debug screen. **Remark**: In order to avoid repeated reactivations, the module ensures an automatic 10s delay between two resets.
Automatic	The reactivation is executed automatically every 10s until the error disappears.

The reactivation mode is defined for 8-channel groups.

Procedure

The following table shows the procedure for defining the module output channel reset mode.

Step	Action
1	Open the desired module configuration screen.
2	For the desired channel group, click on the arrow of the **Reactivate** drop-down menu. **Result** : The following list appears. 
3	Select the required reactivation mode.
4	Validate the modification by clicking **Edit** →**Confirm**.

Chapter 28
Application-Specific Discrete Module Language Objects

Subject of this Section

This chapter describes the language objects associated with application-specific discrete modules from various IODDT.

What Is in This Chapter?

This chapter contains the following sections:

Section 28.1
Language Objects and IODDT

Description of the Discrete Function Objects Languages

General Points

Discrete modules have different associated IODDTs.

The IODDTs are predefined by the manufacturer. They contain input/output languages objects belonging to a channel of a specific application module.

There are 4 IODDT types for the discrete modules:

- T_DIS_IN_GEN
- T_DIS_IN_STD
- T_DIS_OUT_GEN
- T_DIS_OUT_STD

NOTE: IODDT variables may be created in two ways:
- using the **I/O objects** *(see Unity Pro, Operating Modes)* tab
- using the Data Editor

Language Object Types

Each IODDT contains a group of language objects which are used to control them and check their operation.

There are two types of language objects:

- **Implicit Exchange Objects**, which are automatically exchanged at each cycle pass of the task associated to the module
- **Explicit Exchange Objects**, which are exchanged upon demand from the application, while using explicit exchange instructions

Implicit exchanges concern the module inputs/outputs: measurement, information, and operation results.

Explicit exchanges enable module configuration and diagnosis.

NOTE: In order to avoid several simultaneous explicit exchanges for the same channel, it is necessary to test the value of the word EXCH_STS of the IODDT associated to the channel before to call EF using this channel.

Section 28.2
Discrete Module IODDTs and Device DDTs

Subject of this Section

This section presents the different IODDT languages usable in a Modicon M340 Local and objects related to discrete input/output modules and the Device DDTs.

What Is in This Section?

This section contains the following topics:

IODDT Links

IODDT Link Table

This table describes the IODDT linked to each discrete input/output module:

Module Reference	IODDTs linked to discrete module			
	T_DIS_IN_GEN	T_DIS_IN_STD	T_DIS_OUT_GEN	T_DIS_OUT_STD
BMX DDI 1602	x	x	-	-
BMX DDI 1604T	x	x	-	-
BMX DDI 3202 K	x	x	-	-
BMX DDI 6402 K	x	x	-	-
BMX DDI 1603	x	x	-	-
BMX DDI 1602	x	x	-	-
BMX DDI 1603	x	x	-	-
BMX DDO 1602	-	-	x	x
BMX DDO 3202 K	-	-	x	x
BMX DDO 6402 K	-	-	x	x
BMX DRA 0804T	-	-	x	x
BMX DRA 0805	-	-	x	x
BMX DRA 1605	-	-	x	x
BMX DDM 16022	x	x	x	x
BMX DDM 16025	x	x	x	x
BMX DDM 3202 K	x	x	x	x
BMX DAO 1605	-	-	x	x
BMX DDO 1612	-	-	x	x
X: Linked -: Not linked				

Details About T_DIS_IN_GEN Type IODDT Implicit Object Exchange

At a glance

This section describes `T_DIS_IN_GEN` type IODDT Implicit Object Exchange that applies to all discrete input modules.

Input Flag

The following table presents the `VALUE` (%Ir.m.c) bit meaning.

Standard symbol	Type	Access	Meaning	Address
`VALUE`	EBOOL	R	Indicates that the status of the sensor controlling the input channel **c**.	%Ir.m.c

Error Bit

The following table presents the `CH_ERROR` (%Ir.m.c.ERR) bit meaning.

Standard symbol	Type	Access	Meaning	Address
`CH_ERROR`	BOOL	R	Indicates that **c** input channel is in error.	%Ir.m.c.ERR

Details About T_DIS_IN_STD Type IODDT Implicit Object Exchange

At a Glance

This section presents IODDT implicit exchange objects of the `T_DIS_IN_STD`-type applicable to discrete input modules.

Input Flag

The following table shows the `VALUE` (%Ir.m.c) bit meaning.

Standard symbol	Type	Access	Meaning	Address
`VALUE`	EBOOL	R	Indicates that the status of the sensor controlling the input channel **c**.	%Ir.m.c

Error Bit

The following table presents the `CH_ERROR` (%Ir.m.c.ERR) bit meaning.

Standard symbol	Type	Access	Meaning	Address
`CH_ERROR`	BOOL	R	Indicates that **c** input channel is in error.	%Ir.m.c.ERR

Details About T_DIS_IN_STD Type IODDT Explicit Object Exchange

At a Glance

This section presents IODDT explicit exchange objects of the T_DIS_IN_STD type applicable to discrete input modules. This section includes the word type objects whose bits have a specific meaning. These objects are explained in detail below.

Example of a declaration of a variable:

IODDT_VAR1 of type T_DIS_INT_STD

NOTE: In general, the meaning of the bits is given for bit status 1. In specific cases an explanation is given for each status of the bit.

NOTE: Not all bits are used.

Execution Indicators for an Explicit Exchange: EXCH_STS

The following table shows exchange control bit meanings for channel EXCH_STS (%MWr.m.c.0).

Standard symbol	Type	Access	Meaning	Address
STS_IN_PROGR	BOOL	R	Read channel status words in progress	%MWr.m.c.0.0
CMD_IN_PROGR	BOOL	R	Command parameter exchange in progress	%MWr.m.c.0.1

Explicit Exchange Report: EXCH_RPT

The table below presents the meaning of the EXCH_RPT exchange report bits (%MWr.m.c.1).

Standard symbol	Type	Access	Meaning	Address
STS_ERR	BOOL	R	Error in reading status words of the channel (1 = error)	%MWr.m.c.1.0
CMD_ERR	BOOL	R	Error during a command parameter exchange (1 = error)	%MWr.m.c.1.1

Standard Channel Status: CH_FLT

The table below shows the meaning of the bits of the status word CH_FLT (%MWr.m.c.2). Reading is performed by a READ_STS (IODDT_VAR1).

Standard symbol	Type	Access	Meaning	Number
TRIP	BOOL	R	External event: Tripped	%MWr.m.c.2.0
FUSE	BOOL	R	External event: Fuse	%MWr.m.c.2.1
BLK	BOOL	R	Terminal block incorrectly wired	%MWr.m.c.2.2
EXT_PS_FLT	BOOL	R	External supply event	%MWr.m.c.2.3
INTERNAL_FLT	BOOL	R	Internal event module inoperative	%MWr.m.c.2.4
CONF_FLT	BOOL	R	Hardware or software configuration error	%MWr.m.c.2.5

Standard symbol	Type	Access	Meaning	Number
COM_FLT	BOOL	R	Communication interruption	%MWr.m.c.2.6
SHORT_CIRCUIT	BOOL	R	External event: Short-circuit on a channel	%MWr.m.c.2.8
LINE_FLT	BOOL	R	External event: Line open or short circuit	%MWr.m.c.2.9

Status Word: CH_CMD

The table below shows the CH_CMD (%MWr.m.c.3) status word bit meanings. The command is made by a WRITE_CMD (IODDT_VAR1).

Standard symbol	Type	Access	Meaning	Number
PS_CTRL_DIS	BOOL	R/W	Disable control of the external supply.	%MWr.m.c.3.1
PS_CTRL_EN	BOOL	R/W	Enable control of the external supply.	%MWr.m.c.3.2

NOTE: The control of the external power supply is managed to enable or disable a group of 16-channels from the PLC application and through a WRITE_CMD instruction addressing the 1st channel of 16-channel group (that is, channel 0, 16, 32, 46). However this command does not work with the last eight channels of the 16-channel groups (that is, channels 8..15, 24..31, 40..47, 56..63).

Details About T_DIS_OUT_GEN Type IODDT Implicit Object Exchange

At a Glance

This section presents `T_DIS_OUT_GEN` type IODDT Implicit Object Exchange that applies to discrete output modules.

Output Flag

The following table presents the `VALUE` (%Qr.m.c) bit meaning.

Standard symbol	Type	Access	Meaning	Number
`VALUE`	EBOOL	R/W	Indicates the status of the **c** output channel	%Qr.m.c

Error Bit

The following table presents the `CH_ERROR` (%Ir.m.c.ERR) bit meaning.

Standard symbol	Type	Access	Meaning	Number
`CH_ERROR`	BOOL	R	Indicates that **c** output channel is in error	%Ir.m.c.ERR

Details About T_DIS_OUT_STD Type IODDT Implicit Object Exchange

At a Glance

This section presents `T_DIS_OUT_STD` type IODDT Implicit Object Exchange that applies to discrete output modules.

Output Flag

The following table presents the `VALUE` (%Qr.m.c) bit meanings.

Standard symbol	Type	Access	Meaning	Number
`VALUE`	EBOOL	R/W	Indicates the status of the c output channel	%Qr.m.c

Error Bit

The following table presents the `CH_ERROR` (%Ir.m.c.ERR) bit meaning.

Standard symbol	Type	Access	Meaning	Number
`CH_ERROR`	BOOL	R	Indicates that c input channel is in error	%Ir.m.c.ERR

Details About T_DIS_OUT_STD Type IODDT Explicit Object Exchange

At a Glance

This section presents T_DIS_OUT_STD type IODDT Explicit Object Exchange that applies to discrete output modules. It includes the word type objects whose bits have a specific meaning. These objects are explained in detail below.

Example of a declaration of a variable:

IODDT_VAR1 of the T_DIS_OUT_STD type

NOTE: In general, the meaning of the bits is given for bit status 1. In specific cases an explanation is given for each status of the bit.

NOTE: Not all bits are used.

Execution Indicators for an Explicit Exchange: EXCH_STS

The table below shows the meanings of channel exchange control bits from channel EXCH_STS (%MWr.m.c.0).

Standard symbol	Type	Access	Meaning	Address
STS_IN_PROGR	BOOL	R	Read channel status words in progress	%MWr.m.c.0.0
CMD_IN_PROGR	BOOL	R	Command parameter exchange in progress	%MWr.m.c.0.1

Explicit Exchange Report: EXCH_RPT

The table below presents the meaning of the EXCH_RPT exchange report bits (%MWr.m.c.1).

Standard symbol	Type	Access	Meaning	Address
STS_ERR	BOOL	R	Error in reading status words of the channel (1 = error)	%MWr.m.c.1.0
CMD_ERR	BOOL	R	Error during a command parameter exchange (1 = error)	%MWr.m.c.1.1

Standard Channel Status: CH_FLT

The table below shows the meaning of the bits of the status word CH_FLT (%MWr.m.c.2). Reading is performed by a READ_STS (IODDT_VAR1).

Standard symbol	Type	Access	Meaning	Number
TRIP	BOOL	R	External event: Tripped	%MWr.m.c.2.0
FUSE	BOOL	R	External event: Fuse	%MWr.m.c.2.1
BLK	BOOL	R	Terminal block incorrectly wired	%MWr.m.c.2.2
EXT_PS_FLT	BOOL	R	External supply event	%MWr.m.c.2.3
INTERNAL_FLT	BOOL	R	Internal event module inoperative	%MWr.m.c.2.4
CONF_FLT	BOOL	R	Hardware or software configuration error	%MWr.m.c.2.5

Standard symbol	Type	Access	Meaning	Number
COM_FLT	BOOL	R	Communication interruption	%MWr.m.c.2.6
SHORT_CIRCUIT	BOOL	R	External event: Short-circuit on a channel	%MWr.m.c.2.8
LINE_FLT	BOOL	R	External event: Line open or short circuit	%MWr.m.c.2.9

Status word: CH_CMD

The table below shows the CH_CMD (%MWr.m.c.3) status word bit meanings. The command is made by a WRITE_CMD (IODDT_VAR1).

Standard symbol	Type	Access	Meaning	Address
REAC_OUT	BOOL	R/W	Reactivation of tripped outputs (protected outputs)	%MWr.m.c.3.0
PS_CTRL_DIS	BOOL	R/W	Inhibit control of external supply	%MWr.m.c.3.1
PS_CTRL_EN	BOOL	R/W	Validation of the external supply control	%MWr.m.c.3.2

NOTE: This object is specific to output modules with reactivation.

NOTE: The control of the external power supply is managed to enable or disable a group of 16-channels from the PLC application and through a WRITE_CMD instruction addressing the 1st channel of 16-channel group (i.e. channel 0, 16, 32, 46). However this command does not work with the last eight channels of the 16-channel groups (i.e. channels 8..15, 24..31, 40..47, 56..63).

Details of the Language Objects of the IODDT of Type T_GEN_MOD

Introduction

The modules of Modicon M340 and X80 PLCs have an associated IODDT of type T_GEN_MOD.

Observations

In general, the meaning of the bits is given for bit status 1. In specific cases an explanation is given for each status of the bit.

Some bits are not used.

List of Objects

The table below presents the objects of the IODDT.

Standard Symbol	Type	Access	Meaning	Address
MOD_ERROR	BOOL	R	Module detected error bit	%Ir.m.MOD.ERR
EXCH_STS	INT	R	Module exchange control word	%MWr.m.MOD.0
STS_IN_PROGR	BOOL	R	Reading of status words of the module in progress	%MWr.m.MOD.0.0
EXCH_RPT	INT	R	Exchange report word	%MWr.m.MOD.1
STS_ERR	BOOL	R	Event when reading module status words	%MWr.m.MOD.1.0
MOD_FLT	INT	R	Internal detected errors word of the module	%MWr.m.MOD.2
MOD_FAIL	BOOL	R	module inoperable	%MWr.m.MOD.2.0
CH_FLT	BOOL	R	Inoperative channel(s)	%MWr.m.MOD.2.1
BLK	BOOL	R	Terminal block incorrectly wired	%MWr.m.MOD.2.2
CONF_FLT	BOOL	R	Hardware or software configuration anomaly	%MWr.m.MOD.2.5
NO_MOD	BOOL	R	Module missing or inoperative	%MWr.m.MOD.2.6
EXT_MOD_FLT	BOOL	R	Internal detected errors word of the module (Fipio extension only)	%MWr.m.MOD.2.7
MOD_FAIL_EXT	BOOL	R	Internal detected error, module unserviceable (Fipio extension only)	%MWr.m.MOD.2.8
CH_FLT_EXT	BOOL	R	Inoperative channel(s) (Fipio extension only)	%MWr.m.MOD.2.9
BLK_EXT	BOOL	R	Terminal block incorrectly wired (Fipio extension only)	%MWr.m.MOD.2.10
CONF_FLT_EXT	BOOL	R	Hardware or software configuration anomaly (Fipio extension only)	%MWr.m.MOD.2.13
NO_MOD_EXT	BOOL	R	Module missing or inoperative (Fipio extension only)	%MWr.m.MOD.2.14

Modicon 340 Discrete I/O Module Configuration Constants

Module level constants

The table following presents the %KW common for each channel group of the module:

Object	Type	Detail	Channel group							
%KWr.m.c.0 with c = 0, 8, 16, 24, 32, 40, 48, 56.	INT	For each channel group bit 0: Validation input function = 1 bit 1: Validation output function = 1 bit 2: Strategy of fallback: 1 = get value, 0 = stay at current value bit 3: Input filtering (1 = fast, 0 = normal), fixed at 0 bit 4: Ouput protection (1 = yes, 0 = no) bit 5: Rearm outputs: 1 = automatic, 0 = by command bit 6: Not used bit 7: Power supply control inhibition (1 = yes, 0 = 0)	0-7 1 st grp	8-15 2 nd grp	16-23 3 rd grp	24-31 4 th grp	32-39 5 th grp	40-47 6 th grp	48-55 7 th grp	56-63 8 th grp
			Fallback value (ouputs) or sensor type (inputs) for channel:							
		bit 8	0	8	16	24	32	40	48	56
		bit 9	1	9	17	25	33	41	49	57
		bit 10	2	10	18	26	34	42	50	58
		bit 11	3	11	19	27	35	43	51	59
		bit 12	4	12	20	28	36	44	52	60
		bit 13	5	13	21	29	37	45	53	61
		bit 14	6	14	22	30	38	46	54	62
		bit 15	7	15	23	31	39	47	55	63
%KWr.m.c.1	INT									
byte 0	byte		Validation of Input/output open line control for channel:							
		bit 0	0	8	16	24	32	40	48	56
		bit 1	1	9	17	25	33	41	49	57
		bit 2	2	10	18	26	34	42	50	58
		bit 3	3	11	19	27	35	43	51	59
		bit 4	4	12	20	28	36	44	52	60
		bit 5	5	13	21	29	37	45	53	61
		bit 6	6	14	22	30	38	46	54	62
		bit 7	7	15	23	31	39	31	55	63

Object	Type	Detail	Channel group							
byte 1	byte		Validation of value memorization for channel:							
		bit 8	0	8	16	24	32	40	48	56
		bit 9	1	9	17	25	33	41	49	57
		bit 10	2	10	18	26	34	42	50	58
		bit 11	3	11	19	27	35	43	51	59
		bit 12	4	12	20	28	36	44	52	60
		bit 13	5	13	21	29	37	45	53	61
		bit 14	6	14	22	30	38	46	54	62
		bit 15	7	15	23	31	39	47	55	63
%KWr.m.c.2	INT									
byte 0	byte	not used								
byte 1	byte	not used								

There are one %KWr.m.c.0, one %KWr.m.c.1 and one %KWr.m.c.2 common for all channels for a group in this FB_type

NOTE: It is not possible to configure a module by programming using direct language objects %KW; these words are accessible in read only format.

Discrete Device DDT Names

Introduction

This topic describes the Unity Pro **Discrete Device DDT**.

The default device DDT name contains the following information:
- module input and/or output (***X*** symbol)
- module insertion number (**#** symbol)

For example: `MOD_DIS_`***x***`_`**#**

The default device DDT type contains the following information:
- platform with:
  - M for Modicon M340
  - U for unified structure between M340 and Quantum
- device type (DIS for discrete)
- function (STD for standard)
- direction:
  - IN
  - OUT
- max channel (1, 2, 4 …64)

Example

For a Modicon M340 device with 16 standard inputs/outputs: T_U_DIS_STD_IN_16_OUT_16

List of Implicit Device DDT

The following table shows the list of Modicon M340 devices and their corresponding device DDT name and type:

Device DDT Name	Device DDT Type	Modicon M340 Devices
MOD_DIS_8_#	`T_U_DIS_STD_IN_8`	BMX DAI 0805 BMX DAI 0814
MOD_DIS_16_#	`T_U_DIS_STD_IN_16`	BMX DAI 1602 BMX DAI 1603 BMX DDI 1602 BMX DDI 1603 BMX DDI 1604 BMX DAI 1604
MOD_DIS_32_#	`T_U_DIS_STD_IN_32`	BMX DDI 3202K
MOD_DIS_64_#	`T_U_DIS_STD_IN_64`	BMX DDI 6404K
MOD_DIS_8_#	`T_U_DIS_STD_OUT_8`	BMX DRA 0805 BMX DRA 0804

Device DDT Name	Device DDT Type	Modicon M340 Devices
MOD_DIS_16_#	`T_U_DIS_STD_OUT_16`	BMX DDO 1612 BMX DDO 1602 BMX DAO 1605 BMX DRA 1605
MOD_DIS_32_#	`T_U_DIS_STD_OUT_32`	BMX DDO 3202K
MOD_DIS_64_#	`T_U_DIS_STD_OUT_64`	BMX DDO 6404K
MOD_DIS_16_#	`T_U_DIS_STD_IN_8_OUT_8`	BMX DDM 16022 BMX DDM 16025
MOD_DIS_32_#	`T_U_DIS_STD_IN_16_OUT_16`	BMX DDM 3202K

Implicit Device DDT instances Description

The following table shows the `T_U_DIS_STD_IN_x` and the `T_U_DIS_STD_OUT_y` status word bits:

Standard Symbol	Type	Meaning	Access
MOD_HEALTH	BOOL	0 = the module has a detected error	read
		1 = the module is operating correctly	
MOD_FLT[1]	BYTE	internal detected errors byte of the module	read
DIS_CH_IN	ARRAY [0...x-1]of `T_U_DIS_STD_CH_IN`	array of structure	
DIS_CH_OUT	ARRAY [0...y-1] of `T_U_DIS_STD_CH_OUT`	array of structure	

1 Module Status is implicitly exchanged through the `MOD_FLT` field

The following table shows the `T_U_DIS_STD_IN_x_OUT_y` status word bits:

Standard Symbol	Type	Meaning	Access
MOD_HEALTH	BOOL	0 = the module has a detected error	read
		1 = the module is operating correctly	
MOD_FLT[1]	BYTE	internal detected errors byte of the module	read
DIS_CH_IN	ARRAY [0...x-1] of `T_U_DIS_STD_CH_IN`	array of structure	
DIS_CH_OUT	ARRAY [x...(x+y-1)] of `T_U_DIS_STD_CH_OUT`	array of structure	

1 Module Status is implicitly exchanged through the `MOD_FLT` field

The following table shows the T_U_DIS_STD_CH_IN[0...x-1] and the T_U_DIS_STD_CH_OUT[x...(x+y-1)] structure meaning:

Standard Symbol	Type	Meaning	Access
CH_HEALTH	BOOL	0 = the channel has a detected error	read
		1 = the channel is operating correctly	
VALUE	EBOOL	indicates the status of the sensor controlling the input channel **c**	read[1]
1 VALUE of the T_U_DIS_STD_CH_OUT structure can be accessed in read / write			

Explicit DDT Instances Description

Explicit exchanges (Read Status or Write Command) - only applicable to Modicon M340 I/O channels - are managed with READ_STS_QX or WRITE_CMD_QX EFB instances.

- Targeted channel address (ADDR) can be managed with ADDMX *(see Unity Pro, Communication, Block Library)* EF (connect ADDMX OUT to ADDR)
- READ_STS_QX *(see Unity Pro, I/O Management, Block Library)* output parameter (STS) can be connected to a "T_M_xxx_yyy_CH_STS" DDT instance (variable to be created manually), where:
  - xxx represents the device type
  - yyy represents the function

  Example: T_M_DIS_STD_CH_STS
- WRITE_CMD_QX *(see Unity Pro, I/O Management, Block Library)* input parameter (CMD) can be connected to a ""T_M_DIS_STD_xxx_yyy_CMD" DDT instance
  where:
  - xxx represents the device type
  - yyy represents the direction

  Example: T_M_DIS_STD_CH_IN_CMD

The following table shows the T_M_DIS_CH_STS, T_M_DIS_STD_CH_IN_CMD, T_M_DIS_STD_CH_OUT_CMD status word bits:

Type	Type	Access
STRUCT	T_M_DIS_STD_CH_STS	
STRUCT	T_M_DIS_STD_CH_IN_CMD	
STRUCT	T_M_DIS_STD_CH_OUT_CMD	

The following table shows the `T_M_DIS_STD_CH_STS` structure status word bits:

Standard Symbol		Type	Bit	Meaning	Access
CH_FLT	TRIP	BOOL	0	external detected error tripped	read
	FUSE	BOOL	1	external detected error: fuse	read
	BLK	BOOL	2	terminal block detected error	read
	EXT_PS_FLT	BOOL	3	internal detected error: module out of order	read
	INTERNAL_FLT	BOOL	4	external supply detected fault	read
	CONF_FLT	BOOL	5	configuration detected fault: different hardware and software configurations	read
	COM_FLT	BOOL	6	problem communicating with the PLC	read
	--	BOOL	7	reserved	read
	SHORT_CIRCUIT	BOOL	8	external detected error: short-circuit on a channel	read
	LINE_FLT	BOOL	9	external detected error: line fault	read

The following table presents the `T_M_DIS_STD_CH_IN_CMD` structure status word bits:

Standard Symbol		Type	Bit	Meaning	Access
CH_CMD [INT]	PS_CTRL_DIS	BOOL	1	disable control of the external supply	read / write
	PS_CTRL_EN	BOOL	2	enable control of the external supply	read / write

The following table presents the `T_M_DIS_STD_CH_OUT_CMD` structure status word bits:

Standard Symbol		Type	Bit	Meaning	Access
CH_CMD [INT]	REAC_OUT	BOOL	0	reactivation of tripped outputs (protected outputs)	read / write
	PS_CTRL_DIS	BOOL	1	disable control of the external supply	read / write
	PS_CTRL_EN	BOOL	2	enable control of the external supply	read / write

NOTE: In a user application the `WRITE_CMD_QX` (in an EIO drop) can also define the active or inactive state of the external power supply monitoring and overrides the **Supply monitoring** setting.
`WRITE_CMD_QX` only works over the first 8 channels (0...7, 16...23, 32...39 and 48...55) of the 16 channel groups, but affects all 16 channels of the group.

Chapter 29
Debugging

Subject of this Section

This section describes the debugging aspect of the application-specific discrete module for implementation.

What Is in This Chapter?

This chapter contains the following topics:

Introduction to the Debugging Function of a Discrete Module

Introduction

For each discrete input/output module, the Debug function enables:

- display of the parameters of each of its channels (channel state, filtering value, etc.)
- access to the diagnostics and adjustment functions for the selected channel (channel forcing, channel masking, etc.)

The function also gives access to module diagnostics in the event of a detected error.

NOTE: This function is only available in on-line mode.

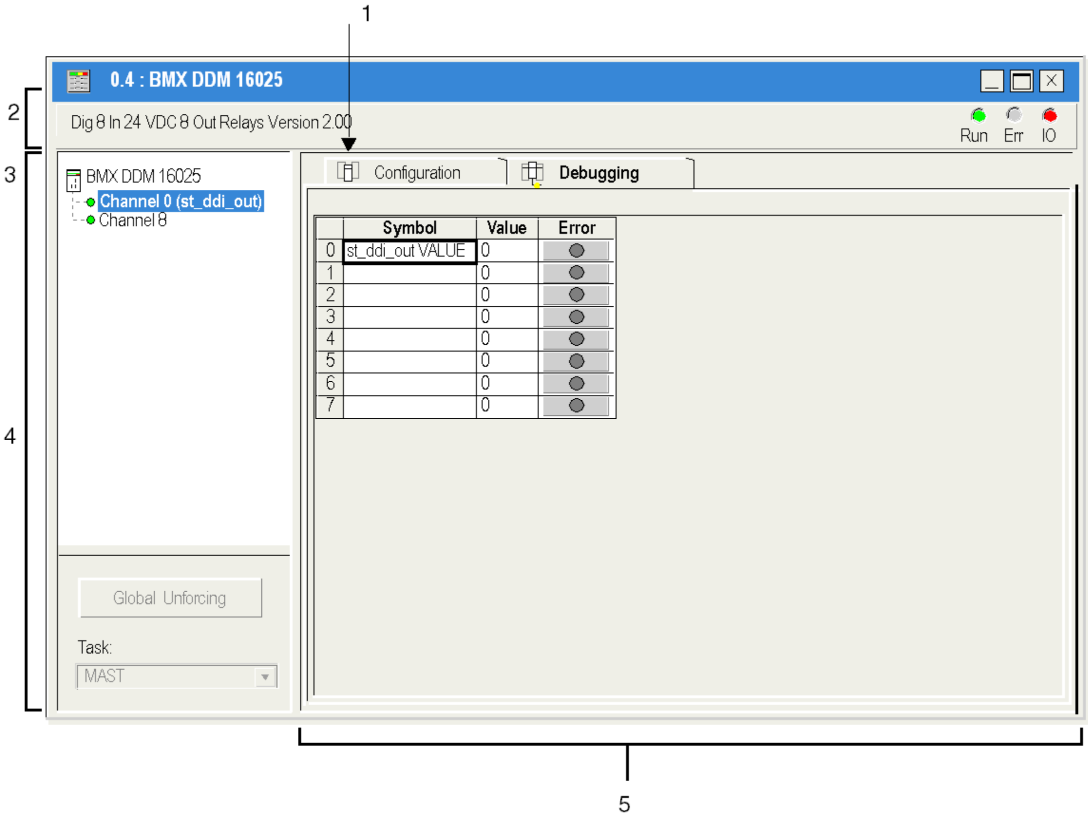
Debugging Screen

At a Glance

The debugging screen *(see Unity Pro, Operating Modes)* shows, in real time, the value and state of each channel of the selected module. It also allows access to the channel commands (forcing of the input or output value, reactivation of outputs, etc.).

Illustration

The figure below shows a sample debugging screen.



Description

The following table shows the various parts of the debugging screen and their functions.

Number	Element	Function
1	Tabs	The tab in the foreground indicates the mode in progress (**Debug** in this example). Every mode can be selected using the respective tab. ● **Debug** which can be accessed only in online mode ● **Configuration**
2	**Module** area	Contains the abbreviated title of the module. In the same area there are 3 LEDs which indicate the module's operating mode: ● **RUN** indicates the operating status of the module ● **ERR** indicates an internal event in the module ● **I/O** indicates an event from outside the module or an application issue

3	**Channel** area	Allows you:
		● by clicking on the reference number, to display the tabs:
		  ● **Description** which gives the characteristics of the device
		  ● **I/O Objects,** *(see Unity Pro, Operating Modes)* which is used to pre-symbolize the input/output objects
		  ● **Fault** which shows the device status (in on-line mode)
		● to select a channel
		● to display the **Symbol**, name of the channel defined by the user (using the variable editor)

4	**General parameters** area	Specifies the parameters of the channel: ● **Function:** specifies the function configured. This heading is frozen. The **Global unforcing** button provides direct access to the global unforcing of channels function. ● **Task:** specifies the **MAST** or **FAST** task configured. This heading is frozen.
5	**Parameters in progress** field	This field displays the state of inputs and outputs and the various current parameters. For each channel, four items of information are available: ● **Symbol** displays the symbol associated with the channel when it has been defined by the user (using the variable editor) ● **Value** displays the state of each channel of the module ● **Error** provides direct access to channel by channel diagnostics when these are inoperable (indicated by the LED built into the diagnostics access, which turns red)

How to Access the Forcing/Unforcing Function

At a Glance

This function allows you to modify the state of all or part of the channels of a module.

NOTE: The state of a forced output is frozen and can only be modified by the application after unforcing. However, in the event of a detected error leading to output fallback, the state of these outputs -assumes the value defined when configuring the **Fallback mode** *(see Premium and Atrium using Unity Pro, Discrete I/O modules, User manual)* parameter.

The various commands available are:

- for one or more channels:
  - force to 1
  - force to 0
  - unforcing (when the channel or channels selected are forced)
- for all the channels on the module (when at least one channel is forced):
  - global unforcing of channels

Procedure

The following table shows the procedure for forcing or unforcing all or part of the channels of a module.

Step	Action for one channel	Action for all channels
1	Access the module’s debugging screen.	
2	In the **Value** column, right-click the cell of the required channel.	Click on the **Global unforcing** button found in the general parameters field.
3	Select the required function: ● **forcing to 0** ● **forcing to 1**	

How to Access the SET and RESET Commands

At a Glance

These commands are used to change the state of a module’s outputs to 0 (**RESET**) or 1 (**SET**).

NOTE: The state of the output affected by one of these commands is temporary and can be modified at any time by the application when the PLC is in **RUN**.

Procedure

The table below shows the procedure for assigning the value 0 or 1 to all or part of the channels of a module.

Step	Action for one channel
1	Access the module’s debugging screen.
2	In the **Value** column, right-click the cell of the required channel.
3	Select the desired function. ● **Set** ● **Reset**

How to Access the Reactivation of Outputs Command

At a Glance

When an event has caused a tripped output, this command is used to reactivate the output if no error remains at its terminals.

Reset is defined by a group of 8 channels. It has no effect on an inactive channel or channel without a detected error.

Procedure

The following table shows the procedure for reactivating tripped outputs.

Step	Action
1	Access the module’s debugging screen.
2	For the chosen group of channels, click on the **Reset** button situated in the **General parameters** field.

Applied Outputs of a Discrete Module

At a Glance

This check (red **Stop** LED lit) informs the user that a given group of output channels is not correctly applied by the PLC (fallback status).

The possible causes are:

- processor error
- rack connection error
- inter-rack link connection error

Chapter 30
Diagnostics of the Modules

Subject of this Section

This section describes the diagnostic aspect in the implementation of the application-specific discrete modules.

What Is in This Chapter?

This chapter contains the following topics:

How to Access the Diagnostics Function

At a Glance

The **Module diagnostics** function displays current errors and where they exist. Errors are classified according to their category.

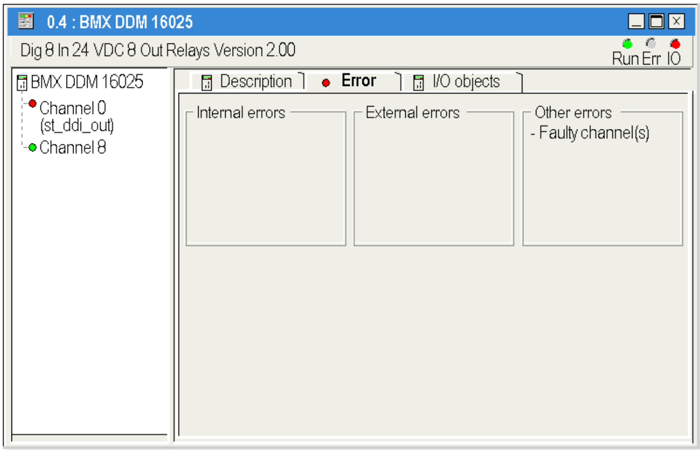
- **Internal events**:
  - module inoperable
  - self-tests running
- **External events**
- **Other events**:
  - configuration error
  - module missing or off
  - inoperative channel(s) *(see Premium and Atrium using Unity Pro, Discrete I/O modules, User manual)*

A module status is indicated when certain LED's change to red, such as:

- in the configuration editor at rack level:
  - the LED of the rack number
  - the LED of the slot number of the module on the rack
- in the configuration editor at module level:
  - the **I/O** LED according to the type of event
  - the **Channel** LED in the **Channel** field
  - the **Fault** tab

Procedure

The following table shows the procedure for accessing the **Module status** screen.

Step	Action
1	Access the module's debugging screen.
2	Click on the module reference in the channel zone and select the **Fault** command. **Result**: The list of module errors appears.  **Remark:** It is not possible to access the module diagnostics screen if a configuration error, major breakdown error, or module missing error occurs. The following message then appears on the screen: `The module is not present or is different from the one configured in this position.`

How to Access the Channel Diagnostics Function of a Discrete Module

At a Glance

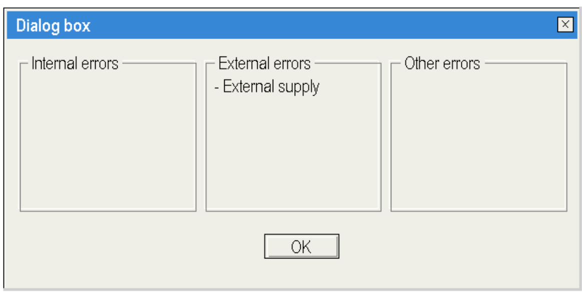
The **Channel diagnostics** function displays current errors and where they exist. Errors are classified according to their category:

- **Internal events**:
  - inoperative channel
- **External events:**
  - link or sensor supply fault
- **Other events:**
  - terminal block incorrectly wired
  - configuration error
  - communication interruption

A channel error appears in the **Debug** tab when the  LED, located in the **Error** column, turns red.

Procedure

The following table shows the procedure for accessing the **Channel error** screen.

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Access the module’s debugging screen.</td></tr>
<tr><td>2</td><td>Click on the button  situated in the Error column of the inoperative channel.
Result: The list of channel errors appears.


Note: Channel diagnostics information can also be accessed by program using the <code>READ_STS</code> instruction.</td></tr>
</table>

Appendices

Appendix A
Topological/State RAM Addressing of the Modules

Topological/State RAM Addressing of Modicon M340 Discrete Modules

Discrete Modules

With Unity Pro 6.1 or later and Modicon M340 firmware 2.4 or later, you can access the modules either via topological or State RAM addresses. Please also refer to *Memory Tab (see Unity Pro, Operating Modes)*.

The following table shows the Modicon M340 discrete module objects that can be mapped to topological or State RAM addresses.

Module reference	Topological address	State RAM address
BMX DAI 0805 BMX DAI 0814	%I rack.slot.channel, channel [0,7]	-%IStart address ... %IStart address + 7, one channel per %I or -%IWStart address, one channel per bit of %IW
BMX DAI 1602	%I rack.slot.channel, channel [0,15]	- %IStart address ... %IStart address + 15, one channel per %I or - %IWStart address, one channel per bit of %IW
BMX DAI 1603	%I rack.slot.channel, channel [0,15]	- %IStart address ... %IStart address + 15, one channel per %I or - %IWStart address, one channel per bit of %IW
BMX DAI 1604	%I rack.slot.channel, channel [0,15]	- %IStart address ... %IStart address + 15, one channel per %I or - %IWStart address, one channel per bit of %IW
BMX DAI 0804 *(BMX DAI 1604 module with reduced number of I/Os) (see LL984 Editor, Reference Manual, LL984 Specifics)*	%I rack.slot.channel, channel [0,7]	- %IStart address ... %IStart address + 7, one channel per %I or - %IWStart address, one channel per bit of %IW
BMX DAO 1605	%Q rack.slot.channel, channel [0,15]	- %MStart address ... %MStart address + 15, one channel per %M or - %MWStart address, one channel per bit of %MW

Module reference	Topological address	State RAM address
BMX DAO 0805 *(BMX DAO 1605 module with reduced number of I/Os) (see LL984 Editor, Reference Manual, LL984 Specifics)*	%Q rack.slot.channel, channel [0,7]	- %MStart address ... %MStart address + 7, one channel per %M or - %MWStart address, one channel per bit of %MW
BMX DDI 1602	%I rack.slot.channel, channel [0,15]	- %IStart address ... %IStart address + 15, one channel per %I or - %IWStart address, one channel per bit of %IW
BMX DDI 1603	%I rack.slot.channel, channel [0,15]	- %IStart address ... %IStart address + 15, one channel per %I or - %IWStart address, one channel per bit of %IW
BMX DDI 1604	%I rack.slot.channel, channel [0,15]	- %IStart address ... %IStart address + 15, one channel per %I or - %IWStart address, one channel per bit of %IW
BMX DDI 0804 *(BMX DDI 1604 module with reduced number of I/Os) (see LL984 Editor, Reference Manual, LL984 Specifics)*	%I rack.slot.channel, channel [0,7]	- %IStart address ... %IStart address + 7, one channel per %I or - %IWStart address, one channel per bit of %IW
BMX DDI 3202K	%I rack.slot.channel, channel [0,31]	- %IStart address ... %IStart address + 31, one channel per %I or - %IWStart address ... %IWStart address + 1, one channel per bit of %IW
BMX DDI 6402K	%I rack.slot.channel, channel [0,63]	- %IStart address ... %IStart address + 63, one channel per %I or - %IWStart address ... %IWStart address + 3, one channel per bit of %IW
BMX DDM 16022	%I rack.slot.channel, channel [0,7] %Q rack.slot.channel, channel [16,23]	- %IStart address ... %IStart address + 7, one channel per %I and - %M Start address ... %MStart address + 7, one channel per %M or - %IWStart address, one channel per bit of %IW and %MWStart address, one channel per bit of %MW

Module reference	Topological address	State RAM address
BMX DDM 16025	%I rack.slot.channel, channel [0,7] %Q rack.slot.channel, channel [16,23]	- %IStart address ... %IStart address + 7, one channel per %I and - %M Start address ... %MStart address + 7, one channel per %M or - %IWStart address one channel per bit of %IW and - %MWStart address, one channel per bit of %MW
BMX DDM 3202K	%I rack.slot.channel, channel [0,15] %Q rack.slot.channel, channel [16,31]	- %IStart address ... %IStart address + 15, one channel per %I and - %M Start address ... %MStart address + 15, one channel per %M or - %IWStart address, one channel per bit of %IW and - %MWStart address, one channel per bit of %MW
BMX DDO 1602	%Q rack.slot.channel, channel [0,15]	- %MStart address ... %MStart address + 15, one channel per %M or - %MWStart address, one channel per bit of %MW
BMX DDO 1612	%Q rack.slot.channel, channel [0,15]	- %MStart address ... %MStart address + 15, one channel per %M or - %MWStart address, one channel per bit of %MW
BMX DDO 3202K	%Q rack.slot.channel, channel [0,31]	- %MStart address ... %MStart address + 31, one channel per %M or - %MWStart address ... %MWStart address + 1, one channel per bit of %MW
BMX DDO 6402K	%Q rack.slot.channel, channel [0,63]	- %MStart address ... %MStart address + 63, one channel per %M or - %MWStart address ... %MWStart address + 3, one channel per bit of %MW
BMX DRA 0804	%Q rack.slot.channel, channel [0,7]	- %MStart address ... %MStart address + 7, one channel per %M or - %MWStart address, one channel per bit of %MW

Module reference	Topological address	State RAM address
BMX DRA 0805	%Q rack.slot.channel, channel [0,7]	- %MStart address ... %MStart address + 7, one channel per %M or - %MWStart address, one channel per bit of %MW
BMX DRA 1605	%Q rack.slot.channel, channel [0,15]	- %MStart address ... %MStart address + 15, one channel per %M or - %MWStart address, one channel per bit of %MW

For additional information please refer to *Special Conversion for Compact I/O Modules (see LL984 Editor, Reference Manual, LL984 Specifics)*.

Glossary

C

Channel group

Channels of the same type with common parameters. This notion concerns certain application-specific modules such as discrete modules.

CPU

Central Processing Unit: generic name used for Schneider Electric processors.

D

Discrete Module

Discrete inputs/outputs

I

IODDT

Type of data derived from inputs/outputs (Input/Output Derived Data Type).

IP20

This index is present on all device labels. It specifies the device’s level of protection:

- against an intrusion of solids and dust, against contact with parts that are powered up (in our case, IP2•: protection against solids larger than 12 mm);
- against permeation of liquids (in our case, IP•0: Negligeable presence of water).

P

PLC

Type of computer dedicated to controlling industrial processes (Programmable Logic Controller).

T

TELEFAST 2

A group of products which enable discrete input and output modules to be quickly connected to operational components. This system, which consists of connection bases for interfaces and linking cables, can only be connected to modules which are fitted with 40-pin connectors.

U

Unity Pro

Schneider Electric PLC programming software.

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