

VIPA System SLIO

SM-DIO || Manual HB300 | SM-DIO || en | 18-16 Digital signal modules - SM 02x



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VIPA CONTROLS

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1 General

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1.2 About this manual

Target audience	The manual is targeted at users who have a background in automation technology.		
Structure of the manual	The manual consists of chapters. Every chapter provides a self-contained description of a specific topic.		
Guide to the document	 The following guides are available in the manual: An overall table of contents at the beginning of the manual References with page numbers 		
Availability	 The manual is available in: printed form, on paper in electronic form as PDF-file (Adobe Acrobat Reader) 		
Icons Headings	Important passages in the text are highlighted by following icons and headings: DANGER! Immediate or likely danger. Personal injury is possible.		



CAUTION! Damages to property is likely if these warnings are not heeded.



Supplementary information and useful tips.

1.3 Safety information

Applications conforming with specifications

- The system is constructed and produced for:
- communication and process control
- general control and automation tasks
- industrial applications
- operation within the environmental conditions specified in the technical data
- installation into a cubicle



DANGER!

This device is not certified for applications in

in explosive environments (EX-zone)

Documentation

The manual must be available to all personnel in the

- project design department
- installation department
- commissioning
- operation



CAUTION!

The following conditions must be met before using or commissioning the components described in this manual:

- Hardware modifications to the process control system should only be carried out when the system has been disconnected from power!
- Installation and hardware modifications only by properly trained personnel.
- The national rules and regulations of the respective country must be satisfied (installation, safety, EMC ...)

Disposal

National rules and regulations apply to the disposal of the unit!

Safety information for users

2 Basics and mounting

2.1 Safety information for users

Handling of electrostatic sensitive modules VIPA modules make use of highly integrated components in MOS-Technology. These components are extremely sensitive to over-voltages that can occur during electrostatic discharges. The following symbol is attached to modules that can be destroyed by electrostatic discharges.



The Symbol is located on the module, the module rack or on packing material and it indicates the presence of electrostatic sensitive equipment. It is possible that electrostatic sensitive equipment is destroyed by energies and voltages that are far less than the human threshold of perception. These voltages can occur where persons do not discharge themselves before handling electrostatic sensitive modules and they can damage components thereby, causing the module to become inoperable or unusable. Modules that have been damaged by electrostatic discharges can fail after a temperature change, mechanical shock or changes in the electrical load. Only the consequent implementation of protection devices and meticulous attention to the applicable rules and regulations for handling the respective equipment can prevent failures of electrostatic sensitive modules.

Shipping of modules

Modules must be shipped in the original packing material.

Measurements and alterations on electrostatic sensitive modules When you are conducting measurements on electrostatic sensitive modules you should take the following precautions:

- Floating instruments must be discharged before use.
- Instruments must be grounded.

Modifying electrostatic sensitive modules you should only use soldering irons with grounded tips.



CAUTION!

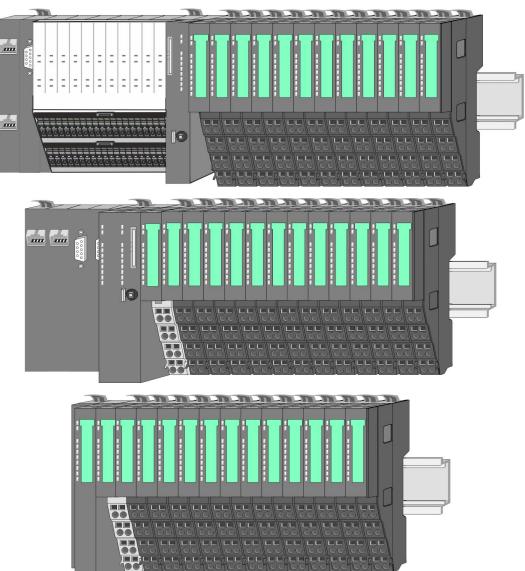
Personnel and instruments should be grounded when working on electrostatic sensitive modules.

System conception > Overview

2.2 System conception

2.2.1 Overview

System SLIO is a modular automation system for assembly on a 35mm mounting rail. By means of the peripheral modules with 2, 4 or 8 channels this system may properly be adapted matching to your automation tasks. The wiring complexity is low, because the supply of the DC 24V power section is integrated to the backplane bus and defective modules may be replaced with standing wiring. By deployment of the power modules in contrasting colors within the system, further isolated areas may be defined for the DC 24V power section supply, respectively the electronic power supply may be extended with 2A.



2.2.2 Components

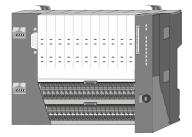
- CPU (head module)
- Bus coupler (head module)
- Line extension

- Periphery modules
- Accessories

CAUTION!

Only modules of VIPA may be combined. A mixed operation with thirdparty modules is not allowed!

CPU 01xC



With this CPU 01xC, the CPU electronic, input/output components and power supply are integrated to one casing. In addition, up to 64 periphery modules of the System SLIO can be connected to the backplane bus. As head module via the integrated power supply CPU electronic and the I/O components are power supplied as well as the electronic of the connected periphery modules. To connect the power supply of the I/O components and for DC 24V power supply of via backplane bus connected peripheral modules, the CPU has removable connectors. By installing of up to 64 periphery modules at the backplane bus, these are electrically connected, this means these are assigned to the backplane bus, the electronic modules are power supplied and each periphery module is connected to the DC 24V power section supply.

CPU 01x



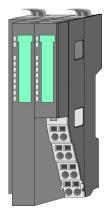
With this CPU 01x, the CPU electronic and power supply are integrated to one casing. As head module, via the integrated power module for power supply, CPU electronic and the electronic of the connected periphery modules are supplied. The DC 24 power section supply for the linked periphery modules is established via a further connection of the power module. By installing of up to 64 periphery modules at the backplane bus, these are electrically connected, this means these are assigned to the backplane bus, the electronic modules are power supplied and each periphery module is connected to the DC 24V power section supply.



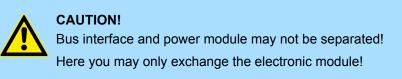
CAUTION!

CPU part and power module may not be separated! Here you may only exchange the electronic module!

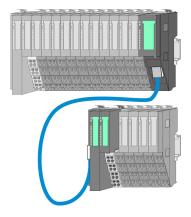
Bus coupler



With a bus coupler bus interface and power module is integrated to one casing. With the bus interface you get access to a subordinated bus system. As head module, via the integrated power module for power supply, bus interface and the electronic of the connected periphery modules are supplied. The DC 24 power section supply for the linked periphery modules is established via a further connection of the power module. By installing of up to 64 periphery modules at the bus coupler, these are electrically connected, this means these are assigned to the backplane bus, the electronic modules are power supplied and each periphery module is connected to the DC 24V power section supply.



Line extension

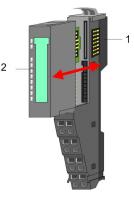


In the System SLIO there is the possibility to place up to 64 modules in on line. By means of the line extension you can divide this line into several lines. Here you have to place a line extension master at each end of a line and the subsequent line has to start with a line extension slave. Master and slave are to be connected via a special connecting cable. In this way, you can divide a line on up to 5 lines. For each line extension the maximum number of pluggable modules at the System SLIO bus is decreased by 1. To use the line extension no special configuration is required.

Periphery modules

Each periphery module consists of a *terminal* and an *electronic module*.





- 1 Terminal module
- 2 Electronic module

System conception > Accessories

Terminal module



The *terminal* module serves to carry the electronic module, contains the backplane bus with power supply for the electronic, the DC 24V power section supply and the staircase-shaped terminal for wiring. Additionally the terminal module has a locking system for fixing at a mounting rail. By means of this locking system your SLIO system may be assembled outside of your switchgear cabinet to be later mounted there as whole system.

Electronic module



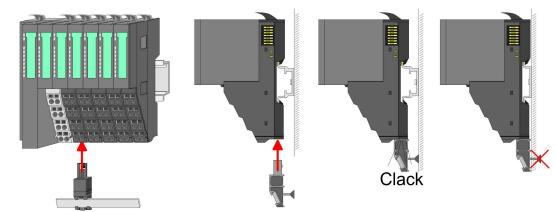
The functionality of a SLIO periphery module is defined by the *electronic* module, which is mounted to the terminal module by a sliding mechanism. With an error the defective module may be exchanged for a functional module with standing installation. At the front side there are LEDs for status indication. For simple wiring each module shows a corresponding connection diagram at the front and at the side.

2.2.3 Accessories

Shield bus carrier



The shield bus carrier (order no.: 000-0AB00) serves to carry the shield bus (10mm x 3mm) to connect cable shields. Shield bus carriers, shield bus and shield fixings are not in the scope of delivery. They are only available as accessories. The shield bus carrier is mounted underneath the terminal of the terminal module. With a flat mounting rail for adaptation to a flat mounting rail you may remove the spacer of the shield bus carrier.



Bus cover



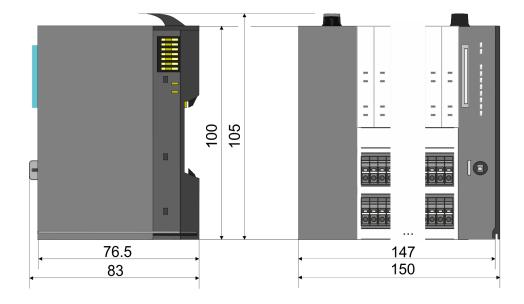
With each head module, to protect the backplane bus connectors, there is a mounted bus cover in the scope of delivery. You have to remove the bus cover of the head module before mounting a System SLIO module. For the protection of the backplane bus connector you always have to mount the bus cover at the last module of your system again. The bus cover has the order no. 000-0AA00.

Coding pins



There is the possibility to fix the assignment of electronic and terminal module. Here coding pins (order number 000-0AC00) from VIPA can be used. The coding pin consists of a coding jack and a coding plug. By combining electronic and terminal module with coding pin, the coding jack remains in the electronic module and the coding plug in the terminal module. This ensures that after replacing the electronics module just another electronic module can be plugged with the same encoding.

2.3 Dimensions Dimensions CPU 01xC

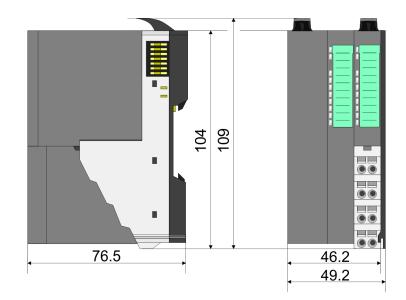


Dimensions

Dimensions CPU 01x

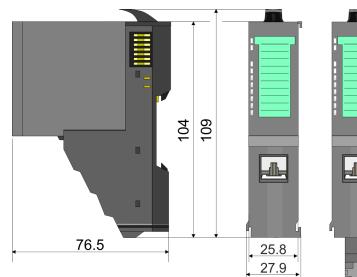


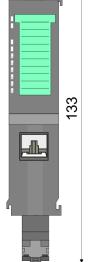
Dimensions bus coupler and line extension slave



Dimensions

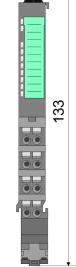
Dimensions line extension master



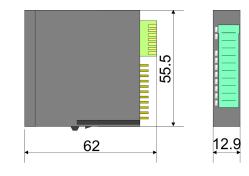


Dimension periphery module

104 109 133 76.5 12.**9** 15



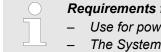
Dimensions electronic module



Dimensions in mm

Mounting periphery modules

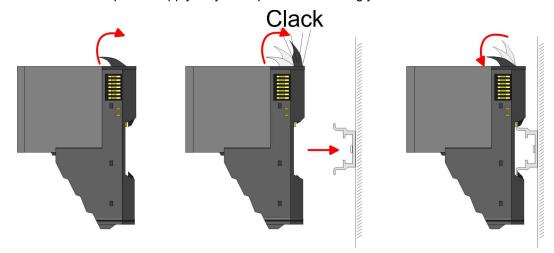
2.4 Mounting periphery modules



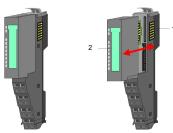
Requirements for UL compliance use

- Use for power supply exclusively SELV/PELV power supplies.
- The System SLIO must be installed and operated in a housing according to IEC 61010-1 9.3.2 c).

There is a locking lever at the top side of the module. For mounting and demounting this locking lever is to be turned upwards until this engages. For mounting place the module to the module installed before and push the module to the mounting rail guided by the strips at the upper and lower side of the module. The module is fixed to the mounting rail by pushing downward the locking lever. The modules may either separately be mounted to the mounting rail or as block. Here is to be considered that each locking lever is opened. The modules are each installed on a mounting rail. The electronic and power section supply are connected via the backplane bus. Up to 64 modules may be mounted. Please consider here that the sum current of the electronic power supply does not exceed the maximum value of 3A. By means of the power module 007-1AB10 the current of the electronic power supply may be expanded accordingly.



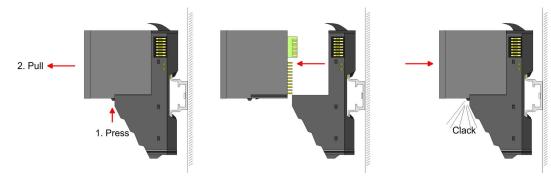
Terminal and electronic module



Each periphery module consists of a *terminal* and an *electronic module*.

- 1 Terminal module
- 2 Electronic module

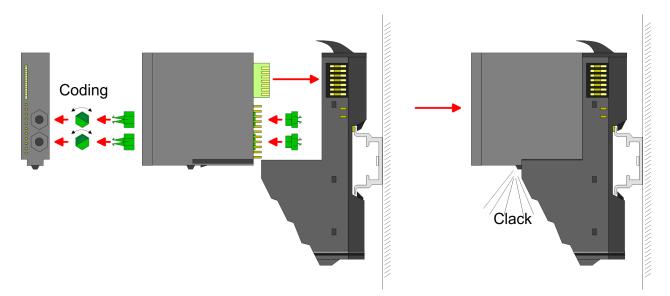
For the exchange of a electronic module, the electronic module may be pulled forward after pressing the unlocking lever at the lower side of the module. For installation plug the electronic module guided by the strips at the lower side until this engages audible to the terminal module.



Coding



There is the possibility to fix the assignment of electronic and terminal module. Here coding pins (order number 000-0AC00) from VIPA can be used. The coding pin consists of a coding jack and a coding plug. By combining electronic and terminal module with coding pin, the coding jack remains in the electronic module and the coding plug in the terminal module. This ensures that after replacing the electronics module just another electronic module can be plugged with the same encoding.



Each electronic module has on its back 2 coding sockets for coding jacks. Due to the characteristics, with the coding jack 6 different positions can be plugged, each. Thus there are 36 possible combinations for coding with the use of both coding sockets.

- 1. Plug, according to your coding, 2 coding jacks in the coding sockets of your electronic module until they lock
- **2.** Now plug the according coding plugs into the coding jacks.
- 3. To fix the coding put both the electronic and terminal module together until they lock



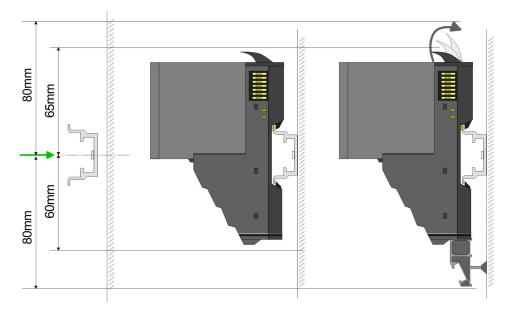
CAUTION!

Please consider that when replacing an already coded electronic module, this is always be replaced by an electronic module with the same coding.

Even with an existing coding on the terminal module, you can plug an electronic module without coding. The user is responsible for the correct usage of the coding pins. VIPA assumes no liability for incorrectly attached electronic modules or for damages which arise due to incorrect coding!

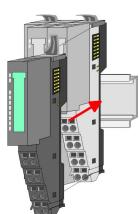
Mounting periphery modules

Mounting periphery modules

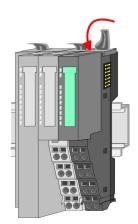


- **1.** Mount the mounting rail! Please consider that a clearance from the middle of the mounting rail of at least 80mm above and 60mm below, respectively 80mm by deployment of shield bus carriers, exist.
- 2. Mount your head module such as CPU or field bus coupler.
- **3.** Before mounting the periphery modules you have to remove the bus cover at the right side of the Head module by pulling it forward. Keep the cover for later mounting.

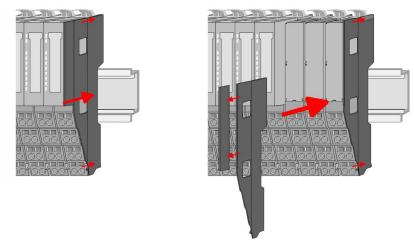




- **4.** For mounting turn the locking lever of the module upward until it engages.
- **5.** For mounting place the module to the module installed before and push the module to the mounting rail guided by the strips at the upper and lower side of the module.
- **6.** Turn the locking lever of the periphery module downward, again.



Wiring periphery modules



7. After mounting the whole system, to protect the backplane bus connectors at the last module you have to mount the bus cover, now. If the last module is a clamp module, for adaptation the upper part of the bus cover is to be removed.

2.5 Wiring periphery modules

Terminal module terminals



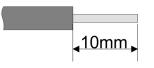
CAUTION!

Do not connect hazardous voltages!

If this is not explicitly stated in the corresponding module description, hazardous voltages are not allowed to be connected to the corresponding terminal module!

With wiring the terminal modules, terminals with spring clamp technology are used for wiring. The spring clamp technology allows quick and easy connection of your signal and supply lines. In contrast to screw terminal connections this type of connection is vibration proof.

Data



 U_{max}
 240V AC / 30V DC

 I_{max}
 10A

 Cross section
 0.08 ... 1.5mm² (AWG 28 ... 16)

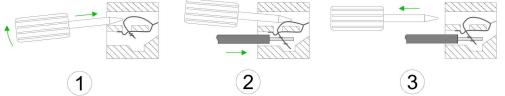
 Stripping length
 10mm

Wiring procedure



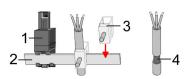
- 1 Pin number at the connector
- 2 Opening for screwdriver
- 3 Connection hole for wire

Wiring periphery modules



- 1. Insert a suited screwdriver at an angel into the square opening as shown. Press and hold the screwdriver in the opposite direction to open the contact spring.
- 2. Insert the stripped end of wire into the round opening. You can use wires with a cross section of 0.08mm² up to 1.5mm²
- By removing the screwdriver, the wire is securely fixed via the spring contact to the 3. terminal.

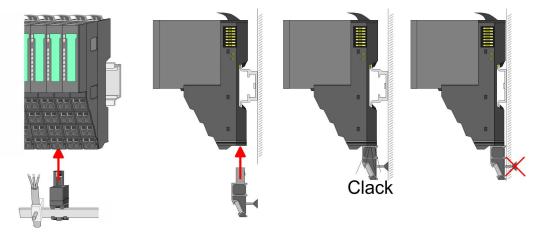
Shield attachment



- Shield bus carrier 1
- 2 Shield bus (10mm x 3mm)
- 3 Shield clamp
- 4 Cable shield

To attach the shield the mounting of shield bus carriers are necessary. The shield bus carrier (available as accessory) serves to carry the shield bus to connect cable shields.

- 1. Each System SLIO module has a carrier hole for the shield bus carrier. Push the shield bus carrier, until they engage into the module. With a flat mounting rail for adaptation to a flat mounting rail you may remove the spacer of the shield bus carrier.
- 2. Put your shield bus into the shield bus carrier.



Attach the cables with the accordingly stripped cable screen and fix it by the shield 3. clamp with the shield bus.

2.6 Wiring power modules

Terminal module terminals

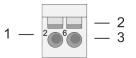
Power modules are either integrated to the head module or may be installed between the periphery modules. With power modules, terminals with spring clamp technology are used for wiring. The spring clamp technology allows quick and easy connection of your signal and supply lines. In contrast to screw terminal connections this type of connection is vibration proof.

Data

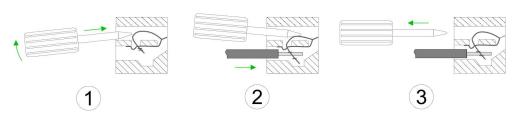
_10mm

U_{max} 30V DC 10A Imax 0.08 ... 1.5mm² (AWG 28 ... 16) Cross section Stripping length 10mm

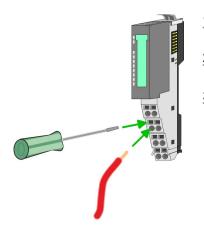
Wiring procedure



- Pin number at the connector 1
- 2 3 Opening for screwdriver
- Connection hole for wire

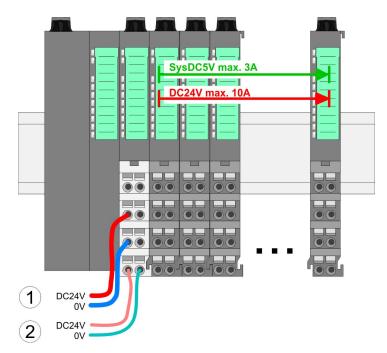


- Insert a suited screwdriver at an angel into the square opening as shown. Press 1. and hold the screwdriver in the opposite direction to open the contact spring.
- 2. Insert the stripped end of wire into the round opening. You can use wires with a cross section of 0.08mm² up to 1.5mm²
- By removing the screwdriver, the wire is securely fixed via the spring contact to the 3. terminal.



Wiring power modules

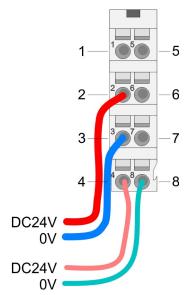
Standard wiring



(1) DC 24V for power section supply I/O area (max. 10A)

(2) DC 24V for electronic power supply bus coupler and I/O area

PM - Power module



For wires with a core cross-section of 0.08mm² up to 1.5mm².

Pos.	Function	Туре	Description
1			not connected
2	DC 24V	I	DC 24V for power section supply
3	0V	I	GND for power section supply
4	Sys DC 24V	I	DC 24V for electronic section supply
5			not connected
6	DC 24V	I	DC 24V for power section supply
7	0V	I	GND for power section supply
8	Sys 0V	I	GND for electronic section supply

I: Input



CAUTION!

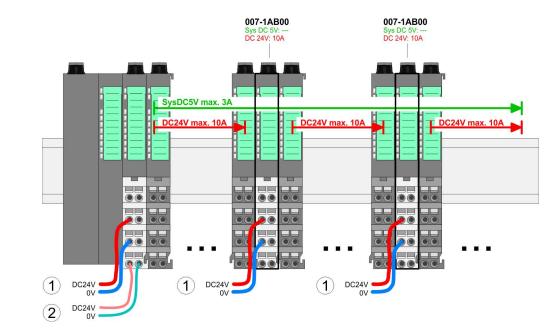
Since the power section supply is not internally protected, it is to be externally protected with a fuse, which corresponds to the maximum current. This means max. 10A is to be protected by a 10A fuse (fast) respectively by a line circuit breaker 10A characteristics Z!



The electronic power section supply is internally protected against higher voltage by fuse. The fuse is within the power module. If the fuse releases, its electronic module must be exchanged!

Fusing	 The power section supply is to be externally protected with a fuse, which corresponds to the maximum current. This means max. 10A is to be protected with a 10A fuse (fast) respectively by a line circuit breaker 10A characteristics Z! It is recommended to externally protect the electronic power supply for head modules and I/O area with a 2A fuse (fast) respectively by a line circuit breaker 2A characteristics Z. The electronic power supply for the I/O area of the power module 007-1AB10 should also be externally protected with a 1A fuse (fast) respectively by a line circuit breaker 1A characteristics Z.
State of the electronic power supply via LEDs	After PowerON of the System SLIO the LEDs RUN respectively MF get on so far as the sum current does not exceed 3A. With a sum current greater than 3A the LEDs may not be activated. Here the power module with the order number 007-1AB10 is to be placed between the peripheral modules.
Deployment of the power modules	 If the 10A for the power section supply is no longer sufficient, you may use the power module from VIPA with the order number 007-1AB00. So you have also the possibility to define isolated groups. The power module with the order number 007-1AB10 is to be used if the 3A for the electronic power supply at the backplane bus is no longer sufficient. Additionally you get an isolated group for the DC 24V power section supply with max. 4A. By placing the power module 007-1AB10 at the following backplane bus modules.

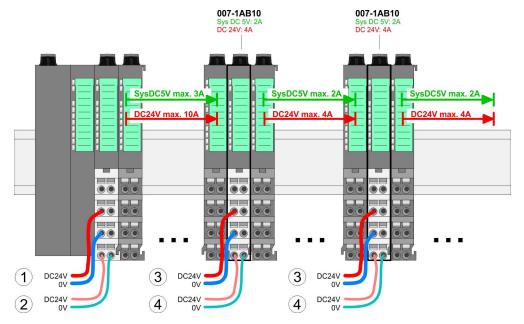
By placing the power module 007-1AB10 at the following backplane bus modules may be placed with a sum current of max. 2A. Afterwards a power module is to be placed again. To secure the power supply, the power modules may be mixed used.



Power module 007-1AB00

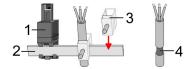
Wiring power modules

Power module 007-1AB10



- (1) DC 24V for power section supply I/O area (max. 10A)
- (2) DC 24V for electronic power supply bus coupler and I/O area
 (3) DC 24V for power section supply I/O area (max. 4A)
- (4) DC 24V for electronic power supply I/O area

Shield attachment

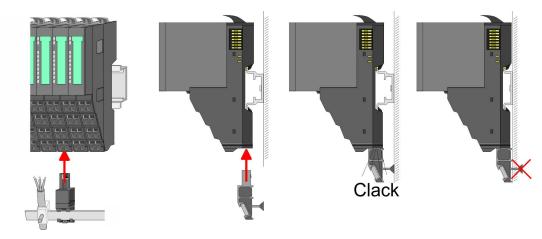


- Shield bus carrier 1
- 2 Shield bus (10mm x 3mm)
- Shield clamp 3
- 4 Cable shield

To attach the shield the mounting of shield bus carriers are necessary. The shield bus carrier (available as accessory) serves to carry the shield bus to connect cable shields.

- 1. Each System SLIO module has a carrier hole for the shield bus carrier. Push the shield bus carrier, until they engage into the module. With a flat mounting rail for adaptation to a flat mounting rail you may remove the spacer of the shield bus carrier.
- 2. Put your shield bus into the shield bus carrier.

Demounting periphery modules



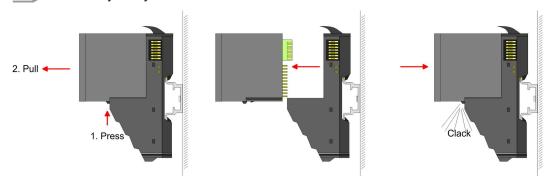
3. Attach the cables with the accordingly stripped cable screen and fix it by the shield clamp with the shield bus.

2.7 Demounting periphery modules

Proceeding

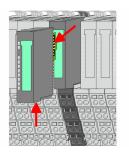
Exchange of an electronic module

1. Power-off your system.



- **2.** For the exchange of a electronic module, the electronic module may be pulled forward after pressing the unlocking lever at the lower side of the module.
- **3.** For installation plug the new electronic module guided by the strips at the lower side until this engages to the terminal module.
 - ⇒ Now you can bring your system back into operation.

Exchange of a periphery module



- **1.** Power-off your system.
- **2.** Remove if exists the wiring of the module.

3.

For demounting and exchange of a (head) module or a group of modules, due to mounting reasons you always have to remove the electronic module <u>right</u> beside. After mounting it may be plugged again.

Press the unlocking lever at the lower side of the just mounted right module and pull it forward.

Demounting periphery modules

VIPA System SLIO

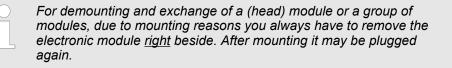
- 5. Pull the module.
- 6. For mounting turn the locking lever of the module to be mounted upwards.

- 7. To mount the module put it to the gap between the both modules and push it, guided by the stripes at both sides, to the mounting rail.
- **8.** Turn the locking lever downward, again.

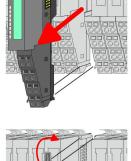
- **9.** Plug again the electronic module, which you have removed before.
- 10. Wire your module.
 - ⇒ Now you can bring your system back into operation.
- 1. Power-off your system.

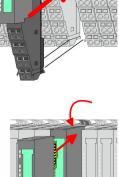
3.

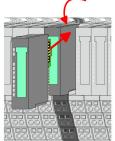
2. Remove if exists the wiring of the module group.



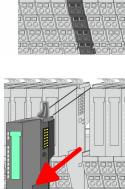
Press the unlocking lever at the lower side of the just mounted right module near the module group and pull it forward.







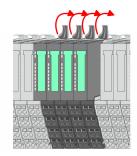
Exchange of a module

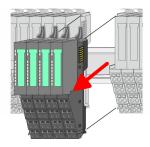


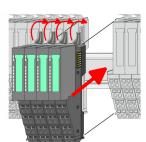
4. Turn the locking lever of the module to be exchanged upwards.

HB300 | SM-DIO | | en | 18-16

group







7. To mount the module group put it to the gap between the both modules and push it, guided by the stripes at both sides, to the mounting rail.

6. For mounting turn all the locking lever of the module group to be mounted upwards.

4. Turn all the locking lever of the module group to be exchanged upwards.

8. Turn all the locking lever downward, again.

5. Pull the module group forward.

- **9.** Plug again the electronic module, which you have removed before.
- **10.** Wire your module group.
 - ⇒ Now you can bring your system back into operation.

Trouble shooting - LEDs

RUN

MF

RUN 💭 RUN

MF

MF

RUN

MF

2.8 Trouble shooting - LEDs

General

Each module has the LEDs RUN and MF on its front side. Errors or incorrect modules may be located by means of these LEDs.

In the following illustrations flashing LEDs are marked by $\dot{\heartsuit}$.

Sum current of the electronic power supply exceeded



Behaviour: After PowerON the RUN LED of each module is off and the MF LED of each module is sporadically on.

Reason: The maximum current for the electronic power supply is exceeded.

Remedy: As soon as the sum current of the electronic power supply is exceeded, always place the power module 007-1AB10. *Chapter 2.6 Wiring power modules' on page 21*

Error in configuration

Behaviour: After PowerON the MF LED of one module respectively more modules flashes. The RUN LED remains off.

Reason: At this position a module is placed, which does not correspond to the configured module.

RUN

MF

RUN

MF

Remedy: Match configuration and hardware structure.

RUN

MF

RUN 🔲 RUN

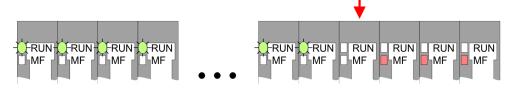
MF

MF

RUN

MF

Module failure



Behaviour: After PowerON all of the RUN LEDs up to the defective module are flashing. With all following modules the MF LED is on and the RUN LED is off.

Reason: The module on the right of the flashing modules is defective.

Remedy: Replace the defective module.

2.9 Installation	quidelines
------------------	------------

General	The installation guidelines contain information about the interference free deployment of a PLC system. There is the description of the ways, interference may occur in your PLC, how you can make sure the electromagnetic compatibility (EMC), and how you manage the isolation.			
What does EMC mean?	Electromagnetic compatibility (EMC) means the ability of an electrical device, to function error free in an electromagnetic environment without being interfered respectively without interfering the environment.			
	The components of VIPA are developed for the deployment in industrial environments and meets high demands on the EMC. Nevertheless you should project an EMC planning before installing the components and take conceivable interference causes into account.			
Possible interference causes	 Electromagnetic interferences may interfere your control via different ways: Electromagnetic fields (RF coupling) Magnetic fields with power frequency Bus system Power supply 			
	 Protected earth conductor 			
	Depending on the spreading medium (lead bound or lead free) and the distance to the interference cause, interferences to your control occur by means of different coupling mechanisms.			
	There are:			
	 galvanic coupling capacitive coupling inductive coupling radiant coupling 			
Basic rules for EMC	In the most times it is enough to take care of some elementary rules to guarantee the EMC. Please regard the following basic rules when installing your PLC.			
	 Take care of a correct area-wide grounding of the inactive metal parts when installing your components. Install a central connection between the ground and the protected earth conductor system. Connect all inactive metal extensive and impedance-low. Please try not to use aluminium parts. Aluminium is easily oxidizing and is therefore less suitable for grounding. When cabling, take care of the correct line routing. Organize your cabling in line groups (high voltage, current supply, signal and data lines). Always lay your high voltage lines and signal respectively data lines in separate channels or bundles. Route the signal and data lines as near as possible beside ground areas (e.g. suspension bars, metal rails, tin cabinet). 			

- Proof the correct fixing of the lead isolation.
 - Data lines must be laid isolated.
 - Analog lines must be laid isolated. When transmitting signals with small amplitudes the one sided laying of the isolation may be favourable.
 - Lay the line isolation extensively on an isolation/protected earth conductor rail directly after the cabinet entry and fix the isolation with cable clamps.
 - Make sure that the isolation/protected earth conductor rail is connected impedance-low with the cabinet.
 - Use metallic or metallised plug cases for isolated data lines.
- In special use cases you should appoint special EMC actions.
 - Consider to wire all inductivities with erase links.
 - Please consider luminescent lamps can influence signal lines.
- Create a homogeneous reference potential and ground all electrical operating supplies when possible.
 - Please take care for the targeted employment of the grounding actions. The grounding of the PLC serves for protection and functionality activity.
 - Connect installation parts and cabinets with your PLC in star topology with the isolation/protected earth conductor system. So you avoid ground loops.
 - If there are potential differences between installation parts and cabinets, lay sufficiently dimensioned potential compensation lines.

Isolation of conductors Electrical, magnetically and electromagnetic interference fields are weakened by means of an isolation, one talks of absorption. Via the isolation rail, that is connected conductive with the rack, interference currents are shunt via cable isolation to the ground. Here you have to make sure, that the connection to the protected earth conductor is impedancelow, because otherwise the interference currents may appear as interference cause.

When isolating cables you have to regard the following:

- If possible, use only cables with isolation tangle.
- The hiding power of the isolation should be higher than 80%.
- Normally you should always lay the isolation of cables on both sides. Only by means of the both-sided connection of the isolation you achieve high quality interference suppression in the higher frequency area. Only as exception you may also lay the isolation one-sided. Then you only achieve the absorption of the lower frequencies. A one-sided isolation connection may be convenient, if:
 - the conduction of a potential compensating line is not possible.
 - analog signals (some mV respectively μA) are transferred.
 - foil isolations (static isolations) are used.
- With data lines always use metallic or metallised plugs for serial couplings. Fix the isolation of the data line at the plug rack. Do not lay the isolation on the PIN 1 of the plug bar!
- At stationary operation it is convenient to strip the insulated cable interruption free and lay it on the isolation/protected earth conductor line.
- To fix the isolation tangles use cable clamps out of metal. The clamps must clasp the isolation extensively and have well contact.
- Lay the isolation on an isolation rail directly after the entry of the cable in the cabinet. Lead the isolation further on to your PLC and don't lay it on there again!



Please regard at installation!

At potential differences between the grounding points, there may be a compensation current via the isolation connected at both sides.

Remedy: Potential compensation line

General data

2.10 General data

Conformity and approval		
Conformity		
CE	2014/35/EU	Low-voltage directive
	2014/30/EU	EMC directive
Approval		
UL	-	Refer to Technical data
others		
RoHS	2011/65/EU	Restriction of the use of certain hazardous substances in electrical and electronic equipment

Protection of persons and device protection		
Type of protection	-	IP20
Electrical isolation		
to the field bus	-	electrically isolated
to the process level	-	electrically isolated
Insulation resistance	-	-
Insulation voltage to reference earth		
Inputs / outputs	-	AC / DC 50V, test voltage AC 500V
Protective measures	-	against short circuit

Environmental conditions to EN 61131-2					
Climatic					
Storage / transport	EN 60068-2-14	-25+70°C			
Operation					
Horizontal installation hanging	EN 61131-2	0+60°C			
Horizontal installation lying	EN 61131-2	0+55°C			
Vertical installation	EN 61131-2	0+50°C			
Air humidity	EN 60068-2-30	RH1 (without condensation, rel. humidity 1095%)			
Pollution	EN 61131-2	Degree of pollution 2			
Installation altitude max.	-	2000m			
Mechanical					
Oscillation	EN 60068-2-6	1g, 9Hz 150Hz			
Shock	EN 60068-2-27	15g, 11ms			

General data

Mounting conditions		
Mounting place	-	In the control cabinet
Mounting position	-	Horizontal and vertical

EMC	Standard		Comment
Emitted interference	EN 61000-6-4		Class A (Industrial area)
Noise immunity	EN 61000-6-2		Industrial area
zone B		EN 61000-4-2	ESD
			8kV at air discharge (degree of severity 3),
			4kV at contact discharge (degree of severity 2)
		EN 61000-4-3	HF field immunity (casing)
			80MHz 1000MHz, 10V/m, 80% AM (1kHz)
			1.4GHz 2.0GHz, 3V/m, 80% AM (1kHz)
			2GHz 2.7GHz, 1V/m, 80% AM (1kHz)
		EN 61000-4-6	HF conducted
			150kHz 80MHz, 10V, 80% AM (1kHz)
		EN 61000-4-4	Burst, degree of severity 3
		EN 61000-4-5	Surge, degree of severity 3 *

*) Due to the high-energetic single pulses with Surge an appropriate external protective circuit with lightning protection elements like conductors for lightning and overvoltage is necessary.

3 Digital Input

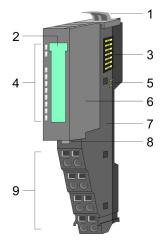
3.1 021-1BB00 - DI 2xDC 24V

Properties

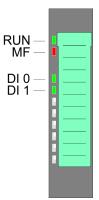
The electronic module collects the binary control signals from the process level and transmits them isolated to the central bus system. It has 2 channels and their status is monitored via LEDs.

- 2 digital inputs, isolated to the backplane bus
- Suited for switches and approximate switches
- Status indication of the channels via LEDs also with de-activated electronic power supply

Structure



Status indication

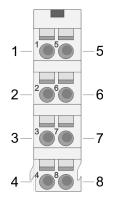


RUN green	MF red	DI x	Description
-		х	Bus communication is OK Module status is OK
	•	x	Bus communication is OK Module status reports an error
	•	x	Bus communication is not possible Module status reports an error
		Х	Error at bus power supply
х	ZHz	Х	Flashing: Error in configuration
			Digital input has signal "1"
			Digital input has signal "0"

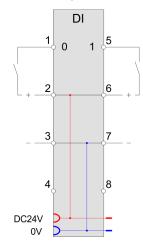
- 1 Locking lever terminal module
- 2 Labeling strip
- 3 Backplane bus
- 4 LED status indication
- 5 DC 24V power section supply
- 6 Electronic module 7 Terminal module
- 7 Terminal module8 Locking lever ele
- Locking lever electronic module
- 9 Terminal

021-1BB00 - DI 2xDC 24V

Pin assignment



For wires with a cross section of 0.08mm² up to 1.5mm².



Pos.	Function	Туре	Description
1	DI 0	I	Digital input DI 0
2	DC 24V	0	DC 24V for sensor
3	0V	0	GND
4			not connected
5	DI 1	I	Digital input DI 1
6	DC 24V	0	DC 24V for sensor
7	0V	0	GND
8			not connected

I: Input, O: Output

Input area

At CPU, PROFIBUS and PROFINET the input area is embedded to the corresponding address area.

- IX Index for access via CANopen
- SX Subindex for access via EtherCAT with Index 6000h + EtherCAT-Slot

More can be found in the according manual of your bus coupler.

Addr.	Name	Bytes	Function	IX	SX
+0	PII	1	State of the inputs	5000h	
			Bit 0: DI 0		01h
			Bit 1: DI 1		02h
	Bit 7 2: reserved				

Output area

No byte of the output area is used by the module.

021-1BB00 - DI 2xDC 24V > Technical data

3.1.1 Technical data

Module ID0019 F82Current consumption/power loss55 mAPower loss0.5 WPower loss0.5 WTechnical data digital inputs2Cable length, shielded1000 mCable length, shielded600 mCable length, unshielded600 mCater data digital inputs2Carrent consumption from load voltage L+ (without load)-Rated load voltage0.00 mCarrent consumption from load voltage L+ (without load)0.00 mInput voltage for signal "1"DC 1.528.8 VInput voltage for signal "1"DC 1.528.8 VInput voltage for signal "1"0.01 mInput voltage for signal "1"3 mAConnection of Two-Wire-BEROs possible-Input during of of "1"3 msInput delay of "1" to "0"3 msNumber of simultaneously utilizable inputs horizontal com figuration2Number of simultaneously utilizable inputs horizontal com figuration2Status display21Input characteristic curveEC 61131-2. type 1Input characteristic curve2Status display10Status display0Indernation, alarma, diagnostica1Interrupt So0Interrupt So0Status display0Interrupt So0Interrupt So0Interrupt So0Interrupt So0Interrupt So0Interrupt So0Interrupt So0	Order no.	021-1BB00
Current consumption/power loss 65 mA Current consumption from backplane bus 65 mA Power loss 0.5 W Technical data digital inputs 0.5 W Number of inputs 2 Cable length, shielded 000 m Cable length, unshielded 600 m Cable length, unshielded 0.6 Om Carrent consumption from load voltage L+ (without load) 0.7 CO Current consumption from load voltage L+ (without load) DC 0.428.8 V Input voltage for signal "1" DC 0.5 V Input voltage for signal "1" 0.6 CO Input voltage for signal "1" 3 mA Connection of Two-Wire-BEROS possible - Input voltage hysteresis - Input delay of "0" to "1" 3 ms Input delay of "1" to "0" 3 ms Number of simultaneously utilizable inputs vertical configur 2 Input delay of "1" to "0" 2 Number of simultaneously utilizable inputs vertical configur 2 Input delay of "1" to "0" 2 Number of simultaneously utilizable inputs vertical configur 2	Туре	SM 021
Current consumption from backplane bus 65 mA Power loss 0.5 W Technical data digital inputs 2 Status digital inputs 2 Cable length, shielded 1000 m Cable length, unshielded 600 m Cable length, unshielded 600 m Rated load voltage - Current consumption from load voltage L+ (without load) - Rated value DC 20.428.8 V Input voltage for signal "0" DC 1528.8 V Input voltage for signal "1" DC 1528.8 V Input voltage for signal "1" DC 1528.8 V Input voltage hysteresis - Frequency range - Input current for signal "1" 3 mA Connection of Two-Wire-BEROs possible - Max. permissible BERO quiescent current 0.5 mA Input delay of "1" to "0" 3 ms Number of simultaneously utilizable inputs vertical configu 2 Input delay of "1" to "0" 3 ms Number of simultaneously utilizable inputs vertical configu 2 Input characteristic curve EC 61131-2,	Module ID	0001 9F82
Power loss0.5 WTechnical data digital inputs2Number of inputs2Cable length, shielded600 mCable length, unshielded600 mCable length, unshielded00 mRated load voltage-Current consumption from load voltage L+ (without load)0C 0.428.8 VInput voltage for signal "0"DC 05 VInput voltage for signal "1"DC 1528.8 VInput voltage hysteresis-Input voltage hysteresis-Input voltage for Signal "1"SmAConnection of Two-Wire-BEROs possible✓Max. permissible BERO quiescent current0.5 mAInput delay of "0" to "1"3 msNumber of simultaneously utilizable inputs voltage long utilizable inputs voltage for simultaneously utilizable inputs voltage long utilizable inputs voltage for simultaneously utilizable inputs voltage long utilizable inp	Current consumption/power loss	
Technical data digital inputsImput displayNumber of inputs2Cable length, shielded600 mCable length, unshielded600 mRated load voltage-Current consumption from load voltage L+ (without load)-Rated valueDC 20.428.8 VInput voltage for signal "0"DC 1528.8 VInput voltage for signal "1"DC 1528.8 VInput voltage for signal "1"CC 1528.8 VInput voltage for signal "1"S MAInput voltage for signal "1"S MAConnection of Two-Wire-BEROs possible✓Input delay of "0" to "1"S MAInput delay of "1" to "0"S msInput delay of "1" to "0"S msNumber of simultaneously utilizable inputs horizontal configurationIC 61131-2, type 1Input characteristic curveIC 61131-2, type 1Initial data sizeS ItStatus displaygreen LED per channelInterruptsnoProcess alarmNoDiagnostic interruptNoDiagnostic functionsNoDiagnostic functionsNoDiagnostic functionsNoDiagnostic functions <td>Current consumption from backplane bus</td> <td>65 mA</td>	Current consumption from backplane bus	65 mA
Number of inputs2Cable length, shielded1000 mCable length, unshielded600 mRated load voltage-Current consumption from load voltage L+ (without load)-Rated valueDC 20.428.8 VInput voltage for signal "0"DC 05 VInput voltage for signal "1"DC 1528.8 VInput voltage for signal "1"Sm AConnection of Two-Wire-BEROs possibleVameer of simultaneously utilizable inputs horizontal configuration3 msInput delay of "0" to "1"3 msNumber of simultaneously utilizable inputs vortical configuration2Input characteristic curveEC 61131-2, type 1Initial data size2 BitStatus displaygreen LED per channelInterruptsnoProcess alarmnoDiagnostic interruptnoDiagnostic functionsno	Power loss	0.5 W
Cable lengh, shielded1000 mCable lengh, unshielded600 mRated load voltage-Current consumption from load voltage L+ (without load)-Rated valueDC 20.428.8 VInput voltage for signal "0"DC 05 VInput voltage for signal "1"DC 1528.8 VInput voltage hysteresis-Frequency range-Input resistance-Input voltage for signal "1"3 mAConnection of Two-Wire-BERO spossible-Max. permissible BERO quiescent current0.5 mAInput delay of "0" to "1"3 msInput delay of "0" to "1"3 msNumber of simultaneously utilizable inputs horizontal com figuration2Number of simultaneously utilizable inputs vertical configu2Number of simultaneously utilizable inputs wertical configu2Status displaygreen LED per channelInterruptsnoProcess alarmnoDiagnostic interruptnoDiagnostic functionsno	Technical data digital inputs	
Cable length, unshielded600 mRated load voltage-Current consumption from load voltage L+ (without load)-Rated valueDC 20.428.8 VInput voltage for signal "0"DC 05 VInput voltage for signal "1"DC 1528.8 VInput voltage hysteresis-Frequency range-Input resistance-Input current for signal "1"3 mAConnection of Two-Wire-BEROs possible-Max. permissible BERO quiescent current0.5 mAInput delay of "0" to "1"3 msInput delay of "1" to "0"3 msNumber of simultaneously utilizable inputs horizontal con- figuration2Input characteristic curveEC 61131-2, type 1Initial data size2 BitStatus displaygreen LED per channelInterruptsnoProcess alarmnoDiagnostic interruptnoDiagnostic functionsno	Number of inputs	2
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Current consumption from load voltage L+ (without load)-Rated valueDC 20.428.8 VInput voltage for signal "0"DC 05 VInput voltage for signal "1"DC 1528.8 VInput voltage hysteresis-Frequency range-Input resistance-Input resistance-Connection of Two-Wire-BEROs possible✓Max. permissible BERO quiescent current3 mAInput delay of "0" to "1"3 msInput delay of "0" to "1"3 msNumber of simultaneously utilizable inputs horizontal configur3 msInput characteristic curveIEC 61131-2, type 1Intit data size2 bitStatus information, alarms, diagnosticsFeen LED per channelProcess alarmnoProcess alarmnoDiagnostic interruptnoDiagnostic functionsno	Cable length, unshielded	600 m
Rated valueDC 20428.8 VInput voltage for signal "0"DC 05 VInput voltage for signal "1"DC 1528.8 VInput voltage hysteresis-Frequency range-Input voltage hysteresis-Input voltage hysteresis-Input resistance-Input current for signal "1"3 mAConnection of Two-Wire-BEROs possibleMax. permissible BERO quiescent current0.5 mAInput delay of "0" to "1"3 msInput delay of "0" to "1"3 msNumber of simultaneously utilizable inputs horizontal com- figuration2Number of simultaneously utilizable inputs vertical configu- ationEC 61131-2, type 1Input dela size2 BitStatus displaygreen LED per channelInterruptsnoProcess alarmnoDiagnostic interruptnoDiagnostic functionsno	Rated load voltage	-
Input voltage for signal "0"DC 05 VInput voltage for signal "1"DC 1528.8 VInput voltage hysteresis-Frequency range-Input resistance-Input resistance3 mAConnection of Two-Wire-BEROs possible✓Max. permissible BERO quiescent current0.5 mAInput delay of "0" to "1"3 msInput delay of "0" to "1"3 msNumber of simultaneously utilizable inputs horizontal com figuration2Number of simultaneously utilizable inputs vertical configur ation2Status display2EC 61131-2, type 1Input delay signalgreen LED per channelProcess alarmnoProcess alarmnoDiagnostic interruptnoDiagnostic functionsnoDiagnostic functionsno	Current consumption from load voltage L+ (without load)	-
Input voltage for signal "1"DC 1528.8 VInput voltage hysteresis-Frequency range-Input resistance-Input current for signal "1"3 mAConnection of Two-Wire-BEROs possible✓Max. permissible BERO quiescent current0.5 mAInput delay of "0" to "1"3 msInput delay of "0" to "1"3 msInput delay of "1" to "0"3 msNumber of simultaneously utilizable inputs horizontal con- figuration2Number of simultaneously utilizable inputs vertical configu- ation2Status displaygreen LED per channelInterruptsnoProcess alarmnoDiagnostic functionsnoDiagnostic functionsno	Rated value	DC 20.428.8 V
Input voltage hysteresis-Frequency range-Input resistance-Input current for signal "1"3 mAConnection of Two-Wire-BEROs possible✓Max. permissible BERO quiescent current0.5 mAInput delay of "0" to "1"3 msInput delay of "0" to "1"3 msInput delay of "1" to "0"3 msNumber of simultaneously utilizable inputs horizontal con- figuration2Number of simultaneously utilizable inputs vertical configu- ration2Status displayEC 61131-2, type 1Initial data size2 BitStatus displaygreen LED per channelInterruptsnoProcess alarmnoDiagnostic interruptnoDiagnostic functionsnoDiagnostic functionsno	Input voltage for signal "0"	DC 05 V
Frequency range-Input resistance-Input current for signal "1"3 mAConnection of Two-Wire-BEROs possible-Max. permissible BERO quiescent current0.5 mAInput delay of "0" to "1"3 msInput delay of "0" to "1"3 msNumber of simultaneously utilizable inputs horizontal configuration2Number of simultaneously utilizable inputs vertical configuration2Input deta size2 BitStatus information, alarms, diagnostics2Status displaygreen LED per channelInterruptsnoProcess alarmnoDiagnostic interruptnoDiagnostic functionsno	Input voltage for signal "1"	DC 1528.8 V
Input resistance-Input current for signal "1"3 mAConnection of Two-Wire-BEROs possible✓Max. permissible BERO quiescent current0.5 mAInput delay of "0" to "1"3 msInput delay of "1" to "0"3 msNumber of simultaneously utilizable inputs horizontal con- figuration2Input characteristic curveIEC 61131-2, type 1Initial data size2 BitStatus displaygreen LED per channelInterruptsnoProcess alarmnoDiagnostic interruptnoInagrostic functionsno	Input voltage hysteresis	-
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Max. permissible BERO quiescent current0.5 mAInput delay of "0" to "1"3 msInput delay of "0" to "0"3 msInput delay of "1" to "0"3 msNumber of simultaneously utilizable inputs horizontal configuration2Number of simultaneously utilizable inputs vertical configur2Input characteristic curveIEC 61131-2, type 1Intital data size2 BitStatus information, alarms, diagnosticsgreen LED per channelProcess alarmnoDiagnostic interruptnoDiagnostic functionsno	Input current for signal "1"	3 mA
Input delay of "0" to "1"3 msInput delay of "0" to "1" to "0"3 msNumber of simultaneously utilizable inputs horizontal con- figuration2Number of simultaneously utilizable inputs vertical configu- ration2Input characteristic curveIEC 61131-2, type 1Initial data size2 BitStatus information, alarms, diagnosticsgreen LED per channelInterruptsnoProcess alarmnoDiagnostic interruptnoDiagnostic functionsno	Connection of Two-Wire-BEROs possible	\checkmark
Input delay of "1" to "0"3 msNumber of simultaneously utilizable inputs horizontal configuration2Number of simultaneously utilizable inputs vertical configuration2Input characteristic curveIEC 61131-2, type 1Intitial data size2 BitStatus information, alarms, diagnosticsgreen LED per channelInterruptsnoProcess alarmnoDiagnostic functionsnoDiagnostic functionsno	Max. permissible BERO quiescent current	0.5 mA
Number of simultaneously utilizable inputs horizontal configuration2Number of simultaneously utilizable inputs vertical configuration2Input characteristic curveIEC 61131-2, type 1Input characteristic curve2 BitStatus information, alarms, diagnosticsgreen LED per channelInterruptsnoProcess alarmnoDiagnostic interruptnoDiagnostic functionsno	Input delay of "0" to "1"	3 ms
figurationConstraintsNumber of simultaneously utilizable inputs vertical configuration2Input characteristic curveIEC 61131-2, type 1Initial data size2 BitStatus information, alarms, diagnosticsStatus displaygreen LED per channelInterruptsnoProcess alarmnoDiagnostic interruptnoDiagnostic functionsno	Input delay of "1" to "0"	3 ms
ration IIIC 61131-2, type 1 IEC 61131-2, type 1 2 Bit Status information, alarms, diagnostics Status display green LED per channel Interrupts no Process alarm no Diagnostic interrupt no	Number of simultaneously utilizable inputs horizontal con- figuration	2
Initial data size2 BitStatus information, alarms, diagnosticsgreen LED per channelStatus displaygreen LED per channelInterruptsnoProcess alarmnoDiagnostic interruptnoDiagnostic functionsno	Number of simultaneously utilizable inputs vertical configuration	2
Status information, alarms, diagnosticsgreen LED per channelStatus displaygreen LED per channelInterruptsnoProcess alarmnoDiagnostic interruptnoDiagnostic functionsno	Input characteristic curve	IEC 61131-2, type 1
Status displaygreen LED per channelInterruptsnoProcess alarmnoDiagnostic interruptnoDiagnostic functionsno	Initial data size	2 Bit
Interrupts no Process alarm no Diagnostic interrupt no Diagnostic functions no	Status information, alarms, diagnostics	
Process alarm no Diagnostic interrupt no Diagnostic functions no	Status display	green LED per channel
Diagnostic interrupt no Diagnostic functions no	Interrupts	no
Diagnostic functions no	Process alarm	no
	Diagnostic interrupt	no
Diagnostics information read-out none	Diagnostic functions	no
	Diagnostics information read-out	none
Module state green LED	Module state	green LED

Digital Input

021-1BB00 - DI 2xDC 24V > Technical data

Order no.	021-1BB00
Module error display	red LED
Channel error display	none
Isolation	
Between channels	-
Between channels of groups to	-
Between channels and backplane bus	\checkmark
Insulation tested with	DC 500 V
Safety	
Safety protocol	-
Safety requirements	-
Secure user address	-
Watchdog	-
Two channels	-
Test pulse outputs	-
Datasizes	
Input bytes	1
Output bytes	0
Parameter bytes	0
Diagnostic bytes	0
Housing	
Material	PPE / PPE GF10
Mounting	Profile rail 35 mm
Mechanical data	
Dimensions (WxHxD)	12.9 mm x 109 mm x 76.5 mm
Net weight	57 g
Weight including accessories	57 g
Gross weight	72 g
Environmental conditions	
Operating temperature	0 °C to 60 °C
Storage temperature	-25 °C to 70 °C
Certifications	
UL certification	yes
KC certification	yes

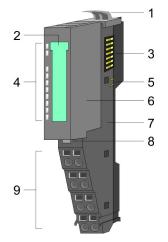
3.2 021-1BB10 - DI 2xDC 24V 2µs...4ms

Properties

The electronic module collects the binary control signals from the process level and transmits them isolated to the central bus system. The module has 2 fast digital input channels and their status is monitored via LEDs.

- 2 fast digital inputs, isolated to the backplane bus
- Suited for switches and approximate switches
- Status indication of the channels via LEDs also with de-activated electronic power supply
- Parameterizable input delay
- Interrupt and diagnostics function

Structure



Status indication

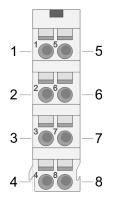
RUN MF DI 0 DI 1 5

RUN	MF	DI x	Description
		х	Bus communication is OK
		^	Module status is OK
	-	х	Bus communication is OK
	-	^	Module status reports an error
	-	х	Bus communication is not possible
	-	^	Module status reports an error
		Х	Error at bus power supply
			Flashing: Error in configuration
Х	ZHz 2	Х	Schapter 2.8 'Trouble shooting - LEDs' on page 28
			Digital input has signal "1"
			Digital input has signal "0"
not relevant	: X		

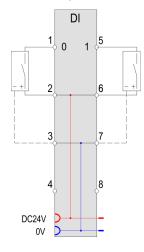
- Locking lever terminal module 1 2
- Labeling strip 3
- Backplane bus 4
- LED status indication 5 DC 24V power section supply
- 6 Electronic module
- 7 Terminal module
- 8 Locking lever electronic module
- 9 Terminal

021-1BB10 - DI 2xDC 24V 2µs...4ms

Pin assignment



For wires with a cross section of 0.08mm² up to 1.5mm².



Pos.	Function	Туре	Description
1	DI 0	I.	Digital input DI 0
2	DC 24V	0	DC 24V for sensor
3	0V	0	GND
4			not connected
5	DI 1	L	Digital input DI 1
6	DC 24V	0	DC 24V for sensor
7	0V	0	GND
8			not connected

I: Input, O: Output

Input area

At CPU, PROFIBUS and PROFINET the input area is embedded to the corresponding address area.

- IX Index for access via CANopen
- SX Subindex for access via EtherCAT with Index 6000h + EtherCAT-Slot

More can be found in the according manual of your bus coupler.

Addr.	Name	Bytes	Function	IX	SX
+0 PII 1	1	State of the inputs	5000h		
		Bit 0: DI 0		01h	
		Bit 1: DI 1		02h	
			Bit 7 2: reserved		

Output area

No byte of the output area is used by the module.

021-1BB10 - DI 2xDC 24V 2µs...4ms > Technical data

3.2.1 Technical data

Order no.	021-1BB10
Туре	SM 021
Module ID	000A 1F02
Current consumption/power loss	
Current consumption from backplane bus	100 mA
Power loss	0.9 W
Technical data digital inputs	
Number of inputs	2
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	DC 20.428.8 V
Current consumption from load voltage L+ (without load)	12 mA
Rated value	DC 20.428.8 V
Input voltage for signal "0"	DC 05 V
Input voltage for signal "1"	DC 1528.8 V
Input voltage hysteresis	-
Frequency range	-
Input resistance	-
Input current for signal "1"	3 mA
Connection of Two-Wire-BEROs possible	\checkmark
Max. permissible BERO quiescent current	0.5 mA
Input delay of "0" to "1"	parameterizable 2µs - 3ms
Input delay of "1" to "0"	parameterizable 2µs - 3ms
Number of simultaneously utilizable inputs horizontal con- figuration	2
Number of simultaneously utilizable inputs vertical configu- ration	2
Input characteristic curve	IEC 61131-2, type 1
Initial data size	2 Bit
Status information, alarms, diagnostics	
Status display	green LED per channel
Interrupts	yes, parameterizable
Process alarm	yes, parameterizable
Diagnostic interrupt	yes, parameterizable
Diagnostic functions	yes
Diagnostics information read-out	possible
Module state	green LED

Digital Input

021-1BB10 - DI 2xDC 24V 2µs...4ms > Technical data

Order no.	021-1BB10
Module error display	red LED
Channel error display	none
Isolation	
Between channels	-
Between channels of groups to	-
Between channels and backplane bus	\checkmark
Insulation tested with	DC 500 V
Safety	
Safety protocol	-
Safety requirements	-
Secure user address	-
Watchdog	-
Two channels	-
Test pulse outputs	-
Datasizes	
Input bytes	1
Output bytes	0
Parameter bytes	9
Diagnostic bytes	20
Housing	
Material	PPE / PPE GF10
Mounting	Profile rail 35 mm
Mechanical data	
Dimensions (WxHxD)	12.9 mm x 109 mm x 76.5 mm
Net weight	58 g
Weight including accessories	58 g
Gross weight	73 g
Environmental conditions	
Operating temperature	0 °C to 60 °C
Storage temperature	-25 °C to 70 °C
Certifications	
UL certification	yes
KC certification	yes

3.2.2 Parameter data

- DS Record set for access via CPU, PROFIBUS and PROFINET
- IX Index for access via CANopen
- SX Subindex for access via EtherCAT with Index 3100h + EtherCAT-Slot

More can be found in the according manual of your bus coupler.

Name	Bytes	Function	Default	DS	IX	SX
DIAG_EN	1	Diagnostic interrupt *	00h	00h	3100h	01h
CH0D	1	Input delay DI 0	02h	01h	3101h	02h
CH1D	1	Input delay DI 1	02h	01h	3102h	03h
INTRE	1	Process interrupt at edge 0-1 of DI x	00h	80h	3103h	04h
INTFE	1	Process interrupt at edge 1-0 of DI x	00h	80h	3104h	05h

 $^{\ast})$ This record set may only be transferred at STOP state.

DIAG_EN Diagnostic inter- rupt	Byte	Bit 7 0
	0	Diagnostic interrupt
		00h: disable
		40h: enable

Here you activate res. de-activate the diagnostic function.

CHxD Input delay

Byte	Function	Possible values		
0	Input delay DI x	00h: 1µs	07h: 86µs	
		02h: 3µs	09h: 342µs	
		04h: 10µs	0Ch: 2731µs	
		Other values are no	ot permissible!	

Input delay allows you to preset a filter for the corresponding channel. With the help of filters you may e.g. filter signal peaks at a blurred input signal.

INTRE Interrupt edge 0-1

Byte	Bit 7 0
0	Bit 0: Process interrupt at edge 0-1 of DI 0
	Bit 1: Process interrupt at edge 0-1 of DI 1
	(0: disable, 1: enable)
	Bit 7 2: reserved

021-1BB10 - DI 2xDC 24V 2µs...4ms > Diagnostics and interrupt

INTFE Interrupt ed	ge 1-0
---------------------------	--------

Byte	Bit 7 0
0	Bit 0: Process interrupt at edge 1-0 of DI 0
	Bit 1: Process interrupt at edge 1-0 of DI 1
	(0: disable, 1: enable)
	Bit 7 2: reserved

3.2.3 Diagnostics and interrupt

Event	Process interrupt	Diagnostics inter- rupt	parameterizable
Edge 0-1 DI x	Х	-	Х
Edge 1-0 DI x	Х	-	Х
Diagnostics buffer overflow	-	Х	-
Process interrupt lost	-	Х	-

Process interrupt

So you may react to asynchronous events, there is the possibility to activate a process interrupt. A process interrupt interrupts the linear program sequence and jumps depending on the master system to a corresponding Interrupt routine. Here you can react to the process interrupt accordingly.

With CANopen the process interrupt data a transferred via an emergency telegram.

Operating with CPU, PROFIBUS and PROFINET the process interrupt data were transferred via diagnostics telegram.

SX - Subindex for access via EtherCAT with Index 5000h

More can be found in the according manual of your bus coupler.

Name	Bytes	Function	Default	SX
PRIT_A	1	Process interrupt data	00h	02h
PRIT_B	1	State of the inputs	00h	03h
PRIT_US	2	µs ticker	00h	04h (high byte)
				05h (low byte)

PRIT_A Process interrupt data	Byte	Bit 7 0
	0	Bit 0: Edge at Digital input DI 0
		Bit 1: Edge at Digital input DI 1
		Bit 7 2: reserved

021-1BB10 - DI 2xDC 24V 2µs...4ms > Diagnostics and interrupt

PRIT_B State of	of the inputs	Byte	Bit 7 0				
		0	State of the in	nputs at the mo	ment of the	process interrup	t
			Bit 0: State Ir	nput DI 0			
			Bit 1: State Ir	nput DI 1			
			Bit 7 2: res	erved			
PRIT_US µs-Ti	cker	Byte	Bit 7 0				
		0 1	Value of the	us ticker at the r	noment of t	he process inter	rupt
		µs ticker					
				a 32 bit timer (µ s the timer start		ith PowerON the ain.	e timer starts
		PRIT_US rep	resents the lov	ver 2 byte of the	µs ticker va	alue (0 2 ¹⁶ -1).	
Diagnostic dat	а	Via the param	neterization voi	u mav activate a	ı diagnostic	interrupt for the	module.
		•		•	U U	•	liagnostic interrupt
incoming					-		
			e reason for releasing a diagnostic interrupt is no longer present, the diag- ot _{going} automatically takes place.				
All events of a are not stored			a channel between diagnostic interrupt _{incoming} and diagnostic interrupt _{going} I and get lost.				
			ne window (1. c of the module is		upt _{incoming} u	ntil last diagnost	ic interrupt _{going})
					PROFINET. The accessed by DS	access happens 00h.	
				ANopen. The a ccessed by IX 2		ens by IX 2F01h	n. Additionally the
		SX - Subind	ex for access v	via EtherCAT wi	th Index 500)5h.	
		More can be	found in the ac	cording manual	of your bus	coupler.	
Name	Bytes	Function		Default	DS	IX	SX
ERR_A	1	Diagnostic		00h	01h	2F01h	02h
MODTYP	1	Module informa	ation	1Fh			03h
ERR_C	1	reserved		00h			04h
ERR_D	1	Diagnostic		00h			05h
CHTYP	1	Channel type		70h			06h
NUMBIT	1	Number of diag	nostics bits	00h			07h
NUMCH	1	Number channe module	els of the	02h			08h

00h

1

Channel error

CHERR

09h

021-1BB10 - DI 2xDC 24V 2µs...4ms > Diagnostics and interrupt

Name	Bytes	Function	Default	DS	IX	SX
CH0ERR CH7ERR	8	reserved	00h			0Ah 11h
DIAG_US	4	µs ticker	00h			13h

0 Bit 0: set at module failure Bit 2: set at external error Bit 3: set at channel error Bit 7 4: reserved MODTYP Modul information Byte Bit 7 0 0 Bit 3 0: Module class 1111b Digital module Bit 7 0 0 Bit 7 0 0 Bit 7 0 0 reserved ERR_C reserved Byte Byte Bit 7 0 0 reserved ERR_D Diagnostic Byte Byte Bit 7 0 0 Bit 3: set at internal diagnostics buffer overflow Bit 6: 0: creserved Bit 6: 0: creserved CHTYP Channel type Bit 7 0 0 Bit 7 0	ERR_A Diagnostic	Byte	Bit 7 0
Bit 2: set at external error Bit 3: set at channel error Bit 7 4: reserved Byte Bit 7 0 Bit 3 0: Module class 1111b Digital module Bit 7 0 0 Bit 7 0 0 Bit 7 0 0 Reserved ERR_C reserved Byte Byte Bit 7 0 0 reserved ERR_D Diagnostic Byte Byte Bit 7 0 0 Bit 3 0: reserved ERR_D Diagnostic Byte Byte Bit 7 0 0 Bit 3 0: reserved Bit 3: set at internal diagnostics buffer overflow Bit 4: reserved Bit 6: Process interrupt lost Bit 6: Process interrupt lost Bit 7 0 0 Bit 6 0: Channel type 70h: Digital input Bit 7: reserved Bit 6 0: Channel type 70h: Digital input Bit 7: reserved Bit 7 0		0	Bit 0: set at module failure
MODTYP Moduli information Bit 3: set at channel error Bit 7 4: reserved 0 Bit 3 0: Module class 1111b Digital module Bit 4: Channel information present Bit 7 5: reserved Byte ERR_C reserved Byte Byte Bit 7 0 0 reserved ERR_D Diagnostic Byte Byte Bit 7 0 0 Bit 3: set at internal diagnostics buffer overflow Bit 5 4: reserved Bit 5 4: reserved CHTYP Channel type Byte Bit 7 0 0 Bit 7 0 0 Bit 6 0: Channel type Byte Bit 7 0 0 Bit 7 0 0 Bit 6 0: Channel type Byte Bit 7 0 0 Bit 6 0: Channel type 70h: Digital input Bit 7: reserved Bit 7 0 NUMBIT Diagnostic bits Byte Bit 7 0			Bit 1: reserved
MODTYP Moduli information Byte Bit 7 0 0 Bit 3 0: Module class 1111b Digital module Bit 4: Channel information present Bit 7 5: reserved Byte ERR_C reserved Byte 0 reserved ERR_D Diagnostic Byte Byte Bit 7 0 0 Bit 2 0: reserved ERR_D Diagnostic Byte Byte Bit 7 0 0 Bit 2 0: reserved ERR_D Diagnostic Byte Byte Bit 7 0 0 Bit 3: set at internal diagnostics buffer overflow Bit 5 4: reserved Bit 6: Process interrupt lost Bit 7: reserved Bit 6: 0: Channel type 70: Digital input Bit 7 0 NUMBIT Diagnostic bits Byte Bit 7 0			Bit 2: set at external error
MODTYP Modul information Byte Bit 7 0 0 Bit 3 0: Module class 1111b Digital module Bit 4: Channel information present Bit 4: Channel information present Bit 7 0 0 reserved ERR_C reserved Byte Byte Bit 7 0 0 reserved ERR_D Diagnostic Byte Byte Bit 7 0 0 Bit 2 0: reserved Bit 3: set at internal diagnostics buffer overflow Bit 5: 4: reserved Bit 6: Process interrupt lost Bit 7: reserved 0 Bit 7 0 CHTYP Channel type Byte Bit 7 0 NUMBIT Diagnostic bits Byte			Bit 3: set at channel error
tion Dyte Dit 1 0 0 Bit 3 0: Module class 1111b Digital module Bit 4: Channel information present Bit 7 5: reserved Bit 7 0 0 reserved ERR_C reserved Byte Byte Bit 7 0 0 reserved ERR_D Diagnostic Byte Byte Bit 7 0 0 Bit 3: set at internal diagnostics buffer overflow Bit 5: 4: reserved Bit 6: Process interrupt lost Bit 6: Process interrupt lost Bit 7: reserved 0 Bit 7 0 CHTYP Channel type Byte Byte Bit 7 0 NUMBIT Diagnostic bits Byte Byte Bit 7 0			Bit 7 4: reserved
tion Dyte Dit 1 m 0 0 Bit 3 0: Module class 1111b Digital module Bit 4: Channel information present Bit 7 5: reserved Bit 7 0 0 reserved ERR_D Diagnostic Byte Byte Bit 7 0 0 reserved ERR_D Diagnostic Byte Byte Bit 7 0 0 Bit 3: set at internal diagnostics buffer overflow Bit 5 4: reserved Bit 6: Process interrupt lost Bit 6: Process interrupt lost Bit 7: reserved 0 Bit 7 0 0 Bit 6 0: Channel type 0 Bit 7 0 NUMBIT Diagnostic bits Byte Byte Bit 7 0			
0 Bit 3 0: Module class 1111b Digital module Bit 4: Channel information present Bit 7 5: reserved ERR_C reserved Byte Bit 7 0 0 reserved ERR_D Diagnostic Byte Byte Bit 7 0 0 Bit 2 0: reserved Byte Bit 2 0: reserved Bit 3: set at internal diagnostics buffer overflow Bit 5 4: reserved Bit 6: Process interrupt lost Bit 7: reserved O Bit 6 0: Channel type 0 Bit 6 0: Channel type 70h: Digital input Bit 7 reserved NUMBIT Diagnostic bits Byte Bit 7 0		Byte	Bit 7 0
Bit 4: Channel information present Bit 7 5: reserved ERR_C reserved Byte Bit 7 0 0 reserved ERR_D Diagnostic Byte Byte Bit 7 0 0 Bit 2 0: reserved Bit 3: set at internal diagnostics buffer overflow Bit 5 4: reserved Bit 6: Process interrupt lost Bit 7: reserved D CHTYP Channel type Byte Bit 7 0 0 Bit 6 0: Channel type 70h: Digital input Bit 7 0 NUMBIT Diagnostic bits Byte	uon	0	Bit 3 0: Module class
ERR_C reserved Byte Bit 7 0 0 reserved ERR_D Diagnostic Byte Bit 7 0 0 Bit 2 0: reserved 0 Bit 2 0: reserved Bit 3: set at internal diagnostics buffer overflow Bit 5 4: reserved Bit 6: Process interrupt lost Bit 7: reserved Byte Bit 7 0 CHTYP Channel type Byte Byte Bit 7 0 NUMBIT Diagnostic bits Byte Byte Bit 7 0			1111b Digital module
ERR_C reserved Byte Bit 7 0 0 reserved ERR_D Diagnostic Byte Bit 7 0 0 Bit 2 0: reserved Bit 3: set at internal diagnostics buffer overflow Bit 5 4: reserved Bit 6: Process interrupt lost Bit 7: reserved CHTYP Channel type Byte Bit 7 0 0 Bit 6 0: Channel type 0 Bit 6 0: Channel type 0 Bit 6 0: Channel type 0 Bit 7 0 NUMBIT Diagnostic bits Byte Bit 7 0			Bit 4: Channel information present
ERR_D Diagnostic Byte Bit 7 0 0 Bit 2 0: reserved 0 Bit 2 0: reserved Bit 3: set at internal diagnostics buffer overflow Bit 5 4: reserved Bit 6: Process interrupt lost Bit 7: reserved Bit 7: reserved Bit 7: reserved Bit 6: Discussioner overflow Bit 7: reserved Bit 7: reserved Bit 7: reserved NUMBIT Diagnostic bits Byte Bit 7 0			Bit 7 5: reserved
ERR_D Diagnostic Byte Bit 7 0 0 Bit 2 0: reserved 0 Bit 2 0: reserved Bit 3: set at internal diagnostics buffer overflow Bit 5 4: reserved Bit 6: Process interrupt lost Bit 7: reserved Bit 7: reserved Bit 7: reserved O Bit 6 0: Channel type 0 Bit 6 0: Channel type 0 Bit 6 0: Channel type 70h: Digital input Bit 7: reserved NUMBIT Diagnostic bits Byte Bit 7 0			
ERR_D Diagnostic Byte Bit 7 0 0 Bit 2 0: reserved Bit 3: set at internal diagnostics buffer overflow Bit 5 4: reserved Bit 6: Process interrupt lost Bit 7: reserved 0 Byte Bit 6 0: Channel type 0 Bit 6 0: Channel type 0 Bit 6 0: Channel type 0 Bit 6 0: Channel type NUMBIT Diagnostic bits Byte Bit 7 0	ERR_C reserved	Byte	Bit 7 0
Dyte Dit 1 0 0 Bit 2 0: reserved Bit 3: set at internal diagnostics buffer overflow Bit 5 4: reserved Bit 6: Process interrupt lost Bit 7: reserved 0 Byte Bit 7 0 0 Bit 6 0: Channel type 0 Bit 6 0: Channel type 70h: Digital input Bit 7: reserved		0	reserved
Dyte Dit 1 0 0 Bit 2 0: reserved Bit 3: set at internal diagnostics buffer overflow Bit 5 4: reserved Bit 6: Process interrupt lost Bit 7: reserved 0 Bit 7 0 0 Bit 6 0: Channel type 0 Bit 6 0: Channel type 0 Bit 6 0: Channel type 70h: Digital input Bit 7: reserved			
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CHTYP Channel type Byte Bit 7 0 0 Bit 6 0: Channel type NUMBIT Diagnostic bits Byte Bit 7 0 Bit 6 0: Channel type Bit 6 0: Channel type Bit 7 0 Bit 7 0			
Bit 5 4: reserved Bit 6: Process interrupt lost Bit 7: reservedCHTYP Channel typeByteBit 7 00Bit 6 0: Channel type 70h: Digital input Bit 7: reservedNUMBIT Diagnostic bitsByteBit 7 0			
CHTYP Channel type Byte Bit 7 0 0 Bit 6 0: Channel type 70h: Digital input Bit 7: reserved NUMBIT Diagnostic bits Byte Bit 7 0			
CHTYP Channel type Byte Bit 7 0 0 Bit 6 0: Channel type 70h: Digital input Bit 7: reserved NUMBIT Diagnostic bits Byte Bit 7 0			Bit 6: Process interrupt lost
Dyte Dit 7 0 0 Bit 6 0: Channel type 70h: Digital input Bit 7: reserved			Bit 7: reserved
Dyte Dit 1 0 0 Bit 6 0: Channel type 70h: Digital input Bit 7: reserved			
NUMBIT Diagnostic bits Byte Bit 7 0	CHTYP Channel type	Byte	Bit 7 0
NUMBIT Diagnostic bits Byte Bit 7 0		0	Bit 6 0: Channel type
NUMBIT Diagnostic bits Byte Bit 7 0			70h: Digital input
Bit i mo			Bit 7: reserved
0 Number of diagnostics bits of the module per channel	NUMBIT Diagnostic bits	Byte	Bit 7 0
		0	Number of diagnostics bits of the module per channel
(here 00h)			(here 00h)

Digital Input

NUMCH Channels	Byte	Bit 7 0	
	0	Number of channels of the module	
		(here 02h)	
CHERR Channel error	Byte	Bit 7 0	
	0	Bit 0: Edge lost at DI 0	
		Bit 1: Edge lost at DI 1	
		Bit 7 2: reserved	
CHxERR reserved	Byte	Bit 7 0	
	0	reserved	
DIAG_US μs ticker	Byte	Bit 7 0	
	0 3	Value of the μ s ticker at the moment of the diagnostic	
	µs ticker		
	In the SLIO module there is a 32 bit timer (μ s ticker). With PowerON the timer state counting with 0. After 2 ³² -1 μ s the timer starts with 0 again.		

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021-1BB50 - DI 2xDC 24V NPN

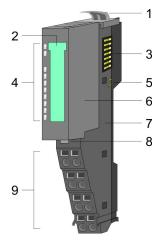
3.3 021-1BB50 - DI 2xDC 24V NPN

Properties

The electronic module collects the binary control signals from the process level and transmits them isolated to the central bus system. It has 2 channels and their status is monitored via LEDs. An input becomes active as soon as it is connected to ground.

- 2 digital inputs (N switching), isolated to the backplane bus
- Suited for switches and approximate switches
- Status indication of the channels via LEDs also with de-activated electronic power supply

Structure



4 LED status indication5 DC 24V power section supply

6 Electronic module

Labeling strip

Backplane bus

- 7 Terminal module8 Locking lever ele
 - Locking lever electronic module

Locking lever terminal module

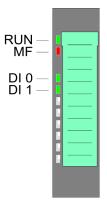
9 Terminal

1

2

3

Status indication

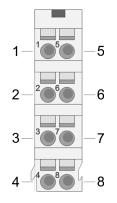


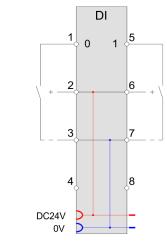
RUN	MF e red	DI x	Description		
_			Bus communication is OK		
		Х	Module status is OK		
	-	v	Bus communication is OK		
	-	Х	Module status reports an error		
	_	х	Bus communication is not possible		
	-	X	Module status reports an error		
		Х	Error at bus power supply		
			Flashing: Error in configuration		
Х	ZHz	Х	& Chapter 2.8 'Trouble shooting - LEDs' on page 28		
			Digital input has signal "1"		
			Digital input has signal "0"		
not relevant: X					

021-1BB50 - DI 2xDC 24V NPN

Pin assignment

For wires with a cross section of 0.08mm² up to 1.5mm².





Pos.	Function	Туре	Description
1	DI 0	I	Digital input DI 0
2	DC 24V	0	DC 24V for sensor
3	0V	0	GND
4			not connected
5	DI 1	L	Digital input DI 1
6	DC 24V	0	DC 24V for sensor
7	0V	0	GND
8			not connected

I: Input, O: Output

Input area

At CPU, PROFIBUS and PROFINET the input area is embedded to the corresponding address area.

- IX Index for access via CANopen
- SX Subindex for access via EtherCAT with Index 6000h + EtherCAT-Slot

More can be found in the according manual of your bus coupler.

Addr.	Name	Bytes	Function	IX	SX
+0	PII	1	State of the inputs	5000h	
			Bit 0: DI 0		01h
			Bit 1: DI 1		02h
			Bit 7 2: reserved		

Output area

No byte of the output area is used by the module.

021-1BB50 - DI 2xDC 24V NPN > Technical data

3.3.1 Technical data

Tuno	
Туре	SM 021
Module ID	0002 9F82
Current consumption/power loss	
Current consumption from backplane bus	65 mA
Power loss	0.5 W
Technical data digital inputs	
Number of inputs	2
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	-
Current consumption from load voltage L+ (without load)	-
Rated value	DC 20.428.8 V
Input voltage for signal "0"	DC 1528.8 V
Input voltage for signal "1"	DC 05 V
Input voltage hysteresis	-
Frequency range	-
Input resistance	-
Input current for signal "1"	3 mA
Connection of Two-Wire-BEROs possible	\checkmark
Max. permissible BERO quiescent current	0.5 mA
Input delay of "0" to "1"	3 ms
Input delay of "1" to "0"	3 ms
Number of simultaneously utilizable inputs horizontal con- figuration	2
Number of simultaneously utilizable inputs vertical configu- ration	2
Input characteristic curve	-
Initial data size	2 Bit
Status information, alarms, diagnostics	
Status display	green LED per channel
Interrupts	no
Process alarm	no
Diagnostic interrupt	no
Diagnostic functions	no
Diagnostics information read-out	none
Module state	green LED

021-1BB50 - DI 2xDC 24V NPN > Technical data

Module error displayred LEDChannel error displaynoneisolationBetween channels-Between channels of groups to-Between channels and backplane busInsulation tested withDC 500 VSafety-Safety protocol-Safety requirements-Sacure user address-Watchdog-Two channels-Two channels-Datasizes-Two channels-Datasizes-Input bytes-Diagnostic bytes0Diagnostic bytes0Diagnostic bytes0MontingPP PPE GF10Metrial129 PM SC SmMetrial27 gMetrial table-Metrial table-Dimensions (WxHxD)57 gWeight including accessories-Gross weight-Dirensions (mathemetric)-Contractions-Contractions-Contractions-Contractions-Contractions-Contractions-Contractions-Contractions-Contractions-Contractions-Contractions-Contractions-Contractions-Contractions-Contractions-Contractions-Contractions-Contracti	Order no.	021-1BB50
IsolationIndexted set of a construction o	Module error display	red LED
Between channels-Between channels of groups to-Between channels and backplane bus✓Insulation tested withDC 500 VSafety-Safety protocol-Safety requirements-Safety requirements-Watchdog-Two channels-Two channels-Datasizes-Input bytes0Output bytes0Diagnostic bytes0Parameter bytes0MaterialPE/ /PE GF 10Monting2.9 mm x 109 mm x 76.5 mmNet weight1.2 mm x 109 mm x 76.5 mmNet weight7.9Stronge temperature0.1 Cot 60 °CStorage temperature2.5 °C to 70 °CVarietation9Furtification9Vict offication9Stronge temperature3.5 °C to 70 °CVict offication9Vict offication9Stronge temperature9Stronge temperat	Channel error display	none
Between channels of groups to-Between channels and backplane bus✓Insulation tested withDC 500 VSafetySafety protocol-Safety requirements-Sacter user address-Watchdog-Two channels-Tost pulse outputs-Datasizes-Input bytes0Output bytes0Diagnostic bytes0MaterialPPC /PPE GF10MaterialPPC /PPE GF10Net weight5.9 groupsNet weight5.9 groupsVielt hindling accessories5.7 gGross weight0.7 GOros meight7.9 GStorage temperature0.7 GCortifications2.9 cm 7.0 °CUt certification0.7 °CUt certification9.5 °CStorage temperature0.7	Isolation	
Between channels and backplane bus✓Insulation tested withDC 500 VSafetySafety protocol-Safety requirements-Safety requirements-Secure user address-Watchdog-Two channels-Test pulse outputs-Dataizes-Input bytes1Output bytes0Diagnostic bytes0MaterialPPE/ PPE GF10MountingProfile rail 35 mmMechanical data57 gDimensions (WXHxD)12.9 mm x 10.9 mm x 76.5 mmNet weight57 gGross weight-Operating temperature0° Cto 60 °CStorage temperature-UL certificationyesUL certificationyes	Between channels	-
Insulation tested with DC 500 V Safety Safety protocol - Safety protocol - Safety requirements - Safety requirements - Safety requirements - Watchdog - Watchdog - Two channels - Test pulse outputs - Datasizes - Input bytes 0 Output bytes 0 Parameter bytes 0 Diagnostic bytes 0 Material PPE / PPE GF10 Mounting POE Mounting 12.9 mmx 109 mm x 76.5 mm Net weight 57 g Veight including accessories 57 g Gross weight 2.9 Cor 0° C Portored 2.5 Cio 70 °C Storage temperature - Outper temperature - Uc certification yes	Between channels of groups to	-
SafetyImage: statumentsSafety requirements-Safety requirements-Secure user address-Watchdog-Two channels-Two channels-Test pulse outputs-Dataizes-Input bytes0Output bytes0Diagnostic bytes0MaterialPE / PE GF 10MountingPofile rail 35 mmNet weight57 gNet weight79 gVeight including accessories57 gGross weight22 gPorrang temperature-Operating temperature-Ore to Go °C-Storage temperature-Ut certificationyes	Between channels and backplane bus	\checkmark
Safety protocol.Safety requirements.Secure user address.Watchdog.Two channels.Test pulse outputs.Dataizes.Input bytes0Output bytes0Diagnostic bytes0MaterialPPE / PPE GF10MountingProfile rail 35 mmNet weight57 gNet weight57 gVeight including accessories57 gGross weight.Operating temperature.Or Co 60 °C.Storage temperature.UL certificationyesUL certificationyes	Insulation tested with	DC 500 V
Safety requirements-Secure user address-Watchdog-Two channels-Tost pulse outputs-DatasizesIInput bytes0Output bytes0Output bytes0Diagnostic bytes0MaterialPPE / PPE GF10MountingPPI / PPE GF10Net weight57 gViewight57 gViewight72 gOrgen weight-Operating temperature0Conson weight-Dirage temperature-Corage temperature0Strage temperature-Cutrifications0Ut curtification-Strage temperature-Strage temperature-Strage temperature-Ut curtification-Strage temperature-Strage temperature-	Safety	
Secure user address-Watchdog-Two channels-Test pulse outputs-DatasizesIInput bytes1Output bytes0Parameter bytes0Diagnostic bytes0MaterialPPE / PPE GF10MountingProfiler ail 35 mmMensions (WXHxD)12.9 mm x 76.5 mmNet weight57 gYeight including accessories57 gGross weight-Porrating temperature0° C to 60 °CStorage temperature-Uc certificationsyesUt certificationyes	Safety protocol	-
Vatchdog-Two channels-Test pulse outputs-Datasizes-Input bytes1Output bytes0Parameter bytes0Diagnostic bytes0HousingPE / PPE GF10MountingPofile rail 35 mmMechanical data2.9 mm x 109 mm x 76.5 mmNet weight57 gVeight including accessories57 gGross weight-Operating temperature0°C to 60°CStorage temperature-Ut certificationsyes	Safety requirements	-
Two channels-Test pulse outputs-Datasizes-Input bytes1Output bytes0Parameter bytes0Diagnostic bytes0HousingPPE / PPE GF10MaterialPPE / PPE GF10MountingProfile rail 35 mmMechanical data12.9 mm x 109 mm x 76.5 mmNet weight57 gVeight including accessories57 gGross weight72 gEnvironmental conditions0°C to 60 °CStorage temperature-UL certificationsyes	Secure user address	-
Test pulse outputs-Datasizes-Input bytes1Output bytes0Output bytes0Parameter bytes0Diagnostic bytes0MountingPPE / PPE GF10MountingProfile rail 35 mmMechanical data2Dimensions (WxHxD)12.9 mm x 109 mm x 76.5 mmNet weight57 gGross weight72 gEnvironmental conditions0°C to 60°CStorage temperature0°C to 70°CCertificationsyes	Watchdog	-
DatasizesIInput bytes1Output bytes0Parameter bytes0Diagnostic bytes0Housing0MaterialPPE / PPE GF 10MountingProfile rail 35 mmMechanical data1Dimensions (WxHxD)12.9 mm x 109 mm x 76.5 mmNet weight57 gGross weight72 gEnvironmental conditions0°C to 60°CStorage temperature-25°C to 70°CCertificationsyes	Two channels	-
Input bytes1Output bytes0Parameter bytes0Diagnostic bytes0Mousing0MaterialPPE / PPE GF 10MountingProfile rail 35 mmMechanical data2Dimensions (WxHxD)12.9 mm x 109 mm x 76.5 mmNet weight57 gWeight including accessories57 gGross weight7 gDiperating temperature0 °C to 60 °CStorage temperature-25 °C to 70 °CCertificationsyes	Test pulse outputs	-
Output bytes0Parameter bytes0Diagnostic bytes0HousingPPE / PPE GF10MaterialPPE / PPE GF10MountingProfile rail 35 mmMechanical data12.9 mm x 109 mm x 76.5 mmDimensions (WxHxD)12.9 mm x 109 mm x 76.5 mmNet weight57 gWeight including accessories57 gGross weight0 °C to 60 °CDiperating temperature0 °C to 60 °CStorage temperature-25 °C to 70 °CCertificationsyes	Datasizes	
Parameter bytes0Diagnostic bytes0HousingMaterialPPE / PPE GF10MountingProfile rail 35 mmMechanical dataDimensions (WxHxD)12.9 mm x 109 mm x 76.5 mmNet weight57 gVeight including accessories57 gGross weight72 gEnvironmental conditionsOperating temperature0 °C to 60 °CStorage temperature-25 °C to 70 °CCertificationsyes	Input bytes	1
Diagnostic bytes0HousingImage: Constraint of the second	Output bytes	0
HousingPPE / PPE GF10MaterialProfile rail 35 mmMountingProfile rail 35 mmMechanical dataDimensions (WxHxD)12.9 mm x 109 mm x 76.5 mmNet weight57 gWeight including accessories57 gGross weight72 gEnvironmental conditionsOperating temperature0 °C to 60 °CStorage temperature-25 °C to 70 °CCertificationsyes	Parameter bytes	0
MaterialPPE / PPE GF10MountingProfile rail 35 mmMechanical dataImage: Constraint of the second sec	Diagnostic bytes	0
MountingProfile rail 35 mmMechanical dataProfile rail 35 mmDimensions (WxHxD)12.9 mm x 109 mm x 76.5 mmNet weight57 gWeight including accessories57 gGross weight72 gEnvironmental conditions0 °C to 60 °COperating temperature0 °C to 70 °CCertificationsJune 100 °CUL certificationyes	Housing	
Mechanical dataImage: constraint of the second	Material	PPE / PPE GF10
Dimensions (WxHxD)12.9 mm x 109 mm x 76.5 mmNet weight57 gWeight including accessories57 gGross weight72 gEnvironmental conditions-Operating temperature0 °C to 60 °CStorage temperature-25 °C to 70 °CCertifications-UL certificationyes	Mounting	Profile rail 35 mm
Net weight57 gWeight including accessories57 gGross weight72 gEnvironmental conditions0°C to 60°COperating temperature0°C to 70°CStorage temperature-25 °C to 70°CUL certificationsyes	Mechanical data	
Weight including accessories57 gGross weight72 gEnvironmental conditions0°C to 60 °COperating temperature0 °C to 60 °CStorage temperature-25 °C to 70 °CCertificationsyes	Dimensions (WxHxD)	12.9 mm x 109 mm x 76.5 mm
Gross weight72 gEnvironmental conditions0Operating temperature0 °C to 60 °CStorage temperature-25 °C to 70 °CCertificationsyes	Net weight	57 g
Environmental conditions·Operating temperature0 °C to 60 °CStorage temperature-25 °C to 70 °CCertifications·UL certificationyes	Weight including accessories	57 g
Operating temperature0 °C to 60 °CStorage temperature-25 °C to 70 °CCertifications-25 °C to 70 °CUL certificationyes	Gross weight	72 g
Storage temperature -25 °C to 70 °C Certifications ull certification	Environmental conditions	
Certifications UL certification yes	Operating temperature	0 °C to 60 °C
UL certification yes	Storage temperature	-25 °C to 70 °C
	Certifications	
KC certification yes	UL certification	yes
	KC certification	yes

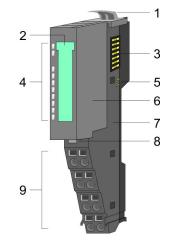
3.4 021-1BB70 - DI 2xDC 24V ETS

Properties

The electronic module collects the binary control signals from the process level and transmits them isolated to the central bus system. It has 2 channels and their status is monitored via LEDs. With configured ETS functionality (ETS = edge time stamp) and the corresponding (rising/falling) edge the current time value of the µs timer is stored together with the state of the inputs in the process image. Depending on the configuration 5 (20byte) respectively 15 (60byte) ETS entries may be stored in the process image one after another.

- 2 digital inputs, isolated to the backplane bus
- Configurable ETS functionality for 5 respectively 15 ETS entries (each 4byte)
- **Diagnostics function**
- Suited for switches and approximate switches
- Status indication of the channels via LEDs also with de-activated electronic power supply

Structure



- 1 Locking lever terminal module
- 2 Labeling strip
- 3 Backplane bus
- 4 LED status indication
- 5 DC 24V power section supply
- 6 Electronic module
- 7 Terminal module 8 Locking lever electronic module
- Terminal
- 9

Status indication

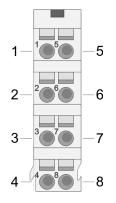
RUN — MF —	
DI 0 — DI 1 —	

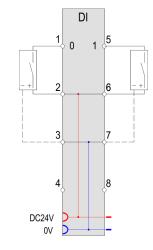
RUN	MF	DI x	Description	
		x	Bus communication is OK Module status is OK	
	•	x	Bus communication is OK Module status reports an error	
		x	Bus communication is not possible Module status reports an error	
		Х	Error at bus power supply	
x	ZHz	x	Flashing: Error in configuration	
			Digital input has signal "1"	
			Digital input has signal "0"	
not relevant: X				

021-1BB70 - DI 2xDC 24V ETS

Pin assignment

For wires with a cross section of 0.08mm^2 up to 1.5mm^2 .





Pos.	Function	Туре	Description
1	DI 0	I	Digital input DI 0
2	DC 24V	0	DC 24V for sensor
3	0V	0	GND
4			not connected
5	DI 1	I	Digital input DI 1
6	DC 24V	0	DC 24V for sensor
7	0V	0	GND
8			not connected

I: Input, O: Output

In-/Output area	With configured ETS functionality (ETS= e dge time stamp) and the corresponding edge the current time value of the SLIO μ s timer is stored together with the state of the inputs and a running number as ETS entry in the process image.
	You may configure the following variants:
	 021-1BB70 DI 2xDC24V (20): uses 20byte in the PII for 5 ETS entries 021-1BB70 DI 2xDC24V (60): uses 60byte in the PII for 15 ETS entries
Output area	No byte of the output area is used by the module.
Input area 20byte respec- tively 60byte	Depending on the configured variant, the module serves for an area for 5 resp. 15 ETS entries. Each ETS entry uses 4byte in input area:
Input area	The input range is used for status message. At CPU, PROFIBUS and PROFINET the input respectively output area is embedded to the corresponding address area.
	IX - IX = Index for access via CANopen. With s = Subindex the corresponding ETS entry is addressed.
	SX - Subindex for access via EtherCAT with Index 6000h + EtherCAT-Slot
	More can be found in the according manual of your bus coupler.

Structure	of an	ETS	entry
-----------	-------	-----	-------

	et u et u		, incluy			
	Addr.	Name	Bytes	Function	IX	SX
	+0	PII	1	State of the inputs	5430h/s	01h
	+1	RN	1	Running number		02h
	+2	ETS_US	2	µs ticker		03h
PII	Here the	state of the in	puts after ar	edge change is stor	red.	
		t byte has the				
	Bit 0: DI	•	J	<u> </u>		
	Bit 1: DI					
	Bit 2 7					
	-	- ()				
RN	The R un	nina N umber ((RN) is a cor	tinuous number 0	127. which starts w	vith 1. The RN
				der of the edges.	,	
ETS_US				t timer (µs ticker). W		ner starts
	_			mer starts with 0 aga		
	ETS_US	always conta	ins the low w	ord of the µs ticker (065535µs).	
ETS functionality				alue of the timer is st e state of the inputs		
	image as ETS_US together with the state of the inputs PII and the running number RN. The following figure shows the sequence of how the ETS entries are stored in the input					
	area.					
					t ►	
	Que	CEED	Fue Oue		65535µs	
	0µs	0000	5µs 0µs		00000µ8	
			Ad	dr. PII RN E	TS_US	
			+(TS_US-0	
			+4		TS_US-1	
			+{	3 PII-2 RN-2 E	TS_US-2	
			-		TS_US-3	
			+	16 PII-4 RN-4 E	TS_US-4	
Input area	The inpu	t range is use	d for status r	nessage. At CPU, PI	ROFIBLIS and PRO	FINET the
πραιαισα				bedded to the corre		
				Nopen. With s = Sub	index the correspor	nding ETS
	en	try is addresse	ed.			

SX - Subindex for access via EtherCAT with Index 6000h + EtherCAT-Slot

More can be found in the according manual of your bus coupler.

Configured as 021-1BB70 DI 2xDC 24V (20) 20byte - 5 ETS entries

Digital Input

021-1BB70 - DI 2xDC 24V ETS

Addr.	PII	IX=5430h	SX	Addr.	RN	IX=5430h	SX	Addr.	ETS-US	IX=5430h	SX
+0	PII-0	s=1	01h	+1	RN-0	s=1	02h	+2	ETS_US-0	s=1	03h
+4	PII-1	s=2	04h	+5	RN-1	s=2	05h	+6	ETS_US-1	s=2	06h
+8	PII-2	s=3	07h	+9	RN-2	s=3	08h	+10	ETS_US-2	s=3	09h
+12	PII-3	s=4	0Ah	+13	RN-3	s=4	0Bh	+14	ETS_US-3	s=4	0Ch
+16	PII-4	s=5	0Dh	+17	RN-4	s=5	0Eh	+18	ETS_US-4	s=5	0Fh

Configured as 021-1BB70

DI 2xDC 24V (60) 60byte - 15 ETS entries

Addr.	PII	IX=5430h	SX	Addr.	RN	IX=5430h	SX	Addr.	ETS-US	IX=5430h	SX
+0	PII-0	s=1	01h	+1	RN-0	s=1	02h	+2	ETS_US-0	s=1	03h
+4	PII-1	s=2	04h	+5	RN-1	s=2	05h	+6	ETS_US-1	s=2	06h
+8	PII-2	s=3	07h	+9	RN-2	s=3	08h	+10	ETS_US-2	s=3	09h
+12	PII-3	s=4	0Ah	+13	RN-3	s=4	0Bh	+14	ETS_US-3	s=4	0Ch
+16	PII-4	s=5	0Dh	+17	RN-4	s=5	0Eh	+18	ETS_US-4	s=5	0Fh
+20	PII-5	s=6	10h	+21	RN-5	s=6	11h	+22	ETS_US-5	s=6	12h
+24	PII-6	s=7	13h	+25	RN-6	s=7	14h	+26	ETS_US-6	s=7	15h
+28	PII-7	s=8	16h	+29	RN-7	s=8	17h	+30	ETS_US-7	s=8	18h
+32	PII-8	s=9	19h	+33	RN-8	s=9	1Ah	+34	ETS_US-8	s=9	1Bh
+36	PII-9	s=10	1Ch	+37	RN-9	s=10	1Dh	+38	ETS_US-9	s=10	1Eh
+40	PII-10	s=11	1Fh	+41	RN-10	s=11	20h	+42	ETS_US-10	s=11	21h
+44	PII-11	s=12	22h	+45	RN-11	s=12	23h	+46	ETS_US-11	s=12	24h
+48	PII-12	s=13	25h	+49	RN-12	s=13	26h	+50	ETS_US-12	s=13	27h
+52	PII-13	s=14	28h	+53	RN-13	s=14	29h	+54	ETS_US-13	s=14	2Ah
+56	PII-14	s=15	2Bh	+57	RN-14	s=15	2Ch	+58	ETS_US-14	s=15	2Dh



The ETS module may only be accessed by the System SLIO CPU by means of SFC 14 or via the process image.

021-1BB70 - DI 2xDC 24V ETS > Technical data

3.4.1 Technical data

Order no.	021-1BB70
Туре	SM 021
Module ID	0F01 47C1
Current consumption/power loss	
Current consumption from backplane bus	100 mA
Power loss	0.9 W
Technical data digital inputs	
Number of inputs	2
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	DC 24 V
Current consumption from load voltage L+ (without load)	10 mA
Rated value	DC 20.428.8 V
Input voltage for signal "0"	DC 05 V
Input voltage for signal "1"	DC 1528.8 V
Input voltage hysteresis	-
Frequency range	-
Input resistance	-
Input current for signal "1"	3 mA
Connection of Two-Wire-BEROs possible	\checkmark
Max. permissible BERO quiescent current	0.5 mA
Input delay of "0" to "1"	parameterizable 2µs - 3ms
Input delay of "1" to "0"	parameterizable 2µs - 3ms
Number of simultaneously utilizable inputs horizontal con- figuration	2
Number of simultaneously utilizable inputs vertical configuration	2
Input characteristic curve	IEC 61131-2, type 1
Initial data size	60 Byte
Status information, alarms, diagnostics	
Status display	green LED per channel
Interrupts	no
Process alarm	no
Diagnostic interrupt	no
Diagnostic functions	no
Diagnostics information read-out	possible
Module state	green LED

021-1BB70 - DI 2xDC 24V ETS > Technical data

error display red LED error display none channels channels of groups to channels and backplane bus channels and backplane bus rotocol equirements agginements ser address g g nnels e outputs es es set es set es set es set es set es set es set es set es set set	
Image: channels - channels of groups to - channels and backplane bus ✓ channels and backplane bus ✓ n tested with DC 500 rotocol - equirements - ser address - g - nnels - eoutputs - es 20 / 60 ytes 0 er bytes 10	V
channels of groups to	V
channels of groups to	V
channels and backplane bus✓In tested withDC 500rotocol-rotocol-equirements-iser address-g-nnels-eo outputs-es20 / 60ytes0er bytes10	N/
n tested with DC 500 rotocol	N/
rotocol	V
equirements - iser address - g - nnels - ie outputs - es 20 / 60 ytes 0 er bytes 10	v
equirements - iser address - g - nnels - ie outputs - es 20 / 60 ytes 0 er bytes 10	
iser address - g - nnels - e outputs - es 20 / 60 ytes 0 0 er bytes 10	
g - nnels - e outputs - es 20 / 60 ytes 0 er bytes 10	
nnels	
ee outputs	
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ytes 0 er bytes 10	
er bytes 10	
,	
ic hytes 20	
10 Dy 100 20	
I	
PPE / P	PE GF10
Profile r	ail 35 mm
ical data	
ons (WxHxD) 12.9 mm	n x 109 mm x 76.5 mm
ht 58 g	
ncluding accessories 58 g	
eight 73 g	
mental conditions	
g temperature 0 °C to	60 °C
temperature -25 °C t	o 70 °C
tions	
ication yes	
ication yes	

3.4.2 Parameter data

The following variants may be configured:

 021-1BB70 DI 2xDC24V (20): uses 20byte in the PII for 5 ETS entries
 021-1BB70 DI 2xDC24V (60): uses 60byte in the PII for 15 ETS entries

3.4.2.1 Parameters

- DS Record set for access via CPU, PROFIBUS and PROFINET
- IX Index for access via CANopen
- SX Subindex for access via EtherCAT with Index 3100h + EtherCAT-Slot

More can be found in the according manual of your bus coupler.

Name	Bytes	Function	Default	DS	IX	SX	
PII_L	1	Length process image	14h resp.	02h	3100h	01h	
		input data ^{1, 2}	3Ch (fix)				
PIQ_L	1	Length process image	00h (fix)	02h	3101h	02h	
		output data ²					
CH0D	1	Input delay DI 0	02h	01h	3102h	03h	
CH1D	1	Input delay DI 1	02h	01h	3103h	04h	
TSER	1	Raising edge 0-1 at DI x	00h	80h	3104h	05h	
TSEF	1	Falling edge 1-0 at DI x	00h	80h	3105h	06h	
4) T 1	I) This approaches approaches of the configured vision						

1) This parameter corresponds of the configured variant.

2) This record set may only be transferred at STOP state.

PII_L	Byte	Bit 7 0					
	0	The length for the process image terized variant (14h or 3Ch).	is fixed adjusted to the le	ngth of the parame-			
PIQ_L	Byte	Bit 7 0					
	0	The length of the process image of the output data is fix set to 0byte.					
CHxD DI x	Byte	Description	Possible values				
	0	Input delay DI x	00h: 1µs	07h: 86µs			
			02h: 3µs	09h: 342µs			
			04h: 10µs	0Ch: 2731µs			
			Other values are n	ot permissible!			

With the help of filters you may e.g. filter signal peaks at a blurred input signal.

Edge select Here the ETS function for DI 0 and DI 1 may be activated. With these 2 bytes you may define the type of edge of the input signal, to which the current µs timer value is stored in the process image together with the state of the inputs.

0	Bit 0: ETS record at edge 0-1 (rising edge) DI 0
	Bit 1: ETS record at edge 0-1 (rising edge) DI 1
	(0: disable, 1: enable)
	Bit 7 2: reserved

 TSEF edge 1-0 DI x
 Byte
 Bit 7 ... 0

 0
 Bit 0: ETS record at edge 1-0 (falling edge) DI 0

 Bit 1: ETS record at edge 1-0 (falling edge) DI 1
 (0: disable, 1: enable)

 Bit 7 ... 2: reserved
 Bit 7 ... 2: reserved

3.4.2.2 Example of the principle of operation

In the following it is demonstrated by an example, in which order the ETS entries are stored.

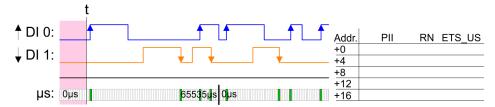
In this example a module is configured, which occupies 20byte for 5 ETS entries.

The following edges for the input channels are preset.

- DI 0: Edge 0-1: ↑
- DI 1: Edge 1-0: ↓

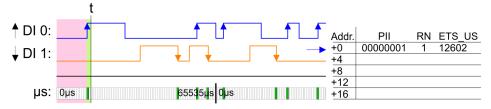
The green area of the diagram indicates the ETS entries, which were available at time "t". ETS entries, which are not (longer) available are marked red.

Process image is empty New ETS entries are always registered starting from address +0. Thereby already existing ETS entries are shifted 4 byte each.

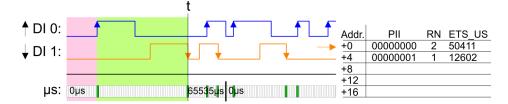


1. ETS entry

Released by an edge 0-1 from DI 0 the 1. ETS entry is registered starting from address +0.

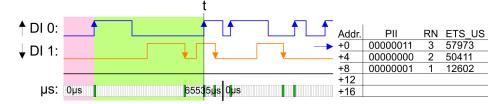


2. ETS entry Released by an edge 1-0 from DI 1 the 2. ETS entry is registered starting from address +0 and the 1. ETS entry is shifted 4 byte.



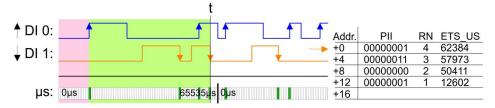
3. ETS entry

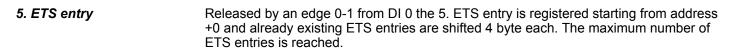
Released by an edge 1-0 from DI 1 the 2. ETS entry is registered starting from address +0 and the 1. ETS entry is shifted 4 byte.

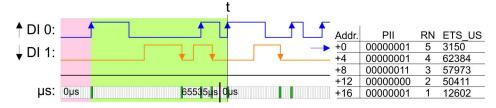


4. ETS entry

Released by an edge 1-0 from DI 1 the 4. ETS entry is registered starting from address +0 and already existing ETS entries are shifted 4 byte each.

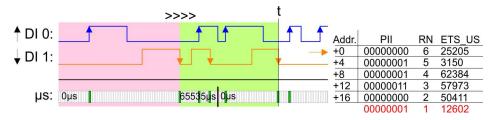




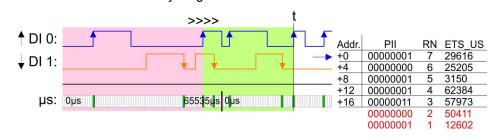


6. ETS entry

Released by an edge 1-0 from DI 1 the 6. ETS entry is registered starting from address +0 and already existing ETS entries are shifted 4 byte each. Thereby the 1. ETS entry is deleted and is not available any longer.

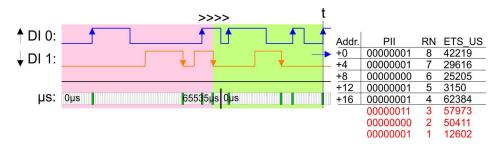


7. ETS entry Released by an edge 0-1 from DI 0 the 7. ETS entry is registered starting from address +0 and already existing ETS entries are shifted 4 byte each. Thereby the 2. ETS entry is deleted and is not available any longer.



8. ETS entry

Released by an edge 0-1 from DI 0 the 8. ETS entry is registered starting from address +0 and already existing ETS entries are shifted 4 byte each. Thereby the 3. ETS entry is deleted and is not available any longer.



Please consider the ETS modules can only effectively be used together with head modules, which have an integrated μ s ticker. The Ethernet coupler with ModbusTCP 053-1MT00 for example does not have an μ s ticker.

021-1BB70 - DI 2xDC 24V ETS > Diagnostic data

3.4.3 Diagnostic data

So this module does not support interrupt functions, the diagnostic data serve the information about this module.

- DS Record set for access via CPU, PROFIBUS and PROFINET. The access happens by DS 01h. Additionally the first 4 bytes may be accessed by DS 00h.
- IX Index for access via CANopen. The access happens by IX 2F01h. Additionally the first 4 bytes may be accessed by IX 2F00h.
- SX Subindex for access via EtherCAT with Index 5005h.

More can be found in the according manual of your bus coupler.

Name	Bytes	Function	Default	DS	IX	SX
ERR_A	1	reserved	00h	01h	2F01h	02h
MODTYP	1	Module information	1Fh			03h
ERR_C	1	reserved	00h			04h
ERR_D	1	reserved	00h			05h
CHTYP	1	Channel type	70h			06h
NUMBIT	1	Number of diagnostics bits per channel	00h			07h
NUMCH	1	Number channels of the module	02h			08h
CHERR	1	reserved	00h			09h
CH0ERR CH7ERR	8	reserved	00h			0Ah 11h
DIAG_US	4	µs ticker (32bit)	00h			13h

MODTYP Modul informa- tion	Byte	Bit 7 0
	0	Bit 3 0: Module class
		1111b Digital module
		Bit 4: Channel information present
		Bit 7 5: reserved
CHTYP Channel type	Byte	Bit 7 0
	0	Bit 6 0: Channel type
		70h: Digital input
		Bit 7: 0 (fix)
NUMBIT Diagnostic bits	Byte	Bit 7 0
	0	Number of diagnostics bits of the module per channel
		(here 00h)

021-1BB70 - DI 2xDC 24V ETS > Diagnostic data

NUMCH channels	Byte	Bit 7 0
	0	Number of channels of the module
		(here 02h)
DIAG_US μs ticker	Byte	Bit 7 0
	0 3	Value of the $\boldsymbol{\mu} s$ ticker at the moment of the diagnostic data generation
ERR_A/C/D CHERR, CHxERR reserved	Byte	Bit 7 0
ONALIAA reserved	0	reserved

021-1BD00 - DI 4xDC 24V

3.5 021-1BD00 - DI 4xDC 24V

1

2

3

4

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8

9

Properties

The electronic module collects the binary control signals from the process level and transmits them isolated to the central bus system. It has 4 channels and their status is monitored via LEDs.

- 4 digital inputs, isolated to the backplane bus
- Suited for switches and approximate switches

Locking lever terminal module

DC 24V power section supply

Locking lever electronic module

Labeling strip

Backplane bus

LED status indication

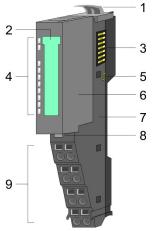
Electronic module

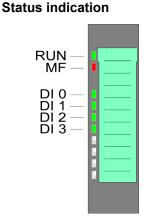
Terminal module

Terminal

 Status indication of the channels via LEDs also with de-activated electronic power supply

Structure

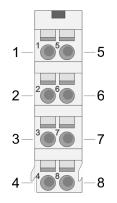


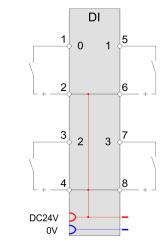


RUN	MF	DI x	Description
green	red	green	beechpiten
_		х	Bus communication is OK
-		^	Module status is OK
_	-	x	Bus communication is OK
-	-	^	Module status reports an error
	_	х	Bus communication is not possible
	-		Module status reports an error
		Х	Error at bus power supply
			Flashing: Error in configuration
Х	ZHz 2Hz	Х	Chapter 2.8 'Trouble shooting - LEDs' on page 28
			Digital input has signal "1"
			Digital input has signal "0"
not relevant: X			

Pin assignment

For wires with a cross section of 0.08mm² up to 1.5mm².





Pos.	Function	Туре	Description
1	DI 0	I	Digital input DI 0
2	DC 24V	0	DC 24V for sensor
3	DI 2	I	Digital input DI 2
4	DC 24V	0	DC 24V for sensor
5	DI 1	I	Digital input DI 1
6	DC 24V	0	DC 24V for sensor
7	DI 3	I	Digital input DI 3
8	DC 24V	0	DC 24V for sensor

I: Input, O: Output

Input area

At CPU, PROFIBUS and PROFINET the input area is embedded to the corresponding address area.

IX - Index for access via CANopen

SX - Subindex for access via EtherCAT with Index 6000h + EtherCAT-Slot

More can be found in the according manual of your bus coupler.

Addr.	Name	Bytes	Function	IX	SX
+0	PII 1	State of the inputs	5000h		
			Bit 0: DI 0		01h
		Bit 1: DI 1		02h	
		Bit 2: DI 2		03h	
			Bit 3: DI 3		04h
			Bit 7 4: reserved		

Output area

No byte of the output area is used by the module.

021-1BD00 - DI 4xDC 24V > Technical data

3.5.1 Technical data

Order no.	021-1BD00
Туре	SM 021
Module ID	0003 9F84
Current consumption/power loss	
Current consumption from backplane bus	65 mA
Power loss	0.6 W
Technical data digital inputs	
Number of inputs	4
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	-
Current consumption from load voltage L+ (without load)	-
Rated value	DC 20.428.8 V
Input voltage for signal "0"	DC 05 V
Input voltage for signal "1"	DC 1528.8 V
Input voltage hysteresis	-
Frequency range	-
Input resistance	-
Input current for signal "1"	3 mA
Connection of Two-Wire-BEROs possible	\checkmark
Max. permissible BERO quiescent current	0.5 mA
Input delay of "0" to "1"	3 ms
Input delay of "1" to "0"	3 ms
Number of simultaneously utilizable inputs horizontal con- figuration	4
Number of simultaneously utilizable inputs vertical configuration	4
Input characteristic curve	IEC 61131-2, type 1
Initial data size	4 Bit
Status information, alarms, diagnostics	
Status display	green LED per channel
Interrupts	no
Process alarm	no
Diagnostic interrupt	no
Diagnostic functions	no
Diagnostics information read-out	none
Module state	green LED

021-1BD00 - DI 4xDC 24V > Technical data

Order no.	021-1BD00
Module error display	red LED
Channel error display	none
Isolation	
Between channels	-
Between channels of groups to	-
Between channels and backplane bus	\checkmark
Insulation tested with	DC 500 V
Safety	
Safety protocol	-
Safety requirements	-
Secure user address	-
Watchdog	-
Two channels	-
Test pulse outputs	-
Datasizes	
Input bytes	1
Output bytes	0
Parameter bytes	0
Diagnostic bytes	0
Housing	
Material	PPE / PPE GF10
Mounting	Profile rail 35 mm
Mechanical data	
Dimensions (WxHxD)	12.9 mm x 109 mm x 76.5 mm
Net weight	57 g
Weight including accessories	57 g
Gross weight	72 g
Environmental conditions	
Operating temperature	0 °C to 60 °C
Storage temperature	-25 °C to 70 °C
Certifications	
UL certification	yes
KC certification	yes

021-1BD10 - DI 4xDC 24V 2µs...4ms

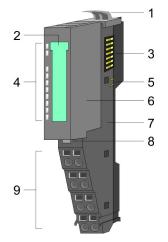
3.6 021-1BD10 - DI 4xDC 24V 2µs...4ms

Properties

The electronic module collects the binary control signals from the process level and transmits them isolated to the central bus system. It has 4 fast digital input channels and their status is monitored via LEDs.

- 4 fast digital inputs, isolated to the backplane bus
- Suited for switches and approximate switches
- Status indication of the channels via LEDs also with de-activated electronic power supply
- Parameterizable input delay
- Interrupt and diagnostics function

Structure



Status indication

RUN — MF — DI 0 — DI 1 — DI 2 — DI 3 —

RUN	MF	DI x	Description
		X	Bus communication is OK
		Х	Module status is OK
	-	х	Bus communication is OK
	-	^	Module status reports an error
	_	х	Bus communication is not possible
	-		Module status reports an error
		Х	Error at bus power supply
			Flashing: Error in configuration
Х	ZHz 2Hz	Х	Chapter 2.8 'Trouble shooting - LEDs' on page 28
			Digital input has signal "1"
			Digital input has signal "0"
not relevant: X			

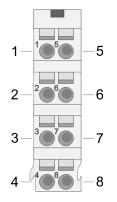
1 Locking lever terminal module

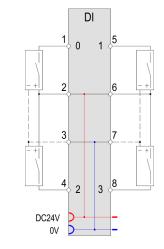
- 2 Labeling strip
- 3 Backplane bus
- 4 LED status indication
- 5 DC 24V power section supply
- 6 Electronic module
- 7 Terminal module8 Locking lever ele
- B Locking lever electronic module
- 9 Terminal

021-1BD10 - DI 4xDC 24V 2µs...4ms

Pin assignment

For wires with a cross section of 0.08mm² up to 1.5mm².





Pos.	Function	Туре	Description
1	DI 0	I	Digital input DI 0
2	DC 24V	0	DC 24V for sensor
3	0V	0	GND
4	DI 2	I	Digital input DI 2
5	DI 1	I	Digital input DI 1
6	DC 24V	0	DC 24V for sensor
7	0V	0	GND
8	DI 3	0	Digital input DI 3

I: Input, O: Output

Input area

At CPU, PROFIBUS and PROFINET the input area is embedded to the corresponding address area.

- IX Index for access via CANopen
- SX Subindex for access via EtherCAT with Index 6000h + EtherCAT-Slot

More can be found in the according manual of your bus coupler.

Addr.	Name	Bytes	Function	IX	SX
+0	PII 1	State of the inputs	5000h		
			Bit 0: DI 0		01h
		Bit 1: DI 1		02h	
		Bit 2: DI 2		03h	
		Bit 3: DI 3		04h	
			Bit 7 4: reserved		

Output area

No byte of the output area is used by the module.

021-1BD10 - DI 4xDC 24V 2µs...4ms > Technical data

3.6.1 Technical data

Order no.	021-1BD10
Туре	SM 021
Module ID	0009 1F04
Current consumption/power loss	
Current consumption from backplane bus	100 mA
Power loss	0.95 W
Technical data digital inputs	
Number of inputs	4
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	DC 20.428.8 V
Current consumption from load voltage L+ (without load)	15 mA
Rated value	DC 20.428.8 V
Input voltage for signal "0"	DC 05 V
Input voltage for signal "1"	DC 1528.8 V
Input voltage hysteresis	-
Frequency range	-
Input resistance	-
Input current for signal "1"	3 mA
Connection of Two-Wire-BEROs possible	\checkmark
Max. permissible BERO quiescent current	0.5 mA
Input delay of "0" to "1"	parameterizable 2µs - 3ms
Input delay of "1" to "0"	parameterizable 2µs - 3ms
Number of simultaneously utilizable inputs horizontal con- figuration	4
Number of simultaneously utilizable inputs vertical configuration	4
Input characteristic curve	IEC 61131-2, type 1
Initial data size	4 Bit
Status information, alarms, diagnostics	
Status display	green LED per channel
Interrupts	yes, parameterizable
Process alarm	yes, parameterizable
Diagnostic interrupt	yes, parameterizable
Diagnostic functions	yes
Diagnostics information read-out	possible
Module state	green LED

021-1BD10 - DI 4xDC 24V 2µs...4ms > Technical data

Output bytes0Parameter bytes11	Order no.	021-1BD10
Isolation Image: i	Module error display	red LED
Between channels-Between channels of groups to-Between channels and backplane bus✓Insulation tested withDC 500 VSafety-Safety protocol-Safety requirements-Sactru user address-Watchdog-Two channels-Two channels-Dataszos-Input bytes-Output bytes0Dataszos1Diagnostic bytes0Parameter bytes1MatrialPE/ PPE GF10Mouting2.9 mm 109 mm x 76.5 mmNet weight5.9 gNet weight5.9 gNet weight5.9 gPortorentationes5.9 gStroke mentationes5.9 GStroke mentationes5.0 GStroke m	Channel error display	none
Between channels of groups to-Between channels and backplane bus✓Insulation tested withDC 500 VSafetySafety protocol-Safety requirements-Sacter user address-Watchdog-Two channels-Two channels-Type puips to-Datasizes-Input bytes1Output bytes0Diagnostic bytes1Diagnostic bytes20MutchingPC / PPE GF 10MutrialPC / PPE GF 10Mutring99 gSteweight59 gNet weight59 gSeross weight0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2	Isolation	
Between channels and backplane busInsulation tested withDC 500 VSafetySafety protocolSafety requirementsSafety requirementsSecure user addressWatchdogTwo channelsToto channelsDatasizesInput bytes1Output bytes0Output bytes1Diagnostic bytes1MaterialPPE / PPE GF10MountingProfile rail 35 mmMethanical dataDimensions (WkHxD)12.9 mm x 10.9 mm x 76.5 mmNet weight5.9 gStroke methanelOperating temperature°Orgerating temperature°Orgerating temperature°Cortifications°Ut, certificationSo °C Co 70 °CUt, certificationyes	Between channels	-
Insulation tested with DC 500 V Safety - Safety protocol - Safety prequirements - Safety prequirements - Safety source address - Watchdog - Two channels - Tosc pathese outputs - Datasizes - Input bytes 0 Output bytes 0 Parameter bytes 11 Diagostic bytes 0 Material PPE / PPE GF10 Mounting POE Mechanical data 12.9 mmx 109 mm x 76.5 mm Dimensions (WxHxD) 12.9 mmx 109 mm x 76.5 mm Net weight 59 g Gross weight 73 g Poursonnental conditions - Operating temperature 0 °C to 60 °C Storage temperature 25 °C to 70 °C Curtification yes	Between channels of groups to	-
SafetyImage: style styl	Between channels and backplane bus	\checkmark
Safety protocol.Safety requirements.Sacure user address.Watchdog.Watchdog.Two channels.Test pulse outputs.Datasizes.Input bytes1Output bytes0Parameter bytes11Diagnostic bytes20MaterialPE / PE GF10MountingPer Jenger SumMethanical data.Net weight59 gNet weight59 gOrger Sum Suff Sum.Porter Suff Suff Suff Suff Suff Suff Suff Suf	Insulation tested with	DC 500 V
Safety requirements-Secure user address-Watchdog-Two channels-Two channels-Test pulse outputs-DatasizesIInput bytes0Output bytes0Parameter bytes11Diagnostic bytes20MaterialPPE / PPE GF10MoutingPPE / PPE GF10Methanical data59Net weight59 gNet weight59 gGross weight-Operating temperature0'C to 60 °CStorage temperature-Ur certifications-Ur certification-Ur certification-Storage temperature-Ur certification-Storage temperature-Ur certification-Storage temperature-Ur certification-Storage temperature-Storage temperature- <t< td=""><td>Safety</td><td></td></t<>	Safety	
Secure user address.Watchdog.Watchdog.Two channels.Test pulse outputs.Datasizes.Input bytes0Output bytes0Parameter bytes1Diagnostic bytes.MaterialPE/ PPE GF10Mouting12.9 mm x 76.5 mmNew eight.Signer Mark.Preinential conditions.Pierder Sories.Oros weight.Operating temperature.Storage temperature.Cuttifications.Ut certification.Ut certification.Ut certification.Storage temperature.Ut certification.Storage temperature.Ut certification.Storage temperature.Storage temperature	Safety protocol	-
Watchdog-Two channels-Test pulse outputs-Datasizes-Input bytes1Output bytes0Parameter bytes11Diagnostic bytes20HousingPPE / PPE GF10MaterialPPE / PPE GF10Mounting20Dimensions (WxHxD)12.9 mm x 109 mm x 76.5 mmNetweight59 gNetweight59 gOross weight-Environmental conditions0°C to 60°CStorage temperature-Ut certificationyes	Safety requirements	-
Two channels-Test pulse outputs-Datasizes-Input bytes1Output bytes0Parameter bytes11Diagnostic bytes20HousingPPE / PPE GF10MaterialPPE / PPE GF10MountingProfile rail 35 mmDimensions (WxHxD)12.9 mm x 109 mm x 76.5 mmNet weight59 gGross weight73 gEnvironmental conditions0°C to 60°CStorage temperature-UL certificationsyes	Secure user address	-
Test pulse outputs-Datasizes-Input bytes1Output bytes0Parameter bytes11Diagnostic bytes20HousingPPE / PPE GF10MaterialPPE / PPE GF10MountingProfile rail 35 mmMechanical data12.9 mm x 109 mm x 76.5 mmNet weight59 gGross weight73 gEnvironmental conditions0°C to 60 °COperating temperature-25 °C to 70 °CCertificationsyes	Watchdog	-
DatasizesIInput bytes1Output bytes0Parameter bytes11Diagnostic bytes20HousingPPE / PPE GF10MaterialPPE / PPE GF10MountingProfile rail 35 mmMechanical data1Neweight59 gVielght including accessories59 gGross weight73 gPortaring temperature0°C to 60°COperating temperature25°C to 70°CCertificationsyes	Two channels	-
Input bytes1Output bytes0Parameter bytes11Diagnostic bytes20HousingVMaterialPPE / PPE GF 10MountingProfile rail 35 mmMechanical data2Dimensions (WxHxD)12.9 mm x 109 mm x 76.5 mmNet weight59 gGross weight73 gEnvironmental conditions0 °C to 60 °COperating temperature0 °C to 70 °CCertificationsyes	Test pulse outputs	-
Output bytes0Parameter bytes11Diagnostic bytes20HousingVMaterialPPE / PPE GF10MountingProfile rail 35 mmMechanical data2Dimensions (WxHxD)12.9 mm x 109 mm x 76.5 mmNet weight59 gKet weight39 gProfile rail gemperature0 °C to 60 °CStorage temperature-25 °C to 70 °CCertificationsyes	Datasizes	
Parameter bytes11Diagnostic bytes20HousingVMaterialPPE / PPE GF 10MoutingProfile rail 35 mmMechanical data20Dimensions (WxHxD)12.9 mm x 109 mm x 76.5 mmNet weight59 gVeight including accessories59 gGross weight73 gDiperating temperature0°C to 60°CStorage temperature-25°C to 70°CCertificationsyes	Input bytes	1
Diagnostic bytes20HousingVMaterialPPE / PPE GF10MountingProfile rail 35 mmMechanical dataVDimensions (WxHxD)12.9 mm x 109 mm x 76.5 mmNet weight59 gVeight including accessories59 gGross weight73 gDoperating temperature0 °C to 60 °CStorage temperature-25 °C to 70 °CCertificationsyes	Output bytes	0
HousingHousingMaterialPPE / PPE GF10MountingProfile rail 35 mmMechanical dataIDimensions (WxHxD)12.9 mm x 109 mm x 76.5 mmNet weight59 gVeight including accessories59 gGross weight73 gEnvironmental conditions°C to 60 °CStorage temperature-25 °C to 70 °CCertificationsyes	Parameter bytes	11
MaterialPPE / PPE GF10MountingProfile rail 35 mmMechanical dataDimensions (WxHxD)12.9 mm x 109 mm x 76.5 mmNet weight59 gVeight including accessories59 gGross weight73 gEnvironmental conditions0 °C to 60 °CStorage temperature-25 °C to 70 °CCertificationsyes	Diagnostic bytes	20
MountingProfile rail 35 mmMechanical dataIntervention (MxHxD)Dimensions (WxHxD)12.9 mm x 109 mm x 76.5 mmNet weight59 gWeight including accessories59 gGross weight73 gEnvironmental conditions0 °C to 60 °COperating temperature0 °C to 60 °CStorage temperature-25 °C to 70 °CCertificationsyes	Housing	
Mechanical dataImage: constraint of the second	Material	PPE / PPE GF10
Dimensions (WxHxD)12.9 mm x 109 mm x 76.5 mmNet weight59 gWeight including accessories59 gGross weight73 gEnvironmental conditions-Operating temperature0 °C to 60 °CStorage temperature-25 °C to 70 °CCertifications-UL certificationyes	Mounting	Profile rail 35 mm
Net weight59 gWeight including accessories59 gGross weight73 gEnvironmental conditions0°C to 60°COperating temperature0°C to 70°CStorage temperature-25°C to 70°CUL certificationsyes	Mechanical data	
Weight including accessories59 gGross weight73 gEnvironmental conditions0°C to 60°COperating temperature0°C to 60°CStorage temperature-25°C to 70°CCertificationsUL certificationyes	Dimensions (WxHxD)	12.9 mm x 109 mm x 76.5 mm
Gross weight73 gEnvironmental conditions0°C to 60°COperating temperature0°C to 60°CStorage temperature-25°C to 70°CCertificationsyes	Net weight	59 g
Environmental conditions0°C to 60°COperating temperature0°C to 60°CStorage temperature-25°C to 70°CCertificationsUL certification	Weight including accessories	59 g
Operating temperature0 °C to 60 °CStorage temperature-25 °C to 70 °CCertifications	Gross weight	73 g
Storage temperature -25 °C to 70 °C Certifications ull certification	Environmental conditions	
Certifications UL certification yes	Operating temperature	0 °C to 60 °C
UL certification yes	Storage temperature	-25 °C to 70 °C
	Certifications	
KC certification yes	UL certification	yes
	KC certification	yes

021-1BD10 - DI 4xDC 24V 2µs...4ms > Parameter data

3.6.2 Parameter data

- DS Record set for access via CPU, PROFIBUS and PROFINET
- IX Index for access via CANopen
- SX Subindex for access via EtherCAT with Index 3100h + EtherCAT-Slot

More can be found in the according manual of your bus coupler.

Name	Bytes	Function	Default	DS	IX	SX
DIAG_EN	1	Diagnostic interrupt *	00h	00h	3100h	01h
CH0D	1	Input delay DI 0	02h	01h	3101h	02h
CH1D	1	Input delay DI 1	02h	01h	3102h	03h
CH2D	1	Input delay DI 2	02h	01h	3103h	04h
CH3D	1	Input delay DI 3	02h	01h	3104h	05h
INTRE	1	Diagnostic interrupt at edge 0-1 of DI x	00h	80h	3105h	06h
INTFE	1	Diagnostic interrupt at edge 1-0 of DI x	00h	80h	3106h	07h
*) This second act may any the transformed at CTOD state						

 $^{\ast})$ This record set may only be transferred at STOP state.

DIAG_	EN	Diagnostic	inter-
rupt			

Byte	Bit 7 0
0	Diagnostic interrupt
	00h: disable
	40h: enable

Here you activate res. de-activate the diagnostic function.

CHxD Input delay

Byte	Function	Possible values	
0	0 Input delay DI x	00h: 1µs	07h: 86µs
		02h: 3µs	09h: 342µs
		04h: 10µs	0Ch: 2731µs
		Other values are ne	ot permissible!

Input delay allows you to preset a filter for the corresponding channel. With the help of filters you may e.g. filter signal peaks at a blurred input signal.

INTRE Interrupt edge 0-1

Byte	Bit 7 0
0	Bit 0: Diagnostic interrupt at edge 0-1 of DI 0
	Bit 1: Diagnostic interrupt at edge 0-1 of DI 1
	Bit 2: Diagnostic interrupt at edge 0-1 of DI 2
	Bit 3: Diagnostic interrupt at edge 0-1 of DI 3
	(0: disable, 1: enable)
	Bit 7 4: reserved

021-1BD10 - DI 4xDC 24V 2µs...4ms > Diagnostics and interrupt

INTFE Interrupt edge 1-0	Byte	Bit 7 0
	0	Bit 0: Diagnostic interrupt at edge 1-0 of DI 0
		Bit 1: Diagnostic interrupt at edge 1-0 of DI 1
		Bit 2: Diagnostic interrupt at edge 1-0 of DI 2
		Bit 3: Diagnostic interrupt at edge 1-0 of DI 3
		(0: disable, 1: enable)
		Bit 7 4: reserved

3.6.3 Diagnostics and interrupt

Event	Process interrupt	Diagnostics interrupt	parameterizable
Edge 0-1 DI x	Х	-	Х
Edge 1-0 DI x	Х	-	Х
Diagnostics buffer overflow	-	Х	-
Process interrupt lost	-	Х	-

Process interrupt

So you may react to asynchronous events, there is the possibility to activate a process interrupt. A process interrupt interrupts the linear program sequence and jumps depending on the master system to a corresponding Interrupt routine. Here you can react to the process interrupt accordingly.

With CANopen the process interrupt data a transferred via an emergency telegram.

Operating with CPU, PROFIBUS and PROFINET the process interrupt data were transferred via diagnostics telegram.

SX - Subindex for access via EtherCAT with Index 5000h

More can be found in the according manual of your bus coupler.

Name	Bytes	Function	Default	SX
PRIT_A	1	Process interrupt data	00h	02h
PRIT_B	1	State of the inputs	00h	03h
PRIT_US	2	µs ticker	00h	04h (high byte)
				05h (low byte)

PRIT_A Process interrupt data	Byte	Bit 7 0
	0	Bit 0: Edge at Digital input DI 0
		Bit 1: Edge at Digital input DI 1
		Bit 2: Edge at Digital input DI 2
		Bit 3: Edge at Digital input DI 3
		Bit 7 4: reserved

021-1BD10 - DI 4xDC 24V 2µs...4ms > Diagnostics and interrupt

PRIT_B State of the inputs	Byte	Bit 7 0
	0	State of the inputs at the moment of the process interrup
		Bit 0: State Input DI 0
		Bit 1: State Input DI 1
		Bit 2: State Input DI 2
		Bit 3: State Input DI 3
		Bit 7 4: reserved

PRIT_US μs ticker	Byte	Bit 7 0		
	0 1	Value of the μ s ticker at the moment of the process interrupt		
	µs ticker			
		odule there is a 32 bit timer (µs ticker). With PowerON the timer starts 0. After 2 ³² -1µs the timer starts with 0 again.		
	PRIT_US represents the lower 2 byte of the μ s ticker value (0 2 ¹⁶ -1).			
Diagnostic data	Via the parameterization you may activate a diagnostic interrupt for the module.			
	With a diagnostics interrupt the module serves for diagnostics data for diagnostic inter- rupt _{incoming} .			
		e reason for releasing a diagnostic interrupt is no longer present, the diag- ot _{going} automatically takes place.		
	All events of a not stored and	a channel between diagnostic interrupt _{incoming} and diagnostic interrupt _{going} are d get lost.		
		ne window (1. diagnostic interrupt _{incoming} until last diagnostic interrupt _{going}) the e module is on.		
		set for access via CPU, PROFIBUS and PROFINET. The access happens 01h. Additionally the first 4 bytes may be accessed by DS 00h.		
		or access via CANopen. The access happens by IX 2F01h. Additionally the ytes may be accessed by IX 2F00h.		
	SX - Subinde	ex for access via EtherCAT with Index 5005h.		

More can be found in the according manual of your bus coupler.

Name	Bytes	Function	Default	DS	IX	SX
ERR_A	1	Diagnostic	00h	01h 2F	2F01h	02h
MODTYP	1	Module information	1Fh			03h
ERR_C	1	reserved	00h			04h
ERR_D	1	Diagnostic	00h			05h
CHTYP	1	Channel type	70h		06h	
NUMBIT	1	Number of diagnostics bits per channel	00h			07h

021-1BD10 - DI 4xDC 24V 2µs...4ms > Diagnostics and interrupt

Name	Bytes	Function	Default	DS	IX	SX
NUMCH	1	Number channels of the module	04h			08h
CHERR	1	Channel error	00h			09h
CH0ERR CH7ERR	8	reserved	00h			0Ah 11h
DIAG_US	4	µs ticker	00h			13h

ERR_A Diagnostic	Byte	Bit 7 0
	0	Bit 0: set at module failure
		Bit 1: reserved
		Bit 2: set at external error
		Bit 3: set at channel error
		Bit 7 4: reserved
MODTYP Modul informa- tion	Byte	Bit 7 0
	0	Bit 3 0: Module class
		1111b: Digital module
		Bit 4: Channel information present
		Bit 7 5: reserved
ERR_C reserved	Byte	Bit 7 0
	0	reserved
ERR_D Diagnostic	Byte	Bit 7 0
	0	Bit 2 0: reserved
		Bit 3: set at internal diagnostics buffer overflow
		Bit 5 4: reserved
		Bit 6: Process interrupt lost
		Bit 7: reserved
CHTYP Channel type	Byte	Bit 7 0
	0	Bit 6 0: Channel type
		70h: Digital input
		Bit 7: reserved

021-1BD10 - DI 4xDC 24V 2µs...4ms > Diagnostics and interrupt

NUMBIT Diagnostic bits	Byte	Bit 7 0
	0	Number of diagnostics bits of the module per channel (here 00h)
NUMCH Channels	Byte	Bit 7 0
	0	Number of channels of the module (here 04h)
CHERR Channel error	Byte	Bit 7 0
	0	Bit 0: Edge lost at DI 0
		Bit 1: Edge lost at DI 1
		Bit 2: Edge lost at DI 2
		Bit 3: Edge lost at DI 3
		Bit 7 4: reserved
CHxERR reserved	Byte	Bit 7 0
	0	reserved
DIAG_US µs ticker	Byte	Bit 7 0
	0 3	Value of the μ s ticker at the moment of the diagnostic
	μs ticker In the SLIO module	there is a 32 bit timer (μ s ticker). With PowerON the timer starts

In the SLIO module there is a 32 bit timer (µs ticker). With PowerON the timer starts counting with 0. After 2³²-1µs the timer starts with 0 again.

3.7 021-1BD40 - DI 4xDC 24V 3 wire

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Properties

The electronic module collects the binary control signals from the process level and transmits them isolated to the central bus system. It has 4 channels and their status is monitored via LEDs.

- 4 digital inputs with 3 wire connection, isolated to the backplane bus
- Suited for switches and approximate switches

Locking lever terminal module

DC 24V power section supply

Locking lever electronic module

Labeling strip

Backplane bus

LED status indication

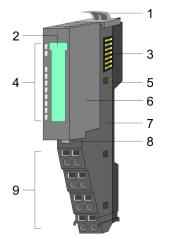
Electronic module

Terminal module

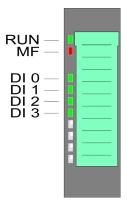
Terminal

 Status indication of the channels via LEDs also with de-activated electronic power supply

Structure



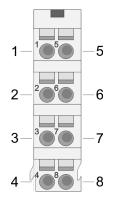
Status indication



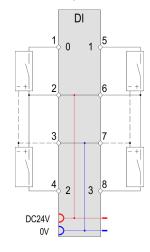
RUN	MF e red	DI x	Description
_		х	Bus communication is OK
		^	Module status is OK
_	-	х	Bus communication is OK
	-	^	Module status reports an error
	_	х	Bus communication is not possible
	-	^	Module status reports an error
		Х	Error at bus power supply
			Flashing: Error in configuration
Х	ZHz	Х	Schapter 2.8 'Trouble shooting - LEDs' on page 28
			Digital input has signal "1"
			Digital input has signal "0"
not relevant	: X		

021-1BD40 - DI 4xDC 24V 3 wire

Pin assignment



For wires with a cross section of 0.08mm² up to 1.5mm².



Pos.	Function	Туре	Description
1	DI 0	I	Digital input DI 0
2	DC 24V	0	DC 24V for sensor
3	0V	0	GND
4	DI 2	I	Digital input DI 2
5	DI 1	I	Digital input DI 1
6	DC 24V	0	DC 24V for sensor
7	0V	0	GND
8	DI 3	I	Digital input DI 3

I: Input, O: Output

Input area

At CPU, PROFIBUS and PROFINET the input area is embedded to the corresponding address area.

- IX Index for access via CANopen
- SX Subindex for access via EtherCAT with Index 6000h + EtherCAT-Slot

More can be found in the according manual of your bus coupler.

Addr.	Name	Bytes	Function	IX	SX
+0	PII	1	State of the inputs		
			Bit 0: DI 0		01h
			Bit 1: DI 1		02h
			Bit 2: DI 2		03h
		Bit 3: DI 3		04h	
			Bit 7 4: reserved		

Output area

No byte of the output area is used by the module.

021-1BD40 - DI 4xDC 24V 3 wire > Technical data

3.7.1 Technical data

Order no.	021-1BD40
Туре	SM 021
Module ID	0008 9F84
Current consumption/power loss	
Current consumption from backplane bus	65 mA
Power loss	0.6 W
Technical data digital inputs	
Number of inputs	4
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	-
Current consumption from load voltage L+ (without load)	-
Rated value	DC 20.428.8 V
Input voltage for signal "0"	DC 05 V
Input voltage for signal "1"	DC 1528.8 V
Input voltage hysteresis	-
Frequency range	-
Input resistance	-
Input current for signal "1"	3 mA
Connection of Two-Wire-BEROs possible	\checkmark
Max. permissible BERO quiescent current	0.5 mA
Input delay of "0" to "1"	3 ms
Input delay of "1" to "0"	3 ms
Number of simultaneously utilizable inputs horizontal con- figuration	4
Number of simultaneously utilizable inputs vertical configuration	4
Input characteristic curve	IEC 61131-2, type 1
Initial data size	4 Bit
Status information, alarms, diagnostics	
Status display	green LED per channel
Interrupts	no
Process alarm	no
Diagnostic interrupt	no
Diagnostic functions	no
Diagnostics information read-out	none
Module state	green LED

021-1BD40 - DI 4xDC 24V 3 wire > Technical data

Order no.	021-1BD40
Module error display	red LED
Channel error display	none
Isolation	
Between channels	-
Between channels of groups to	-
Between channels and backplane bus	\checkmark
Insulation tested with	DC 500 V
Safety	
Safety protocol	-
Safety requirements	-
Secure user address	-
Watchdog	-
Two channels	-
Test pulse outputs	-
Datasizes	
Input bytes	1
Output bytes	0
Parameter bytes	0
Diagnostic bytes	0
Housing	
Material	PPE / PPE GF10
Mounting	Profile rail 35 mm
Mechanical data	
Dimensions (WxHxD)	12.9 mm x 109 mm x 76.5 mm
Net weight	57 g
Weight including accessories	57 g
Gross weight	71 g
Environmental conditions	
Operating temperature	0 °C to 60 °C
Storage temperature	-25 °C to 70 °C
Certifications	
UL certification	yes
KC certification	yes

3.8 021-1BD50 - DI 4xDC 24V NPN

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Properties

The electronic module collects the binary control signals from the process level and transmits them isolated to the central bus system. It has 4 channels and their status is monitored via LEDs. An input becomes active as soon as it is connected to ground.

- 4 digital inputs (N switching), isolated to the backplane bus
- Suited for switches and approximate switches

Locking lever terminal module

DC 24V power section supply

Locking lever electronic module

Labeling strip

Backplane bus

LED status indication

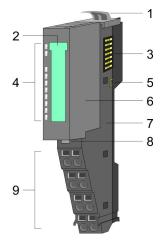
Electronic module

Terminal module

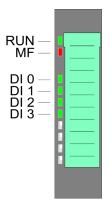
Terminal

 Status indication of the channels via LEDs also with de-activated electronic power supply

Structure



Status indication



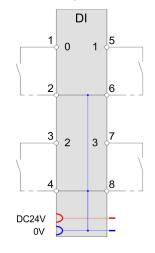
RUN	MF red	DI x	Description	
_		v	Bus communication is OK	
-		Х	Module status is OK	
	_	х	Bus communication is OK	
	-	^	Module status reports an error	
	_	V	Bus communication is not possible	
	-	Х	Module status reports an error	
		Х	Error at bus power supply	
			Flashing: Error in configuration	
Х	ZHz	Х	Schapter 2.8 'Trouble shooting - LEDs' on page 28	
			Digital input has signal "1"	
			Digital input has signal "0"	
not relevant:	not relevant: X			

021-1BD50 - DI 4xDC 24V NPN

Pin assignment

 $1 - \frac{1}{5} - 5$ $2 - \frac{2}{5} - 6$ $3 - \frac{3}{7} - 7$ $4 - \frac{4}{5} - 8$

For wires with a cross section of 0.08mm² up to 1.5mm².



Pos.	Function	Туре	Description
1	DI 0	I	Digital input DI 0
2	0V	0	GND
3	DI 2	I	Digital input DI 2
4	0V	0	GND
5	DI 1	I	Digital input DI 1
6	0V	0	GND
7	DI 3	I	Digital input DI 3
8	0V	0	GND

I: Input, O: Output

Input area

At CPU, PROFIBUS and PROFINET the input area is embedded to the corresponding address area.

- IX Index for access via CANopen
- SX Subindex for access via EtherCAT with Index 6000h + EtherCAT-Slot

More can be found in the according manual of your bus coupler.

Addr.	Name	Bytes	Function	IX	SX
+0	PII	1	State of the inputs	5000h	
			Bit 0: DI 0		01h
			Bit 1: DI 1		02h
			Bit 2: DI 2		03h
			Bit 3: DI 3		04h
			Bit 7 4: reserved		

Output area

No byte of the output area is used by the module.

021-1BD50 - DI 4xDC 24V NPN > Technical data

3.8.1 Technical data

Order no.	021-1BD50
Туре	SM 021
Module ID	0004 9F84
Current consumption/power loss	
Current consumption from backplane bus	65 mA
Power loss	0.6 W
Technical data digital inputs	
Number of inputs	4
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	-
Current consumption from load voltage L+ (without load)	-
Rated value	DC 20.428.8 V
Input voltage for signal "0"	DC 1528.8 V
Input voltage for signal "1"	DC 05 V
Input voltage hysteresis	-
Frequency range	-
Input resistance	-
Input current for signal "1"	3 mA
Connection of Two-Wire-BEROs possible	\checkmark
Max. permissible BERO quiescent current	0.5 mA
Input delay of "0" to "1"	3 ms
Input delay of "1" to "0"	3 ms
Number of simultaneously utilizable inputs horizontal con- figuration	4
Number of simultaneously utilizable inputs vertical configuration	4
Input characteristic curve	-
Initial data size	4 Bit
Status information, alarms, diagnostics	
Status display	green LED per channel
Interrupts	no
Process alarm	no
Diagnostic interrupt	no
Diagnostic functions	no
Diagnostics information read-out	none

021-1BD50 - DI 4xDC 24V NPN > Technical data

Order no.	021-1BD50
Module error display	red LED
Channel error display	none
Isolation	
Between channels	-
Between channels of groups to	-
Between channels and backplane bus	\checkmark
Insulation tested with	DC 500 V
Safety	
Safety protocol	-
Safety requirements	-
Secure user address	-
Watchdog	-
Two channels	-
Test pulse outputs	-
Datasizes	
Input bytes	1
Output bytes	0
Parameter bytes	0
Diagnostic bytes	0
Housing	
Material	PPE / PPE GF10
Mounting	Profile rail 35 mm
Mechanical data	
Dimensions (WxHxD)	12.9 mm x 109 mm x 76.5 mm
Net weight	58 g
Weight including accessories	58 g
Gross weight	72 g
Environmental conditions	
Operating temperature	0 °C to 60 °C
Storage temperature	-25 °C to 70 °C
Certifications	
UL certification	yes
KC certification	yes

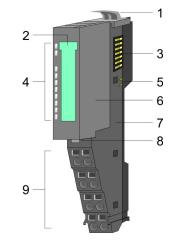
3.9 021-1BD70 - DI 4xDC 24V ETS

Properties

The electronic module collects the binary control signals from the process level and transmits them isolated to the central bus system. It has 4 channels and their status is monitored via LEDs. With configured ETS functionality (ETS = edge time stamp) and the corresponding (rising/falling) edge the current time value of the μ s timer is stored together with the state of the inputs in the process image. Depending on the configuration 5 (20byte) respectively 15 (60byte) ETS entries may be stored in the process image one after another.

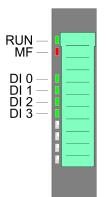
- 4 digital inputs, isolated to the backplane bus
- Configurable ETS functionality for 5 respectively 15 ETS entries (each 4byte)
- Diagnostics function
- Suited for switches and approximate switches
- Status indication of the channels via LEDs also with de-activated electronic power supply

Structure



- 1 Locking lever terminal module
- 2 Labeling strip
- 3 Backplane bus
- 4 LED status indication
- 5 DC 24V power section supply
- 6 Electronic module
- 7 Terminal module
- 8 Locking lever electronic module
- 9 Terminal

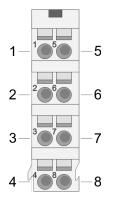
Status indication



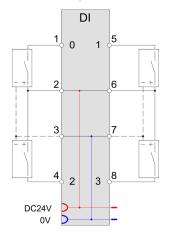
RUN	MF	DI x	Description
•		x	Bus communication is OK Module status is OK
•	•	х	Bus communication is OK Module status reports an error
	•	x	Bus communication is not possible Module status reports an error
		Х	Error at bus power supply
х	ZHz	х	Flashing: Error in configuration
			Digital input has signal "1"
			Digital input has signal "0"
not relevant:	Х		

021-1BD70 - DI 4xDC 24V ETS

Pin assignment



For wires with a cross section of 0.08mm^2 up to 1.5mm^2 .



Pos.	Function	Туре	Description
1	DI 0	I	Digital input DI 0
2	DC 24V	0	DC 24V for sensor
3	0V	0	GND
4	DI 2	I	Digital input DI 2
5	DI 1	I	Digital input DI 1
6	DC 24V	0	DC 24V for sensor
7	0V	0	GND
8	DI 3	I	Digital input DI 3

I: Input, O: Output

In-/Output area	With configured ETS functionality (ETS=edge time stamp) and the corresponding edge the current time value of the SLIO μ s timer is stored together with the state of the inputs and a running number as ETS entry in the process image.
	You may configure the following variants:
	 021-1BD70 DI 4xDC24V (20): uses 20byte in the PII for 5 ETS entries 021-1BD70 DI 4xDC24V (60): uses 60byte in the PII for 15 ETS entries
Output area	No byte of the output area is used by the module.
Input area 20byte respec- tively 60byte	Depending on the configured variant, the module serves for an area for 5 resp. 15 ETS entries. Each ETS entry uses 4byte in input area:
Input area	The input range is used for status message. At CPU, PROFIBUS and PROFINET the input respectively output area is embedded to the corresponding address area.
	IX - IX = Index for access via CANopen. With s = Subindex the corresponding ETS entry is addressed.
	SX - Subindex for access via EtherCAT with Index 6000h + EtherCAT-Slot
	More can be found in the according manual of your bus coupler.

021-1BD70 - DI 4xDC 24V ETS

Structure of an ETS entry

	Structure	e or an ETS entry	/			
	Addr.	Name	Bytes	Function	IX	SX
	+0	PII	1	State of the inputs	5430h/s	01h
	+1	RN	1	Running number		02h
	+2	ETS_US	2	µs ticker		03h
PII	Here the	state of the inputs	s after an e	dge change is stored.		
		byte has the follo				
	Bit 0: DI 0	2	Jung and a			
	Bit 1: DI 1					
	Bit 2: DI 2					
	Bit 3: DI 3	3				
	Bit 4 7:	0 (fix)				
RN				nuous number 0 127,	, which starts with	1. The RN
	correspor	nds to the chronol	ogical orde	er of the edges.		
ETS_US				imer (µs ticker). With Po er starts with 0 again.	owerON the time	r starts
	-		•	rd of the µs ticker (06	5535us)	
	210_00				0000µ0).	
ETS functionality	With the o	corresponding ed	be the valu	le of the timer is stored	as ETS entry in t	he process
				state of the inputs PII ar		
		ving figure shows	the seque	nce of how the ETS en	tries are stored ir	n the input
	area.					>
						t
	Oµs		655	535µs 0µs	65	535µs
				Addr. PII	RN ETS_	-
				+0 PII-0		-
				+4 PII-1		-
				+8 PII-2 +12 PII-3		-
				+16 PII-4		-
Input area				essage. At CPU, PROFI		
				edded to the correspon- open. With s = Subinde	-	
		ry is addressed.				
	SX - Sul	nindex for access	via Ether(CAT with Index 6000h +	EtherCAT-Slot	

SX - Subindex for access via EtherCAT with Index 6000h + EtherCAT-Slot

More can be found in the according manual of your bus coupler.

021-1BD70 - DI 4xDC 24V ETS

Configured as 021-1BD70 DI 4xDC 24V (20) 20byte - 5 ETS entries

Addr.	PII	IX=5430h	SX	Addr.	RN	IX=5430h	SX	Addr.	ETS-US	IX=5430h	SX
+0	PII-0	s=1	01h	+1	RN-0	s=1	02h	+2	ETS_US-0	s=1	03h
+4	PII-1	s=2	04h	+5	RN-1	s=2	05h	+6	ETS_US-1	s=2	06h
+8	PII-2	s=3	07h	+9	RN-2	s=3	08h	+10	ETS_US-2	s=3	09h
+12	PII-3	s=4	0Ah	+13	RN-3	s=4	0Bh	+14	ETS_US-3	s=4	0Ch
+16	PII-4	s=5	0Dh	+17	RN-4	s=5	0Eh	+18	ETS_US-4	s=5	0Fh

Configured as 021-1BD70

DI 4xDC 24V (60) 60byte - 15 ETS entries

Addr.	PII	IX=5430h	SX	Addr.	RN	IX=5430h	SX	Addr.	ETS-US	IX=5430h	SX
+0	PII-0	s=1	01h	+1	RN-0	s=1	02h	+2	ETS_US-0	s=1	03h
+4	PII-1	s=2	04h	+5	RN-1	s=2	05h	+6	ETS_US-1	s=2	06h
+8	PII-2	s=3	07h	+9	RN-2	s=3	08h	+10	ETS_US-2	s=3	09h
+12	PII-3	s=4	0Ah	+13	RN-3	s=4	0Bh	+14	ETS_US-3	s=4	0Ch
+16	PII-4	s=5	0Dh	+17	RN-4	s=5	0Eh	+18	ETS_US-4	s=5	0Fh
+20	PII-5	s=6	10h	+21	RN-5	s=6	11h	+22	ETS_US-5	s=6	12h
+24	PII-6	s=7	13h	+25	RN-6	s=7	14h	+26	ETS_US-6	s=7	15h
+28	PII-7	s=8	16h	+29	RN-7	s=8	17h	+30	ETS_US-7	s=8	18h
+32	PII-8	s=9	19h	+33	RN-8	s=9	1Ah	+34	ETS_US-8	s=9	1Bh
+36	PII-9	s=10	1Ch	+37	RN-9	s=10	1Dh	+38	ETS_US-9	s=10	1Eh
+40	PII-10	s=11	1Fh	+41	RN-10	s=11	20h	+42	ETS_US-10	s=11	21h
+44	PII-11	s=12	22h	+45	RN-11	s=12	23h	+46	ETS_US-11	s=12	24h
+48	PII-12	s=13	25h	+49	RN-12	s=13	26h	+50	ETS_US-12	s=13	27h
+52	PII-13	s=14	28h	+53	RN-13	s=14	29h	+54	ETS_US-13	s=14	2Ah



The ETS module may only be accessed by the System SLIO CPU by means of SFC 14 or via the process image.

021-1BD70 - DI 4xDC 24V ETS > Technical data

3.9.1 Technical data

Order no.	021-1BD70
Туре	SM 021
Module ID	0F03 47C2
Current consumption/power loss	
Current consumption from backplane bus	100 mA
Power loss	0.95 W
Technical data digital inputs	
Number of inputs	4
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	DC 24 V
Current consumption from load voltage L+ (without load)	15 mA
Rated value	DC 20.428.8 V
Input voltage for signal "0"	DC 05 V
Input voltage for signal "1"	DC 1528.8 V
Input voltage hysteresis	-
Frequency range	-
Input resistance	-
Input current for signal "1"	3 mA
Connection of Two-Wire-BEROs possible	\checkmark
Max. permissible BERO quiescent current	0.5 mA
Input delay of "0" to "1"	parameterizable 2µs - 3ms
Input delay of "1" to "0"	parameterizable 2µs - 3ms
Number of simultaneously utilizable inputs horizontal con- figuration	4
Number of simultaneously utilizable inputs vertical configuration	4
Input characteristic curve	IEC 61131-2, type 1
Initial data size	60 Byte
Status information, alarms, diagnostics	
Status display	green LED per channel
Interrupts	no
Process alarm	no
Diagnostic interrupt	no
Diagnostic functions	no
Diagnostics information read-out	possible

021-1BD70 - DI 4xDC 24V ETS > Technical data

Order no.	021-1BD70
Module error display	red LED
Channel error display	none
Isolation	
Between channels	-
Between channels of groups to	-
Between channels and backplane bus	\checkmark
Insulation tested with	DC 500 V
Safety	
Safety protocol	-
Safety requirements	-
Secure user address	-
Watchdog	-
Two channels	-
Test pulse outputs	-
Datasizes	
Input bytes	20 / 60
Output bytes	0
Parameter bytes	12
Diagnostic bytes	20
Housing	
Material	PPE / PPE GF10
Mounting	Profile rail 35 mm
Mechanical data	
Dimensions (WxHxD)	12.9 mm x 109 mm x 76.5 mm
Net weight	58 g
Weight including accessories	58 g
Gross weight	73 g
Environmental conditions	
Operating temperature	0 °C to 60 °C
Storage temperature	-25 °C to 70 °C
Certifications	
UL certification	yes
KC certification	yes

021-1BD70 - DI 4xDC 24V ETS > Parameter data

3.9.2 Parameter data

The following variants may be configured:

- 021-1BD70 DI 4xDC24V (20): uses 20byte in the PII for 5 ETS entries
 021-1BD70 DI 4xDC24V (60):
- uses 60byte in the PII for 15 ETS entries

3.9.2.1 Parameters

- DS Record set for access via CPU, PROFIBUS and PROFINET
- IX Index for access via CANopen
- SX Subindex for access via EtherCAT with Index 3100h + EtherCAT-Slot

More can be found in the according manual of your bus coupler.

Name	Bytes	Function	Default	DS	IX	SX
PII_L	1	Length process image input data ^{1, 2}	14h resp. 3Ch (fix)	02h	3100h	01h
PIQ_L	1	Length process image output data ²	00h (fix)	02h	3101h	02h
CH0D	1	Input delay DI 0	02h	01h	3102h	03h
CH1D	1	Input delay DI 1	02h	01h	3103h	04h
CH2D	1	Input delay DI 2	02h	01h	3104h	05h
CH3D	1	Input delay DI 3	02h	01h	3105h	06h
TSER	1	Raising edge 0-1 at DI x	00h	80h	3106h	07h
TSEF	1	Falling edge 1-0 at DI x	00h	80h	3107h	08h
1) This parameter	corresponds of the	e configured variant.				

2) This record set may only be transferred at STOP state.

PII_L

Byte Bit 7 ... 0

0 The length of the process image of the input data is fix set to the configured variant (14h or 3Ch).

PIQ_L

Byte	Bit 7 0
0	The length of the process image of the output data is fix set to 0 byte.

021-1BD70 - DI 4xDC 24V ETS > Parameter data

CHxD DI x	Byte	Description	Possible values			
	0	Input delay DI x	00h: 1µs	07h: 86µs		
			02h: 3µs	09h: 342µs		
			04h: 10µs	0Ch: 2731µs		
			Other values are	e not permissible!		
	With the	help of filters you may e.g. f	ilter signal peaks at a blurr	ed input signal.		
-	Here the ETS function for DI 0 DI 3 may be activated. With these 2 bytes you may define the type of edge of the input signal, to which the current μ s timer value is stored the process image together with the state of the inputs.					
TSER edge 0-1 DI x	Byte	Bit 7 0				
	0	Bit 0: ETS record at edge 0-1 (rising edge) DI 0				
		Bit 1: ETS record at edge 0-1 (rising edge) DI 1				
	Bit 3: ETS record at edge 0-1 (rising edge) DI 3 (0: disable, 1: enable)					
		Bit 7 4: reserved				
TSEF edge 1-0 DI x	Byte	Bit 7 0				
	0	Bit 0: ETS record at edge	1-0 (falling edge) DI 0			
		Bit 1: ETS record at edge	1-0 (falling edge) DI 1			
		Bit 2: ETS record at edge	1-0 (falling edge) DI 2			
		Bit 3: ETS record at edge	1-0 (falling edge) DI 3			
		(0: disable, 1: enable)				
		Bit 7 4: reserved				

3.9.2.2 Example of the principle of operation

In the following it is demonstrated by an example, in which order the ETS entries are stored.

In this example a module is configured, which occupies 20byte for 5 ETS entries. The following edges for the input channels are preset.

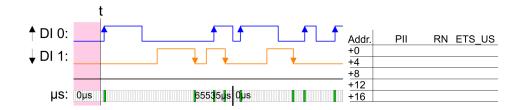
- DI 0: Edge 0-1: ↑

- DI 1: Edge 1-0: ↓

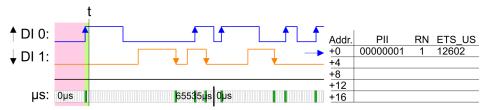
- DI 2 and DI 3 are 0 constant

Process image is empty New ETS entries are always registered starting from address +0. Thereby already existing ETS entries are shifted 4 byte each.

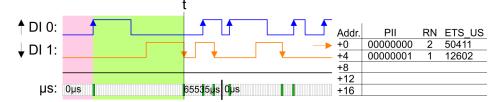
021-1BD70 - DI 4xDC 24V ETS > Parameter data



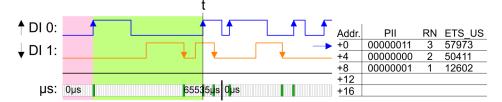
1. ETS entry Released by an edge 0-1 from DI 0 the 1. ETS entry is registered starting from address +0.



2. ETS entry Released by an edge 1-0 from DI 1 the 2. ETS entry is registered starting from address +0 and the 1. ETS entry is shifted 4 byte.



3. ETS entry Released by an edge 0-1 from DI 0 the 3. ETS entry is registered starting from address +0 and already existing ETS entries are shifted 4 byte each.



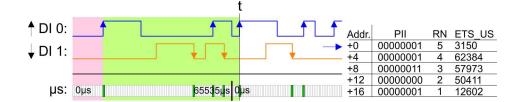
4. ETS entry

Released by an edge 1-0 from DI 1 the 4. ETS entry is registered starting from address +0 and already existing ETS entries are shifted 4 byte each.

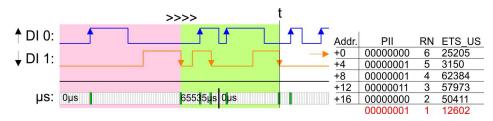


5. ETS entry

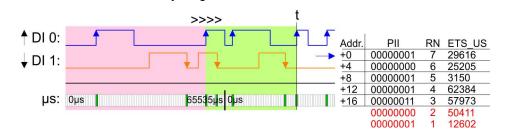
Released by an edge 0-1 from DI 0 the 5. ETS entry is registered starting from address +0 and already existing ETS entries are shifted 4 byte each. The maximum number of ETS entries is reached.



6. ETS entry Released by an edge 1-0 from DI 1 the 6. ETS entry is registered starting from address +0 and already existing ETS entries are shifted 4 byte each. Thereby the 1. ETS entry is deleted and is not available any longer.

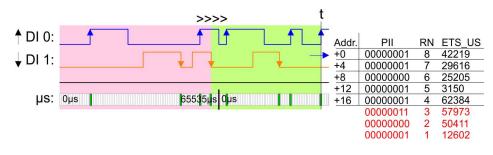


7. ETS entry Released by an edge 0-1 from DI 0 the 7. ETS entry is registered starting from address +0 and already existing ETS entries are shifted 4 byte each. Thereby the 2. ETS entry is deleted and is not available any longer.



8. ETS entry

Released by an edge 0-1 from DI 0 the 8. ETS entry is registered starting from address +0 and already existing ETS entries are shifted 4 byte each. Thereby the 3. ETS entry is deleted and is not available any longer.





Please consider the ETS modules can only effectively be used together with head modules, which have an integrated μ s ticker. The Ethernet coupler with ModbusTCP 053-1MT00 for example does not have an μ s ticker.

3.9.3 Diagnostic data

So this module does not support interrupt functions, the diagnostic data serve the information about this module.

- DS Record set for access via CPU, PROFIBUS and PROFINET. The access happens by DS 01h. Additionally the first 4 bytes may be accessed by DS 00h.
- IX Index for access via CANopen. The access happens by IX 2F01h. Additionally the first 4 bytes may be accessed by IX 2F00h.
- SX Subindex for access via EtherCAT with Index 5005h.

More can be found in the according manual of your bus coupler.

Name	Bytes	Function	Default	DS	IX	SX
ERR_A	1	reserved	00h	01h	2F01h	02h
MODTYP	1	Module information	1Fh			03h
ERR_C	1	reserved	00h			04h
ERR_D	1	reserved	00h			05h
CHTYP	1	Channel type	70h			06h
NUMBIT	1	Number of diagnostics bits per channel	00h			07h
NUMCH	1	Number channels of the module	04h			08h
CHERR	1	reserved	00h			09h
CH0ERR CH7ERR	8	reserved	00h			0Ah 11h
DIAG_US	4	µs ticker (32bit)	00h			13h

MODTYP Modul informa- tion	Byte	Bit 7 0
	0	Bit 3 0: Module class
		1111b Digital module
		Bit 4: Channel information present
		Bit 7 5: reserved
CHTYP Channel type	Byte	Bit 7 0
	0	Bit 6 0: Channel type
		70h: Digital input
		Bit 7: 0 (fix)
NUMBIT Diagnostic bits	Byte	Bit 7 0
	0	Number of diagnostics bits of the module per channel
		(here 00h)

021-1BD70 - DI 4xDC 24V ETS > Diagnostic data

NUMCH channels	Byte	Bit 7 0
	0	Number of channels of the module
		(here 04h)
DIAG_US µs ticker	Byte	Bit 7 0
	0 3	Value of the $\boldsymbol{\mu} s$ ticker at the moment of the diagnostic data generation
ERR_A/C/D CHERR, CHxERR reserved	Byte	Bit 7 0
ONXENT reserved	0	reserved

3.10 021-1BF00 - DI 8xDC 24V

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Properties

The electronic module collects the binary control signals from the process level and transmits them isolated to the central bus system. It has 8 channels and their status is monitored via LEDs.

- 8 digital inputs, isolated to the backplane bus
- Suited for switches and approximate switches

Locking lever terminal module

DC 24V power section supply

Locking lever electronic module

Labeling strip

Backplane bus

LED status indication

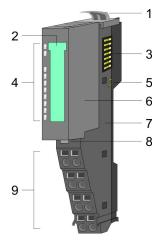
Electronic module

Terminal module

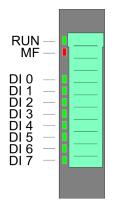
Terminal

 Status indication of the channels via LEDs also with de-activated electronic power supply

Structure



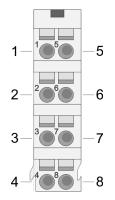
Status indication



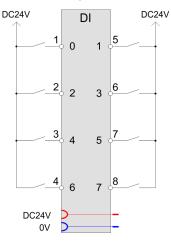
RUN	MF e red	DI x	Description	
_		х	Bus communication is OK	
		^	Module status is OK	
	-	х	Bus communication is OK	
	-	^	Module status reports an error	
	_	х	Bus communication is not possible	
	-		Module status reports an error	
		Х	Error at bus power supply	
			Flashing: Error in configuration	
Х	ZHz	Х	Chapter 2.8 'Trouble shooting - LEDs' on page 28	
			Digital input has signal "1"	
			Digital input has signal "0"	
not relevant	not relevant: X			

021-1BF00 - DI 8xDC 24V

Pin assignment



For wires with a cross section of 0.08mm² up to 1.5mm².



Pos.	Function	Туре	Description
1	DI 0	I	Digital input DI 0
2	DI 2	L	Digital input DI 2
3	DI 4	I	Digital input DI 4
4	DI 6	I	Digital input DI 6
5	DI 1	I	Digital input DI 1
6	DI 3	I	Digital input DI 3
7	DI 5	I	Digital input DI 5
8	DI 7	I	Digital input DI 7

I: Input

Input area

At CPU, PROFIBUS and PROFINET the input area is embedded to the corresponding address area.

- IX Index for access via CANopen
- SX Subindex for access via EtherCAT with Index 6000h + EtherCAT-Slot

More can be found in the according manual of your bus coupler.

Addr.	Name	Bytes	Function	IX	SX
+0	PII 1	1	State of the inputs	6000h	
			Bit 0: DI 0		01h
		Bit 1: DI 1		02h	
		Bit 2: DI 2		03h	
			Bit 3: DI 3		04h
		Bit 4: DI 4		05h	
		Bit 5: DI 5		06h	

021-1BF00 - DI 8xDC 24V > Technical data

Addr.	Name	Bytes	Function	IX	SX
			Bit 6: DI 6		07h
			Bit 7: DI 7		08h

Output area

No byte of the output area is used by the module.

3.10.1 Technical data

Order no.	021-1BF00
Туре	SM 021
Module ID	0005 9FC1
Current consumption/power loss	
Current consumption from backplane bus	65 mA
Power loss	0.9 W
Technical data digital inputs	
Number of inputs	8
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	-
Current consumption from load voltage L+ (without load)	-
Rated value	DC 20.428.8 V
Input voltage for signal "0"	DC 05 V
Input voltage for signal "1"	DC 1528.8 V
Input voltage hysteresis	-
Frequency range	-
Input resistance	-
Input current for signal "1"	3 mA
Connection of Two-Wire-BEROs possible	\checkmark
Max. permissible BERO quiescent current	0.5 mA
Input delay of "0" to "1"	3 ms
Input delay of "1" to "0"	3 ms
Number of simultaneously utilizable inputs horizontal con- figuration	8
Number of simultaneously utilizable inputs vertical configu- ration	8
Input characteristic curve	IEC 61131-2, type 1
Initial data size	8 Bit
Status information, alarms, diagnostics	

021-1BF00 - DI 8xDC 24V > Technical data

Order no.	021-1BF00
Status display	green LED per channel
Interrupts	no
Process alarm	no
Diagnostic interrupt	no
Diagnostic functions	no
Diagnostics information read-out	none
Module state	green LED
Module error display	red LED
Channel error display	none
Isolation	
Between channels	-
Between channels of groups to	-
Between channels and backplane bus	\checkmark
Insulation tested with	DC 500 V
Safety	
Safety protocol	-
Safety requirements	-
Secure user address	-
Watchdog	-
Two channels	-
Test pulse outputs	-
Datasizes	
Input bytes	1
Output bytes	0
Parameter bytes	0
Diagnostic bytes	0
Housing	
Material	PPE / PPE GF10
Mounting	Profile rail 35 mm
Mechanical data	
Dimensions (WxHxD)	12.9 mm x 109 mm x 76.5 mm
Net weight	57 g
Weight including accessories	57 g
Gross weight	71 g
Environmental conditions	
Operating temperature	0 °C to 60 °C

Digital Input

021-1BF00 - DI 8xDC 24V > Technical data

Order no.	021-1BF00
Storage temperature	-25 °C to 70 °C
Certifications	
UL certification	yes
KC certification	yes

3.11 021-1BF01 - DI 8xDC 24V 0.5ms

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Properties

The electronic module collects the binary control signals from the process level and transmits them isolated to the central bus system. It has 8 channels and their status is monitored via LEDs.

- 8 digital inputs, isolated to the backplane bus
- Suited for switches and approximate switches

Locking lever terminal module

DC 24V power section supply

Locking lever electronic module

Labeling strip

Backplane bus

LED status indication

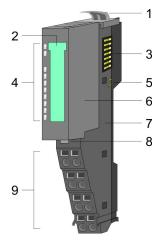
Electronic module

Terminal module

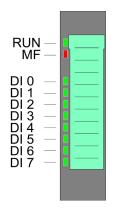
Terminal

 Status indication of the channels via LEDs also with de-activated electronic power supply

Structure



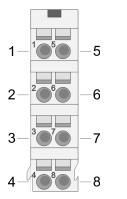
Status indication



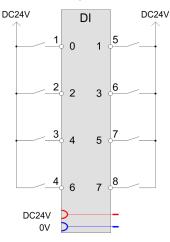
RUN	MF e red	DI x	Description
_		х	Bus communication is OK
		^	Module status is OK
_	-	х	Bus communication is OK
	-	^	Module status reports an error
	_	x	Bus communication is not possible
	-		Module status reports an error
		Х	Error at bus power supply
			Flashing: Error in configuration
Х	ZHz	Х	Chapter 2.8 'Trouble shooting - LEDs' on page 28
			Digital input has signal "1"
			Digital input has signal "0"
not relevant: X			

021-1BF01 - DI 8xDC 24V 0.5ms

Pin assignment



For wires with a cross section of 0.08mm² up to 1.5mm².



Pos.	Function	Туре	Description
1	DI 0	I	Digital input DI 0
2	DI 2	I	Digital input DI 2
3	DI 4	I	Digital input DI 4
4	DI 6	I	Digital input DI 6
5	DI 1	I	Digital input DI 1
6	DI 3	I	Digital input DI 3
7	DI 5	I	Digital input DI 5
8	DI 7	I	Digital input DI 7

I: Input

Input area

At CPU, PROFIBUS and PROFINET the input area is embedded to the corresponding address area.

- IX Index for access via CANopen
- SX Subindex for access via EtherCAT with Index 6000h + EtherCAT-Slot

More can be found in the according manual of your bus coupler.

Addr.	Name	Bytes	Function	IX	SX
+0	+0 PII 1	1	State of the inputs	6000h	
			Bit 0: DI 0		01h
			Bit 1: DI 1		02h
			Bit 2: DI 2		03h
			Bit 3: DI 3		04h
			Bit 4: DI 4		05h
		Bit 5: DI 5		06h	

021-1BF01 - DI 8xDC 24V 0.5ms > Technical data

Addr.	Name	Bytes	Function	IX	SX
			Bit 6: DI 6		07h
			Bit 7: DI 7		08h

Output area

No byte of the output area is used by the module.

3.11.1 Technical data

Order no.	021-1BF01
Туре	SM 021
Module ID	0013 9FC1
Current consumption/power loss	
Current consumption from backplane bus	35 mA
Power loss	0.9 W
Technical data digital inputs	
Number of inputs	8
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	-
Current consumption from load voltage L+ (without load)	-
Rated value	DC 20.428.8 V
Input voltage for signal "0"	DC 05 V
Input voltage for signal "1"	DC 1528.8 V
Input voltage hysteresis	-
Frequency range	-
Input resistance	-
Input current for signal "1"	3 mA
Connection of Two-Wire-BEROs possible	\checkmark
Max. permissible BERO quiescent current	0.5 mA
Input delay of "0" to "1"	max. 500 μs
Input delay of "1" to "0"	max. 500 μs
Number of simultaneously utilizable inputs horizontal con- figuration	8
Number of simultaneously utilizable inputs vertical configu- ration	8
Input characteristic curve	IEC 61131-2, type 1
Initial data size	8 Bit
Status information, alarms, diagnostics	

021-1BF01 - DI 8xDC 24V 0.5ms > Technical data

Order no.	021-1BF01
Status display	green LED per channel
Interrupts	no
Process alarm	no
Diagnostic interrupt	no
Diagnostic functions	no
Diagnostics information read-out	none
Module state	green LED
Module error display	red LED
Channel error display	none
Isolation	
Between channels	-
Between channels of groups to	-
Between channels and backplane bus	\checkmark
Insulation tested with	DC 500 V
Safety	
Safety protocol	-
Safety requirements	-
Secure user address	-
Watchdog	-
Two channels	-
Test pulse outputs	-
Datasizes	
Input bytes	1
Output bytes	0
Parameter bytes	0
Diagnostic bytes	0
Housing	
Material	PPE / PPE GF10
Mounting	Profile rail 35 mm
Mechanical data	
Dimensions (WxHxD)	12.9 mm x 109 mm x 76.5 mm
Net weight	57 g
Weight including accessories	57 g
Gross weight	71 g
Environmental conditions	
Operating temperature	0 °C to 60 °C

021-1BF01 - DI 8xDC 24V 0.5ms > Technical data

Order no.	021-1BF01
Storage temperature	-25 °C to 70 °C
Certifications	
UL certification	yes
KC certification	yes

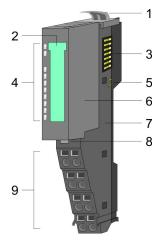
3.12 021-1BF50 - DI 8xDC 24V NPN

Properties

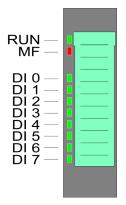
The electronic module collects the binary control signals from the process level and transmits them isolated to the central bus system. It has 8 channels and their status is monitored via LEDs. An input becomes active as soon as it is connected to ground.

- 8 digital inputs (N switching), isolated to the backplane bus
- Suited for switches and approximate switches
- Status indication of the channels via LEDs also with de-activated electronic power supply

Structure



Status indication



RUN	MF	DI x	Description		
green	red	green	Description		
		х	Bus communication is OK		
-		^	Module status is OK		
_	_	х	Bus communication is OK		
-	-	^	Module status reports an error		
	_	V	Bus communication is not possible		
	-	Х	Module status reports an error		
		Х	Error at bus power supply		
			Flashing: Error in configuration		
Х	ZHz	Х	Schapter 2.8 'Trouble shooting - LEDs' on page 28		
			Digital input has signal "1"		
			Digital input has signal "0"		
not relevant:	not relevant: X				

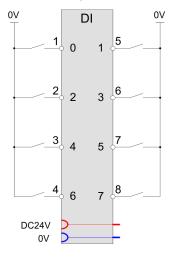
- 1 Locking lever terminal module
- 2 Labeling strip
- 3 Backplane bus
- 4 LED status indication
- 5 DC 24V power section supply
- 6 Electronic module
- 7 Terminal module
- 8 Locking lever electronic module
- 9 Terminal

021-1BF50 - DI 8xDC 24V NPN

Pin assignment

 $1 - \frac{1}{5} - 5$ $2 - \frac{2}{5} - 6$ $3 - \frac{3}{7} - 7$ $4 - \frac{4}{5} - 8$

For wires with a cross section of 0.08mm² up to 1.5mm².



Pos.	Function	Туре	Description
1	DI 0	L	Digital input DI 0
2	DI 2	L	Digital input DI 2
3	DI 4	I	Digital input DI 4
4	DI 6	I	Digital input DI 6
5	DI 1	L	Digital input DI 1
6	DI 3	L	Digital input DI 3
7	DI 5	L	Digital input DI 5
8	DI 7	I	Digital input DI 7

I: Input

Input area

At CPU, PROFIBUS and PROFINET the input area is embedded to the corresponding address area.

- IX Index for access via CANopen
- SX Subindex for access via EtherCAT with Index 6000h + EtherCAT-Slot

More can be found in the according manual of your bus coupler.

Addr.	Name	Bytes	Function	IX	SX
+0	+0 PII 1	l 1	State of the inputs	6000h	
		Bit 0: DI 0		01h	
		Bit 1: DI 1		02h	
		Bit 2: DI 2		03h	
			Bit 3: Di 3		04h
			Bit 4: DI 4		05h
		Bit 5: DI 5		06h	

021-1BF50 - DI 8xDC 24V NPN > Technical data

Addr.	Name	Bytes	Function	IX	SX
			Bit 6: DI 6		07h
			Bit 7: DI 7		08h

Output area

No byte of the output area is used by the module.

3.12.1 Technical data

Order no.	021-1BF50
Туре	SM 021
Module ID	0007 9FC1
Current consumption/power loss	
Current consumption from backplane bus	65 mA
Power loss	0.9 W
Technical data digital inputs	
Number of inputs	8
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	-
Current consumption from load voltage L+ (without load)	-
Rated value	DC 20.428.8 V
Input voltage for signal "0"	DC 1528.8 V
Input voltage for signal "1"	DC 05 V
Input voltage hysteresis	-
Frequency range	-
Input resistance	-
Input current for signal "1"	3 mA
Connection of Two-Wire-BEROs possible	\checkmark
Max. permissible BERO quiescent current	0.5 mA
Input delay of "0" to "1"	3 ms
Input delay of "1" to "0"	3 ms
Number of simultaneously utilizable inputs horizontal con- figuration	8
Number of simultaneously utilizable inputs vertical configuration	8
Input characteristic curve	-
Initial data size	8 Bit
Status information, alarms, diagnostics	

021-1BF50 - DI 8xDC 24V NPN > Technical data

Order no.	021-1BF50
Status display	green LED per channel
Interrupts	no
Process alarm	no
Diagnostic interrupt	no
Diagnostic functions	no
Diagnostics information read-out	none
Module state	green LED
Module error display	red LED
Channel error display	none
Isolation	
Between channels	-
Between channels of groups to	-
Between channels and backplane bus	\checkmark
Insulation tested with	DC 500 V
Safety	
Safety protocol	-
Safety requirements	-
Secure user address	-
Watchdog	-
Two channels	-
Test pulse outputs	-
Datasizes	
Input bytes	1
Output bytes	0
Parameter bytes	0
Diagnostic bytes	0
Housing	
Material	PPE / PPE GF10
Mounting	Profile rail 35 mm
Mechanical data	
Dimensions (WxHxD)	12.9 mm x 109 mm x 76.5 mm
Net weight	57 g
Weight including accessories	57 g
Gross weight	71 g
Environmental conditions	
Operating temperature	0 °C to 60 °C

021-1BF50 - DI 8xDC 24V NPN > Technical data

Order no.	021-1BF50
Storage temperature	-25 °C to 70 °C
Certifications	
UL certification	yes
KC certification	yes

021-1DF00 - DI 8xDC 24V Diagnosis

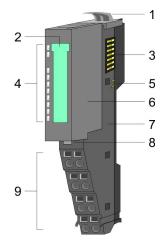
3.13 021-1DF00 - DI 8xDC 24V Diagnosis

Properties

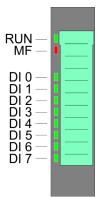
The electronic module with diagnosis collects the binary control signals from the process level and transmits them isolated to the central bus system. It has 8 digital input channels (with parameterizable input delay) and their status is monitored via LEDs.

- 8 digital inputs, isolated to the backplane bus
- Suited for switches and approximate switches
- Monitoring wire break
- Parameterizable input delay
- Diagnostics function
- Status indication of the channels via LEDs also with de-activated electronic power supply

Structure



Status indication

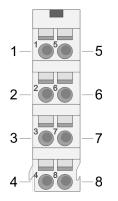


RUN	MF red	DI x	Description
		х	Bus communication is OK
		^	Module status is OK
	-	х	Bus communication is OK
		^	Module status reports an error
	-	х	Bus communication is not possible
		^	Module status reports an error
		Х	Error at bus power supply
			Flashing: Error in configuration
Х	ZHz 2Hz	Х	Chapter 2.8 'Trouble shooting - LEDs' on page 28
			Digital input has signal "1"
			Digital input has signal "0"
not relevant: X			

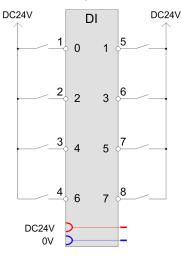
- 1 Locking lever terminal module
- 2 Labeling strip
- 3 Backplane bus
- 4 LED status indication
- 5 DC 24V power section supply
- 6 Electronic module
- 7 Terminal module
- 8 Locking lever electronic module
- 9 Terminal

021-1DF00 - DI 8xDC 24V Diagnosis

Pin assignment



For wires with a cross section of 0.08mm² up to 1.5mm².



Pos.	Function	Туре	Description
1	DI 0	I	Digital input DI 0
2	DI 2	I	Digital input DI 2
3	DI 4	I	Digital input DI 4
4	DI 6	I	Digital input DI 6
5	DI 1	I	Digital input DI 1
6	DI 3	I	Digital input DI 3
7	DI 5	I	Digital input DI 5
8	DI 7	I	Digital input DI 7

I: Input



To use wire break detection, there must be a minimum current of 0.5mA with signal state "0". This can be achieved by parallel connecting a resistor ($22k\Omega \dots 47k\Omega$) on your switch.

Input area

At CPU, PROFIBUS and PROFINET the input area is embedded to the corresponding address area.

- IX Index for access via CANopen
- SX Subindex for access via EtherCAT with Index 6000h + EtherCAT-Slot

More can be found in the according manual of your bus coupler.

Adr.	Name	Bytes	Function	IX	SX
+0	PII	1	State of the inputs	6000h	
			Bit 0: DI 0		01h
			Bit 1: DI 1		02h

021-1DF00 - DI 8xDC 24V Diagnosis > Technical data

Adr.	Name	Bytes	Function	IX	SX
			Bit 2: DI 2		03h
			Bit 3: Di 3		04h
			Bit 4: DI 4		05h
			Bit 5: DI 5		06h
			Bit 6: DI 6		07h
			Bit 7: DI 7		08h

Output area

No byte of the output area is used by the module.

3.13.1 Technical data

Order no.	021-1DF00
Туре	SM 021
Module ID	0012 1F41
Current consumption/power loss	
Current consumption from backplane bus	60 mA
Power loss	1.1 W
Technical data digital inputs	
Number of inputs	8
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	-
Current consumption from load voltage L+ (without load)	-
Rated value	DC 20.428.8 V
Input voltage for signal "0"	DC 05 V
Input voltage for signal "1"	DC 10,828,8 V
Input voltage hysteresis	-
Frequency range	-
Input resistance	-
Input current for signal "1"	3 mA
Connection of Two-Wire-BEROs possible	✓
Max. permissible BERO quiescent current	1.5 mA
Input delay of "0" to "1"	parameterizable 100µs - 20ms
Input delay of "1" to "0"	parameterizable 100µs - 20ms
Number of simultaneously utilizable inputs horizontal con- figuration	8

021-1DF00 - DI 8xDC 24V Diagnosis > Technical data

Order no.	021-1DF00	
Number of simultaneously utilizable inputs vertical configu- ration	8	
Input characteristic curve	IEC 61131-2, type 3	
Initial data size	8 Bit	
Status information, alarms, diagnostics		
Status display	green LED per channel	
Interrupts	yes	
Process alarm	no	
Diagnostic interrupt	yes, parameterizable	
Diagnostic functions	yes	
Diagnostics information read-out	possible	
Module state	green LED	
Module error display	red LED	
Channel error display	none	
Isolation		
Between channels	-	
Between channels of groups to	-	
Between channels and backplane bus	\checkmark	
Insulation tested with	DC 500 V	
Safety		
Safety protocol	-	
Safety requirements	-	
Secure user address	-	
Watchdog	-	
Two channels	-	
Test pulse outputs	-	
Datasizes		
Input bytes	1	
Output bytes	0	
Parameter bytes	12	
Diagnostic bytes	20	
Housing		
Material	PPE / PPE GF10	
Mounting	Profile rail 35 mm	
Mechanical data		
Dimensions (WxHxD)	12.9 mm x 109 mm x 76.5 mm	

021-1DF00 - DI 8xDC 24V Diagnosis > Parameter data

Order no.	021-1DF00
Net weight	57 g
Weight including accessories	57 g
Gross weight	71 g
Environmental conditions	
Operating temperature	0 °C to 60 °C
Storage temperature	-25 °C to 70 °C
Certifications	
UL certification	yes
KC certification	yes

3.13.2 Parameter data

- DS Record set for access via CPU, PROFIBUS and PROFINET
- IX Index for access via CANopen
- SX Subindex for access via EtherCAT with Index 3100h + EtherCAT-Slot

More can be found in the according manual of your bus coupler.

Name	Bytes	Function	Default	DS	IX	SX
DIAG_EN	1	Diagnostic interrupt *	00h	00h	3100h	01h
WIBRK_EN	1	Wire break recognition *	00h	00h	3101h	02h
C0_OptionNo	1	Filter time DI 0, DI 1	11h	80h	3102h	03h
C1_OptionNo	1	Filter time DI 2, DI 3	11h	81h	3103h	04h
C2_OptionNo	1	Filter time DI 4, DI 5	11h	82h	3104h	05h
C3_OptionNo	1	Filter time DI 6, DI 7	11h	83h	3105h	06h
*) This record set may only	he transferre	t at STOP state				

DIAG_EN Diagnostic interrupt

Byte	Bit 7 0
0	 Diagnostic interrupt: 00h: disable 40h: enable

Here you activate res. de-activate the diagnostic function.

021-1DF00 - DI 8xDC 24V Diagnosis > Diagnostic data

WIBRK_EN Wire break recognition

Byte	Bit 7 0
0	Bit 0: Wire break recognition DI 0 on "1"
	Bit 1: Wire break recognition DI 1 on "1"
	Bit 7: Wire break recognition DI 7 on "1"

Here you activate res. de-activate the Wire break recognition.

Cx_OptionNo Filter time

Byte	Function	Possible values
0	 Bit 3 0: Filter time DI 0 Bit 7 4: Filter time DI 1 	1h: 100µs 2h: 400µs
0	 Bit 3 0: Filter time DI 2 Bit 7 4: Filter time DI 3 	3h: 800µs 4h: 1.6ms
0	 Bit 3 0: Filter time DI 4 Bit 7 4: Filter time DI 5 	5h: 3.2ms 6h: 10ms
0	 Bit 3 0: Filter time DI 6 Bit 7 4: Filter time DI 7 	7h: 20ms Other values are not permissible!

Filter time allows you to preset a input delay for the corresponding channel. With the help of filters you may e.g. filter signal peaks at a blurred input signal.

3.13.3 Diagnostic data

The following errors are listed in the diagnostics data:

- Error project engineering/parameterization
- Wire break (if parameterized)
- Internal communication error
- Internal diagnostics buffer overflow
- External power supply error
- DS Record set for access via CPU, PROFIBUS and PROFINET. The access happens by DS 01h. Additionally the first 4 bytes may be accessed by DS 00h.
- IX Index for access via CANopen. The access happens by IX 2F01h. Additionally the first 4 bytes may be accessed by IX 2F00h.
- SX Subindex for access via EtherCAT with Index 5005h.

More can be found in the according manual of your bus coupler.

Name	Bytes	Function	Default	DS	IX	SX
ERR_A	1	Diagnostic	00h	01h	2F01h	02h
MODTYP	1	Module information	1Fh			03h
ERR_C	1	reserved	00h			04h
ERR_D	1	Diagnostic	00h			05h
CHTYP	1	Channel type	70h			06h

021-1DF00 - DI 8xDC 24V Diagnosis > Diagnostic data

Name	Bytes	Function	Default	DS	IX	SX
NUMBIT	1	Number of diagnostics bits per channel	08h			07h
NUMCH	1	Number channels of the module	08h			08h
CHERR	1	Channel error	00h			09h
CH0ERR	1	Channel specific error DI 1	00h			0Ah
CH1ERR	1	Channel specific error DI 2	00h			0Bh
CH7ERR	1	Channel specific error DI 7	00h			11h
DIAG_US	4	µs ticker (32bit)	00h			13h

ERR_A Diagnostic	Byte	Bit 7 0
	0	 Bit 0: set at module failure Bit 1: set at internal error Bit 2: set at external error Bit 3: set at channel error Bit 4: set at external auxiliary supply missing Bit 6, 5: reserved Bit 7: set at error in parameterization
MODTYP Modul informa- tion	Byte	Bit 7 0
	0	 Bit 3 0: Module class 1111b: Digital module Bit 4: Channel information present Bit 7 5: reserved

ERR_C reserved	Byte	Bit 7 0
	0	reserved

ERR_D Diagnostic	Byte	Bit 7 0
	0	 Bit 2 0: reserved Bit 3: set at internal diagnostics buffer overflow Bit 4: set at internal communication error Bit 7 5: reserved

CHTYP Channel type	Byte	Bit 7 0
	0	 Bit 6 0: Channel type 70h: Digital input Bit 7: reserved

021-1DF00 - DI 8xDC 24V Diagnosis > Diagnostic data

NUMBIT Diagnostic bits	Byte	Bit 7 0
	0	Number of diagnostics bits of the module per channel (here 08h)
NUMCH Channels	Byte	Bit 7 0
	0	Number of channels of the module (here 08h)
CHERR DI x	Byte	Bit 7 0
	0	 Bit 0: Channel error DI 0 Bit 1: Channel error DI 1 Bit 7: Channel error DI 7
CHxERR	Byte	Bit 7 0
	0	Channel-specific error: DI x:
		 Bit 0: set at error in project engineering/parameterization Bit 3 1: reserved Bit 4: set at wire break Bit 7 5: reserved
DIAG_US µs ticker	Byte	Bit 7 0

DIAG_US µs ticker

Byte	Bit 7 0
0 3	Value of the µs ticker at the moment of the diagnostic

µs ticker

In the SLIO module there is a 32 bit timer (μ s ticker). With PowerON the timer starts counting with 0. After 2³²-1 μ s the timer starts with 0 again.

022-1BB00 - DO 2xDC 24V 0.5A

4 Digital Output

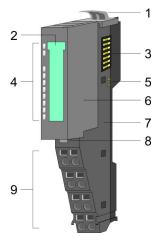
4.1 022-1BB00 - DO 2xDC 24V 0.5A

Properties

The electronic module accepts binary control signals from the central bus system and transfers them to the process level via outputs. It has 2 channels and their status is monitored via LEDs.

- 2 digital outputs, isolated to the backplane bus
- Status indication of the channels via LEDs

Structure

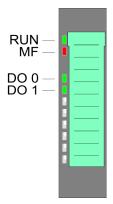


- Locking lever terminal module
- 2 Labeling strip

1

- 3 Backplane bus
- 4 LED status indication
- 5 DC 24V power section supply
- 6 Electronic module
- 7 Terminal module8 Locking lever election
 - Locking lever electronic module
- 9 Terminal

Status indication

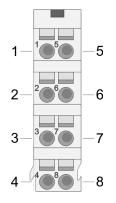


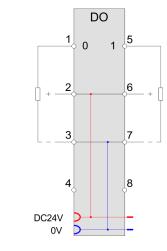
RUN	MF	DO x	Description
			Bus communication is OK
		Х	Module status is OK
			Bus communication is OK
•	•	х	Module status reports an error with overload, short circuit or overheat
			Bus communication is not possible
	•	Х	Module status reports an error with overload, short circuit or overheat
		Х	Error at bus power supply
			Flashing: Error in configuration
Х	ZHz 2Hz	Х	Chapter 2.8 'Trouble shooting - LEDs' on page 28
			Digital output has "1" signal
			Digital output has "0" signal
not relevant:	Х		

022-1BB00 - DO 2xDC 24V 0.5A

Pin assignment

For wires with a cross section of 0.08mm² up to 1.5mm².





Pos.	Function	Туре	Description
1	DO 0	0	Digital output DO 0
2	DC 24V	0	DC 24V
3	0V	0	GND for actuator
4			not connected
5	DO 1	0	Digital output DO 1
6	DC 24V	0	DC 24V
7	0V	0	GND for actuator
8			not connected

O: Output



Feeding in voltage at an output is not allowed and can destroy the module!

 Input area
 No byte of the input area is used by the module.

 Output area
 At CPU, PROFIBUS and PROFINET the output area is embedded to the corresponding address area.

 IX
 - Index for access via CANopen

 SX
 - Subindex for access via EtherCAT with Index 7000h + EtherCAT-Slot

 More can be found in the according manual of your bus coupler.

Addr.	Name	Bytes	Function	IX	SX
+0	PIQ	1	State of the outputs	5200h	
			Bit 0: DO 0		01h

022-1BB00 - DO 2xDC 24V 0.5A > Technical data

Addr.	Name	Bytes	Function	IX	SX
			Bit 1: DO 1		02h
			Bit 7 2: reserved		

4.1.1 Technical data

Order no.	022-1BB00
Туре	SM 022
Module ID	0101 AF90
Current consumption/power loss	
Current consumption from backplane bus	70 mA
Power loss	0.4 W
Technical data digital outputs	
Number of outputs	2
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	DC 20.428.8 V
Current consumption from load voltage L+ (without load)	5 mA
Total current per group, horizontal configuration, 40°C	1 A
Total current per group, horizontal configuration, 60°C	1 A
Total current per group, vertical configuration	1 A
Output current at signal "1", rated value	0.5 A
Output delay of "0" to "1"	30 µs
Output delay of "1" to "0"	175 µs
Minimum load current	-
Lamp load	10 W
Parallel switching of outputs for redundant control of a load	not possible
Parallel switching of outputs for increased power	not possible
Actuation of digital input	\checkmark
Switching frequency with resistive load	max. 1000 Hz
Switching frequency with inductive load	max. 0.5 Hz
Switching frequency on lamp load	max. 10 Hz
Internal limitation of inductive shut-off voltage	L+ (-45 V)
Short-circuit protection of output	yes, electronic
Trigger level	1 A
Number of operating cycle of relay outputs	-
Switching capacity of contacts	-

022-1BB00 - DO 2xDC 24V 0.5A > Technical data

Order no.	022-1BB00
Output data size	2 Bit
Status information, alarms, diagnostics	
Status display	green LED per channel
Interrupts	no
Process alarm	no
Diagnostic interrupt	no
Diagnostic functions	no
Diagnostics information read-out	none
Supply voltage display	green LED
Group error display	red LED
Channel error display	none
Isolation	
Between channels	-
Between channels of groups to	-
Between channels and backplane bus	\checkmark
Insulation tested with	DC 500 V
PWM data	
PWM channels	-
PWM time basis	-
Period length	-
Minimum pulse width	-
Type of output	-
Safety	
Safety protocol	-
Safety requirements	-
Secure user address	-
Watchdog	-
Two channels	-
Test pulse length	-
Circuit monitoring	-
Datasizes	
Input bytes	0
Output bytes	1
Parameter bytes	0
Diagnostic bytes	0
Housing	

022-1BB00 - DO 2xDC 24V 0.5A > Technical data

Order no.	022-1BB00
Material	PPE / PPE GF10
Mounting	Profile rail 35 mm
Mechanical data	
Dimensions (WxHxD)	12.9 mm x 109 mm x 76.5 mm
Net weight	58 g
Weight including accessories	58 g
Gross weight	72 g
Environmental conditions	
Operating temperature	0 °C to 60 °C
Storage temperature	-25 °C to 70 °C
Certifications	
UL certification	yes
KC certification	yes

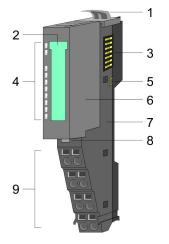
4.2 022-1BB20 - DO 2xDC 24V 2A

Properties

The electronic module accepts binary control signals from the central bus system and transfers them to the process level via outputs. It has 2 channels and their status is monitored via LEDs.

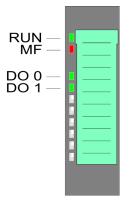
- 2 digital 2A outputs, isolated to the backplane bus
- Status indication of the channels via LEDs

Structure



- 1 Locking lever terminal module
- 2 Labeling strip
- 3 Backplane bus
- 4 LED status indication
- 5 DC 24V power section supply 6
- Electronic module 7 Terminal module
- 8 Locking lever electronic module
- 9 Terminal

Status indication



RUN	MF	DO x	Description	
green	red	green		
		х	Bus communication is OK	
		~	Module status is OK	
			Bus communication is OK	
	-	Х	Module status reports an error with overload, short circuit or overheat	
			Bus communication is not possible	
	-	х	Module status reports an error with overload, short circuit or overheat	
		Х	Error at bus power supply	
			Flashing: Error in configuration	
Х	ZHz	Х	Schapter 2.8 'Trouble shooting - LEDs' on page 28	
			Digital output has "1" signal	
			Digital output has "0" signal	
not relevant	not relevant: X			

022-1BB20 - DO 2xDC 24V 2A

Pin assignment

 $1 - \frac{1}{5} - 5$ $2 - \frac{2}{5} - 6$ $3 - \frac{3}{7} - 7$ $4 - \frac{4}{5} - 8$

For wires with a cross section of 0.08mm² up to 1.5mm².

Pos.	Function	Туре	Description
1	DO 0	0	Digital output DO 0
2	DC 24V	0	DC 24V
3	0V	0	GND for actuator
4			not connected
5	DO 1	0	Digital output DO 1
6	DC 24V	0	DC 24V
7	0V	0	GND for actuator
8			not connected

O: Output



Feeding in voltage at an output is not allowed and can destroy the module!

 Input area
 No byte of the input area is used by the module.

 Output area
 At CPU, PROFIBUS and PROFINET the output area is embedded to the corresponding address area.

 IX
 - Index for access via CANopen

 SX
 - Subindex for access via EtherCAT with Index 7000h + EtherCAT-Slot

More can be found in the according manual of your bus coupler.

Addr.	Name	Bytes	Function	IX	SX
+0	PIQ	1	State of the outputs	5200h	
			Bit 0: DO 0		01h

022-1BB20 - DO 2xDC 24V 2A > Technical data

Addr.	Name	Bytes	Function	IX	SX
			Bit 1: DO 1		02h
			Bit 7 2: reserved		

4.2.1 Technical data

Order no.	022-1BB20
Туре	SM 022
Module ID	0102 AF90
Current consumption/power loss	
Current consumption from backplane bus	70 mA
Power loss	0.55 W
Technical data digital outputs	
Number of outputs	2
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	DC 20.428.8 V
Current consumption from load voltage L+ (without load)	10 mA
Total current per group, horizontal configuration, 40°C	4 A
Total current per group, horizontal configuration, 60°C	4 A
Total current per group, vertical configuration	4 A
Output current at signal "1", rated value	2 A
Output delay of "0" to "1"	100 µs
Output delay of "1" to "0"	250 µs
Minimum load current	-
Lamp load	10 W
Parallel switching of outputs for redundant control of a load	not possible
Parallel switching of outputs for increased power	not possible
Actuation of digital input	\checkmark
Switching frequency with resistive load	max. 1000 Hz
Switching frequency with inductive load	max. 0.5 Hz
Switching frequency on lamp load	max. 10 Hz
Internal limitation of inductive shut-off voltage	L+ (-52 V)
Short-circuit protection of output	yes, electronic
Trigger level	2.7 A
Number of operating cycle of relay outputs	-
Switching capacity of contacts	-

Digital Output

022-1BB20 - DO 2xDC 24V 2A > Technical data

no no interrupt no functions no s information read-out non	een LED per channel
arm no	
arm no interrupt no functions no s information read-out non	
arm no no interrupt no functions no sinformation read-out no	
interrupt no functions no s information read-out non	
functions no no non	
s information read-out non)
)
	one
tage display gree	een LED
r display red	d LED
rror display non	one
hannels -	
hannels of groups to -	
hannels and backplane bus	
tested with DC	C 500 V
inels -	
basis -	
gth -	
oulse width -	
tput -	
tocol -	
uirements -	
er address -	
-	
els -	
length -	
nitoring -	
s 0	
es 1	
bytes 0	
bytes 0	

022-1BB20 - DO 2xDC 24V 2A > Technical data

Order no.	022-1BB20
Material	PPE / PPE GF10
Mounting	Profile rail 35 mm
Mechanical data	
Dimensions (WxHxD)	12.9 mm x 109 mm x 76.5 mm
Net weight	57 g
Weight including accessories	57 g
Gross weight	71 g
Environmental conditions	
Operating temperature	0 °C to 60 °C
Storage temperature	-25 °C to 70 °C
Certifications	
UL certification	yes
KC certification	yes

022-1BB50 - DO 2xDC 24V 0.5A NPN

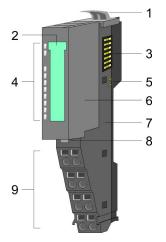
4.3 022-1BB50 - DO 2xDC 24V 0.5A NPN

Properties

The electronic module accepts binary control signals from the central bus system and transfers them to the process level via outputs. It has 2 channels connected to the power supply, which operate as low-side switch and their status is monitored via LEDs. Low-side switches are suited to switch grounds. With a short circuit between switch line and ground the load is activated but the power supply is not influenced.

- 2 digital low-side outputs, isolated to the backplane bus
- Status indication of the channels via LEDs

Structure

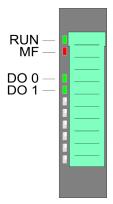


- Locking lever terminal module
- 2 Labeling strip

1

- 3 Backplane bus
- 4 LED status indication
- 5 DC 24V power section supply
- 6 Electronic module
- 7 Terminal module
- 8 Locking lever electronic module
- 9 Terminal

Status indication

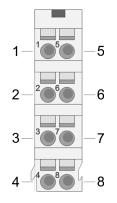


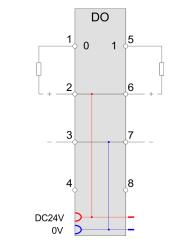
RUN	MF	DO x	Description
green	red	green	Description
		х	Bus communication is OK
		λ	Module status is OK
			Bus communication is OK
	-	х	Module status reports an error with overload, short circuit or overheat
			Bus communication is not possible
	•	Х	Module status reports an error with overload, short circuit or overheat
		Х	Error at bus power supply
			Flashing: Error in configuration
Х	ZHz 2Hz	Х	Schapter 2.8 'Trouble shooting - LEDs' on page 28
			Digital output has "1" signal
			Digital output has "0" signal
not relevant: X			

022-1BB50 - DO 2xDC 24V 0.5A NPN

Pin assignment

For wires with a cross section of 0.08mm² up to 1.5mm².





Pos.	Function	Туре	Description
1	DO 0	0	Digital output DO 0
2	DC 24V	0	DC 24V for actuator
3	0V	0	GND
4			not connected
5	DO 1	0	Digital output DO 1
6	DC 24V	0	DC 24V for actuator
7	0V	0	GND
8			not connected

O: Output



Feeding in voltage at an output is not allowed and can destroy the module!

 Input area
 No byte of the input area is used by the module.

 Output area
 At CPU, PROFIBUS and PROFINET the output area is embedded to the corresponding address area.

 IX
 - Index for access via CANopen

 SX
 - Subindex for access via EtherCAT with Index 7000h + EtherCAT-Slot

More can be found in the according manual of your bus coupler.

Addr.	Name	Bytes	Function	IX	SX
+0	PIQ	1	State of the outputs	5200h	
			Bit 0: DO 0		01h

022-1BB50 - DO 2xDC 24V 0.5A NPN > Technical data

Addr.	Name	Bytes	Function	IX	SX
			Bit 1: DO 1		02h
			Bit 7 2: reserved		

4.3.1 Technical data

Order no.	022-1BB50
Туре	SM 022
Module ID	0103 AF90
Current consumption/power loss	
Current consumption from backplane bus	70 mA
Power loss	0.4 W
Technical data digital outputs	
Number of outputs	2
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	DC 20.428.8 V
Current consumption from load voltage L+ (without load)	2.5 mA
Total current per group, horizontal configuration, 40°C	1 A
Total current per group, horizontal configuration, 60°C	1 A
Total current per group, vertical configuration	1 A
Output current at signal "1", rated value	0.5 A
Output delay of "0" to "1"	30 µs
Output delay of "1" to "0"	100 µs
Minimum load current	-
Lamp load	10 W
Parallel switching of outputs for redundant control of a load	not possible
Parallel switching of outputs for increased power	not possible
Actuation of digital input	\checkmark
Switching frequency with resistive load	max. 1000 Hz
Switching frequency with inductive load	max. 0.5 Hz
Switching frequency on lamp load	max. 10 Hz
Internal limitation of inductive shut-off voltage	+45 V
Short-circuit protection of output	yes, electronic
Trigger level	1.7 A
Number of operating cycle of relay outputs	-
Switching capacity of contacts	-

022-1BB50 - DO 2xDC 24V 0.5A NPN > Technical data

Order no.	022-1BB50
Output data size	2 Bit
Status information, alarms, diagnostics	
Status display	green LED per channel
Interrupts	no
Process alarm	no
Diagnostic interrupt	no
Diagnostic functions	no
Diagnostics information read-out	none
Supply voltage display	green LED
Group error display	red LED
Channel error display	none
Isolation	
Between channels	-
Between channels of groups to	-
Between channels and backplane bus	\checkmark
Insulation tested with	DC 500 V
PWM data	
PWM channels	-
PWM time basis	-
Period length	-
Minimum pulse width	-
Type of output	-
Safety	
Safety protocol	-
Safety requirements	-
Secure user address	-
Watchdog	-
Two channels	-
Test pulse length	-
Circuit monitoring	-
Datasizes	
Input bytes	0
Output bytes	1
Parameter bytes	0
Diagnostic bytes	0
Housing	

022-1BB50 - DO 2xDC 24V 0.5A NPN > Technical data

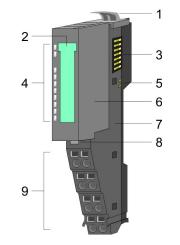
Order no.	022-1BB50
Material	PPE / PPE GF10
Mounting	Profile rail 35 mm
Mechanical data	
Dimensions (WxHxD)	12.9 mm x 109 mm x 76.5 mm
Net weight	57 g
Weight including accessories	57 g
Gross weight	71 g
Environmental conditions	
Operating temperature	0 °C to 60 °C
Storage temperature	-25 °C to 70 °C
Certifications	
UL certification	yes
KC certification	yes

Properties

The electronic module accepts binary control signals from the central bus system and transfers them time-controlled by means of ETS functionality to the process level via outputs. It has 2 channels and their status is monitored via LEDs. With configured ETS functionality (ETS = edge time stamp) depending on the configuration 5 (20byte) respectively 15 (60byte), you may transfer the states for the outputs together with a time value of the μ s ticker as an ETS entry to the FIFO stack. The FIFO memory serves for space for max. 31 ETS entries.

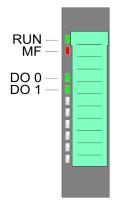
- 2 digital outputs, isolated to the backplane bus
- FIFO stack for 5 respectively 15 ETS entries (each 4byte)
- Diagnostics function
- Controlling by process image respectively handling blocks
- Status indication of the channels via LEDs

Structure



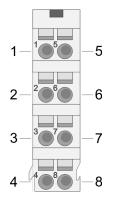
- 1 Locking lever terminal module
- 2 Labeling strip
- 3 Backplane bus
- 4 LED status indication
- 5 DC 24V power section supply
- 6 Electronic module
- 7 Terminal module
- 8 Locking lever electronic module
- 9 Terminal

Status indication

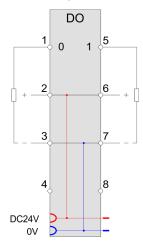


RUN	MF e red	DO x	Description
		х	Bus communication is OK
			Module status is OK
			Bus communication is OK
	-	Х	Module status reports an error with overload, short circuit or overheat
			Bus communication is not possible
	-	Х	Module status reports an error with overload, short circuit or overheat
		Х	Error at bus power supply
			Flashing: Error in configuration
Х	ZHz 2Hz	Х	Schapter 2.8 'Trouble shooting - LEDs' on page 28
			Digital output has "1" signal
			Digital output has "0" signal
not relevant:	Х		

Pin assignment



For wires with a cross section of 0.08mm² up to 1.5mm².



Pos.	Function	Туре	Description
1	DO 0	0	Digital output DO 0
2	DC 24V	0	DC 24V
3	0V	0	GND for actuator
4			not connected
5	DO 1	0	Digital output DO 1
6	DC 24V	0	DC 24V
7	0V	0	GND for actuator
8			not connected

O: Output



CAUTION!

Feeding in voltage at an output is not allowed and can destroy the module!

In-/Output area

With configured ETS functionality (ETS=edge time stamp) a time value (ETS_US) together with the state of the outputs (PIQ) and a running number (RN) may be stored as ETS entry in the process image.

You may configure the following variants:

- 022-1BB70 DO 2xDC 24V (20): FIFO with 20byte for 5 ETS entries
- 022-1BB70 DO 2xDC 24V (60): FIFO with 60byte for 15 ETS entries



Please consider, with a full FIFO stack no further ETS entries may be accepted. To ensure that your ETS entries are kept, you should always check the state of the FIFO stack by STS FIFO in the input area before.

Input area 4byte

The input range is used for status message. At CPU, PROFIBUS and PROFINET the input area is embedded to the corresponding address area.

IX - IX = Index for access via CANopen.

SX - Subindex for access via EtherCAT with Index 6000h + EtherCAT-Slot

More can be found in the according manual of your bus coupler.

Addr.	Name	Bytes	Function	IX	SX
+0	RN_LAST	1	Bit 5 0:	5440h	01h
			RN last FIFO entry		
			Bit 6: 1 (fix)		
			Bit 7: 0 (fix)		
+1	RN_NEXT	1	Bit 5 0:		02h
			RN next FIFO entry to be processed		
			Bit 6: 1 (fix)		
			Bit 7: 1 (fix)		
+2	STS_FIFO	1	State of the FIFO stack		03h
+3	NUM_ETS	1	Number of ETS entries in the FIFO stack		04h

RN_LAST	Bit 5 0: Here the RN of the last ETS entry may be found, which was recognized as valid and written into the FIFO memory of the module.
	Bit 6: 1 (fix) - serves for the identification in the process image
	Bit 7: 0 (fix) - serves for the identification in the process image
RN_NEXT	Bit 5 0: Here the RN of the ETS entry may be found, which will be executed next in the FIFO memory of the module. Please consider Bit 6 and 7 of RN_NEXT are always set.
	Bit 6: 1 (fix) - serves for the identification in the process image
	Bit 7: 1 (fix) - serves for the identification in the process image

STS_FIFO The State informs about the state of the FIFO stack:

STS_FIFO	Description
00h/80h	Everything is OK. You will get this message directly after the storage in the FIFO memory of the module.
01h/81h	There is no following ETS entry in the FIFO.
	The RN does not correspond to the expected RN. Please check your RN in the output area.
02h/82h	There are no new ETS entries in the FIFO.
03h/83h	FIFO stack is full. There is no more place for further ETS entries.

If there are less ETS entries written as possible, additionally bit 6 of the last RN must be set. This is necessary; otherwise you have to overwrite the following entries with a "not valid" entry.

The module ignores entries after an entry with a set bit 6. If there is an ETS entry in the FIFO memory, whose bit 6 is set, STS_FIFO is always returned ored with 80h.

NUM_ETSHere always the current number of the ETS entries in the FIFO memory of the module
may be found.

Structure of an ETS entry Depending on the configuration up to 15 ETS entries may be written via the output area. Each ETS entry uses 4byte in the process image:

Addr.	Name	Bytes	Function	IX	SX
+0	PIQ	1	Output byte	5640h/s	01h
+1	RN	1	Running number		02h
+2	ETS_US	2	µs ticker		03h

PIQ

Here the state of the outputs for the corresponding time may be defined and the output channels may be enabled respectively disabled.

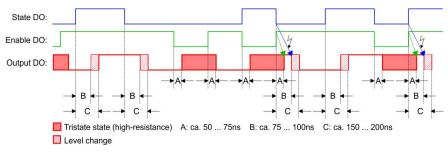
The output byte has the following bit allocation:

Bit 3 ... 0: 0 (fix)

- Bit 4: Enable DO 1 (0: disable, 1: enable)
- Bit 5: Enable DO 0 (0: disable, 1: enable)
- Bit 6: State DO 1
- Bit 7: State DO 0

Time characteristics of an output The simultaneous enabling and state change of an output should be avoided. Due to the different run times (see times A, B and C) up to the change of state this may affect unwanted switching effects.

The following figure shows the time characteristics of an output when using the enable bit.



RN

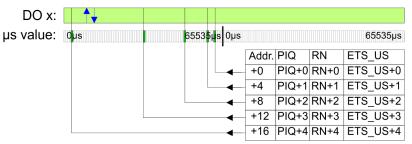
RN (**R**unning **N**umber) is a continuous number 0 ... 63, which has to start with 1. With the RN the chronological order of the ETS entries may be defined. With each ETS entry RN is to be incremented, otherwise the ETS entry may not be recognized by the module.

If there are less ETS entries written as possible, additionally bit 6 of the last RN must be set. This is necessary; otherwise you have to overwrite the following entries with a "not valid" entry. The module ignores entries after an entry with a set bit 6.

ETS_US In the SLIO module there is a 32 bit timer (µs ticker). With PowerON the timer starts counting. After 2³²-1µs the timer starts with 0 again. For ETS_US of an ETS entry you have to define a time value from the low word of the µs ticker (0...65535µs).

Here please enter a time value in $\mu s,$ to which the state of the outputs is to be taken. Range of values: 0 ... 65535

ETS functionality The following picture shows how the ETS entries are to be preset in the output area, so that these can be stored in the FIFO memory.



Output area 20byteAt CPU, PROFIBUS and PROFINET the output area is embedded to the corresponding
address area.

- IX Index for access via CANopen. With s = Subindex the corresponding ETS entry is addressed.
- SX Subindex for access via EtherCAT with Index 7000h + EtherCAT-Slot

More can be found in the according manual of your bus coupler.

Configured as 022-1BB70 DO 2xDC 24V (20)

20byte - 5 ETS entries

Addr.	PIQ	IX=5640h	SX	Addr.	RN	IX=5640h	SX	Addr.	ETS-US	IX=5640h	SX
+0	PIQ+0	s=1	01h	+1	RN+0	s=1	02h	+2	ETS_US+0	s=1	03h
+4	PIQ+1	s=2	04h	+5	RN+1	s=2	05h	+6	ETS_US+1	s=2	06h
+8	PIQ+2	s=3	07h	+9	RN+2	s=3	08h	+10	ETS_US+2	s=3	09h
+12	PIQ+3	s=4	0Ah	+13	RN+3	s=4	0Bh	+14	ETS_US+3	s=4	0Ch
+16	PIQ+4	s=5	0Dh	+17	RN+4	s=5	0Eh	+18	ETS_US+4	s=5	0Fh

Configured as 022-1BB70 DO 2xDC 24V (60)

60byte - 15 ETS entries

Addr.	PIQ	IX=5640h	SX	Addr.	RN	IX=5640h	SX	Addr.	ETS-US	IX=5640h	SX
+0	PIQ+0	s=1	01h	+1	RN+0	s=1	02h	+2	ETS_US+0	s=1	03h
+4	PIQ+1	s=2	04h	+5	RN+1	s=2	05h	+6	ETS_US+1	s=2	06h
+8	PIQ+2	s=3	07h	+9	RN+2	s=3	08h	+10	ETS_US+2	s=3	09h
+12	PIQ+3	s=4	0Ah	+13	RN+3	s=4	0Bh	+14	ETS_US+3	s=4	0Ch
+16	PIQ+4	s=5	0Dh	+17	RN+4	s=5	0Eh	+18	ETS_US+4	s=5	0Fh
+20	PIQ+5	s=6	10h	+21	RN+5	s=6	11h	+22	ETS_US+5	s=6	12h
+24	PIQ+6	s=7	13h	+25	RN+6	s=7	14h	+26	ETS_US+6	s=7	15h
+28	PIQ+7	s=8	16h	+29	RN+7	s=8	17h	+30	ETS_US+7	s=8	18h
+32	PIQ+8	s=9	19h	+33	RN+8	s=9	1Ah	+34	ETS_US+8	s=9	1Bh
+36	PIQ+9	s=10	1Ch	+37	RN+9	s=10	1Dh	+38	ETS_US+9	s=10	1Eh
+40	PIQ+10	s=11	1Fh	+41	RN+10	s=11	20h	+42	ETS_US+10	s=11	21h
+44	PIQ+11	s=12	22h	+45	RN+11	s=12	23h	+46	ETS_US+11	s=12	24h
+48	PIQ+12	s=13	25h	+49	RN+12	s=13	26h	+50	ETS_US+12	s=13	27h
+52	PIQ+13	s=14	28h	+53	RN+13	s=14	29h	+54	ETS_US+13	s=14	2Ah
+56	PIQ+14	s=15	2Bh	+57	RN+14	s=15	2Ch	+58	ETS_US+14	s=15	2Dh



The ETS module may only be accessed by the System SLIO CPU by means of SFC 15 or via the process image. Only the input data of the ETS module may be read by individual accesses.

022-1BB70 - DO 2xDC 24V 0.5A ETS > Technical data

4.4.1 Technical data

Order no.	022-1BB70
Туре	SM 022
Module ID	0F41 57E1
Current consumption/power loss	
Current consumption from backplane bus	105 mA
Power loss	0.95 W
Technical data digital outputs	
Number of outputs	2
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	DC 20.428.8 V
Current consumption from load voltage L+ (without load)	15 mA
Total current per group, horizontal configuration, 40°C	1 A
Total current per group, horizontal configuration, 60°C	1 A
Total current per group, vertical configuration	1 A
Output current at signal "1", rated value	0.5 A
Output delay of "0" to "1"	max. 100 ns
Output delay of "1" to "0"	max. 100 ns
Minimum load current	-
Lamp load	10 W
Parallel switching of outputs for redundant control of a load	not possible
Parallel switching of outputs for increased power	not possible
Actuation of digital input	\checkmark
Switching frequency with resistive load	max. 40 kHz
Switching frequency with inductive load	max. 40 kHz
Switching frequency on lamp load	max. 40 kHz
Internal limitation of inductive shut-off voltage	L+ (-52 V)
Short-circuit protection of output	yes, electronic, and only highside
Trigger level	2.5 A
Number of operating cycle of relay outputs	-
Switching capacity of contacts	-
Output data size	60 Byte
Status information, alarms, diagnostics	
Status display	green LED per channel
Interrupts	no
Process alarm	no

022-1BB70 - DO 2xDC 24V 0.5A ETS > Technical data

Order no.	022-1BB70
Diagnostic interrupt	no
Diagnostic functions	no
Diagnostics information read-out	possible
Supply voltage display	green LED
Group error display	red LED
Channel error display	none
Isolation	
Between channels	-
Between channels of groups to	-
Between channels and backplane bus	\checkmark
Insulation tested with	DC 500 V
PWM data	
PWM channels	-
PWM time basis	-
Period length	-
Minimum pulse width	-
Type of output	-
Safety	
Safety protocol	-
Safety requirements	-
Secure user address	-
Watchdog	-
Two channels	-
Test pulse length	-
Circuit monitoring	-
Datasizes	
Input bytes	4
Output bytes	20 / 60
Parameter bytes	6
Diagnostic bytes	20
Housing	
Material	PPE / PPE GF10
Mounting	Profile rail 35 mm
Mechanical data	
Dimensions (WxHxD)	12.9 mm x 109 mm x 76.5 mm

022-1BB70 - DO 2xDC 24V 0.5A ETS > Parameter data

Order no.	022-1BB70
Weight including accessories	61 g
Gross weight	75 g
Environmental conditions	
Operating temperature	0 °C to 60 °C
Storage temperature	-25 °C to 70 °C
Certifications	
UL certification	yes
KC certification	yes

4.4.2 Parameter data

4.4.2.1 Parameters

The module has the following parameter data, which were fix set and may not be altered.

DS - Record set for access via CPU, PROFIBUS and PROFINET

- IX Index for access via CANopen
- SX Subindex for access via EtherCAT with Index 3100h + EtherCAT-Slot

More can be found in the according manual of your bus coupler.

Name	Bytes	Function	Default	DS	IX	SX
PII_L	1	Length process image input data ¹	04h (fix)	02h	3100h	01h
PIQ_L	1	Length process image output data ^{1, 2}	14h bzw. 3Ch (fix)	02h	3101h	02h
1) This record set	may only be trar	isferred at STOP state.				

2) This parameter depends on the configured variant.

PII_L

Byte	Bit 7 0
0	The length of the process image of the input data is fix set to 4byte.

PIQ_L

Byte	Bit 7 0
0	The length of the process image of the output data is fix set to the configured variant (14h or 3Ch).

4.4.2.2 Example for the principle of operation

In the following it is demonstrated by an example, in which order the ETS entries are stored and processed.

022-1BB70 - DO 2xDC 24V 0.5A ETS > Parameter data

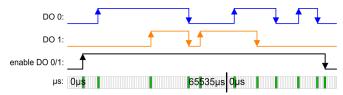
With this example a module is configured, which uses 20byte for 5 ETS entries in the output area PIQ.

ETS values With the following times of the µs ticker the following states of the outputs should be taken:

RN	ETS_US	PIQ DO 0	PIQ DO 1	PIQ enable	PIQ enable
	in µs	(Bit 7)	(Bit 6)	DO 0 (Bit 5)	DO 1 (Bit 4)
01h	6000	0	0	1	1
02h	12506	1	0	1	1
03h	34518	1	1	1	1
04h	49526	0	0	1	1
05h	54529	0	1	1	1
06h	3500	1	1	1	1
07h	12443	1	0	1	1
08h	20185	0	0	1	1
09h	30140	1	0	1	1
0Ah	37330	0	0	1	1
0Bh	40000	0	0	0	0

Time diagram

From the table you get the following time diagram:

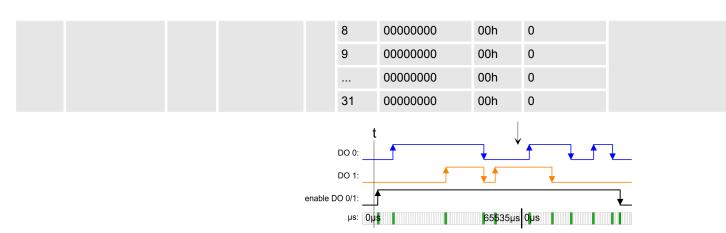


Writing 5 ETS entries After writing the ETS entries into the process output image they are directly stored in the FIFO memory of the module.

The state of the outputs are shown in the diagram at the time "t". In the PII you will find the status bytes.

Addr.	PIQ	RN	ETS_US	\rightarrow	FIFO	PIQ	RN	ETS_US	PII
+0	00110000	01h	6000		1	00110000	01h	6000	RN_LAST: 45h
+4	10110000	02h	12506		2	10110000	02h	12506	RN_NEXT: C1h
+8	11110000	03h	34518		3	11110000	03h	34518	STS_FIFO: 00h
+12	00110000	04h	49526		4	00110000	04h	49526	NUM_ETS: 05h
+16	01110000	05h	54529		5	01110000	05h	54529	
					6	0000000	00h	0	
					7	0000000	00h	0	

022-1BB70 - DO 2xDC 24V 0.5A ETS > Parameter data



Executing ETS function for RN = 01h

So that the outputs can be controlled, they must be enabled before. In this example both outputs are enabled with the 1. RN.

The ETS entry (RN = 01h) is executed and deleted in the FIFO.

Addr.	PIQ	RN	ETS_US		FIFO	PIQ	RN	ETS_US	PII
+0	00110000	01h	6000	\rightarrow	1	10110000	02h	12506	RN_LAST: 45h
+4	10110000	02h	12506		2	11110000	03h	34518	RN_NEXT: C2h
+8	11110000	03h	34518		3	00110000	04h	49526	STS_FIFO: 00h/02h
+12	00110000	04h	49526		4	01110000	05h	54529	NUM_ETS: 04h
+16	01110000	05h	54529		5	0000000	00h	0	
					6	0000000	00h	0	
					7	0000000	00h	0	
					8	0000000	00h	0	
					9	0000000	00h	0	
						0000000	00h	0	
					31	0000000	00h	0	
					DC enable DO (t 0 0:	65	↓ ↓ 35µs <mark>0µ</mark> s ↓	

Executing ETS function for RN = 02h ... 04h

The states of RN = 02h ... RN 04h are successively issued and deleted in the FIFO.

Addr.	PIQ	RN	ETS_US		FIFO	PIQ	RN	ETS_US	PII
+0	00110000	01h	6000	\rightarrow	1	01110000	05h	54529	RN_LAST: 45h
+4	10110000	02h	12506		2	0000000	00h	0	RN_NEXT: C5h
+8	11110000	03h	34518		3	0000000	00h	0	STS_FIFO: 00h/02h
+12	00110000	04h	49526		4	0000000	00h	0	NUM_ETS: 01h

Writing 5 ETS entries

022-1BB70 - DO 2xDC 24V 0.5A ETS > Parameter data

+16	01110000	05h	54529	5	0000000	00h	0	
				6	0000000	00h	0	
				7	0000000	00h	0	
				8	0000000	00h	0	
				9	0000000	00h	0	
					0000000	00h	0	
				31	0000000	00h	0	
				DO DO enable DO 0.	1:	t V		
				٢	ıs: Oµ s	655	35µs Oµs	

After writing the next 5 ETS entries into the process output image they are directly stored in the FIFO memory of the module.

Addr.	PIQ	RN	ETS_US		FIFO	PIQ	RN	ETS_US	PII	
+0	11110000	06h	3500	\rightarrow	1	01110000	05h	54529	RN_LAST: 4Ah	
+4	10110000	07h	12443		2	11110000	06h	3500	RN_NEXT: C5h	
+8	00110000	08h	20185		3	10110000	07h	12443	STS_FIFO: 00h/02h	
+12	10110000	09h	30140		4	00110000	08h	20185	NUM_ETS: 06h	
+16	00110000	0Ah	37330		5	10110000	09h	30140		
					6	00110000	0Ah	37330		
						0000000	00h	0		
						0000000	00h	0		
					9	0000000	00h	0		
						0000000	00h	0		
					31	0000000	00h	0		
DO 0: DO 1: $us: 0\mu$ bs bs bs bs bs bs bs bs										

Executing ETS function for RN = 06h ... 08h

The states of RN = 06h \dots RN 08h are successively issued and deleted in the FIFO.

Addr.	PIQ	RN	ETS_US		FIFO	PIQ	RN	ETS_US	PII
+0	11110000	06h	3500	\rightarrow	1	10110000	09h	30140	RN_LAST: 4Ah
+4	10110000	07h	12443		2	00110000	0Ah	37330	RN_NEXT: C5h

022-1BB70 - DO 2xDC 24V 0.5A ETS > Parameter data

+8	00110000	08h	20185		3	0000000	00h	0	STS_FIFO: 00h/02h
+12	10110000	09h	30140		4	0000000	00h	0	NUM_ETS: 02h
+16	00110000	0Ah	37330		5	0000000	00h	0	
					6	0000000	00h	0	
					7	0000000	00h	0	
					8	0000000	00h	0	
					9	0000000	00h	0	
						0000000	00h	0	
					31	0000000	00h	0	
					DO 0: DO 1:				↓
				e	nable DO 0/1: - µs: [Oµ s	65 5 35µs	Qus	¥_

Writing last ETS entry

Since less than 5 ETS entries are written, bit 6 of RN of the last ETS entry must always be set. RN = 0Bh becomes 4Bh.

Addr.	PIQ	RN	ETS_US		FIFO	PIQ	RN	ETS_US	PII
+0	0000000	4Bh	40000	\rightarrow	1	10110000	09h	30140	RN_LAST: 4Bh
+4	10110000	07h	12443		2	00110000	0Ah	37330	RN_NEXT: C9h
+8	00110000	08h	20185		3	0000000	4Bh	40000	STS_FIFO: 80h/82h
+12	10110000	09h	30140		4	0000000	00h	0	NUM_ETS: 03h
+16	00110000	0Ah	37330		5	0000000	00h	0	
					6	0000000	00h	0	
					7	0000000	00h	0	
					8	0000000	00h	0	
					9	0000000	00h	0	
						0000000	00h	0	
					31	0000000	00h	0	
	$DO 0: _{\mu s} O \mu s$								

The states of RN = 09h ... RN 4Bh are successively issued and deleted in the FIFO.

Executing ETS function for RN = 09h ... 4Bh

022-1BB70 - DO 2xDC 24V 0.5A ETS > Parameter data

Addr.	PIQ	RN	ETS_US		FIFO	PIQ	RN	ETS_US	PII
+0	0000000	4Bh	40000	\rightarrow	1	0000000	00h	0	RN_LAST: 4Bh
+4	10110000	07h	12443		2	0000000	00h	0	RN_NEXT: CCh
+8	00110000	08h	20185		3	0000000	00h	0	STS_FIFO: 80h/82h
+12	10110000	09h	30140		4	0000000	00h	0	NUM_ETS: 00h
+16	00110000	0Ah	37330		5	0000000	00h	0	
					6	0000000	00h	0	
					7	0000000	00h	0	
					8	0000000	00h	0	
					9	0000000	00h	0	
						0000000	00h	0	
					31	0000000	00h	0	
									t
					DO 0:	•			↓
					DO 1:			•	
				enable	DO 0/1:				
					µs: Oµ s		65 5 35µs 0,	IS	



Please consider the ETS modules can only effectively be used together with head modules, which have an integrated μ s ticker. The Ethernet coupler with ModbusTCP 053-1MT00 for example does not have an μ s ticker.

4.4.3 Diagnostic data

This module does not support interrupt functions, the diagnostic data serve the information about this module.

- DS Record set for access via CPU, PROFIBUS and PROFINET. The access happens by DS 01h. Additionally the first 4 bytes may be accessed by DS 00h.
- IX Index for access via CANopen. The access happens by IX 2F01h. Additionally the first 4 bytes may be accessed by IX 2F00h.
- SX Subindex for access via EtherCAT with Index 5005h.

More can be found in the according manual of your bus coupler.

Name	Bytes	Function	Default	DS	IX	SX
ERR_A	1	reserved	00h	01h	2F01h	02h
MODTYP	1	Module information	1Fh			03h
ERR_C	1	reserved	00h			04h
ERR_D	1	reserved	00h			05h
CHTYP	1	Channel type	72h			06h
NUMBIT	1	Number of diagnostics bits per channel	00h			07h
NUMCH	1	Number channels of the module	02h			08h
CHERR	1	reserved	00h			09h
CH0ERR CH7ERR	8	reserved	00h			0Ah 11h
DIAG_US	4	µs ticker (32bit)	00h			13h

MODTYP Modul informa- tion	Byte	Bit 7 0
	0	Bit 3 0: Module class
		1111b Digital module
		Bit 4: Channel information present
		Bit 7 5: reserved
CHTYP Channel type	Byte	Bit 7 0
	0	Bit 6 0: Channel type
		72h: Digital output
		Bit 7: 0 (fix)
NUMBIT Diagnostic bits	Byte	Bit 7 0

Number of diagnostics bits of the module per channel (here 00h)

0

022-1BB70 - DO 2xDC 24V 0.5A ETS > Diagnostic data

NUMCH Number of chan-	Dute	
nels	Byte	Bit 7 0
	0	Number of channels of the module (here 02h)
DIAG_US μs ticker	Duto	
	Byte	Bit 7 0
	0 3	Value of the $\boldsymbol{\mu} s$ ticker at the moment of the diagnostic data generation
ERR_A/C/D CHERR, CHxERR reserved	Byte	Bit 7 0
••••••	0	reserved

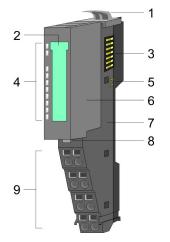
4.5 022-1BB90 - DO 2xDC 24V 0.5A PWM

Properties

The electronic has 2 output channels with PWM functionality (PWM = **p**ulse **w**idth **m**odulation). By presetting of time parameter a pulse sequence with according pulse/break ratio may be issued at the corresponding output channel.

- 2 PWM outputs, isolated to the backplane bus
- PWM outputs switchable between *push/pull* and *high side*
- Diagnostics function
- Status indication of the channels via LEDs
- PWM status
- Variable period duration and pulse duty ratio

Structure



Status indication

RUN	MF e red	DO x	Description		
		х	Bus communication is OK		
-			Module status is OK		
			Bus communication is OK		
		Х	Module status reports an error with overload, short circuit or overheat		
			Bus communication is not possible		
		Х	Module status reports an error with overload, short circuit or overheat		
		Х	Error at bus power supply		
			Flashing: Error in configuration		
Х	ZHz	Х	Chapter 2.8 'Trouble shooting - LEDs' on page 28		
			PWM output has "1" signal		
			PWM output has "0" signal		
not relevant:	not relevant: X				

Locking lever terminal module Labeling strip Backplane bus

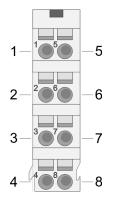
- 3 Backplane bus4 LED status indication
- 5 DC 24V power section supply
- 6 Electronic module
- 7 Terminal module
- 8 Locking lever electronic module
- 9 Terminal

1

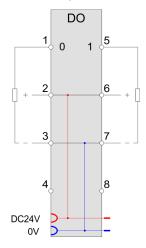
2

022-1BB90 - DO 2xDC 24V 0.5A PWM

Pin assignment



For wires with a cross section of 0.08mm² up to 1.5mm².



Pos.	Function	Туре	Description
1	DO 0	0	PWM output DO 0
2	DC 24V	0	DC 24V
3	0V	0	GND for actuator
4			not connected
5	DO 1	0	PWM output DO 1
6	DC 24V	0	DC 24V
7	0V	0	GND for actuator
8			not connected

O: Output



CAUTION!

Feeding in voltage at an output is not allowed and can destroy the module!

Input area 4byte

At CPU, PROFIBUS and PROFINET the input respectively output area is embedded to the corresponding address area.

- IX Index for access via CANopen with s = subindex, depends on number of PWM modules
- SX Subindex for access via EtherCAT with Index 6000h + EtherCAT-Slot

More can be found in the according manual of your bus coupler.

Addr.	Name	Bytes	Function	IX	SX
+0	PWMSTS_I	2	PWM 0: Status	5420h/s	01h
+2	PWMSTS_II	2	PWM 1: Status	5420h/s+1	02h

022-1BB90 - DO 2xDC 24V 0.5A PWM

Status PWM x

Bit	Name	Function
0	-	reserved
1	STS_PWM	Status PWM 0: PWM output stopped 1: PWM output activated
2	STS_OUTBV	Status output 0: Push/Pull output 1: High side output
3 15	-	reserved

Output area 12byte At CPU, PROFIBUS and PROFINET the output area is embedded to the corresponding address area.

- IX Index for access via CANopen with s = subindex, depends on number of PWM modules
- SX Subindex for access via EtherCAT with Index 7000h + EtherCAT-Slot

More can be found in the according manual of your bus coupler.

Addr.	Name	Bytes	Function	IX	SX
+0	PWMPD_I	4	PWM 0: Pulse duration	5620h/s	01h
+4	PWMPD_II	4	PWM 1: Pulse duration	5620h/s+1	02h
+8	PWMCTRL_I	2	PWM 0: Control word	5621h/s	03h
+10	PWMCTRL_II	2	PWM 1: Control word	5621h/s+1	04h

PWMPD_I PWMPD_IIHere you have to define the pulse duty ratio for the configured *period duration*, by preset-
ting the high level for the corresponding PWM channel. The pulse duration is to be preset
as factor to the base 20.83ns.Range of values: 48 ... 8388607 (1µs ... ca. 175ms)

PWMCTRL_I PWMCTRL_II Here for the corresponding channel the PWM output behavior may be preset and the PWM output may be started respectively stopped.

022-1BB90 - DO 2xDC 24V 0.5A PWM > Technical data

Bit	Name	Function
0 1	-	reserved
2	CTRL_OUTBV	PWM output behavior
		0: Push/Pull output
		1: High side output
		With <i>Push/Pull</i> operation it is active switched to high and low level.
		With <i>High side</i> operation it is only active switched to high level.
3 7	-	reserved
8	CTRL_STRT	Edge 0-1 starts PWM output at channel x
9	CTRL_STP	Edge 0-1 stops PWM output at channel x
10 15	-	reserved

4.5.1 Technical data

Order no.	022-1BB90
Туре	SM 022
Module ID	0901 4880
Current consumption/power loss	
Current consumption from backplane bus	105 mA
Power loss	0.95 W
Technical data digital outputs	
Number of outputs	2
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	DC 20.428.8 V
Current consumption from load voltage L+ (without load)	15 mA
Total current per group, horizontal configuration, 40°C	1 A
Total current per group, horizontal configuration, 60°C	1 A
Total current per group, vertical configuration	1 A
Output current at signal "1", rated value	0.5 A
Output delay of "0" to "1"	max. 100 ns
Output delay of "1" to "0"	max. 100 ns
Minimum load current	-
Lamp load	10 W
Parallel switching of outputs for redundant control of a load	not possible
Parallel switching of outputs for increased power	not possible

022-1BB90 - DO 2xDC 24V 0.5A PWM > Technical data

Actuation of digital inputSwitching frequency with resistive loadmax. 40 kHzSwitching frequency on lamp loadmax. 40 kHzSwitching frequency on lamp loadmax. 40 kHzInternal limitation of inductive shut-off voltageL+ (-52 V)Short-circuit protection of outputyes, electronic, and only highsideTrigger level2.5 ANumber of operating cycle of relay outputs-Switching capacity of contacts12 DyleOutput data size12 DyleStatus information, alarms, diagnostics-Status displaygreen LED per channelInterruptsnoProcess alarmnoDiagnostic interruptnoDiagnostic interruptnoDiagnostic interruptnoneStatus displaygreen LEDStatus displaygreen LEDDiagnostic interruptnoneDiagnostic interruptnoneChannel error displaynoneStatusStatusBetween channels-Between channels and backplane bus-Instructed withDicSol VPWM channels2.5 No.838807* time basePitty Hum basis1.9 No.838807* time basePitty Displayi.9 No.838807* time basePitty Display-Staty Display-Staty Display Colo-Staty Display Colo-Staty Display-Staty Display-Staty Display-Staty Display-Staty Displ	Order no.	022-1BB90
Switching frequency with inductive loadmax. 40 kHzSwitching frequency on lamp loadmax. 40 kHzInternal limitation of inductive shut-off voltageL+ (-52 V)Short-iccuit protection of outputyes, electronic, and only highsideTrigger level2.5 ANumber of operating cycle of relay outputs-Switching capacity of contacts-Output data size12 ByteStatus information, alarms, diagnostics-Status information, alarms, diagnostics-Status information, alarms, diagnostics-Status information, alarms, diagnosticsnoDiagnostic interruptnoDiagnostic interruptnoDiagnostic interruptnoDiagnostic interruptnoDiagnostic interruptnoDiagnostic interruptnoStatus information read-outpossibleSupply voltage displaygreen LEDGroup error displayred LEDBetween channels-Between channels-Between channels of groups to-Between channels of groups to-PWM data2PWM data2PWM time basis2.083nsPeriod length1usMinimun pulse width1usType of output-Safety protocol-Safety requirements-Safety requirements-Safety requirements-Safety requirements-Safety requirements-Safety req	Actuation of digital input	\checkmark
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Short-circuit protection of outputyes, electronic, and only highsideTrigger level2.5 ANumber of operating cycle of relay outputs-Switching capacity of contacts-Output data size12 ByteStatus information, alarms, diagnostics-Status displaygreen LED per channelInterruptsnoProcess alarmnoDiagnostic information read-outpossibleStatus displaygreen LEDOutput diag displaygreen LEDDiagnostic information read-outpossibleSupply voltage displaygreen LEDChannel error displayred LEDChannel error displaynoneIsolation-Between channels of groups to-Between channels of groups to2PWM data2PWM data1 µSPWM dianels1 µSProf display1 µSProf display1 µSStatis district1 µSStatis district1 µSStatis district1 µSPWM dianels1 µSProf display1 µSStatis display1 µSStatis display1 µSStatis display1 µSProf display1 µSStatis display1 µS <td>Switching frequency on lamp load</td> <td>max. 40 kHz</td>	Switching frequency on lamp load	max. 40 kHz
Trigger level2.5 ANumber of operating cycle of relay outputs-Switching capacity of contacts-Output data size12 ByteStatus information, alarms, diagnostics-Status information, alarms, diagnostics-Status displaygreen LED per channelInterruptsnoProcess alarmnoDiagnostic interruptnoDiagnostic interruptnoDiagnostic information read-outpossibleStatus displaygreen LEDGroup error displayred LEDChannel error displaynoneIsolation-Between channels-Between channels of groups to-Between channels and backplane bus-PWM data2PWM data20.83nsProductions1µsPWM data1µsProduptivPushpul/ highsideStafey protocol-Safety requirements-Safety	Internal limitation of inductive shut-off voltage	L+ (-52 V)
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Switching capacity of contacts-Output data size12 ByteStatus information, alarms, diagnosticsgreen LED per channelInterruptsnoProcess alarmnoDiagnostic interruptnoDiagnostic interruptnoDiagnostic interruptnoDiagnostic interruptnoDiagnostic information read-outgreen LEDStubus displaygreen LEDGroup error displaygreen LEDChannel error displaynoneIsolation-Between channels-Between channels of groups to-Between channels of groups toC 500 VPWM data2PWM data2PWM data1µSPiciol length1µSNumm pulse width1µSStafey protocol-Safety protocol-Safety requirements-Safety requirements-Secure user address-Safety requirements-Safety requirements-Sa	Trigger level	2.5 A
Output data size12 ByteStatus information, alarms, diagnosticsImage: Constraint of the status displayStatus displaygreen LED per channelInterruptsnoProcess alarmnoDiagnostic interruptnoDiagnostic interruptnoDiagnostic functionsnoDiagnostic functionsnoDiagnostic information read-outgreen LEDSupply voltage displaygreen LEDGroup error displayred LEDChannel error displaynoneBetween channels of groups to-Between channels of groups to-Between channels of groups to2PWM data2PWM data2PWM data1208388607 * time basePiciol length1 µsType of outputPush pull / highsideSafety protocol-Safety protocol-Safety requirements-Secure user address-Secure user address-	Number of operating cycle of relay outputs	-
Status information, alarms, diagnosticsStatus displaygreen LED per channelInterruptsnoProcess alarmnoDiagnostic interruptnoDiagnostic interruptnoDiagnostic sinformation read-outgreen LEDStupply voltage displaygreen LEDGroup error displayred LEDChannel error displaynoneIsolation.Between channels-Between channels of groups to-Insulation tested withDC 500 VPWM data2PWM channels20.83nsPeriod length1µsNummu pulse width1µsType of outputPush pull / highsideSafety protocol-Safety protocol-Safety requirements-Secure user address-Secure user address-Safety requirements-Safety requirements- <td>Switching capacity of contacts</td> <td>-</td>	Switching capacity of contacts	-
Status displaygreen LED per channelInterruptsnoProcess alarmnoDiagnostic interruptnoDiagnostic interruptnoDiagnostic functionsnoDiagnostic sinformation read-outpossibleSupply voltage displaygreen LEDGroup error displayred LEDChannel error displaynoneBetween channels-Between channels of groups to-Between channels of groups to-Insulation tested withDC 500 VPWM data2PWM channels20.83nsPeriod length1µsNumm pulse width1 µsType of outputSafety protocolSafety protocol-Safety requirements-Serue user address-Serue user address-Safety requirements-Safety requirements-Safety requirements-Safety requirements-Serue user address-Safety requirements-Safety requirements-<	Output data size	12 Byte
InterruptsnoProcess alarmnoDiagnostic interruptnoDiagnostic functionsnoDiagnostic functionspossibleSupply voltage displaygreen LEDGroup error displayred LEDChannel error displaynoneIsolation.Between channels-Between channels of groups to-Between channels of groups toC500 VPWM data2PWM dtanels2.08388607* time basePWM time basis1 µsPriod length1 µsType of outputPush pull / highsideSafety protocol-Safety predocol-Safety requirements-Secure user address-Secure user addrese	Status information, alarms, diagnostics	
Process alarmnoDiagnostic interruptnoDiagnostic functionsnoDiagnostic functionspossibleSupply voltage displaygreen LEDGroup error displayred LEDChannel error displaynoneBetween channels-Between channels of groups to-Between channels and backplane bus·Insulation tested withDC 500 VPWM data2PWM channels2.0	Status display	green LED per channel
Diagnostic interruptnoDiagnostic functionsnoDiagnostic functionspossibleSupply voltage displaygreen LEDGroup error displayred LEDChannel error displaynone Isolation -Between channels-Between channels of groups to-Between channels and backplane busInsulation tested withDC 500 VPWM dtan2PWM channels2.0.83nsProd length1 µsMinimu pulse width1 Quo838607 * time baseSafety protocol-Safety protocol-Safety protocol-Safety protocol-Safety requirements-Safety	Interrupts	no
Diagnostic functionsnoDiagnostics information read-outpossibleSupply voltage displaygreen LEDGroup error displayred LEDChannel eror displaynoneIsolationBetween channels-Between channels of groups to-Between channels and backplane busInsulation tested withDC 500 VPWM data2PWM channels2.03888607 * time basePiciol length1 µsNinimun pulse width1 µsType of outputPush pull / highsideSafety protocol-Safety protocol-Safety requirements-Secure user address-Secure user address-Sofety requirements-Sofety requirements-Subly requirements-Sofety requirements-	Process alarm	no
Diagnostics information read-outpossibleSupply voltage displaygreen LEDGroup error displayred LEDChannel error displaynoneIsolation-Between channels-Between channels of groups to-Between channels and backplane bus✓Insulation tested withDC 500 VPWM data2PVM channels20.83nsPeriod length1µsMinimum pulse width1µsType of outputPush pull / highsideSafety protocol-Safety protocol-Secure user address-Secure user address-	Diagnostic interrupt	no
Supply voltage displaygreen LEDGroup error displayred LEDChannel error displaynonetolation-Between channels-Between channels of groups to-Between channels and backplane busJustation tested withDC 500 VPWM data2PVM channels20.83nsPeriod length1µsMinimum pulse width1µsType of outputPush pull / highsideSafety protocol-Safety protocol-Secure user address-Secure user address-Secure user address-	Diagnostic functions	no
Group error displayred LEDChannel error displaynoneIsolation-Between channels-Between channels of groups to-Between channels and backplane bus✓Insulation tested withDC 500 VPWM data2PWM channels2.0.83nsPeriod length1 µsMinimum pulse width1 µsType of outputPush pull / highsideSafety protocol-Safety requirements-Secure user address-Secure user address-	Diagnostics information read-out	possible
Channel error displaynoneIsolationoneIsolationoneBetween channels-Between channels of groups to-Between channels and backplane bus·Insulation tested withDC 500 VPWM data2PWM channels2.08.3nsPWM time basis200838607 * time basePeriod length1 μsType of outputPush pull / highsideSafety protocol-Safety requirements-Secure user address-Other error	Supply voltage display	green LED
isolationisolationBetween channels-Between channels of groups to-Between channels and backplane busBetween channels and backplane busInsulation tested withDC 500 VPWM data2PWM channels20.83nsPWM time basis200838607 * time basePipe of output1 µsType of outputPush pull / highsideSafety protocol-Safety requirements-Secure user address-Secure user address-	Group error display	red LED
Between channels-Between channels of groups to-Between channels and backplane bus✓Between channels and backplane bus✓Insulation tested withDC 500 VPVM dataPVM channels2PVM channels20.83nsPeriod length1µsMinium pulse width1µsSafetySafety protocol-Safety requirements-Secure user address-Safety requirements-Secure user address-Safety-Secure user address-Safety requirements-Secure user address-Safety requirements-Secure user address-Safety requirements-Safety requirem	Channel error display	none
Between channels of groups to-Between channels and backplane bus✓Isulation tested withDC 500 VPWM dataPVM channels2PVM three basis0.83nsPeriod length12008388607 * time baseMinium pulse width1 µsType of outputPush pull / highsideSafety-Safety protocol-Safety requirements-Secure user address-Safety-Secure user address-Safety-Secure user address-Safety-Secure user address-Safety-Safety requirements-Secure user address-Safety-Safety requirements-Secure user address-Safety requirements-Safety requirements-	Isolation	
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Insulation tested with DC 500 V PWM data DC 500 V PWM channels 2 PWM channels 2 PWM time basis 2 Period length 12008388607 * time base Minimum pulse width 1 µs Type of output 1 Safety Potocol 2 Safety protocol 3 Safety requirements 3 Secure user address 3 DC 500 V 200 V 2	Between channels of groups to	-
PWM dataImage: constraint of the system of the	Between channels and backplane bus	✓
PWM channels2PWM time basis20.83nsPeriod length12008388607 * time baseMinimu pulse width1 μsType of outputPush pull / highsideSafety-Safety protocol-Safety requirements-Secure user address-	Insulation tested with	DC 500 V
PWM time basis20.83nsPeriod length12008388607 * time baseMinimum pulse width1 μsType of outputPush pull / highsideSafety-Safety protocol-Safety requirements-Secure user address-	PWM data	
Period length12008388607 * time baseMinimum pulse width1 μsType of outputPush pull / highsideSafety-Safety protocol-Safety requirements-Secure user address-	PWM channels	2
Minimum pulse width1 μsType of outputPush pull / highsideSafety-Safety protocol-Safety requirements-Secure user address-	PWM time basis	20.83ns
Type of outputPush pull / highsideSafety-Safety protocol-Safety requirements-Secure user address-Secure user address-	Period length	12008388607 * time base
SafetySafety protocolSafety requirementsSecure user addressSafety requirementsSafety requi	Minimum pulse width	1 µs
Safety protocol - Safety requirements - Secure user address -	Type of output	Push pull / highside
Safety requirements - Secure user address -	Safety	
Secure user address -	Safety protocol	-
	Safety requirements	-
Watchdog -	Secure user address	-
	Watchdog	-

022-1BB90 - DO 2xDC 24V 0.5A PWM > Technical data

Order no.	022-1BB90
Two channels	-
Test pulse length	-
Circuit monitoring	-
Datasizes	
Input bytes	4
Output bytes	12
Parameter bytes	12
Diagnostic bytes	20
Housing	
Material	PPE / PPE GF10
Mounting	Profile rail 35 mm
Mechanical data	
Dimensions (WxHxD)	12.9 mm x 109 mm x 76.5 mm
Net weight	61 g
Weight including accessories	61 g
Gross weight	75 g
Environmental conditions	
Operating temperature	0 °C to 60 °C
Storage temperature	-25 °C to 70 °C
Certifications	
UL certification	yes
KC certification	yes

4.5.2 Parameter data

- DS Record set for access via CPU, PROFIBUS and PROFINET
- IX Index for access via CANopen
- SX Subindex for access via EtherCAT with Index 3100h + EtherCAT-Slot

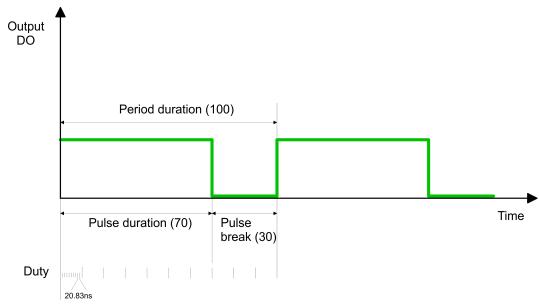
More can be found in the according manual of your bus coupler.

Name	Bytes	Function	Default	DS	IX	SX
PWMPD_I	4	PWM 0: Period duration (Base time: 20.83ns)	1F40h	80h	3100h 3103	01h
PWMPD_II	4	PWM 1: Period duration (Base time: 20.83ns)	1F40h	81h	3104h 3107	02h

PWMPD_x Period duration	Byte	Bit 7 0
	0 3	PWM x Period duration
		Here you have to configure the whole time for <i>Pulse duration</i> and Pulse break. The time is to be preset as factor to the base 20.83ns.
		Values lower than 25µs are ignored. Is the <i>pulse duration</i> value greater than or equal the value of <i>period duration</i> the output is permanently set.
		Range of values: 1200 8388607 (25µs ca. 175ms)

Principle of operation By presetting the *period duration* via parameterization and the *pulse duration* via the output area, the pulse duty ratio for the corresponding PWM output channel may be defined.

By changing the pulse duty ration e.g. a drive system, which is connected via PWM may be controlled by the user program.



022-1BB90 - DO 2xDC 24V 0.5A PWM > Diagnostic data

4.5.3 Diagnostic data

So this module does not support process interrupts, the diagnostics data serve for information about this module.

- DS Record set for access via CPU, PROFIBUS and PROFINET. The access happens by DS 01h. Additionally the first 4 bytes may be accessed by DS 00h.
- IX Index for access via CANopen. The access happens by IX 2F01h. Additionally the first 4 bytes may be accessed by IX 2F00h.
- SX Subindex for access via EtherCAT with Index 5005h.

More can be found in the according manual of your bus coupler.

Name	Bytes	Function	Default	DS	IX	SX
ERR_A	1	reserved	00h	01h	2F01h	02h
MODTYP	1	Module information	1Fh			03h
ERR_C	1	reserved	00h			04h
ERR_D	1	reserved	00h			05h
CHTYP	1	Channel type	72h			06h
NUMBIT	1	Number of diagnostics bits per channel	00h			07h
NUMCH	1	Number channels of the module	02h			08h
CHERR	1	reserved	00h			09h
CH0ERR CH7ERR	8	reserved	00h			0Ah 11h
DIAG_US	4	µs ticker (32bit)	00h			13h

MODTYP Module informa- tion	Byte	Bit 7 0		
	0	Bit 3 0: Module class		
		1111b: Digital module		
		Bit 3 0: Module class 1111b: Digital module Bit 4: Channel information present Bit 7 5: reserved Bit 7 0 Bit 6 0: Channel type 72h: Digital output Bit 7: reserved		
		Bit 4: Channel information present Bit 7 5: reserved Bit 7 0 Bit 6 0: Channel type		
CHTYP Channel type	Byte	Bit 7 0		
	0	Bit 6 0: Channel type		
		72h: Digital output		
		Bit 7: reserved		
NUMBIT Diagnostic bits	Byte	Bit 7 0		

0

Number of diagnostics bits of the module per channel (here 00h)

022-1BB90 - DO 2xDC 24V 0.5A PWM > Diagnostic data

NUMCH Channels	-	
	Byte	Bit 7 0
	0	Number of channels of the module (here 02h)
DIAG_US μs ticker	Byte	Bit 7 0
	0 3	Value of the $\boldsymbol{\mu} s$ ticker at the moment of the diagnostic data generation
ERR_C/D CHERR, CHxERR reserved	Byte	Bit 7 0
	0	reserved

022-1BD00 - DO 4xDC 24V 0.5A

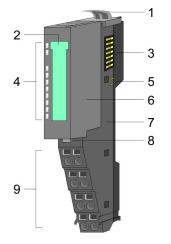
4.6 022-1BD00 - DO 4xDC 24V 0.5A

Properties

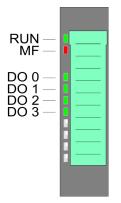
The electronic module accepts binary control signals from the central bus system and transfers them to the process level via outputs. It has 4 channels and their status is monitored via LEDs.

- 4 digital outputs, isolated to the backplane bus
- Status indication of the channels via LEDs

Structure



- 1 Locking lever terminal module
- 2 Labeling strip
- 3 Backplane bus
- 4 LED status indication
- 5 DC 24V power section supply
- 6 Electronic module
- 7 Terminal module 8
 - Locking lever electronic module
- 9 Terminal

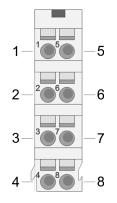


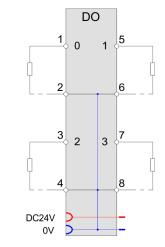
RUN	MF	DO x	Description
green	red	green	Description
_		х	Bus communication is OK
		^	Module status is OK
			Bus communication is OK
		Х	Module status reports an error with overload, short circuit or overheat
			Bus communication is not possible
		Х	Module status reports an error with overload, short circuit or overheat
		Х	Error at bus power supply
			Flashing: Error in configuration
Х	ZHz	Х	Schapter 2.8 'Trouble shooting - LEDs' on page 28
			Digital output has "1" signal
			Digital output has "0" signal
not relevant:	Х		

022-1BD00 - DO 4xDC 24V 0.5A

Pin assignment

For wires with a cross section of 0.08mm² up to 1.5mm².





Pos.	Function	Туре	Description
1	DO 0	0	Digital output DO 0
2	0V	0	GND for actuator DO 0
3	DO 2	0	Digital output DO 2
4	0V	0	GND for actuator DO 2
5	DO 1	0	Digital output DO 1
6	0V	0	GND for actuator DO 1
7	DO 3	0	Digital output DO 3
8	0V	0	GND for actuator DO 3

O: Output



CAUTION!

Feeding in voltage at an output is not allowed and can destroy the module!

 Input area
 No byte of the input area is used by the module.

 Output area
 At CPU, PROFIBUS and PROFINET the output area is embedded to the corresponding address area.

 IX
 - Index for access via CANopen

 SX
 - Subindex for access via EtherCAT with Index 7000h + EtherCAT-Slot

More can be found in the according manual of your bus coupler.

Addr.	Name	Bytes	Function	IX	SX
+0	PIQ	1 State of the outputs		5200h	
			Bit 0: DO 0		01h

022-1BD00 - DO 4xDC 24V 0.5A > Technical data

Addr.	Name	Bytes	Function	IX	SX
			Bit 1: DO 1		02h
		Bit 2: DO 2		03h	
		Bit 3: DO 3		04h	
			Bit 7 4: reserved		

4.6.1 Technical data

Order no.	022-1BD00
Туре	SM 022
Module ID	0104 AFA0
Current consumption/power loss	
Current consumption from backplane bus	75 mA
Power loss	0.5 W
Technical data digital outputs	
Number of outputs	4
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	DC 20.428.8 V
Current consumption from load voltage L+ (without load)	10 mA
Total current per group, horizontal configuration, 40°C	2 A
Total current per group, horizontal configuration, 60°C	2 A
Total current per group, vertical configuration	2 A
Output current at signal "1", rated value	0.5 A
Output delay of "0" to "1"	30 µs
Output delay of "1" to "0"	175 µs
Minimum load current	-
Lamp load	10 W
Parallel switching of outputs for redundant control of a load	not possible
Parallel switching of outputs for increased power	not possible
Actuation of digital input	\checkmark
Switching frequency with resistive load	max. 1000 Hz
Switching frequency with inductive load	max. 0.5 Hz
Switching frequency on lamp load	max. 10 Hz
Internal limitation of inductive shut-off voltage	L+ (-45 V)
Short-circuit protection of output	yes, electronic
Trigger level	1 A

022-1BD00 - DO 4xDC 24V 0.5A > Technical data

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ytes 1	
er bytes 0	

022-1BD00 - DO 4xDC 24V 0.5A > Technical data

Order no.	022-1BD00
Diagnostic bytes	0
Housing	
Material	PPE / PPE GF10
Mounting	Profile rail 35 mm
Mechanical data	
Dimensions (WxHxD)	12.9 mm x 109 mm x 76.5 mm
Net weight	57 g
Weight including accessories	57 g
Gross weight	71 g
Environmental conditions	
Operating temperature	0 °C to 60 °C
Storage temperature	-25 °C to 70 °C
Certifications	
UL certification	yes
KC certification	yes

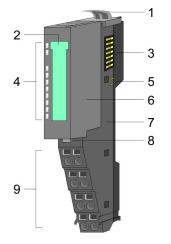
4.7 022-1BD20 - DO 4xDC 24V 2A

Properties

The electronic module accepts binary control signals from the central bus system and transfers them to the process level via outputs. It has 4 channels and their status is monitored via LEDs.

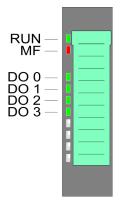
- 4 digital 2A outputs, isolated to the backplane bus
- Status indication of the channels via LEDs

Structure



- 1 Locking lever terminal module
- 2 Labeling strip
- 3 Backplane bus
- 4 LED status indication
- 5 DC 24V power section supply
- 6 Electronic module
- 7 Terminal module 8
 - Locking lever electronic module
- 9 Terminal

Status indication

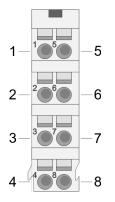


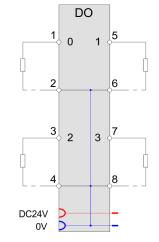
RUN	MF	DO x	Description	
green	red	green		
		х	Bus communication is OK	
		Λ	Module status is OK	
			Bus communication is OK	
		Х	Module status reports an error with overload, short circuit or overheat	
			Bus communication is not possible	
		Х	Module status reports an error with overload, short circuit or overheat	
		Х	Error at bus power supply	
			Flashing: Error in configuration	
Х	ZHz 2Hz	Х	Chapter 2.8 'Trouble shooting - LEDs' on page 28	
			Digital output has "1" signal	
			Digital output has "0" signal	
not relevant: X				

022-1BD20 - DO 4xDC 24V 2A

Pin assignment

For wires with a cross section of 0.08mm^2 up to 1.5mm^2 .





Pos.	Function	Туре	Description
1	DO 0	0	Digital output DO 0
2	0V	0	GND for actuator DO 0
3	DO 2	0	Digital output DO 2
4	0V	0	GND for actuator DO 2
5	DO 1	0	Digital output DO 1
6	0V	0	GND for actuator DO 1
7	DO 3	0	Digital output DO 3
8	0V	0	GND for actuator DO 3

O: Output



Feeding in voltage at an output is not allowed and can destroy the

 Input area
 No byte of the input area is used by the module.

 Output area
 At CPU, PROFIBUS and PROFINET the output area is embedded to the corresponding address area.

 IX
 - Index for access via CANopen

 SX
 - Subindex for access via EtherCAT with Index 7000h + EtherCAT-Slot

More can be found in the according manual of your bus coupler.

Addr.	Name	Bytes	Function	IX	SX
+0	PIQ	1	State of the outputs	5200h	
			Bit 0: DO 0		01h

022-1BD20 - DO 4xDC 24V 2A > Technical data

Addr.	Name	Bytes	Function	IX	SX
			Bit 1: DO 1		02h
			Bit 2: DO 2		03h
		Bit 3: DO 3		04h	
			Bit 7 4: reserved		

4.7.1 Technical data

Order no.	022-1BD20
Туре	SM 022
Module ID	0108 AFA0
Current consumption/power loss	
Current consumption from backplane bus	75 mA
Power loss	0.8 W
Technical data digital outputs	
Number of outputs	4
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	DC 20.428.8 V
Current consumption from load voltage L+ (without load)	20 mA
Total current per group, horizontal configuration, 40°C	4 A
Total current per group, horizontal configuration, 60°C	4 A
Total current per group, vertical configuration	4 A
Output current at signal "1", rated value	2 A
Output delay of "0" to "1"	100 µs
Output delay of "1" to "0"	250 µs
Minimum load current	-
Lamp load	10 W
Parallel switching of outputs for redundant control of a load	not possible
Parallel switching of outputs for increased power	not possible
Actuation of digital input	\checkmark
Switching frequency with resistive load	max. 1000 Hz
Switching frequency with inductive load	max. 0.5 Hz
Switching frequency on lamp load	max. 10 Hz
Internal limitation of inductive shut-off voltage	L+ (-52 V)
Short-circuit protection of output	yes, electronic
Trigger level	2.7 A

Digital Output

022-1BD20 - DO 4xDC 24V 2A > Technical data

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time basis -	
l length -	
um pulse width -	
<i>,</i>	
- protocol	
- requirements	
e user address -	
dog -	
hannels -	
ulse length -	
- monitoring	
izes	
oytes 0	
t bytes 1	
neter bytes 0	

022-1BD20 - DO 4xDC 24V 2A > Technical data

Order no.	022-1BD20
Diagnostic bytes	0
Housing	
Material	PPE / PPE GF10
Mounting	Profile rail 35 mm
Mechanical data	
Dimensions (WxHxD)	12.9 mm x 109 mm x 76.5 mm
Net weight	58 g
Weight including accessories	58 g
Gross weight	73 g
Environmental conditions	
Operating temperature	0 °C to 60 °C
Storage temperature	-25 °C to 70 °C
Certifications	
UL certification	yes
KC certification	yes

022-1BD50 - DO 4xDC 24V 0.5A NPN

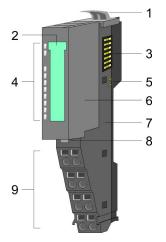
4.8 022-1BD50 - DO 4xDC 24V 0.5A NPN

Properties

The electronic module accepts binary control signals from the central bus system and transfers them to the process level via outputs. It has 4 channels connected to the power supply, which operate as low-side switch and their status is monitored via LEDs. Low-side switches are suited to switch grounds. With a short circuit between switch line and ground the load is activated but the power supply is not influenced.

- 4 digital low-side outputs, isolated to the backplane bus
- Status indication of the channels via LEDs

Structure



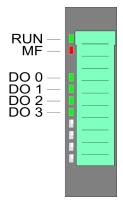
Locking lever terminal module

2 Labeling strip

1

- 3 Backplane bus
- 4 LED status indication
- 5 DC 24V power section supply
- 6 Electronic module
- 7 Terminal module
- 8 Locking lever electronic module
- 9 Terminal

Status indication

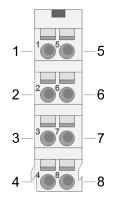


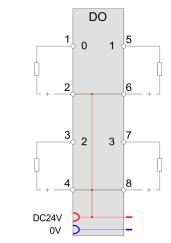
RUN	MF e red	DO x	Description	
-		х	Bus communication is OK	
		Λ	Module status is OK	
			Bus communication is OK	
		Х	Module status reports an error with overload, short circuit or overheat	
			Bus communication is not possible	
	-	Х	Module status reports an error with overload, short circuit or overheat	
		Х	Error at bus power supply	
			Flashing: Error in configuration	
Х	ZHz	Х	Schapter 2.8 'Trouble shooting - LEDs' on page 28	
			Digital output has "1" signal	
			Digital output has "0" signal	
not relevant: X				

022-1BD50 - DO 4xDC 24V 0.5A NPN

Pin assignment

For wires with a cross section of 0.08mm² up to 1.5mm².





Pos.	Function	Туре	Description
1	DO 0	0	Digital output DO 0
2	DC 24V	0	DC 24V for actuator DO 0
3	DO 2	0	Digital output DO 2
4	DC 24V	0	DC 24V for actuator DO 2
5	DO 1	0	Digital output DO 1
6	DC 24V	0	DC 24V for actuator DO 1
7	DO 3	0	Digital output DO 3
8	DC 24V	0	DC 24V for actuator DO 3

O: Output



CAUTION!

Feeding in voltage at an output is not allowed and can destroy the module!

 Input area
 No byte of the input area is used by the module.

 Output area
 At CPU, PROFIBUS and PROFINET the output area is embedded to the corresponding address area.

 IX
 - Index for access via CANopen

 SX
 - Subindex for access via EtherCAT with Index 7000h + EtherCAT-Slot

More can be found in the according manual of your bus coupler.

Addr.	Name	Bytes	Function	IX	SX
+0	PIQ	1	State of the outputs	5200h	
			Bit 0: DO 0		01h

022-1BD50 - DO 4xDC 24V 0.5A NPN > Technical data

Addr.	Name	Bytes	Function	IX	SX
			Bit 1: DO 1		02h
			Bit 2: DO 2		03h
			Bit 3: DO 3		04h
			Bit 7 4: reserved		

4.8.1 Technical data

Order no.	022-1BD50
Туре	SM 022
Module ID	0105 AFA0
Current consumption/power loss	
Current consumption from backplane bus	75 mA
Power loss	0.5 W
Technical data digital outputs	
Number of outputs	4
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	DC 20.428.8 V
Current consumption from load voltage L+ (without load)	5 mA
Total current per group, horizontal configuration, 40°C	2 A
Total current per group, horizontal configuration, 60°C	2 A
Total current per group, vertical configuration	2 A
Output current at signal "1", rated value	0.5 A
Output delay of "0" to "1"	30 µs
Output delay of "1" to "0"	100 µs
Minimum load current	-
Lamp load	10 W
Parallel switching of outputs for redundant control of a load	not possible
Parallel switching of outputs for increased power	not possible
Actuation of digital input	\checkmark
Switching frequency with resistive load	max. 1000 Hz
Switching frequency with inductive load	max. 0.5 Hz
Switching frequency on lamp load	max. 10 Hz
Internal limitation of inductive shut-off voltage	+45 V
Short-circuit protection of output	yes, electronic
Trigger level	1.7 A

022-1BD50 - DO 4xDC 24V 0.5A NPN > Technical data

Order no.	022-1BD50
Number of operating cycle of relay outputs	-
Switching capacity of contacts	-
Output data size	4 Bit
Status information, alarms, diagnostics	
Status display	green LED per channel
Interrupts	no
Process alarm	no
Diagnostic interrupt	no
Diagnostic functions	no
Diagnostics information read-out	none
Supply voltage display	green LED
Group error display	red LED
Channel error display	none
Isolation	
Between channels	-
Between channels of groups to	-
Between channels and backplane bus	\checkmark
Insulation tested with	DC 500 V
PWM data	
PWM channels	-
PWM time basis	-
Period length	-
Minimum pulse width	-
Type of output	-
Safety	
Safety protocol	-
Safety requirements	-
Secure user address	-
Watchdog	-
Two channels	-
Test pulse length	-
Circuit monitoring	-
Datasizes	
Input bytes	0
Output bytes	1
Parameter bytes	0

022-1BD50 - DO 4xDC 24V 0.5A NPN > Technical data

Order no.	022-1BD50
Diagnostic bytes	0
Housing	
Material	PPE / PPE GF10
Mounting	Profile rail 35 mm
Mechanical data	
Dimensions (WxHxD)	12.9 mm x 109 mm x 76.5 mm
Net weight	57 g
Weight including accessories	57 g
Gross weight	72 g
Environmental conditions	
Operating temperature	0 °C to 60 °C
Storage temperature	-25 °C to 70 °C
Certifications	
UL certification	yes
KC certification	yes

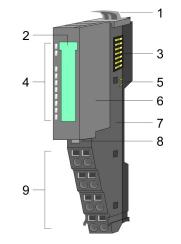
4.9 022-1BD70 - DO 4xDC 24V 0.5A ETS

Properties

The electronic module accepts binary control signals from the central bus system and transfers them time-controlled by means of ETS functionality to the process level via outputs. It has 4 channels and their status is monitored via LEDs. With configured ETS functionality (ETS = edge time stamp) depending on the configuration 5 (20byte) respectively 15 (60byte), you may transfer the states for the outputs together with a time value of the us ticker as an ETS entry to the FIFO stack. The FIFO memory serves for space for max. 31 ETS entries.

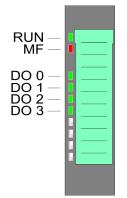
- 4 digital outputs, isolated to the backplane bus
- FIFO stack for 5 respectively 15 ETS entries (each 4byte)
- **Diagnostics function**
- Controlling by process image respectively handling blocks
- Status indication of the channels via LEDs

Structure



- 1 Locking lever terminal module
- 2 Labeling strip
- 3 Backplane bus 4 LED status indication
 - DC 24V power section supply
- 5 6 Electronic module
- 7 Terminal module
- 8 Locking lever electronic module
- 9 Terminal

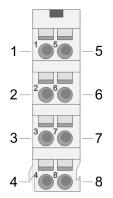
Status indication



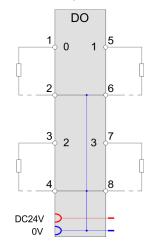
RUN	MF	DO x	Description
		x	Bus communication is OK
			Module status is OK
_	_		Bus communication is OK
•	-	Х	Module status reports an error with overload, short circuit or overheat
			Bus communication is not possible
		Х	Module status reports an error with overload, short circuit or overheat
		Х	Error at bus power supply
			Flashing: Error in configuration
Х	ZHz 2Hz	Х	Schapter 2.8 'Trouble shooting - LEDs' on page 28
			Digital output has "1" signal
			Digital output has "0" signal
not relevant:	Х		

022-1BD70 - DO 4xDC 24V 0.5A ETS

Pin assignment



For wires with a cross section of 0.08mm² up to 1.5mm².



Pos.	Function	Туре	Description
1	DO 0	0	Digital output DO 0
2	0V	0	GND for actuator DO 0
3	DO 2	0	Digital output DO 2
4	0V	0	GND for actuator DO 2
5	DO 1	0	Digital output DO 1
6	0V	0	GND for actuator DO 1
7	DO 3	0	Digital output DO 3
8	0V	0	GND for actuator DO 3

O: Output



CAUTION!

Feeding in voltage at an output is not allowed and can destroy the module!

In-/Output area

With configured ETS functionality (ETS=edge time stamp) a time value (ETS_US) together with the state of the outputs (PIQ) and a running number (RN) may be stored as ETS entry in the process image.

You may configure the following variants:

- 022-1BD70 DO 4xDC 24V (20): FIFO with 20byte for 5 ETS entries
- 022-1BD70 DO 4xDC 24V (60): FIFO with 60byte for 15 ETS entries



Please consider, with a full FIFO stack no further ETS entries may be accepted.

To ensure that your ETS entries are kept, you should always check the state of the FIFO stack by STS_FIFO in the input area before.

Input area 4byte

The input range is used for status message. At CPU, PROFIBUS and PROFINET the input area is embedded to the corresponding address area.

IX - IX = Index for access via CANopen.

SX - Subindex for access via EtherCAT with Index 6000h + EtherCAT-Slot

More can be found in the according manual of your bus coupler.

Addr.	Name	Bytes	Function	IX	SX
+0	RN_LAST	1	Bit 5 0:	5440h	01h
			RN last FIFO entry		
			Bit 6: 1 (fix)		
			Bit 7: 0 (fix)		
+1	RN_NEXT	1	Bit 5 0:		02h
			RN next FIFO entry to be processed		
			Bit 6: 1 (fix)		
			Bit 7: 1 (fix)		
+2	STS_FIFO	1	State of the FIFO stack		03h
+3	NUM_ETS	1	Number of ETS entries in the FIFO stack		04h

RN_LAST	Bit 5 0: Here the RN of the last ETS entry may be found, which was recognized as valid and written into the FIFO memory of the module.					
	Bit 6: 1 (fix) - serves for the identification in the process image					
	Bit 7: 0 (fix) - se	erves for the identification in the process image				
RN_NEXT	Bit 5 0: Here the RN of the ETS entry may be found, which will be executed next in the FIFO memory of the module.					
	Please conside	er Bit 6 and 7 of RN_NEXT are always set.				
	Bit 6: 1 (fix) - serves for the identification in the process image					
	Bit 7: 1 (fix) - serves for the identification in the process image					
STS_FIFO	The <i>State</i> inform	ms about the state of the FIFO stack:				
	STS_FIFO	Description				
	00h/80h	Everything is OK. You will get this message directly after the storage in the FIFO memory of the module.				
	01h/81h	There is no following ETS entry in the FIFO.				
		The RN does not correspond to the expected RN. Please check your RN in the output area.				
	02h/82h	There are no new ETS entries in the FIFO.				
	03h/83h	FIFO stack is full. There is no more place for further ETS entries.				

022-1BD70 - DO 4xDC 24V 0.5A ETS

	If there are less ETS entries written as possible, additionally bit 6 of the last RN must be set. This is necessary; otherwise you have to overwrite the following entries with a "not valid" entry. The module ignores entries after an entry with a set bit 6. If there is an ETS entry in the FIFO memory, whose bit 6 is set, STS_FIFO is always returned ored with 80h.
NUM_ETS	Here always the current number of the ETS entries in the FIFO memory of the module may be found.
Structure of an ETS entry	Depending on the configuration up to 15 ETS entries may be written via the output area. Each ETS entry uses 4byte in the process image:
<i>Output area 20byte respectively 60byte</i>	 At CPU, PROFIBUS and PROFINET the output area is embedded to the corresponding address area. IX - Index for access via CANopen. With s = Subindex the corresponding ETS entry is addressed.
	SX - Subindex for access via EtherCAT with Index 7000h + EtherCAT-Slot
	More can be found in the according manual of your bus coupler.

Addr.	Name	Bytes	Function	IX	SX
+0	PIQ	1	Output byte	5640h/s	01h
+1	RN	1	Running number		02h
+2	ETS_US	2	µs ticker		03h

Here the state of the outputs for the corresponding time may be defined and the output

PIQ

channels may be enabled respectively disabled. The output byte has the following bit allocation: Bit 3 ... 0: 0 (fix)

Bit 4: State DO 3

Bit 5: State DO 2

Bit 6: State DO 1

Bit 7: State DO 0

RN

RN (**R**unning **N**umber) is a continuous number 0 ... 63, which has to start with 1. With the RN the chronological order of the ETS entries may be defined. With each ETS entry RN is to be incremented, otherwise the ETS entry may not be recognized by the module.



If there are less ETS entries written as possible, additionally bit 6 of the last RN must be set. This is necessary; otherwise you have to overwrite the following entries with a "not valid" entry. The module ignores entries after an entry with a set bit 6.

ETS_US

In the SLIO module there is a 32 bit timer (μ s ticker). With PowerON the timer starts counting. After 2³²-1 μ s the timer starts with 0 again. For ETS_US of an ETS entry you have to define a time value from the low word of the μ s ticker (0...65535 μ s).

Here please enter a time value in μ s, to which the state of the outputs is to be taken.

Range of values: 0 ... 65535

ETS functionality The following picture shows how the ETS entries are to be preset in the output area, so that these can be stored in the FIFO memory.

DO x:									
µs value:	Oµs		65535	µs 0µs				655	35µs
					Addr.	PIQ	RN	ETS_U	JS
					+0	PIQ+0	RN+0	ETS_l	JS+0
							RN+1	_	
		l					RN+2		
					+12	PIQ+3	RN+3	ETS_l	JS+3
					+16	PIQ+4	RN+4	ETS_l	JS+4

Output area 20byteAt CPU, PROFIBUS and PROFINET the output area is embedded to the corresponding
address area.

- IX Index for access via CANopen. With s = Subindex the corresponding ETS entry is addressed.
- SX Subindex for access via EtherCAT with Index 7000h + EtherCAT-Slot

More can be found in the according manual of your bus coupler.

Configured as 022-1BD70 DO 4xDC 24V (20)

20byte - 5 ETS entries

Addr.	PIQ	IX=5640h	SX	Addr.	RN	IX=5640h	SX	Addr.	ETS-US	IX=5640h	SX
+0	PIQ+0	s=1	01h	+1	RN+0	s=1	02h	+2	ETS_US+0	s=1	03h
+4	PIQ+1	s=2	04h	+5	RN+1	s=2	05h	+6	ETS_US+1	s=2	06h
+8	PIQ+2	s=3	07h	+9	RN+2	s=3	08h	+10	ETS_US+2	s=3	09h
+12	PIQ+3	s=4	0Ah	+13	RN+3	s=4	0Bh	+14	ETS_US+3	s=4	0Ch
+16	PIQ+4	s=5	0Dh	+17	RN+4	s=5	0Eh	+18	ETS_US+4	s=5	0Fh

022-1BD70 - DO 4xDC 24V 0.5A ETS

Configured as 022-1BD70 DO 4xDC 24V (60)

60byte - 15 ETS entries

Addr.	PIQ	IX=5640h	SX	Addr.	RN	IX=5640h	SX	Addr.	ETS-US	IX=5640h	SX
+0	PIQ+0	s=1	01h	+1	RN+0	s=1	02h	+2	ETS_US+0	s=1	03h
+4	PIQ+1	s=2	04h	+5	RN+1	s=2	05h	+6	ETS_US+1	s=2	06h
+8	PIQ+2	s=3	07h	+9	RN+2	s=3	08h	+10	ETS_US+2	s=3	09h
+12	PIQ+3	s=4	0Ah	+13	RN+3	s=4	0Bh	+14	ETS_US+3	s=4	0Ch
+16	PIQ+4	s=5	0Dh	+17	RN+4	s=5	0Eh	+18	ETS_US+4	s=5	0Fh
+20	PIQ+5	s=6	10h	+21	RN+5	s=6	11h	+22	ETS_US+5	s=6	12h
+24	PIQ+6	s=7	13h	+25	RN+6	s=7	14h	+26	ETS_US+6	s=7	15h
+28	PIQ+7	s=8	16h	+29	RN+7	s=8	17h	+30	ETS_US+7	s=8	18h
+32	PIQ+8	s=9	19h	+33	RN+8	s=9	1Ah	+34	ETS_US+8	s=9	1Bh
+36	PIQ+9	s=10	1Ch	+37	RN+9	s=10	1Dh	+38	ETS_US+9	s=10	1Eh
+40	PIQ+10	s=11	1Fh	+41	RN+10	s=11	20h	+42	ETS_US+10	s=11	21h
+44	PIQ+11	s=12	22h	+45	RN+11	s=12	23h	+46	ETS_US+11	s=12	24h
+48	PIQ+12	s=13	25h	+49	RN+12	s=13	26h	+50	ETS_US+12	s=13	27h
+52	PIQ+13	s=14	28h	+53	RN+13	s=14	29h	+54	ETS_US+13	s=14	2Ah
+56	PIQ+14	s=15	2Bh	+57	RN+14	s=15	2Ch	+58	ETS_US+14	s=15	2Dh



The ETS module may only be accessed by the System SLIO CPU by means of SFC 15 or via the process image. Only the input data of the ETS module may be read by individual accesses.

022-1BD70 - DO 4xDC 24V 0.5A ETS > Technical data

4.9.1 Technical data

Order no.	022-1BD70
Туре	SM 022
Module ID	0F43 57E2
Current consumption/power loss	
Current consumption from backplane bus	105 mA
Power loss	0.95 W
Technical data digital outputs	
Number of outputs	4
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	DC 20.428.8 V
Current consumption from load voltage L+ (without load)	25 mA
Total current per group, horizontal configuration, 40°C	2 A
Total current per group, horizontal configuration, 60°C	2 A
Total current per group, vertical configuration	2 A
Output current at signal "1", rated value	0.5 A
Output delay of "0" to "1"	max. 100 ns
Output delay of "1" to "0"	max. 100 ns
Minimum load current	-
Lamp load	10 W
Parallel switching of outputs for redundant control of a load	not possible
Parallel switching of outputs for increased power	not possible
Actuation of digital input	\checkmark
Switching frequency with resistive load	max. 40 kHz
Switching frequency with inductive load	max. 40 kHz
Switching frequency on lamp load	max. 40 kHz
Internal limitation of inductive shut-off voltage	L+ (-52 V)
Short-circuit protection of output	yes, electronic, and only highside
Trigger level	2.5 A
Number of operating cycle of relay outputs	-
Switching capacity of contacts	-
Output data size	60 Byte
Status information, alarms, diagnostics	
Status display	green LED per channel
Interrupts	no
Process alarm	no

022-1BD70 - DO 4xDC 24V 0.5A ETS > Technical data

Order no.	022-1BD70
Diagnostic interrupt	no
Diagnostic functions	no
Diagnostics information read-out	possible
Supply voltage display	green LED
Group error display	red LED
Channel error display	none
Isolation	
Between channels	-
Between channels of groups to	-
Between channels and backplane bus	\checkmark
Insulation tested with	DC 500 V
PWM data	
PWM channels	-
PWM time basis	-
Period length	-
Minimum pulse width	-
Type of output	-
Safety	
Safety protocol	-
Safety requirements	-
Secure user address	-
Watchdog	-
Two channels	-
Test pulse length	-
Circuit monitoring	-
Datasizes	
Input bytes	4
Output bytes	20 / 60
Parameter bytes	6
Diagnostic bytes	20
Housing	
Material	PPE / PPE GF10
Mounting	Profile rail 35 mm
Mechanical data	
Dimensions (WxHxD)	12.9 mm x 109 mm x 76.5 mm
Net weight	61 g

022-1BD70 - DO 4xDC 24V 0.5A ETS > Parameter data

Order no.	022-1BD70
Weight including accessories	61 g
Gross weight	76 g
Environmental conditions	
Operating temperature	0 °C to 60 °C
Storage temperature	-25 °C to 70 °C
Certifications	
UL certification	yes
KC certification	yes

4.9.2 Parameter data

4.9.2.1 Parameters

The module has the following parameter data, which were fix set and may not be altered.

DS - Record set for access via CPU, PROFIBUS and PROFINET

- IX Index for access via CANopen
- SX Subindex for access via EtherCAT with Index 3100h + EtherCAT-Slot

More can be found in the according manual of your bus coupler.

Name	Bytes	Function	Default	DS	IX	SX
PII_L	1	Length process image input data ¹	04h (fix)	02h	3100h	01h
PIQ_L	1	Length process image output data ^{1, 2}	14h resp. 3Ch (fix)	02h	3101h	02h
1) This record set r	may only be tran	sferred at STOP state.				

2) This parameter depends on the configured variant.

PII_L

Byte	Bit 7 0
0	The length of the process image of the input data is fix set to 4byte.

PIQ_L

Byte	Bit 7 0
0	The length of the process image of the output data is fix set to the configured variant (14h or 3Ch).

4.9.2.2 Example for the principle of operation

In the following it is demonstrated by an example, in which order the ETS entries are stored and processed.

022-1BD70 - DO 4xDC 24V 0.5A ETS > Parameter data

With this example a module is configured, which uses 20byte for 5 ETS entries in the output area PIQ.

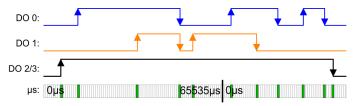
ETS values

With the following times of the μs ticker the following states of the outputs should be taken:

RN	ETS_US	PIQ DO 0	PIQ DO 1	PIQ DO2	PIQ DO 3
	in µs	(Bit 7)	(Bit 6)	(Bit 5)	(Bit 4)
01h	6000	0	0	1	1
02h	12506	1	0	1	1
03h	34518	1	1	1	1
04h	49526	0	0	1	1
05h	54529	0	1	1	1
06h	3500	1	1	1	1
07h	12443	1	0	1	1
08h	20185	0	0	1	1
09h	30140	1	0	1	1
0Ah	37330	0	0	1	1
0Bh	40000	0	0	0	0

Time diagram

From the table you get the following time diagram:



Writing 5 ETS entries After writing the ETS entries into the process output image they are directly stored in the FIFO memory of the module.

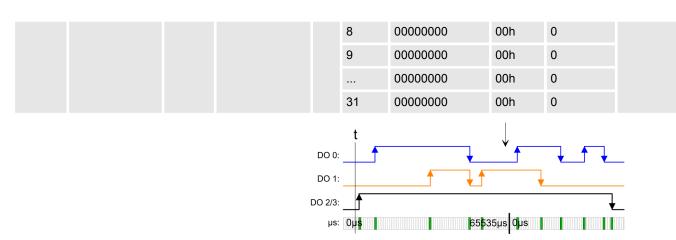
The state of the outputs are shown in the diagram at the time "t".

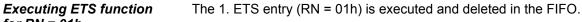
In the PII you will find the status bytes.

Addr.	PIQ	RN	ETS_US	\rightarrow	FIFO	PIQ	RN	ETS_US	PII
+0	00110000	01h	6000		1	00110000	01h	6000	RN_LAST: 45h
+4	10110000	02h	12506		2	10110000	02h	12506	RN_NEXT: C1h
+8	11110000	03h	34518		3	11110000	03h	34518	STS_FIFO: 00h
+12	00110000	04h	49526		4	00110000	04h	49526	NUM_ETS: 05h
+16	01110000	05h	54529		5	01110000	05h	54529	
					6	0000000	00h	0	
					7	0000000	00h	0	

for RN = 01h

022-1BD70 - DO 4xDC 24V 0.5A ETS > Parameter data





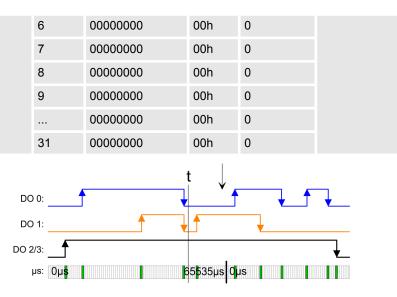
Addr.	PIQ	RN	ETS_US		FIFO	PIQ	RN	ETS_US	PII		
+0	00110000	01h	6000	\rightarrow	1	10110000	02h	12506	RN_LAST: 45h		
+4	10110000	02h	12506		2	11110000	03h	34518	RN_NEXT: C2h		
+8	11110000	03h	34518		3	00110000	04h	49526	STS_FIFO: 00h/02h		
+12	00110000	04h	49526		4	01110000	05h	54529	NUM_ETS: 04h		
+16	01110000	05h	54529		5	0000000	00h	0			
					6	0000000	00h	0			
					7	0000000	00h	0			
					8	0000000	00h	0			
					9	0000000	00h	0			
						0000000	00h	0			
					31	0000000	00h	0			
	$\begin{array}{c} t\\ DO 0: \\ \hline \\ DO 1: \\ \hline \\ DO 2/3: \\ \hline \\ \mus: 0\mu s \end{array} \left \begin{array}{c} t\\ \hline \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ $										

Executing ETS function for RN = 02h ... 04h

The states of RN = 02h ... RN 04h are successively issued and deleted in the FIFO.

Addr.	PIQ	RN	ETS_US		FIFO	PIQ	RN	ETS_US	PII
+0	00110000	01h	6000	\rightarrow	1	01110000	05h	54529	RN_LAST: 45h
+4	10110000	02h	12506		2	0000000	00h	0	RN_NEXT: C5h
+8	11110000	03h	34518		3	0000000	00h	0	STS_FIFO: 00h/02h
+12	00110000	04h	49526		4	0000000	00h	0	NUM_ETS: 01h
+16	01110000	05h	54529		5	0000000	00h	0	

022-1BD70 - DO 4xDC 24V 0.5A ETS > Parameter data



Writing 5 ETS entries

After writing the next 5 ETS entries into the process output image they are directly stored in the FIFO memory of the module.

Addr.	PIQ	RN	ETS_US		FIFO	PIQ	RN	ETS_US	PII		
+0	11110000	06h	3500	\rightarrow	1	01110000	05h	54529	RN_LAST: 4Ah		
+4	10110000	07h	12443		2	11110000	06h	3500	RN_NEXT: C5h		
+8	00110000	08h	20185		3	10110000	07h	12443	STS_FIFO: 00h/02h		
+12	10110000	09h	30140		4	00110000	08h	20185	NUM_ETS: 06h		
+16	00110000	0Ah	37330		5	10110000	09h	30140			
					6	00110000	0Ah	37330			
					7	0000000	00h	0			
					8	0000000	00h	0			
					9	0000000	00h	0			
						0000000	00h	0			
					31	0000000	00h	0			
	DO 0: DO 1: DO 2/3: μ S: 0μ S μ S										

Executing ETS function for RN = 06h ... 08h

The states of RN = 06h \dots RN 08h are successively issued and deleted in the FIFO.

Addr.	PIQ	RN	ETS_US		FIFO	PIQ	RN	ETS_US	PII
+0	11110000	06h	3500	\rightarrow	1	10110000	09h	30140	RN_LAST: 4Ah
+4	10110000	07h	12443		2	00110000	0Ah	37330	RN_NEXT: C5h
									STS_FIFO: 00h/02h

022-1BD70 - DO 4xDC 24V 0.5A ETS > Parameter data

+8	00110000	08h	20185		3	0000000	00h	0	NUM_ETS: 02h
+12	10110000	09h	30140		4	0000000	00h	0	
+16	00110000	0Ah	37330		5	0000000	00h	0	
					6	0000000	00h	0	
					7	0000000	00h	0	
					8	0000000	00h	0	
					9	0000000	00h	0	
						0000000	00h	0	
					31	0000000	00h	0	
							\downarrow	t	
				DO 0:					
				DO 1:				•	
				DO 2/3					

μs: 0μ**s**

Writing last ETS entry

Since less than 5 ETS entries are written, bit 6 of RN of the last ETS entry must always be set. RN = 0Bh becomes 4Bh.

65535µs 0µs

Addr.	PIQ	RN	ETS_US		FIFO	PIQ	RN	ETS_US	PII			
+0	0000000	4Bh	40000	\rightarrow	1	10110000	09h	30140	RN_LAST: 4Bh			
+4	10110000	07h	12443		2	00110000	0Ah	37330	RN_NEXT: C9h			
+8	00110000	08h	20185		3	00000000	4Bh	40000	STS_FIFO: 80h/82h			
+12	10110000	09h	30140		4	00000000	00h	0	NUM_ETS: 03h			
+16	00110000	0Ah	37330		5	00000000	00h	0				
					6	00000000	00h	0				
					7	00000000	00h	0				
					8	00000000	00h	0				
					9	00000000	00h	0				
						00000000	00h	0				
					31	00000000	00h	0				
	DO 0: DO 0: DO 1: DO 2/3: $\mu s: 0\mu s$ bu s bu											

Executing ETS function for RN = 09h ... 4Bh

The states of RN = 09h \dots RN 4Bh are successively issued and deleted in the FIFO.

022-1BD70 - DO 4xDC 24V 0.5A ETS > Diagnostic data

Addr.	PIQ	RN	ETS_US		FIFO	PIQ	RN	ETS_US	PII
+0	0000000	4Bh	40000	\rightarrow	1	0000000	00h	0	RN_LAST: 4Bh
+4	10110000	07h	12443		2	0000000	00h	0	RN_NEXT: CCh
+8	00110000	08h	20185		3	0000000	00h	0	STS_FIFO: 80h/82h
+12	10110000	09h	30140		4	0000000	00h	0	NUM_ETS: 00h
+16	00110000	0Ah	37330		5	0000000	00h	0	
					6	0000000	00h	0	
					7	0000000	00h	0	
					8	0000000	00h	0	
					9	0000000	00h	0	
						0000000	00h	0	
					31	0000000	00h	0	
				D	Ο 0: Ο 1: 2/3: μs: Ομ \$		65 5 35µs Qµs		t



Please consider the ETS modules can only effectively be used together with head modules, which have an integrated μ s ticker. The Ethernet coupler with ModbusTCP 053-1MT00 for example does not have an μ s ticker.

4.9.3 Diagnostic data

This module does not support interrupt functions, the diagnostic data serve the information about this module.

- DS Record set for access via CPU, PROFIBUS and PROFINET. The access happens by DS 01h. Additionally the first 4 bytes may be accessed by DS 00h.
- IX Index for access via CANopen. The access happens by IX 2F01h. Additionally the first 4 bytes may be accessed by IX 2F00h.
- SX Subindex for access via EtherCAT with Index 5005h.

More can be found in the according manual of your bus coupler.

Name	Bytes	Function	Default	DS	IX	SX
ERR_A	1	reserved	00h	01h	2F01h	02h
MODTYP	1	Module information	1Fh			03h
ERR_C	1	reserved	00h			04h

022-1BD70 - DO 4xDC 24V 0.5A ETS > Diagnostic data

Name	Bytes	Function	Default	DS	IX	SX
ERR_D	1	reserved	00h			05h
CHTYP	1	Channel type	72h			06h
NUMBIT	1	Number of diagnostics bits per channel	00h			07h
NUMCH	1	Number channels of the module	04h			08h
CHERR	1	reserved	00h			09h
CH0ERR CH7ERR	8	reserved	00h			0Ah 11h
DIAG_US	4	µs ticker (32bit)	00h			13h

MODTYP Modul informa- tion	Byte	Bit 7 0
	0	Bit 3 0: Module class
		1111b Digital module
		Bit 4: Channel information present
		Bit 7 5: reserved

CHTYP Channel type	Byte	Bit 7 0
	0	Bit 6 0: Channel type
		72h: Digital output
		Bit 7: 0 (fix)

NUMBIT Diagnostic bits	Byte	Bit 7 0
	0	Number of diagnostics bits of the module per channel (here 00h)
NUMCH Number of chan- nels	Byte	Bit 7 0
	0	Number of channels of the module (here 04h)

DIAG_US μs ticker	Byte	Bit 7 0
	0 3	Value of the $\boldsymbol{\mu}s$ ticker at the moment of the diagnostic data generation
ERR_A/C/D CHERR, CHxERR reserved	Byte	Bit 7 0
	0	reserved

022-1BF00 - DO 8xDC 24V 0.5A

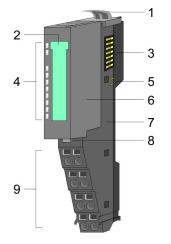
4.10 022-1BF00 - DO 8xDC 24V 0.5A

Properties

The electronic module accepts binary control signals from the central bus system and transfers them to the process level via outputs. It has 8 channels and their status is monitored via LEDs.

- 8 digital outputs, isolated to the backplane bus
- Status indication of the channels via LEDs

Structure



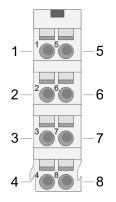
- 1 Locking lever terminal module
- 2 Labeling strip
- 3 Backplane bus
- 4 LED status indication
- 5 DC 24V power section supply
- 6 Electronic module
- 7 Terminal module 8
 - Locking lever electronic module
- 9 Terminal

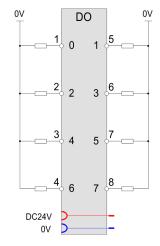
RUN — MF —	
DO 0 DO 1 DO 2 DO 3 DO 4 DO 5 DO 6 DO 7	

RUN	MF	DO x	Description
green	red	green	Description
_		х	Bus communication is OK
-		^	Module status is OK
			Bus communication is OK
		Х	Module status reports an error with overload, short circuit or overheat
			Bus communication is not possible
		Х	Module status reports an error with overload, short circuit or overheat
		Х	Error at bus power supply
			Flashing: Error in configuration
Х	ZHz 2Hz	Х	Schapter 2.8 'Trouble shooting - LEDs' on page 28
			Digital output has "1" signal
			Digital output has "0" signal
not relevant:	Х		

Pin assignment

For wires with a cross section of 0.08mm² up to 1.5mm².





Pos.	Function	Туре	Description
1	DO 0	0	Digital output DO 0
2	DO 2	0	Digital output DO 2
3	DO 4	0	Digital output DO 4
4	DO 6	0	Digital output DO 6
5	DO 1	0	Digital output DO 1
6	DO 3	0	Digital output DO 3
7	DO 5	0	Digital output DO 5
8	DO 7	0	Digital output DO 7

O: Output



CAUTION!

Feeding in voltage at an output is not allowed and can destroy the module!

Input area No byte of the input area is used by the module.

 Output area
 At CPU, PROFIBUS and PROFINET the output area is embedded to the corresponding address area.

IX - Index for access via CANopen

SX - Subindex for access via EtherCAT with Index 7000h + EtherCAT-Slot

More can be found in the according manual of your bus coupler.

Addr.	Name	Bytes	Function	IX	SX
+0	PIQ	1	State of the outputs		
			Bit 0: DO 0		01h

022-1BF00 - DO 8xDC 24V 0.5A > Technical data

Addr.	Name	Bytes	Function	IX	SX
			Bit 1: DO 1		02h
			Bit 2: DO 2		03h
			Bit 3: DO 3		04h
			Bit 4: DO 4		05h
			Bit 5: DO 5		06h
			Bit 6: DO 6		07h
			Bit 7: DO 7		08h

4.10.1 Technical data

Order no.	022-1BF00
Туре	SM 022
Module ID	0106 AFC8
Current consumption/power loss	
Current consumption from backplane bus	80 mA
Power loss	0.7 W
Technical data digital outputs	
Number of outputs	8
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	DC 20.428.8 V
Current consumption from load voltage L+ (without load)	15 mA
Total current per group, horizontal configuration, 40°C	4 A
Total current per group, horizontal configuration, 60°C	4 A
Total current per group, vertical configuration	4 A
Output current at signal "1", rated value	0.5 A
Output delay of "0" to "1"	30 µs
Output delay of "1" to "0"	175 µs
Minimum load current	-
Lamp load	10 W
Parallel switching of outputs for redundant control of a load	not possible
Parallel switching of outputs for increased power	not possible
Actuation of digital input	\checkmark
Switching frequency with resistive load	max. 1000 Hz
Switching frequency with inductive load	max. 0.5 Hz
Switching frequency on lamp load	max. 10 Hz

022-1BF00 - DO 8xDC 24V 0.5A > Technical data

Order no.	022-1BF00
Internal limitation of inductive shut-off voltage	L+ (-45 V)
Short-circuit protection of output	yes, electronic
Trigger level	1 A
Number of operating cycle of relay outputs	-
Switching capacity of contacts	-
Output data size	8 Bit
Status information, alarms, diagnostics	
Status display	green LED per channel
Interrupts	no
Process alarm	no
Diagnostic interrupt	no
Diagnostic functions	no
Diagnostics information read-out	none
Supply voltage display	green LED
Group error display	red LED
Channel error display	none
Isolation	
Between channels	-
Between channels of groups to	-
Between channels and backplane bus	\checkmark
Insulation tested with	DC 500 V
PWM data	
PWM channels	-
PWM time basis	-
Period length	-
Minimum pulse width	-
Type of output	-
Safety	
Safety protocol	-
Safety requirements	-
Secure user address	-
Watchdog	-
Two channels	-
Test pulse length	-
Circuit monitoring	-
Datasizes	

Digital Output

022-1BF00 - DO 8xDC 24V 0.5A > Technical data

Order no.	022-1BF00
Input bytes	0
Output bytes	1
Parameter bytes	0
Diagnostic bytes	0
Housing	
Material	PPE / PPE GF10
Mounting	Profile rail 35 mm
Mechanical data	
Dimensions (WxHxD)	12.9 mm x 109 mm x 76.5 mm
Net weight	58 g
Weight including accessories	58 g
Gross weight	73 g
Environmental conditions	
Operating temperature	0 °C to 60 °C
Storage temperature	-25 °C to 70 °C
Certifications	
UL certification	yes
KC certification	yes

022-1BF50 - DO 8xDC 24V 0.5A NPN

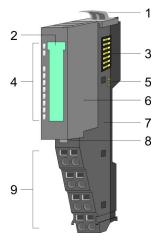
4.11 022-1BF50 - DO 8xDC 24V 0.5A NPN

Properties

The electronic module accepts binary control signals from the central bus system and transfers them to the process level via outputs. It has 8 channels connected to the power supply, which operate as low-side switch and their status is monitored via LEDs. Low-side switches are suited to switch grounds. With a short circuit between switch line and ground the load is activated but the power supply is not influenced.

- 8 digital low-side outputs, isolated to the backplane bus
- Status indication of the channels via LEDs

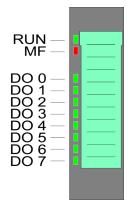
Structure



Locking lever terminal module Labeling strip

- 3 Backplane bus
- 4 LED status indication
- 5 DC 24V power section supply
- 6 Electronic module
- 7 Terminal module
- 8 Locking lever electronic module
- 9 Terminal

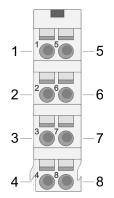
Status indication



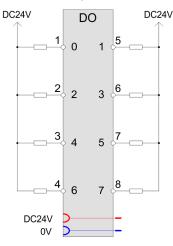
RUN	MF	DO x	Description	
green	red 📕	green		
		х	Bus communication is OK	
		~	Module status is OK	
			Bus communication is OK	
	-	х	Module status reports an error with overload, short circuit or overheat	
			Bus communication is not possible	
	•	Х	Module status reports an error with overload, short circuit or overheat	
		Х	Error at bus power supply	
			Flashing: Error in configuration	
Х	ZHz	Х	Schapter 2.8 'Trouble shooting - LEDs' on page 28	
			Digital output has "1" signal	
			Digital output has "0" signal	
not relevant: X				

022-1BF50 - DO 8xDC 24V 0.5A NPN

Pin assignment



For wires with a cross section of 0.08mm² up to 1.5mm².



Pos.	Function	Туре	Description
1	DO 0	0	Digital output DO 0
2	DO 2	0	Digital output DO 2
3	DO 4	0	Digital output DO 4
4	DO 6	0	Digital output DO 6
5	DO 1	0	Digital output DO 1
6	DO 3	0	Digital output DO 3
7	DO 5	0	Digital output DO 5
8	DO 7	0	Digital output DO 7

O: Output



CAUTION!

Feeding in voltage at an output is not allowed and can destroy the module!

 Input area
 No byte of the input area is used by the module.

 Output area
 At CPU, PROFIBUS and PROFINET the output area is embedded to the corresponding address area.

 IX
 - Index for access via CANopen

 SX
 - Subindex for access via EtherCAT with Index 7000h + EtherCAT-Slot

More can be found in the according manual of your bus coupler.

Addr.	Name	Bytes	Function	IX	SX
+0	PIQ	1	State of the outputs	6200h	
		Bit 0: DO 0		01h	

022-1BF50 - DO 8xDC 24V 0.5A NPN > Technical data

Addr.	Name	Bytes	Function	IX	SX
			Bit 1: DO 1		02h
			Bit 2: DO 2		03h
			Bit 3: DO 3		04h
			Bit 4: DO 4		05h
			Bit 5: DO 5		06h
			Bit 6: DO 6		07h
			Bit 7: DO 7		08h

4.11.1 Technical data

Order no.	022-1BF50
Туре	SM 022
Module ID	0107 AFC8
Current consumption/power loss	
Current consumption from backplane bus	80 mA
Power loss	0.6 W
Technical data digital outputs	
Number of outputs	8
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	DC 20.428.8 V
Current consumption from load voltage L+ (without load)	10 mA
Total current per group, horizontal configuration, 40°C	2.5 A
Total current per group, horizontal configuration, 60°C	2.5 A
Total current per group, vertical configuration	2.5 A
Output current at signal "1", rated value	0.5 A
Output delay of "0" to "1"	30 µs
Output delay of "1" to "0"	100 µs
Minimum load current	-
Lamp load	10 W
Parallel switching of outputs for redundant control of a load	not possible
Parallel switching of outputs for increased power	not possible
Actuation of digital input	\checkmark
Switching frequency with resistive load	max. 1000 Hz
Switching frequency with inductive load	max. 0.5 Hz
Switching frequency on lamp load	max. 10 Hz

Digital Output

Order no.	022-1BF50
Internal limitation of inductive shut-off voltage	+45 V
Short-circuit protection of output	yes, electronic
Trigger level	1.7 A
Number of operating cycle of relay outputs	-
Switching capacity of contacts	-
Output data size	8 Bit
Status information, alarms, diagnostics	
Status display	green LED per channel
Interrupts	no
Process alarm	no
Diagnostic interrupt	no
Diagnostic functions	no
Diagnostics information read-out	none
Supply voltage display	green LED
Group error display	red LED
Channel error display	none
Isolation	
Between channels	-
Between channels of groups to	-
Between channels and backplane bus	✓
Insulation tested with	DC 500 V
PWM data	
PWM channels	-
PWM time basis	-
Period length	-
Minimum pulse width	-
Type of output	-
Safety	
Safety protocol	-
Safety requirements	-
Secure user address	-
Watchdog	-
Two channels	-
Test pulse length	-
Circuit monitoring	-
Datasizes	

022-1BF50 - DO 8xDC 24V 0.5A NPN > Technical data

Order no.	022-1BF50
Input bytes	0
Output bytes	1
Parameter bytes	0
Diagnostic bytes	0
Housing	
Material	PPE / PPE GF10
Mounting	Profile rail 35 mm
Mechanical data	
Dimensions (WxHxD)	12.9 mm x 109 mm x 76.5 mm
Net weight	58 g
Weight including accessories	58 g
Gross weight	73 g
Environmental conditions	
Operating temperature	0 °C to 60 °C
Storage temperature	-25 °C to 70 °C
Certifications	
UL certification	yes
KC certification	yes

022-1DF00 - DO 8xDC 24V 0.5A Diagnostic

4.12 022-1DF00 - DO 8xDC 24V 0.5A Diagnostic

1

2

3

4

5

6

7 8

9

Properties

The electronic module with diagnosis accepts binary control signals from the central bus system and transfers them to the process level via outputs. It has 8 channels and their status is monitored via LEDs.

- 8 digital outputs, isolated to the backplane bus
- Monitoring wire-break and short-circuit

Locking lever terminal module

DC 24V power section supply

Locking lever electronic module

Diagnostics function

Labeling strip

Backplane bus

LED status indication

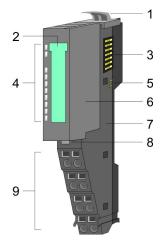
Electronic module

Terminal module

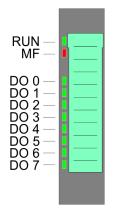
Terminal

Status indication of the channels via LEDs

Structure



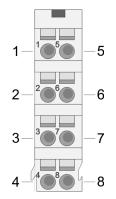
Status indication



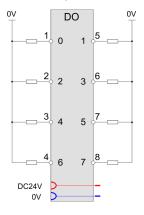
RUN	MF	DO x	Description	
green	red	green	Description	
		х	Bus communication is OK	
		^	Module status is OK	
			Bus communication is OK	
•	-	Х	Module status reports an error with wire- break and short-circuit	
			Bus communication is not possible	
	•	Х	Module status reports an error with wire- break and short-circuit	
		Х	Error at bus power supply	
			Flashing: Error in configuration	
Х	ZHz	Х	Chapter 2.8 'Trouble shooting - LEDs' on page 28	
			Digital output has "1" signal	
			Digital output has "0" signal	
not relevant: X				

022-1DF00 - DO 8xDC 24V 0.5A Diagnostic

Pin assignment



For wires with a cross section of 0.08mm² up to 1.5mm².



Pos.	Function	Туре	Description
1	DO 0	0	Digital output DO 0
2	DO 2	0	Digital output DO 2
3	DO 4	0	Digital output DO 4
4	DO 6	0	Digital output DO 6
5	DO 1	0	Digital output DO 1
6	DO 3	0	Digital output DO 3
7	DO 5	0	Digital output DO 5
8	DO 7	0	Digital output DO 7

O: Output



CAUTION!

Feeding in voltage at an output is not allowed and can destroy the module!

Input area

No byte of the input area is used by the module.

Output area At CPU, PROFIBUS and PROFINET the output area is embedded to the corresponding address area.

- IX Index for access via CANopen
- SX Subindex for access via EtherCAT with Index 7000h + EtherCAT-Slot

More can be found in the according manual of your bus coupler.

Addr.	Name	Bytes	Function	IX	SX
+0	+0 PIQ 1	Q 1 State of the outputs 6200h Bit 0: DO 0 6200h	utputs 6200h		
			Bit 0: DO 0		01h
			Bit 1: DO 1		02h
			Bit 2: DO 2		03h

022-1DF00 - DO 8xDC 24V 0.5A Diagnostic > Technical data

Addr.	Name	Bytes	Function	IX	SX
		Bit 3: DO 3	Bit 3: DO 3		04h
			Bit 4: DO 4		05h
			Bit 5: DO 5		06h
			Bit 6: DO 6		07h
			Bit 7: DO 7		08h

4.12.1 Technical data

Order no.	022-1DF00
Туре	SM 022
Module ID	0113 2F48
Current consumption/power loss	
Current consumption from backplane bus	70 mA
Power loss	1 W
Technical data digital outputs	
Number of outputs	8
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	DC 20.428.8 V
Current consumption from load voltage L+ (without load)	11 mA
Total current per group, horizontal configuration, 40°C	4 A
Total current per group, horizontal configuration, 60°C	4 A
Total current per group, vertical configuration	4 A
Output current at signal "1", rated value	0.5 A
Output delay of "0" to "1"	max. 350 μs
Output delay of "1" to "0"	max. 350 μs
Minimum load current	-
Lamp load	10 W
Parallel switching of outputs for redundant control of a load	not possible
Parallel switching of outputs for increased power	not possible
Actuation of digital input	\checkmark
Switching frequency with resistive load	max. 1000 Hz
Switching frequency with inductive load	max. 0.5 Hz
Switching frequency on lamp load	max. 10 Hz
Internal limitation of inductive shut-off voltage	L+ (-52 V)
Short-circuit protection of output	yes, electronic

022-1DF00 - DO 8xDC 24V 0.5A Diagnostic > Technical data

Trigger level1 ANumber of operating cycle of relay outputs-Switching capacity of contacts-Output data sizeBStatus information, alarms, diagnostics-Status information, alarms, diagnosticsgreen LED per channelInterruptsyes, parameterizableProcess alarmnoDiagnostics information read-outyes information read-outDiagnostics information read-outgreen LEDDiagnostics information read-outgreen LEDGroup error displaygreen LEDChannel error displaynoneStelwen channels-Between channels of groups to-Between channels of groups to-Between channels of groups to-PWM data-PWM dta-PWM dta-PWM dta-Staty protocol-Staty protocol- <trr>-</trr>	Order no.	022-1DF00
Switching capacity of contacts-Output data size8 BitStatus information, alarms, diagnosticsStatus information, alarms, diagnosticsStatus information, alarms, diagnosticsStatus information, alarms, diagnosticsStatus information, alarms, diagnosticsProcess alarmnoDiagnostic interruptyes, parameterizableDiagnostic functionsyesDiagnostic functionsyesStupp voltage displaygreen LEDGroup error displayred LEDChannel error displayred LEDDetween channels-Between channels of groups to-Between channels of groups tovPWM data-PWM data-PWM data-PWM data-PWM data-Statey protocol-Statey requirements-Statey requirements- <td>Trigger level</td> <td>1 A</td>	Trigger level	1 A
Output data size 8 Bit Status information, alarms, diagnostics green LED per channel Status display green LED per channel Interrupts yes, parameterizable Process alarm no Diagnostic interrupt yes, parameterizable Diagnostic functions yes Diagnostic functions yes Diagnostic functions green LED Status information read-out possible Statos information read-out green LED Group error display green LED Group error display none Isolation - Between channels - Between channels and backplane bus - Insulation tested with DC 500 V PWM data - Sofup routput	Number of operating cycle of relay outputs	-
Status information, alarms, diagnosticsStatus displaygreen LED per channelInterruptsyes, parameterizableProcess alarmnoDiagnostic interruptyes, parameterizableDiagnostic functionsyesDiagnostic information read-outgreen LEDStupply voltage displaygreen LEDGroup error displayred LEDChannel error displaynoneBetween channels-Between channels of groups to-Between channels and backplane bus-PWM dataPWM data-PWM data-PWM dath-PVM dath-Staty protocol-Staty protocol-<	Switching capacity of contacts	-
Status displaygreen LED per channelInterruptsyes, parameterizableProcess alarmnoDiagnostic interruptyes, parameterizableDiagnostic functionsyesDiagnostic functionsgreen LEDSupply voltage displaygreen LEDGroup error displayred LEDChannel error displaynoneBetween channels-Between channels of groups to-Between channels of groups to-PWM dataDC 500 VPWM data-PWM data-PWM data-Prod output-Safety protocol-Safety protocol-Safety protocol-Safety protocol-Safety protocol-Such groups so-Safety protocol-Safety protocol-Safety protocol-Safety protocol-Safety protocol-Safety source-Safety source <td>Output data size</td> <td>8 Bit</td>	Output data size	8 Bit
Interruptsyes, parameterizableProcess alarmnoDiagnostic interruptyes, parameterizableDiagnostic functionsyesDiagnostic function read-outpossibleSupply voltage displaygreen LEDGroup error displayred LEDChannel error displaynoneIsolationBetween channels of groups to-Between channels and backplane busPWM dataD2500 VPWM data-PWM dinnum pulse width-Type of output-Safety protocol-Safety protocol-Safety protocol-Safety protocol-Surger surger address-Yusch annels-Safety protocol-Surger surger address-Surger surger address-Surger surger address-Two channels-Surger surger address-Surger surger address- </td <td>Status information, alarms, diagnostics</td> <td></td>	Status information, alarms, diagnostics	
Process alarmnoDiagnostic interruptyes, parameterizableDiagnostic functionsyesDiagnostic information read-outpossibleSupply voltage displaygreen LEDGroup error displayred LEDChannel error displaynoneBetween channels of groups to-Between channels and backplane busInsulation tested withDC 500 VPWM data-PWM data-Piology function-Stafty-Safety protocol-Safety protocol-Safety protocol-Surger audress-Watchdag-Two channels-Safety protocol-Surger audress-Surger audress	Status display	green LED per channel
Diagnostic interruptyes, parameterizableDiagnostic functionsyesDiagnostic information read-outposibleSupply voltage displaygreen LEDGroup error displayred LEDChannel error displaynoneIsolation.Between channels-Between channels of groups to-Between channels and backplane bus·Insulation tested withDC 500 VPWM data-PVW data-PVM data-Protocol ength-Ninimum pulse width-Safety protocol-Safety protocol-Safety protocol-Safety requirements-Watchdog-Two channels-Safety protocol-Surg user address-Watchdog-To channels-Safety requirements-Safety requirements-Surg user address-To channels-To channels-Safety requirements-Safety requirements-Surg user address-To channels-To channels-Safety requirements-Safety requirements-Surg user address-Surg user address-Safety requirements-Safety requirements-Safety requirements-Safety requirements-Safety req	Interrupts	yes, parameterizable
Diagnostic functionsyesDiagnostic information read-outpossibleSupply voltage displaygreen LEDGroup error displayred LEDChannel error displaynoneIsolation.Between channels-Between channels of groups to-Between channels and backplane bus·PWM dataDC 500 VPWM data-PVM data-PvM data-Protocol engly-Nuinnun pulse width-Jype of output-Safety protocol-Safety requirements-Succur user address-Watchdog-Two channels-Safety requirements-Succur user address-Circuit monitoring-Displacements-Succur user address-Succur user address-	Process alarm	no
Diagnostics information read-outpossibleSupply voltage displaygreen LEDGroup error displayred LEDChannel error displaynoneIsolation-Between channels-Between channels of groups to-Between channels and backplane bus✓Insulation tested withDC 500 VPWM data-PWM channels-PWM channels-Proto length-Nummu pulse width-Type of output-Safety protocol-Safety requirements-Safety requirements-Vachdang-Type shall-Vachdang-Safety requirements-Such annels-Such annels-Safety requirements-Safety requirements-Such annels-Type shall-Such annels-Such annels	Diagnostic interrupt	yes, parameterizable
Supply voltage displaygreen LEDGroup error displayred LEDChannel error displaynoneIsolation-Between channels-Between channels of groups to-Between channels and backplane busvInsulation tested withDC 500 VPWM data-PWM data-PWM data-PWM data-Proto length-Numm pulse width-Safety protocol-Safety protocol-Safety requirements-Safety requirements-Vachanels-Two channels-Safety requirements-Safety requirements-Such and	Diagnostic functions	yes
Group error displayred LEDChannel error displaynoneIsolation-Between channels-Between channels of groups to-Between channels and backplane bus✓Insulation tested withDC 500 VPWM data-PWM tabasis-PWM time basis-Port of output-Safety-Safety protocol-Safety protocol-Safety requirements-Safety requirements-Such and Basis-Yutch ang-Safety protocol-Safety protocol-Safety protocol-Such angle-Yutch angle-Safety protocol-Safety protocol-Such angle-Such angle-Yutch angle- <td>Diagnostics information read-out</td> <td>possible</td>	Diagnostics information read-out	possible
Channel error displaynoneIsolationBetween channels-Between channels of groups to-Between channels and backplane busInsulation tested withDC 500 VPWM data-PWM data-PWM channels-PWM time basis-Point length-Agent length-Safety-Safety protocol-Safety protocol-Safety requirements-Safety nequirements-Such angles-Yuch angles-Yuch angles-Safety requirements-Safety nequirements-Such angles-Yuch angles-Yuch angles-Yuch angles-Time the safet angle angles-Safety requirements-Safety requirements-Safety requirements-Safety requirements-Safet protocol-Time the safet angles-Yuch angles-Time the safet angles-Safet protocol-Safet protocol-	Supply voltage display	green LED
IsolationIsolationBetween channels-Between channels of groups to-Between channels and backplane busInsulation tested withDC 500 VPWM dta-PWM dta-PWM channels-PWM time basis-Period length-Ninimum pulse width-Type of output-Safety protocol-Safety requirements-Safety requirements-Vachandeg-Yutochannels-Tyto of output-Safety requirements-Safety requirements-Safety notocol-Safety notocol-Safety notocol-Safety notocol-Safety notocol-Safety requirements-Safety requirements-Safety notocol-Safety notocol- <td>Group error display</td> <td>red LED</td>	Group error display	red LED
Between channels.Between channels of groups to.Between channels and backplane bus.Insulation tested withDC 500 VPWM data.PWM channels.PWM channels.PWM time basis.Period length.Ninimum pulse width.Type of output.Safety.Safety protocol.Safety requirements.Secure user address.Watchanels.Type signel length.Safety requirements.Safety requirements.Safety requirements.Succure user address.Staty protocol.Safety noticol.Safety requirements.Safety requirements.Safety requirements.Safety requirements.Succure user address.Safety requirements.Safety	Channel error display	none
Between channels of groups to-Between channels and backplane busInsulation tested withDC 500 VPWM data-PWM channels-PWM time basis-Period length-Ninimum pulse width-Type of output-Safety-Safety protocol-Safety requirements-Safety requirements-Succur user address-Watchdog-Type signel function-Tot channels-Safety protocol-Safety requirements-Succur user address-Succur user address-Type signel function-Tot channels-Tot channels-Tot pulse length-Succur user address-Succur user address-Succur user address-Type signel function-Type signel function-Type signel function-Succur user address-Succur user a	Isolation	
Between channels and backplane bus·Insulation tested withDC 500 VPWM data-PWM channels-PWM thime basis-Period length-Minimum pulse width-Type of output-Safety-Safety protocol-Safety requirements-Safety requirements-Such and Backplane-Watchdog-Two channels-Toy be length-Such and Backplane-Safety requirements-Safety requirements-Such and Backplane-Such and Backplane-Watchdog-Two channels-Circuit monitoring-Dataizes-Input bytes0	Between channels	-
Insulation tested withDC 500 VPWM dataPWM channels-PWM time basis-Period length-Minimum pulse width-Type of output-Safety-Safety protocol-Safety requirements-Secure user address-Watchdog-Type length-Too channels-Too channels-Sufty protocol-Safety requirements-Secure user address-Watchdog-Too channels-Too channels-Input bytes0	Between channels of groups to	-
PWM dataPWM channels-PWM time basis-PwM time basis-Period length-Minimu pulse width-Type of output-Safety-Safety protocol-Safety requirements-Safety output-Watchdog-Two channels-Tot pulse length-Circuit monitoring-Pataizes-Iput bytes0	Between channels and backplane bus	\checkmark
PWM channels-PWM time basis-Period length-Minimu pulse width-Type of output-Safety-Safety protocol-Safety requirements-Secure user address-Watchdog-Two channels-Tot pulse length-Circuit monitoring-Datasizes-Iput bytes0	Insulation tested with	DC 500 V
PWM time basis-Period length-Animum pulse width-Type of output-Safety-Safety-Safety protocol-Safety requirements-Secure user address-Watchdog-Two channels-Tot pulse length-Circuit monitoring-Datasizes-Iput bytes0	PWM data	
Period length-Minimu pulse width-Type of output-Safety-Safety protocol-Safety requirements-Secure user address-Watchdog-Two channels-Test pulse length-Circuit monitoring-Datasizes-Input bytes0	PWM channels	-
Minimum pulse width-Type of output-Safety-Safety protocol-Safety requirements-Secure user address-Watchdog-Two channels-Test pulse length-Circuit monitoring-Datasizes-Input bytes0	PWM time basis	-
Type of output-Safety-Safety protocol-Safety requirements-Secure user address-Watchdog-Two channels-Test pulse length-Circuit monitoring-Datasizes-Input bytes0	Period length	-
SafetySafety protocol-Safety requirements-Secure user address-Watchdog-Two channels-Test pulse length-Circuit monitoring-Datasizes-Input bytes0	Minimum pulse width	-
Safety protocol-Safety requirements-Secure user address-Watchdog-Two channels-Test pulse length-Circuit monitoring-Datasizes-Input bytes0	Type of output	-
Safety requirements-Secure user address-Watchdog-Two channels-Test pulse length-Circuit monitoring-Datasizes-Input bytes0	Safety	
Secure user address-Watchdog-Two channels-Tots pulse length-Circuit monitoring-Datasizes-Input bytes0	Safety protocol	-
Watchdog-Two channels-Test pulse length-Circuit monitoring-Datasizes-Input bytes0	Safety requirements	-
Two channels-Test pulse length-Circuit monitoring-Datasizes-Input bytes0	Secure user address	-
Test pulse length - Circuit monitoring - Datasizes - Input bytes 0	Watchdog	-
Circuit monitoring-Datasizes0Input bytes0	Two channels	-
Datasizes Input bytes	Test pulse length	-
Input bytes 0	Circuit monitoring	-
	Datasizes	
Output bytes 1	Input bytes	0
	Output bytes	1

022-1DF00 - DO 8xDC 24V 0.5A Diagnostic > Parameter data

Order no.	022-1DF00
Parameter bytes	7
Diagnostic bytes	20
Housing	
Material	PPE / PPE GF10
Mounting	Profile rail 35 mm
Mechanical data	
Dimensions (WxHxD)	12.9 mm x 109 mm x 76.5 mm
Net weight	57 g
Weight including accessories	57 g
Gross weight	71 g
Environmental conditions	
Operating temperature	0 °C to 60 °C
Storage temperature	-25 °C to 70 °C
Certifications	
UL certification	yes
KC certification	yes

4.12.2 Parameter data

- DS Record set for access via CPU, PROFIBUS and PROFINET
- IX Index for access via CANopen
- SX Subindex for access via EtherCAT with Index 3100h + EtherCAT-Slot

More can be found in the according manual of your bus coupler.

Name	Bytes	Function	Default	DS	IX	SX
DIAG_EN	1	Diagnostics*	00h	00h	3100h	01h
WIBRK_EN	1	Wire-break recognition*	00h	00h	3101h	02h
CH0D_EN	1	Short-circuit recognition*	00h	00h	3102h	03h
*) This record set may only be transferred at STOP state						

s record set may only be transferred at STOP state

DIAG_EN Diagnostic interrupt

Byte	Bit 7 0
0	Diagnostic interrupt
	00h: disable
	40h: enable

Here you activate res. de-activate the diagnostic function.

022-1DF00 - DO 8xDC 24V 0.5A Diagnostic > Diagnostic data

WIBRK_EN Wire-break recognition	Byte	Bit 7 0
loogintion	0	Bit 0: Wire-break recognition channel 0 (1: on)
		Bit 1: Wire-break recognition channel 1 (1: on)
		Bit 7: Wire-break recognition channel 7 (1: on)
	Here	you activate res. de-activate the Wire-break recognition.
CH0D_EN Short-circuit recognition	Byte	Bit 7 0
loogintion	0	Bit 0: Short-circuit recognition channel 0 (1:on)
		Bit 1: Short-circuit recognition channel 1 (1:on)
		Bit 7: Short-circuit recognition channel 7 (1:on)

Here you activate res. de-activate the Short-circuit recognition.

4.12.3 Diagnostic data

The following errors are listed in the diagnostics data:

- Error in project engineering / parameterization
- Wire-break
- Short-circuit
- Error external auxiliary supply
- DS Record set for access via CPU, PROFIBUS and PROFINET. The access happens by DS 01h. Additionally the first 4 bytes may be accessed by DS 00h.
- IX Index for access via CANopen. The access happens by IX 2F01h. Additionally the first 4 bytes may be accessed by IX 2F00h.
- SX Subindex for access via EtherCAT with Index 5005h.

More can be found in the according manual of your bus coupler.

Name	Bytes	Function	Default	DS	IX	SX
ERR_A	1	Diagnostic	00h	01h	2F01h	02h
MODTYP	1	Module information	1Fh			03h
RES2	1	reserved	00h			04h
ERR_D	1	Diagnostic	00h			05h
CHTYP	1	Channel type	72h			06h
NUMBIT	1	Number diagnostic bits per channel	08h			07h
NUMCH	1	Number of channels of a module	08h			08h
CHERR	1	Channel error	00h			09h
CH0ERR	1	Channel-specific error channel 0	00h			0Ah
CH1ERR	1	Channel-specific error channel 1	00h			0Bh

Digital Output

022-1DF00 - DO 8xDC 24V 0.5A Diagnostic > Diagnostic data

Name	Bytes	Function	Default	DS	IX	SX
CH7ERR	1	Channel-specific error channel 7	00h			11h
DIAG_US	4	µs ticker (32bit)	00h			13h

ERR_A Diagnostic

ByteBit 7 ... 00Bit 0: set at module failureBit 1: set at internal errorBit 2: set at external errorBit 3: set at channel errorBit 4: set at external auxiliary supply missingBit 5, 6: reservedBit 7: set at error in parameterization

MODTYP Module informa- tion	Byte	Bit 7 0
	0	Bit 3 0: module class
		1111b: Digital module
		Bit 4: set at channel information present
		Bit 7 5: reserved

ERR_D Diagnostic	Byte	Bit 7 0
	0	Bit 3 0: reserved
		Bit 4: set at internal communication error
		Bit 7 5: reserved

CHTYP Channel type	Byte	Bit 7 0
0		Bit 6 0: channel type
		72h: Digital output
		Bit 7: reserved
NUMBIT Diagnostic bits	Byte	Bit 7 0
	0	Number of diagnostic bits per channel
		(here 08h)
NUMCH Channels	Byte	Bit 7 0
	0	Number of channels of a module
		(here 08h)

022-1DF00 - DO 8xDC 24V 0.5A Diagnostic > Diagnostic data

CHERR Channel error	Byte	Bit 7 0
	0	Bit 0: set at error in channel 0
		Bit 1: set at error in channel 1
		Bit 7: set at error in channel 7
CH0ERR CH1ERR Channel specific	Byte	Bit 7 0
Speeme	0	
	0	Channel-specific error channel x:
	0	Bit 0: set at configuring- / parameter assignment error
	U	
	0	Bit 0: set at configuring- / parameter assignment error
	U	Bit 0: set at configuring- / parameter assignment error Bit 1: reserved
	0	Bit 0: set at configuring- / parameter assignment error Bit 1: reserved Bit 2: short-circuit to +DC 24V

DIAG_US µs ticker

	70
03 Value	ue of the μ s ticker at the moment of the diagnostic

µs ticker

In the SLIO module there is a timer (μ s ticker). With PowerON the timer starts counting with 0. After 2³²-1 μ s the timer starts with 0 again.

022-1HB10 - DO 2xRelay

022-1HB10 - DO 2xRelay 4.13

Properties

The electronic module accepts binary control signals from the central bus system and transfers them to the process level via relay outputs. It has 2 channels that operate as switches and the status of each channel is monitored via LEDs.

- 2 relay outputs, isolated to the backplane bus
- DC 30V / AC 230V, 3A

Labeling strip

Backplane bus

LED status indication

Electronic module

Terminal module

Terminal

1 2

3

4

5

6

7

8

9

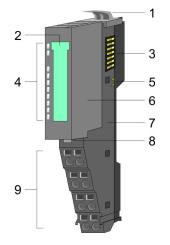
Status indication of the channels via LEDs

Locking lever terminal module

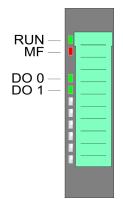
DC 24V power section supply

Locking lever electronic module

Structure



Status indication



RUN	MF	DO x	Description
		х	Bus communication is OK
_			Module status is OK
			Bus communication is OK
	•	Х	Module status reports an error with overload, short circuit or overheat
			Bus communication is not possible
	•	Х	Module status reports an error with overload, short circuit or overheat
		Х	Error at bus power supply
			Flashing: Error in configuration
Х	ZHz	Х	Schapter 2.8 'Trouble shooting - LEDs' on page 28
			Relay output has "1" signal
			Relay output has "0" signal
not relevant	:: X		



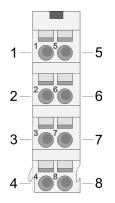
The mixed operation of touch and non touch voltages is not permitted!

022-1HB10 - DO 2xRelay

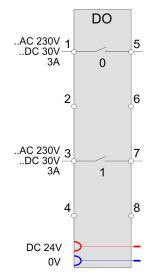
With HW state 04, an interference suppression capacitor (15nF) has been connected parallel to each relay contact in order to improve the EMC resistance.

When using inductive load please take a suitable protector (see installation guidelines).

Pin assignment



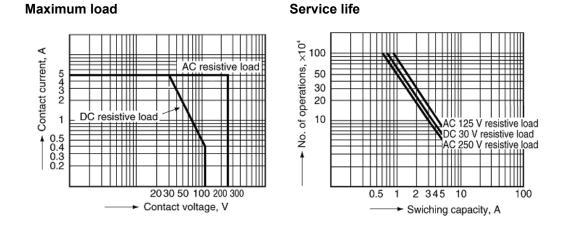
For wires with a cross section of 0.08mm² up to 1.5mm².



Pos.	Function	Туре	Description
1	DO 0	0	Relay output DO 0
2			not connected
3	DO 1	0	Relay output DO 1
4			not connected
5	DO 0	0	Relay output DO 0
6			not connected
7	DO 1	0	Relay output DO 1
8			not connected

O: Output

022-1HB10 - DO 2xRelay > Technical data



Input area

Output area

No byte of the input area is used by the module.

At CPU, PROFIBUS and PROFINET the output area is embedded to the corresponding address area.

IX - Index for access via CANopen

SX - Subindex for access via EtherCAT with Index 7000h + EtherCAT-Slot

More can be found in the according manual of your bus coupler.

Addr.	Name	Bytes	Function	IX	SX
+0	PIQ	1	State of the outputs	5200h	
			Bit 0: DO 0		01h
			Bit 1: DO 1		02h
			Bit 7 2: reserved		

4.13.1 Technical data

Order no.	022-1HB10
Туре	SM 022
Module ID	0109 AF90
Current consumption/power loss	
Current consumption from backplane bus	120 mA
Power loss	0.7 W
Technical data digital outputs	
Number of outputs	2
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	DC 30 V/ AC 230 V

022-1HB10 - DO 2xRelay > Technical data

Order no.	022-1HB10
Current consumption from load voltage L+ (without load)	-
Total current per group, horizontal configuration, 40°C	3 A
Total current per group, horizontal configuration, 60°C	3 A
Total current per group, vertical configuration	3 A
Output current at signal "1", rated value	3 A
Output delay of "0" to "1"	10 ms
Output delay of "1" to "0"	5 ms
Minimum load current	-
Lamp load	-
Parallel switching of outputs for redundant control of a load	not possible
Parallel switching of outputs for increased power	not possible
Actuation of digital input	-
Switching frequency with resistive load	max. 0.33 Hz
Switching frequency with inductive load	max. 0.33 Hz
Switching frequency on lamp load	max. 0.33 Hz
Internal limitation of inductive shut-off voltage	-
Short-circuit protection of output	-
Trigger level	-
Number of operating cycle of relay outputs	-
Switching capacity of contacts	3 A
Output data size	2 Bit
Status information, alarms, diagnostics	
Status display	green LED per channel
Interrupts	no
Process alarm	no
Diagnostic interrupt	no
Diagnostic functions	no
Diagnostics information read-out	none
Supply voltage display	green LED
Group error display	red LED
Channel error display	none
Isolation	
Between channels	✓
Between channels of groups to	-
Between channels and backplane bus	\checkmark
Insulation tested with	AC 2200 V

Digital Output

022-1HB10 - DO 2xRelay > Technical data

Order no.	022-1HB10
PWM data	
PWM channels	-
PWM time basis	-
Period length	-
Minimum pulse width	-
Type of output	-
Safety	
Safety protocol	-
Safety requirements	-
Secure user address	-
Watchdog	-
Two channels	-
Test pulse length	-
Circuit monitoring	-
Datasizes	
Input bytes	0
Output bytes	1
Parameter bytes	0
Diagnostic bytes	0
Housing	
Material	PPE / PPE GF10
Mounting	Profile rail 35 mm
Mechanical data	
Dimensions (WxHxD)	12.9 mm x 109 mm x 76.5 mm
Net weight	62 g
Weight including accessories	62 g
Gross weight	76 g
Environmental conditions	
Operating temperature	0 °C to 60 °C
Storage temperature	-25 °C to 70 °C
Certifications	
UL certification	yes
KC certification	yes

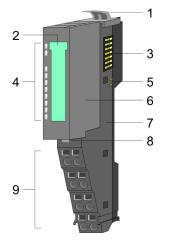
4.14 022-1HD10 - DO 4xRelay

Properties

The electronic module accepts binary control signals from the central bus system and transfers them to the process level via relay outputs. It has 4 channels that operate as switches and the status of each channel is monitored via LEDs.

- 4 relay outputs
 - in groups of two, each with a common terminal
 - isolated between channels and backplane bus
 - isolated between channels of groups
- DC 30V / AC 230V, 1.8 A
- Status indication of the channels via LEDs

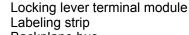
Structure



Status indication

RUN — MF — DO 0 — DO 1 — DO 2 — DO 3 —

RUN	MF red	DO x	Description
_		х	Bus communication is OK
-		^	Module status is OK
			Bus communication is OK
	-	Х	Module status reports an error with overload, short circuit or overheat
			Bus communication is not possible
		Х	Module status reports an error with overload, short circuit or overheat
		Х	Error at bus power supply
			Flashing: Error in configuration
Х	ZHz	Х	Chapter 2.8 'Trouble shooting - LEDs' on page 28
			Relay output has "1" signal
			Relay output has "0" signal
not relevant: X			



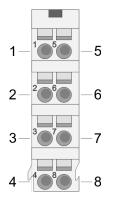
- 3 Backplane bus4 LED status indication
- 5 DC 24V power section supply
- 6 Electronic module
- 7 Terminal module
- 8 Locking lever electronic module
- 9 Terminal

1

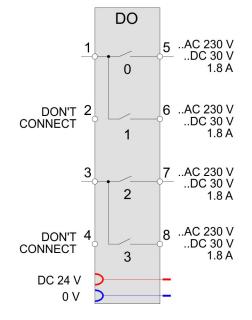
2

022-1HD10 - DO 4xRelay

Pin assignment



For wires with a cross section of 0.08mm² up to 1.5mm².



Pos.	Function	Туре	Description
1	DO 0/1	0	Relay output DO 0 and DO 1
2			must not be connected
3	DO 2/3	0	Relay output DO 2 and DO 3
4			must not be connected
5	DO 0	0	Relay output DO 0
6	DO 1	0	Relay output DO 1
7	DO 2	0	Relay output DO 2
8	DO 3	0	Relay output DO 3

O: Output



CAUTION!

Due to the hardware the pins 2 and 4 must not be connected! The mixed operation of touch and non touch voltages is not per-

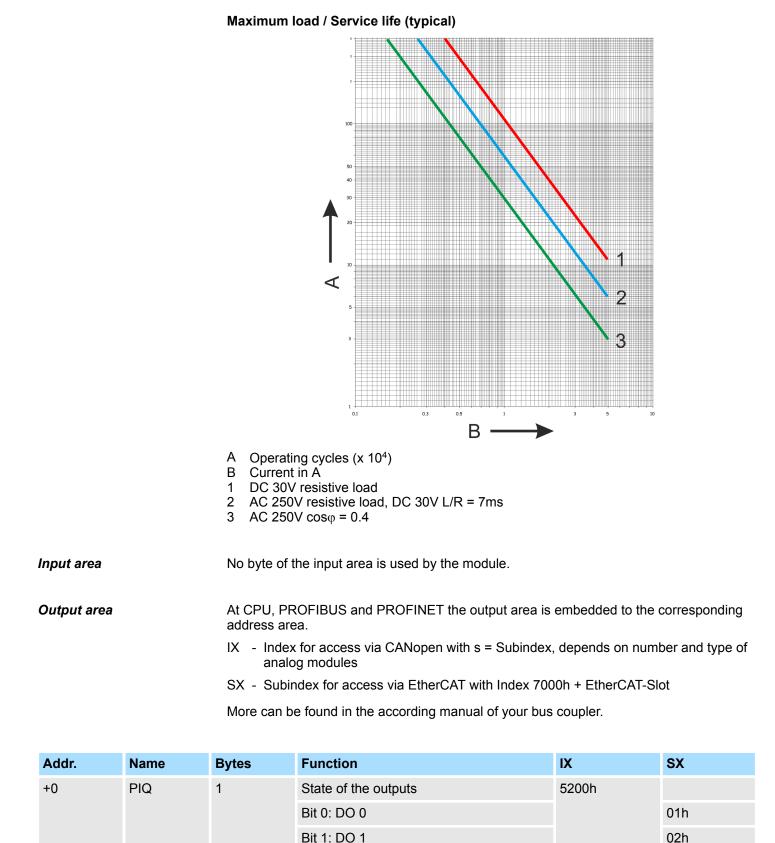
mitted!

With HW state 03, an interference suppression capacitor (15nF) has been connected parallel to each relay contact in order to improve the EMC resistance.



When using inductive load please take a suitable protector (see installation guidelines).

022-1HD10 - DO 4xRelay



Bit 2: DO 2

Bit 3: DO 3

Bit 7 ... 4: reserved

03h

04h

022-1HD10 - DO 4xRelay > Technical data

4.14.1 Technical data

Order no.	022-1HD10
Туре	SM 022
Module ID	010A AFA0
Current consumption/power loss	
Current consumption from backplane bus	120 mA
Power loss	0.7 W
Technical data digital outputs	
Number of outputs	4
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	DC 30 V/ AC 230 V
Current consumption from load voltage L+ (without load)	-
Total current per group, horizontal configuration, 40°C	3.6 A
Total current per group, horizontal configuration, 60°C	3 A
Total current per group, vertical configuration	3.6 A
Output current at signal "1", rated value	1.8 A
Output delay of "0" to "1"	10 ms
Output delay of "1" to "0"	5 ms
Minimum load current	-
Lamp load	-
Parallel switching of outputs for redundant control of a load	not possible
Parallel switching of outputs for increased power	not possible
Actuation of digital input	-
Switching frequency with resistive load	max. 0.33 Hz
Switching frequency with inductive load	max. 0.33 Hz
Switching frequency on lamp load	max. 0.33 Hz
Internal limitation of inductive shut-off voltage	-
Short-circuit protection of output	-
Trigger level	-
Number of operating cycle of relay outputs	-
Switching capacity of contacts	5 A
Output data size	4 Bit
Status information, alarms, diagnostics	
Status display	green LED per channel
Interrupts	no
Process alarm	no

Digital Output

022-1HD10 - DO 4xRelay > Technical data

Diagnostic interruptnoDiagnostic functionsnoDiagnostic sinformation read-outnoneSupply voltage displaygreen LEDGroup error displayred LEDChannel error displaynoneIsolation-Between channels-Between channels of groups to2Between channels and backplane bus~Insulation tested withAC 2200 VPWM data-PWM dannels-PVM time basis-Period length-Safety-Safety protocol-Safety protocol-Safety protocol-Safety sequirements-Vachanels-Puse address-Vachadg-Tore of angles-Safety protocol-Safety protocol-Safety sequirements-Such address-Vachadg-Turo channels-Turo then plane-Safety requirements-Safety requirements-Safety requirements-Safety requirements-Safety requirements-Safety requirements-Disposito plane-Tist pulse length-Output toytes1Parameter bytes0Diagnostic bytes0Diagnostic bytesPParameter bytes-Diagnostic bytes-Diagn	
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Minimum pulse width.Type of output.Safety.Safety protocol.Safety requirements.Secure user address.Watchdog.Two channels.Circuit monitoring.Datasizes.Input bytes0Output bytes.Parameter bytes0Diagnostic bytes.Housing.Housing.Safety bytes.Safety requirements.Safety requirements.Secure user address.Secure user address	
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Two channels-Test pulse length-Circuit monitoring-Datasizes-Input bytes0Output bytes1Parameter bytes0Diagnostic bytes0Housing-	
Test pulse length-Circuit monitoring-Datasizes-Input bytes0Output bytes1Parameter bytes0Diagnostic bytes0Housing-	
Circuit monitoring-Datasizes-Input bytes0Output bytes1Parameter bytes0Diagnostic bytes0Housing-	
DatasizesInput bytes0Output bytes1Parameter bytes0Diagnostic bytes0Housing1	
Input bytes0Output bytes1Parameter bytes0Diagnostic bytes0Housing	
Output bytes1Parameter bytes0Diagnostic bytes0Housing	
Parameter bytes0Diagnostic bytes0Housing	
Diagnostic bytes 0 Housing	
Housing	
Material PPE / PPE GF10	
Mounting Profile rail 35 mm	
Mechanical data	
Dimensions (WxHxD) 12.9 mm x 109 mm x 76.5 mm	
Net weight 69 g	

022-1HD10 - DO 4xRelay > Technical data

Order no.	022-1HD10
Weight including accessories	69 g
Gross weight	83 g
Environmental conditions	
Operating temperature	0 °C to 60 °C
Storage temperature	-25 °C to 70 °C
Certifications	
UL certification	yes
KC certification	yes