VIPA System 100V

SM-PB | Manual

HB100E_SM-PB | Rev. 13/04

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Conformity is indicated by the CE marking affixed to the product.

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Contents

About this Manual

This manual describes the available System 100V decentral block periphery PROFIBUS from VIPA. Besides of a product overview you will find the detailed description of the single components.

You'll get information about installing and operating a decentral block periphery in a PROFIBUS DP system.

Overview

Chapter 1: Basics

This introduction includes recommendations on the handling of the modules of the VIPA System 100V as central resp. decentral automation system.

Besides a system overview you will find general information to the System 100V like dimensions, installation and operating conditions.

Chapter 2: Decentral block periphery PROFIBUS

The decentral block periphery consists of a PROFIBUS DP slave and I/O components.

The decentral block periphery is available in different variants described in this chapter.

This chapter includes all information required for assembly, project engineering and operating this System 100V components.

Objective and contents

This manual describes the System 100V decentral block periphery PROFIBUS from VIPA. It contains a description of the construction, project implementation and usage.

This manual is part of the documentation package with order number HB100E_SM-PB and relevant for:

Product	Order number	as of state: HW
SM-PB	VIPA 15x-xxxx	01

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
- an overview of the topics for every chapter

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.

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

Note!
Supplementary information and useful tips.

Safety information

Applications conforming with specifications

The System 100V is constructed and manufactured for

- communication and process control
- general control and automation applications
- 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

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 modification 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!

Chapter 1 Basics

Overview

This introduction includes recommendations on the handling of the modules of the VIPA System 100V as central resp. decentral automation system.

Besides a system overview you will find general information to the System 100V like dimensions, installation and operating conditions.

Content

Safety information for Users

Handling of electrostatically 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 electrostatically sensitive modules and they can damage components thereby, causing the module to become inoperable or unusable. Modules that have been damaged by electrostatic discharges may 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 electrostatically sensitive modules.

Shipping of electrostatically sensitive modules

Modules have to be shipped in the original packing material.

Measurements and alterations on electrostatically sensitive modules

When you are conducting measurements on electrostatically sensitive modules you should take the following precautions:

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

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

Attention!

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

Overview System 100V

General

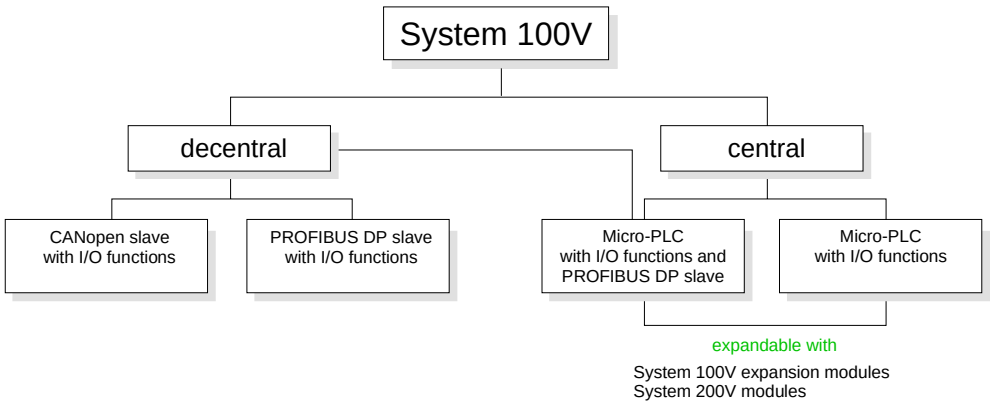
The System 100V from VIPA is a compact central and decentral usable automation system from VIPA. The system is recommended for lower and middle performance needs.

At a System 100V module, CPU res. bus coupler are integrated together with in-/output functions in one case.

System 100V modules are installed directly to a 35mm norm profile rail.

You may expand the number of I/Os of the Micro-PLC by means of expansion modules res. connect System 200V modules via bus couplers.

The following picture shows the performance range of the System 100V:



Central system

The central system is built of one CPU and integrated I/O-functions. The CPU is instruction compatible to the S7-300 from Siemens and may be programmed and projected by means of S7 programming tools from Siemens and VIPA via MPI.

By means of bus couplers you may connect modules of the System 200V family res. enlarge the number of I/Os by installing System 100V expansion modules.

The CPUs are available in different variants.

Central system with DP slave

At the central system besides the CPU and I/O functions, a PROFIBUS DP slave is included that acknowledges itself within the address range of the CPU.

Decentral system

This system contains a PROFIBUS DP res. CANopen slave with I/O functions instead of the CPU. The system is not expandable.

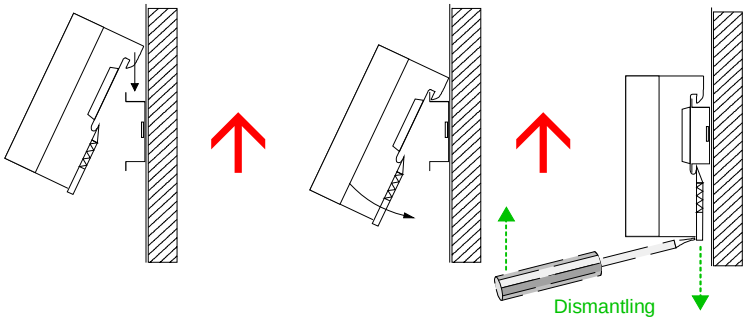
General Description of the System 100V

Structure and dimensions

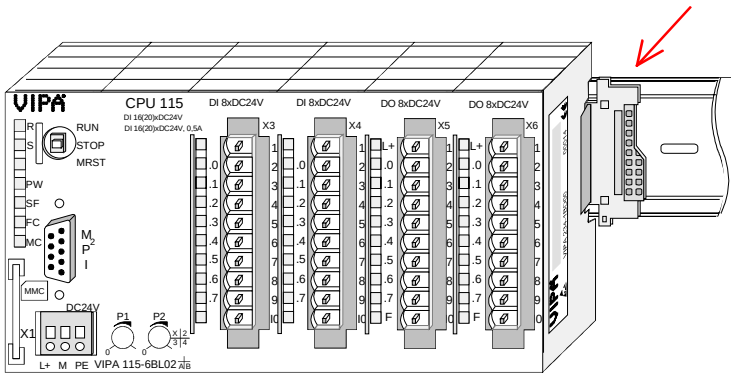
- Norm profile head rail 35mm
- Dimensions basic module:
  4tier width: (WxHxD) in mm: 101.6x76x48 / in inches: 4x3x1.9
  6tier width: (WxHxD) in mm: 152.4x76x48 / in Inches: 6x3x1.9

Installation

The installation of a System 100V module works via snapping on a norm profile head rail.



When using expansion modules, you have to clip the included 1tier bus connector at the right side to the module from behind before the installation.



Operation security

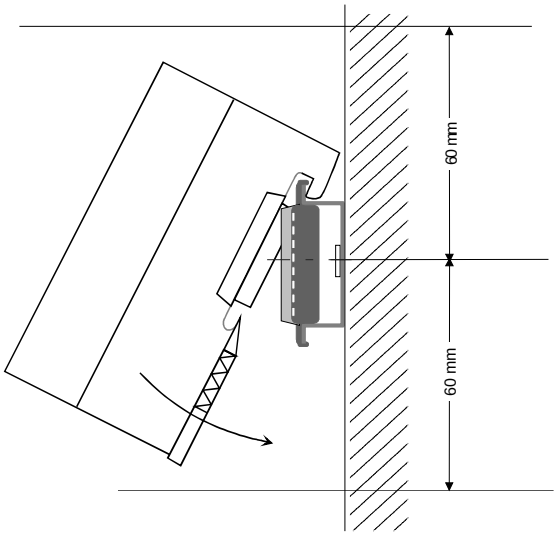
- Plug in via CageClamps, core cross-section 0.08...2.5mm^2
- Total isolation of the cables during module changes
- EMV resistance ESD/Burst acc. IEC 61000-4-2 / IEC 61000-4-4 (to level 3)
- Shock resistance acc. IEC 60068-2-6 / IEC 60068-2-27 (1G/12G)

Environmental conditions

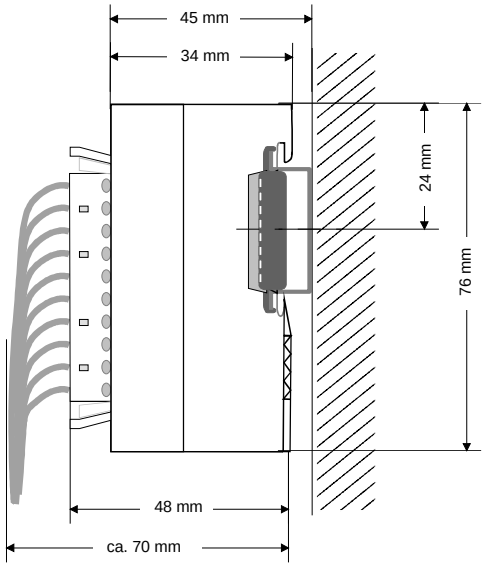
- Operating temperature: 0... + 60°C
- Storage temperature: -25... + 70°C
- Relative humidity: 5 ... 95% without condensation
- fan-less operation

Assembly dimensions

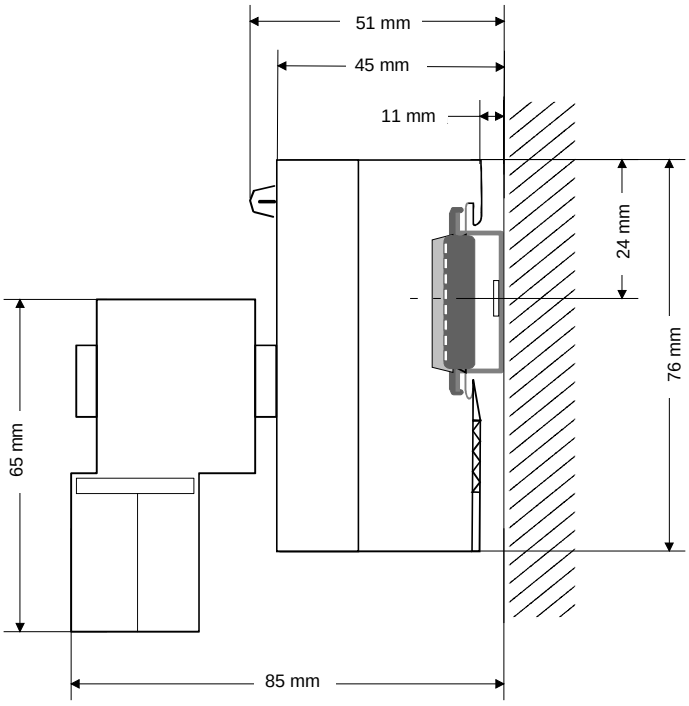
Installation dimensions



Installed and wired dimensions



CPU 11x with EasyConn from VIPA



Chapter 2 Decentral block periphery PROFIBUS DP

Overview

The decentral block periphery consists of a PROFIBUS DP slave and I/O components.

The decentral block periphery is available in different variants described in this chapter.

This chapter includes all information required for assembly, project engineering and operating this System 100V components.

Content

Principles

UL Certification

All the modules in this chapter have got the UL Certification:

UL-Recognition-Mark
Underwriters Laboratories (UL)
Standard UL 508, File Nr.: E234291

General

PROFIBUS is an open fieldbus standard for building, manufacturing and process automation. PROFIBUS defines the technical and functional properties of a serial field-bus system that can be used to create a network of decentral digital field-automation equipment on the lower (sensor/actuator level) to middle performance level (process level).

PROFIBUS comprises various compatible versions. The specifications contained in this description refer to PROFIBUS DP.

PROFIBUS DP

PROFIBUS DP is particularly suitable for applications in production automation. DP is very fast, offers Plug'n'Play and is a cost-effective alternative to parallel cabling between PLC and the decentral periphery. PROFIBUS DP is conceived for high-speed data exchange on the sensor/actuator level. This is where central controllers like PLCs communicate via fast, serial connections with decentral in- and output devices.

During a single bus cycle the master executes one "Data Exchange", i.e. reads the input values from the various slaves and writes new output information into the slaves.

Master and Slaves

PROFIBUS distinguishes between active stations (masters) and passive stations (slaves).

Master devices

Master equipment controls the data traffic on the bus. There may be several masters at one PROFIBUS. This is referred to as multi-master operation. The bus protocol establishes a logical token ring between the intelligent devices connected to the bus.

A master may send unsolicited messages if it has the bus access permission (Token). In the PROFIBUS protocol these masters are also referred to as active stations.

Slave devices

Typical slave equipment holds data of peripheral equipment, sensors, drives, transducers. The VIPA PROFIBUS-couplers of the System 100V are slave devices that transfer data between the System 100V periphery and the leading master.

These devices do not have bus access permission in accordance with the PROFIBUS standard. They can only acknowledge messages or transfer messages to a master if requested by the respective master. Slaves are also referred to as passive stations.

Communication

The bus communication protocol provides two procedures for accessing the bus:

Master to Master

Communications with the master is also referred to as token passing procedure. Token passing guarantees that the station receives access permission to the bus. This access right to the bus is passed between the stations in form of a "token". A token is a specific message that is transferred via the bus.

When a master is in the possession of the token it also has the access right to the bus and can communicate with all other active and passive stations. The token retention time is defined when the system is being configured. When the token retention time has expired the token is passed along to the next master that acquires the bus access rights with the token so that it can communicate with all other stations.

Master-Slave procedure

Data is exchanged in a fixed repetitive sequence between the master and the slaves assigned to the respective master. When you configure the system you define which slaves are assigned to a certain master. You can also specify which DP slave is included in the cyclic exchange of application data and which ones are excluded.

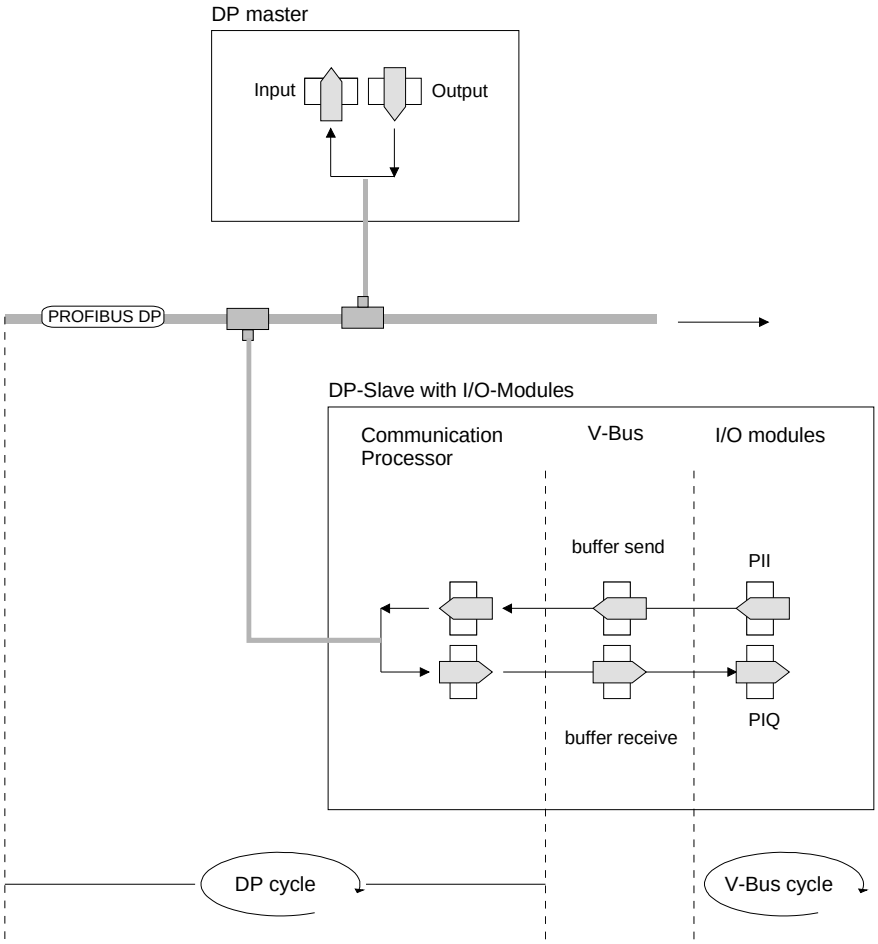
The master-slave data transfer is divided into parameterization, configuration and data transfer phases. Before a DP slave is included in the data transfer phase, the master verifies during the parameterization and configuration phase if the specified configuration is congruent to the effective configuration. This verification process checks the device type, format and length as well as the number of inputs and outputs. This provides you with effective protection against configuration errors.

The master handles application data transfers independently. In addition, you may also send new configuration data to a bus coupler.

If in the status DE "Data Exchange“, the master is sending new basic data to the slave ,and the responding telegram of the slave transfers the recent input data to the master.

The principles of data transfer operations

The data exchange between the DP master and the DP slave is performed in a cycle, using send and receive buffers.



PII: Process image of the inputs

PIQ: Process image of the outputs

V-Bus cycle

In one V-Bus cycle (i.e. VIPA backplane bus), all input data of the single modules are collected in the PII and all output data from the PIQ are transferred to the output modules. After the data exchange is completed, the PII is transferred to the sending buffer (buffer send) and the content of the input buffer (buffer receive) is transferred to PIQ.

DP cycle

In one PROFIBUS cycle, the master contacts all its slaves with a data exchange. There the memory areas assigned to the PROFIBUS are written res. read.

Afterwards the DP master transmits the data of the input area to the receive buffer of the communication processor and the data of the send buffer is transferred into the PROFIBUS output area.

The DP master to DP slave data exchange on the bus is repeated cyclically and does not depend on the V-Bus cycle.

Restrictions

- Max. 125 DP slaves at one DP master - max. 32 slaves/segment
- Peripheral modules may only be plugged in or out after Power-Off!
- max. cable length under RS485 between two stations 1200m (depending on the baudrate)
- max. baudrate 12 MBaud
- You must not alter the PROFIBUS address during operation

Diagnostic

There is a wide range of diagnostic functions under PROFIBUS DP that allow a fast error localization. The diagnostic data is broadcasted by the bus system and summarized at the master.

Transfer medium

As transfer medium, PROFIBUS uses an isolated drilled twisted-pair cable based upon the RS485 interface. The transfer rate is max. 12MBaud.

Electrical system over RS485

The RS485-interface is working with voltage differences. Though it is less irritable from interference than a voltage or a current interface. You are able to configure the network as well linear as in a tree structure. Your VIPA PROFIBUS coupler includes a 9pin slot where you connect the PROFIBUS coupler into the PROFIBUS network as a slave.

The bus structure under RS485 allows an easy connection res. disconnection of stations as well as starting the system step by step. Later expansions don't have any influence on stations that are already integrated. The system realizes automatically if one partner had a fail down or is new at the network.

Addressing

Every partner of the PROFIBUS network identifies itself with a certain address. This address has to be unique at the bus system and has a value between 0 and 99. At the VIPA PROFIBUS couplers you adjust the address with the addressing switch at the front side.

For the VIPA PROFIBUS master you choose the address via your software tool.

GSD-file

To configure the slave connections in your own configuration tool, you've got all the information about your VIPA modules in form of an electronic data sheet file.

Structure and content of this file are dictated by the PROFIBUS User Organization (PNO) and are available there.

The GSD-file for the VIPA PROFIBUS DP Slaves is: VIPA04D4.GSD

Install this file in your configuration tool. Look for more information in the online help of the according tool.

System overview

System overview

The System 100V from VIPA is an universal connecting link between a fieldbus and the sensor/actuator level. In the System 100V, the System 200V technology is integrated in a compact casing.

One System 100V unit consists of a PROFIBUS DP coupler and a combination of in-/output channels and expansion clamps.

Product overview

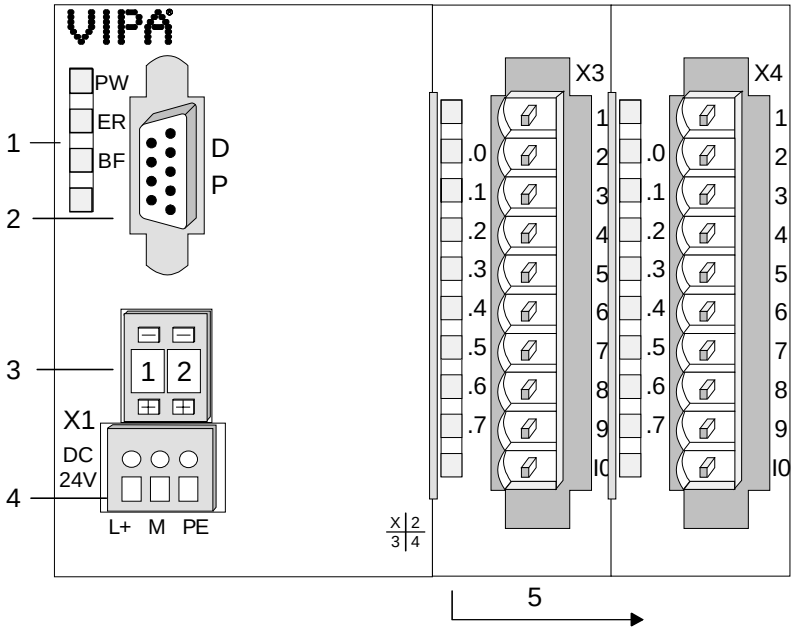
Old order no.	New order no.	Module width	Number of input DC 24V	Number of output DC 24V, 1A	Number of relay output DC 30V/AC 230V, 5A	Input data	Output data	Number of clamps	Current consumption module
	Digital input								
121-4BH00	151-4PH00	4tier	16	-	-	2Byte	-	-	55mA
121-6BH00	151-6PH00	6tier	16	-	-	2Byte	-	4x11	55mA
121-6BL00	151-6PL00	6tier	32	-	-	4Byte	-	-	55mA
	Digital output								
122-4BH00	152-4PH00	4tier	-	16	-	2Byte	-	-	55mA
122-6BH00	152-6PH00	6tier	-	16	-	2Byte	4x11	4x11	55mA
122-6HH00	152-6PH50	6tier	-	-	16	2Byte	-	-	200mA
122-4BL00	152-6PL00	6tier	-	32	-	4Byte	-	-	55mA
	Digital in-/output								
123-4BF00	153-4PF00	4tier	total 8		-	1Byte	1Byte	2x11	55mA
123-4BH00	153-4PH00	4tier	8	8	-	1Byte	1Byte	-	55mA
123-6BH00	153-6PH00	6tier	8	8	-	1Byte	1Byte	4x11	55mA
123-6BL00	153-6PL00	6tier	16	16	-	2Byte	2Byte	-	55mA
123-6BL10	153-6PL10	6tier	24	8	-	3Byte	1Byte	-	55mA
	Clamps								
	101-4FH50	4tier	-	-	-	-	-	8x11	-
	101-6FH50	6tier	-	-	-	-	-	12x11	-

Link up to PROFIBUS

Via the integrated PROFIBUS DP coupler, your System 100V gets the connection to PROFIBUS. The device specific data is delivered on the included disc in an GSD (Electronic Data Sheet; in German: Gerätestammdatei = GSD). With that file you may parameterize your System 100V in every master projecting tool.

Structure

Front view



[1] LED status monitor
[2] PROFIBUS interface
[3] Address selector
[4] Power supply DC24V
[5] Input / output periphery

Components

LEDs PROFIBUS DP slave

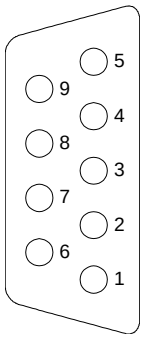
At the frontside there are 3 LEDs for bus diagnostic. The usage and the according colors are described in the following table:

Label	Color	Description
PW	green	Operating voltage Signalizes applying DC 24V operating voltage
ER	red	Error/Diagnostic Blinks at working diagnostic for short circuit, overload or missing voltage supply. Extinguishes as soon as the error is cleared.
BF	red	PROFIBUS bus error Blinks during establishing communication. Extinguishes at active communication.

RS485 interface

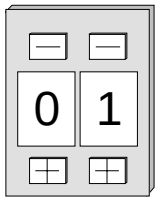
Via a 9pin RS485 interface you include your PROFIBUS slave into your PROFIBUS.

The pin assignment of this interface is shown in this table:



Pin	Assignment
1	screen
2	n.c.
3	RxD/TxD-P (Line B)
4	RTS
5	M5V
6	P5V
7	n.c.
8	RxD/TxD-N (Line A)
9	n.c.

Address adjuster



Via the address selector you choose the address that is used for the project engineering of the DP slave.

Permissible addresses are 1 to 99. Every address has to be unique within the bus.

The slave address has to be adjusted before switching on the bus coupler.

Attention!
You must not change the address during operation!

Power supply

Every PROFIBUS slave has an integrated mains power supply. The mains power supply has to be provided with DC 24V.

The mains power supply is protected against polarity inversion and overvoltage.

Attention!
Please regard the correct polarity at the voltage supply!

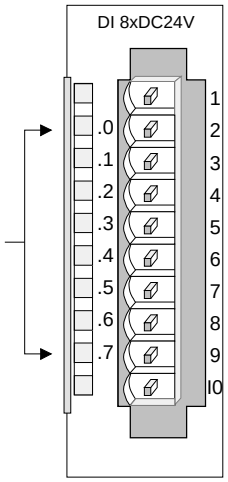
Input section

The digital input section of a System 100V module collects the binary control signals of the process level and transmits them to the leading PROFIBUS.

Every input channel shows its status via a green LED with a time delay of max. 3ms. The nominal input voltage is DC 24V. Hereby 0...5V are recognized as signal state "0" and 15...28.8V as signal state "1". More information about the installation of the input section is to find under "Circuit diagrams".

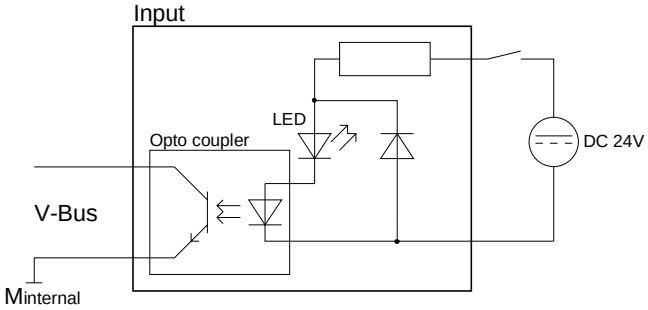
Status monitor
Pin assignment

LED	Description
.0... .7	LEDs (green) I+0.0 to I+0.7 from ca. 15V on, the signal "1" is recognized and the according LED is addressed



Pin	Assignment
1	not used
2	Input I+0.0
3	Input I+0.1
4	Input I+0.2
5	Input I+0.3
6	Input I+0.4
7	Input I+0.5
8	Input I+0.6
9	Input I+0.7
10	Ground

Schematic diagram Input section



Output section

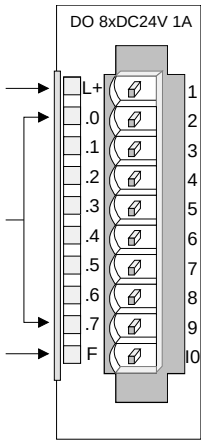
The digital output section collects the binary control signals of the leading PROFIBUS and transmits them to the process level by means of the outputs. The output section has to be additionally provided with DC 24V via the front-facing connector (see also circuit diagrams). The applying voltage supply is shown via the yellow LED (L+).

Every digital output channel shows its state via a green LED. When an output is active, the according LED is on.

At overload, overheat or short circuit, the error LED, labeled with "F", blinks red, a diagnostic is initialized and shown via the red ER-LED at the PROFIBUS coupler.

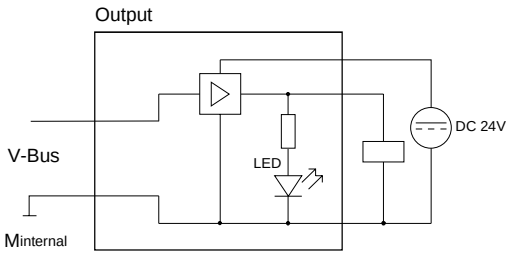
Status monitor
Pin assignment

LED	Description
L+	LED (yellow) Supply voltage applied
.0... .7	LEDs (green) Q+0.0 to Q+0.7 as soon as an output is active, the according LED is addressed
F	LED (red) Error at overload, overheat or short circuit



Pin	Assignment
1	Supply voltage DC 24V
2	Output Q+0.0
3	Output Q+0.1
4	Output Q+0.2
5	Output Q+0.3
6	Output Q+0.4
7	Output Q+0.5
8	Output Q+0.6
9	Output Q+0.7
10	Supply voltage Ground

Schematic diagram Output section



In-/Output section

The In-/Output section has 4 I/O channels that may be used as input or as output channels and 4 normal outputs. Every I/O channel is provided with a diagnostic function, i.e. when an output is active the respective input is set to "1". When a short circuit occurs at the load, the input is held at "0" and the error is detectable by analyzing the input.

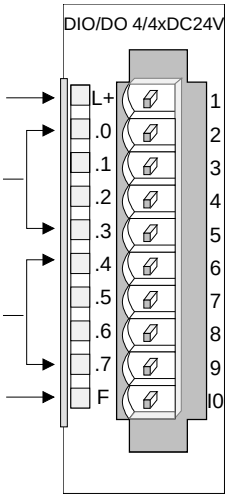
The In-/output section has to be additionally provided with DC 24V via the front-facing connector (see also schematic diagrams). The available supply voltage is shown via the yellow LED (L+).

Every digital in-/output channel shows its status via a green LED. At activated in-/output, the concerning LED is on.

If an overload, overheat or short circuit occurs, the error-LED, marked with "F", is blinking red.

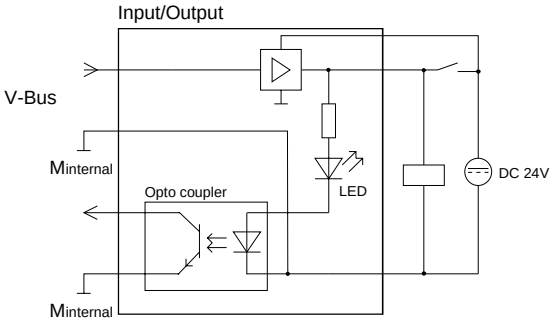
Status monitor pin assignment

LED	Description
L+	LED (yellow) Supply voltage is available
.0... .3	LEDs (green) I/Q+0.0 to I/Q+0.3 as soon as an I/O=1 the according LED is addressed
.4... .7	LEDs (green) Q+0.4 to Q+0.7 as soon as an output is active, the according LED is addressed
F	LED (red) Error at overload, overheat or short circuits.



Pin	Assignment
1	Supply voltage DC 24V
2	In-/Output I/Q+0.0
3	In-/Output I/Q+0.1
4	In-/Output I/Q+0.2
5	In-/Output I/Q+0.3
6	Output Q+0.4
7	Output Q+0.5
8	Output Q+0.6
9	Output Q+0.7
10	Supply voltage ground

Schematic diagram in-/ output section



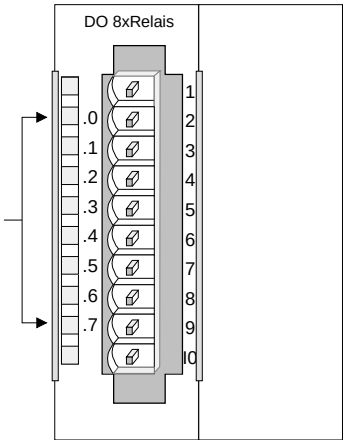
Relay output

At the relay output section, you apply the load voltage on the L+ clamp (10 or 1). From a sum current of 16A on, the load voltage has to be shared between the clamps 1 and 10.

The relay output has no LED for errors or applied load voltage. The relay section is not able to diagnose.

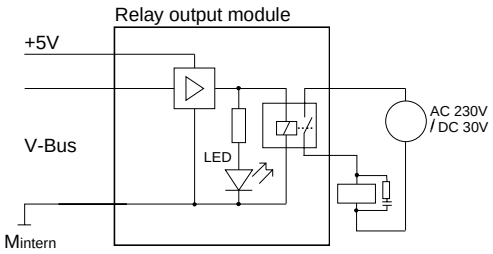
Status monitor
Pin assignment

LED	Description
.0... .7	LED (green) Q+0.0 to Q+0.7 as soon as an output is active, the according LED is addressed



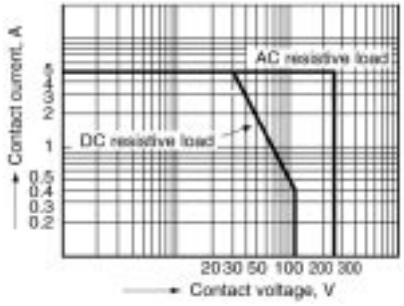
Pin	Assignment
1	Supply voltage Ca
2	Relay output Q+0.0
3	Relay output Q+0.1
4	Relay output Q+0.2
5	Relay output Q+0.3
6	Relay output Q+0.4
7	Relay output Q+0.5
8	Relay output Q+0.6
9	Relay output Q+0.7
10	Supply voltage Cb

Schematic diagram Relay output

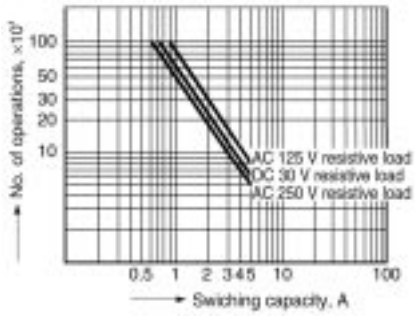


Note: When using inductive load please take an suitable protector (i.e. RC-combination).

Maximum toggle performance



Life time

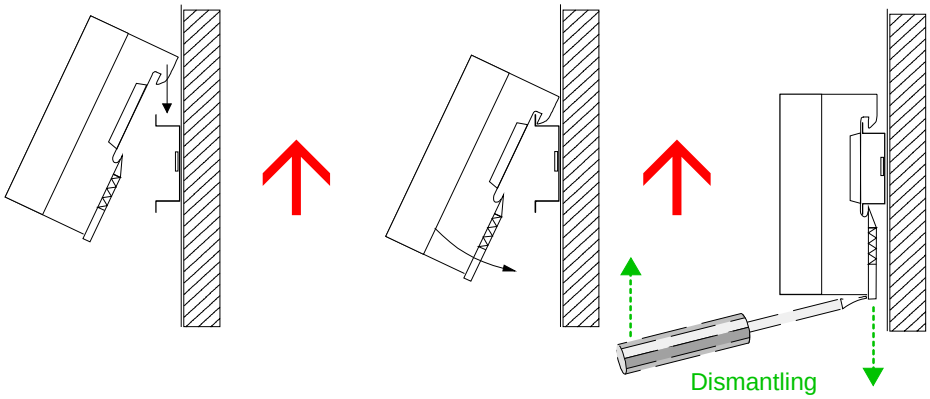


Assembly and cabling

Assembly/ Dismantling

System 100V modules are clipped to 35mm standard norm profile rails.

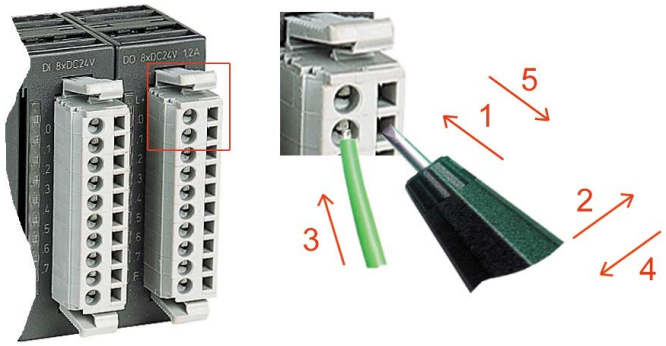
For the dismantling you have to pull down the locker with a screwdriver and lift the module from the profile rail.



Cabling

Take a fitting screwdriver and push the cage clamp in the rectangular opening to the back, then insert the cable into the round opening.

The cage clamp locks securely by removing the screwdriver.



Link up to PROFIBUS

PROFIBUS in general

- The VIPA PROFIBUS DP network must have a linear structure.
- PROFIBUS DP consists of minimum one segment with at least one master and one slave.
- A master is always used in conjunction with a CPU.
- PROFIBUS supports a max. of 125 participants.
- A max. of 32 devices are permitted per segment.
- The maximum length of a segment depends on the transfer rate :

9.6 ... 187.5kBaud	→	1000m
500kBaud	→	400m
1.5MBaud	→	200m
3 ... 12MBaud	→	100m

- The network may have a maximum of 10 segments. Segments are connected by means of repeaters. Every repeater is also seen as participant on the network.
- All devices communicate at the same baudrate, slaves adapt automatically to the baudrate.

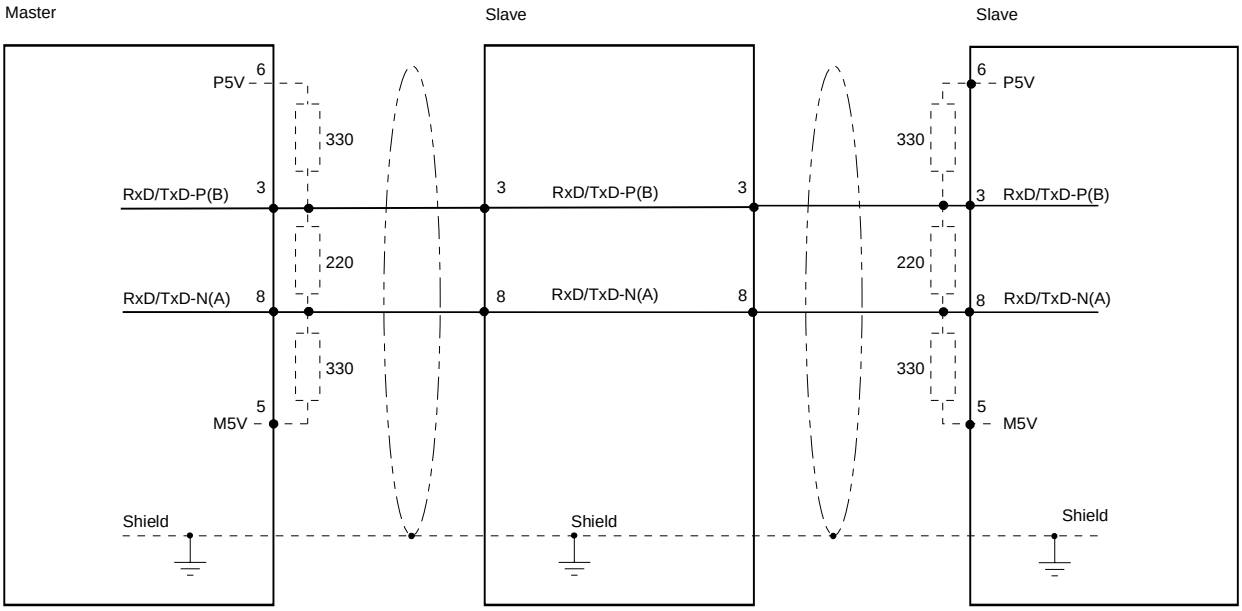
PROFIBUS using RS485

PROFIBUS employs a screened twisted pair cable based on RS485 interface specifications as the data communication medium.

Note!
The PROFIBUS line must be terminated with ripple resistor. Please ensure that the last participant the line is terminated by means of a terminating resistor.

Bus connection

The following picture illustrates the terminating resistors of the respective start and end station.

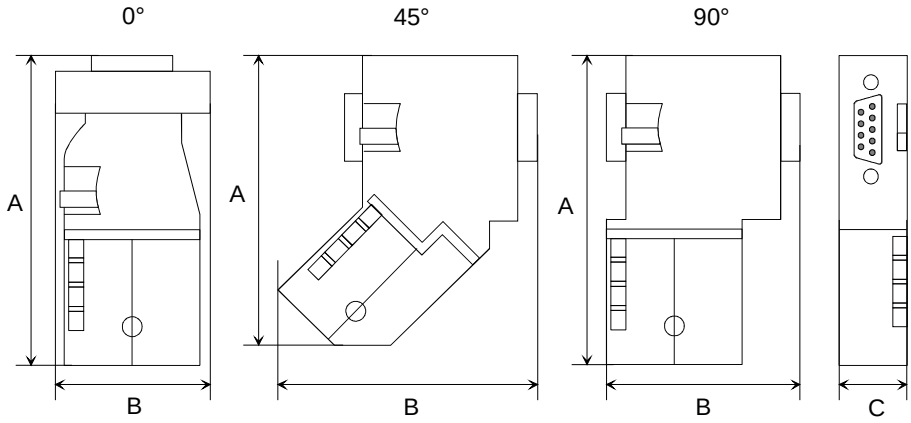


Note!
The PROFIBUS line has to be terminated with its ripple resistor. Please make sure to terminate the last participants on the bus at both ends by activating the terminating resistor.

EasyConn bus connector

In PROFIBUS all participants are wired parallel. For that purpose, the bus cable must be feed-through.

Via the order number VIPA 972-0DP10 you may order the bus connector "EasyConn". This is a bus connector with switchable terminating resistor and integrated bus diagnostic.

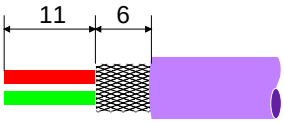


	0°	45°	90°
A	64	61	66
B	34	53	40
C	15.8	15.8	15.8

in mm

Note!

To connect this EasyConn plug, please use the standard PROFIBUS cable type A (EN50170). Starting with release 5 you also can use highly flexible bus cable: Lapp Kabel order no.: 2170222, 2170822, 2170322.
With the order no. 905-6AA00 VIPA offers the "EasyStrip" de-isolating tool that makes the connection of the EasyConn much easier.



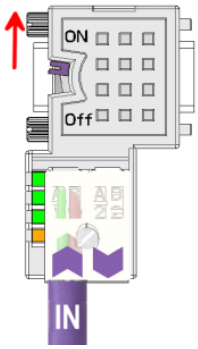
Dimensions in mm

Termination with "EasyConn"

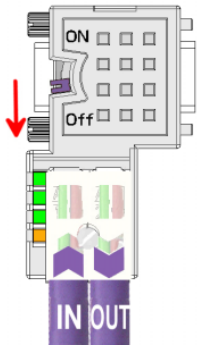
The "EasyConn" bus connector is provided with a switch that is used to activate a terminating resistor.

Wiring

1./last bus participant



further participants



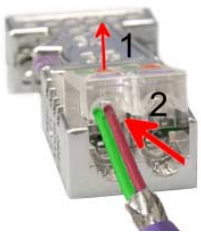
Attention!

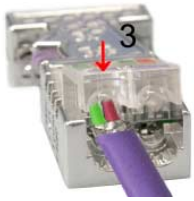
The terminating resistor is only effective, if the connector is installed at a bus participant and the bus participant is connected to a power supply.

Note!

A complete description of installation and deployment of the terminating resistors is delivered with the connector.

Assembly





- Loosen the screw.
- Lift contact-cover.
- Insert both wires into the ducts provided (watch for the correct line color as below!)
- Please take care not to cause a short circuit between screen and data lines!
- Close the contact cover.
- Tighten screw (max. tightening torque 4Nm).

Please note: The green line must be connected to A, the red line to B!

Commissioning

PROFIBUS addressing

Every participant at the PROFIBUS identifies itself with an address. This address has to be unique in this bus system and may cover the range between 0 and 99 at the System 100V.

At the System 100V you adjust the PROFIBUS address via the address adjuster at the module front side.

Note!
Please make sure, that you use the same address in your configuration!

Project engineering

On the included disc you will find the GSD-file of the System 100V in the GSD-folder. Copy it to the GSD-directory of your configuration tool.

When using the configuration tool WinNCS from VIPA together with an IM208-Master from VIPA, the GSD-file is part of WinNCS.

Commissioning

- Install your System 100V at the profile rail.
- Cable your System 100V like shown in the circuit diagrams. Please regard, that the output units need an external voltage supply.
- Choose the PROFIBUS address at the frontside and transfer it into your project engineering.
- Configure your PROFIBUS and transfer your project into the master.
- For further commissioning please proceed the description of your master system.

LEDs PROFIBUS coupler unit

At the frontside there are 3 LEDs, serving the bus diagnostic. The usage and the according colors of this diagnostic LEDs are shown in the table:

Label	Color	Description
PW	green	Operating voltage Signalizes applying DC 24V operating voltage
ER	red	Error/Diagnostics Blink at waiting diagnostic because of a short circuit, an overload or missing voltage supply. Extinguishes as soon as the error is cleared.
BF	yellow	PROFIBUS bus error Blinks during the communication start. Extinguishes as soon as the bus communication is established.

Diagnostic

At request from the master or at an error event, the integrated PROFIBUS coupler sends a 13Byte diagnostic telegram. At this time only the digital output units are diagnosable.

13Byte Diagnostic data

The diagnostic telegram has the following structure:

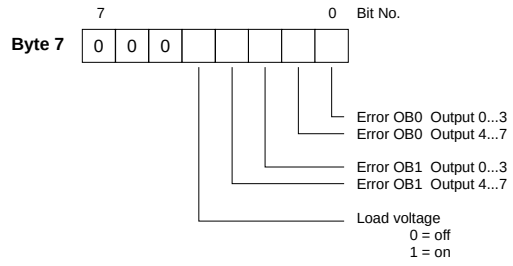
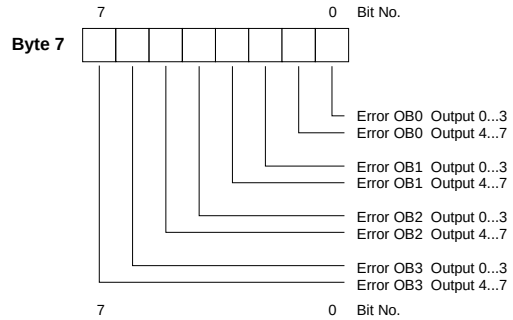
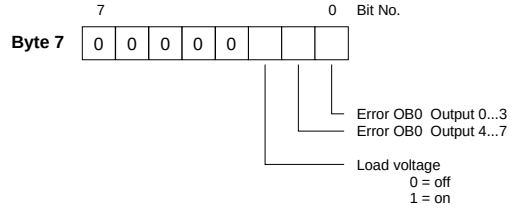
Norm diagnostic data

Byte 0	Station state 1
Byte 1	Station state 2
Byte 2	Station state 3
Byte 3	Master address
Byte 4	Ident no (low)
Byte 5	Ident no (high)

Device related diagnostic data

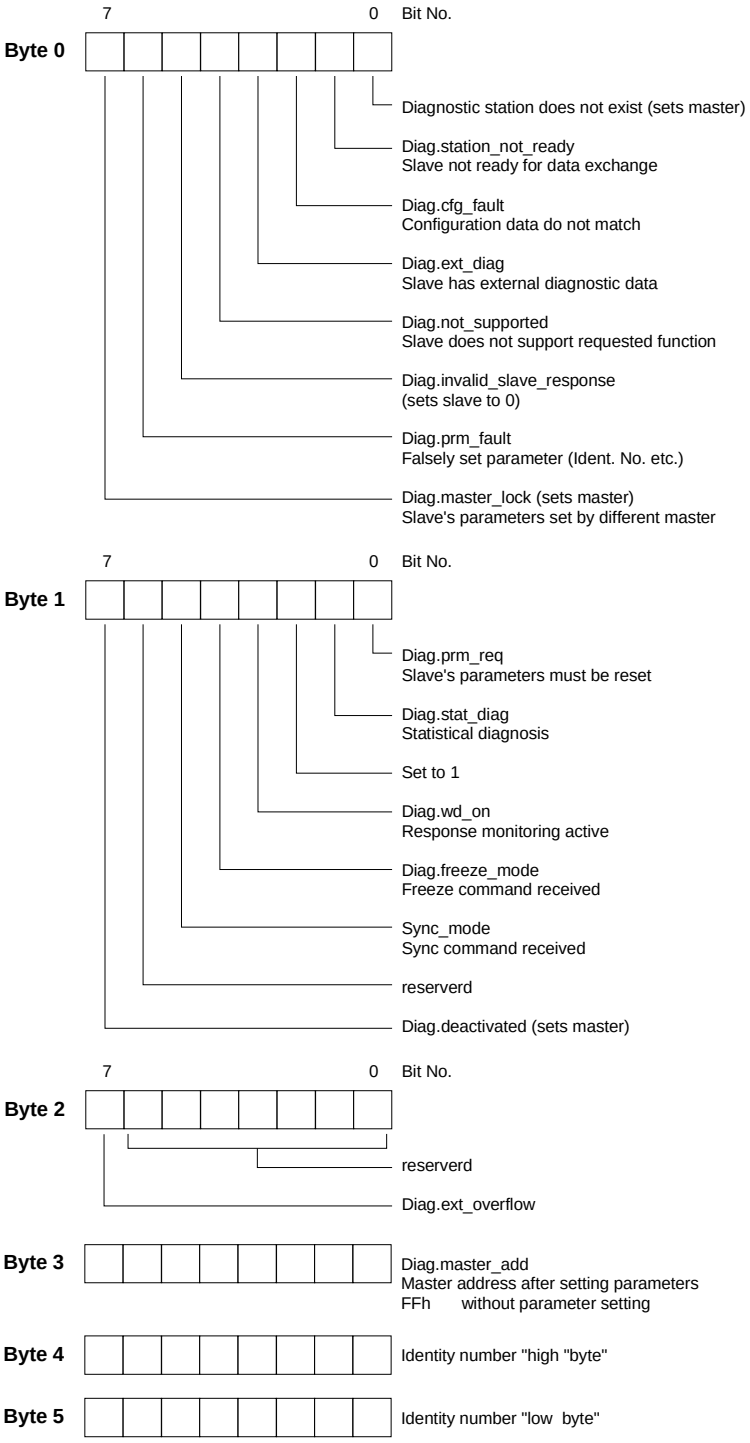
Byte 6	Diagnostic header fixed at 07h
Byte 7	**Diagnostic Byte of the periphery**
Byte 8 ... Byte 12	00h reserved

Overview Diagnostic Byte 7

Module	Structure Diagnostic-Byte 7
152-4PH00 152-6PH00 153-6PL00	
152-6PL00	
153-4PF00 153-4PH00 153-6PH00 153-6PL10	

Norm diagnostic data (Byte 0 ... Byte 5)

More information about the structure of the norm diagnostic data are to find in the PROFIBUS Norm papers. These are available at the "PROFIBUS Nutzer Organisation" (PROFIBUS User Org).



Note!

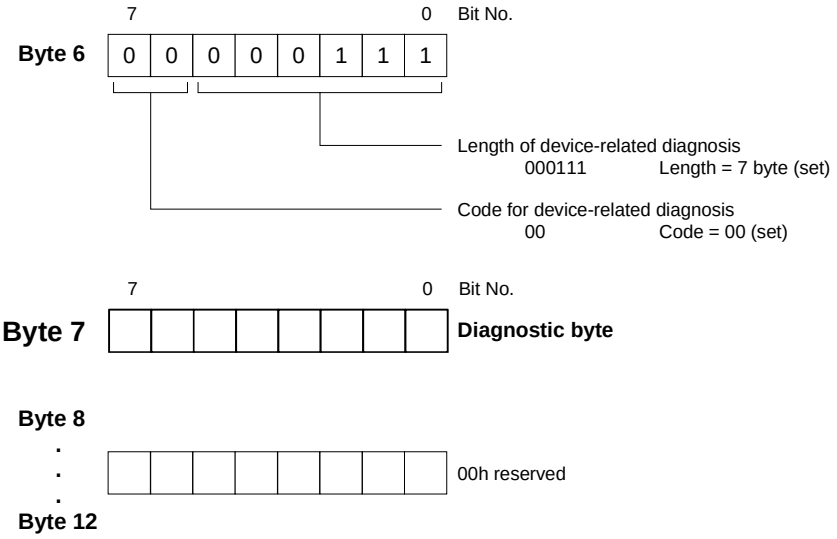
The Byte 3 of the norm diagnostic data contains the address of the PROFIBUS master that parameterizes the System 100V module.

When an FFh is entered here, the according System 100V module is not parameterized in the master.

Device related diagnostic data (Byte 6 ... Byte 12)

The device related diagnostic data contain detailed information about the periphery of the System 100V.

The device related diagnostic data have the following structure:



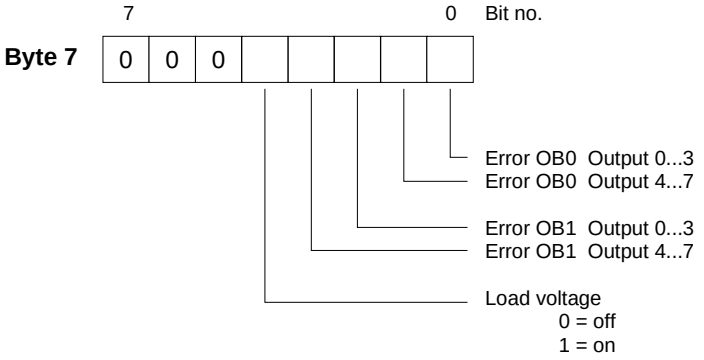
Diagnostic Byte 7

Every output unit is addressed via an output byte (AB). In case of an error, the unit occupies 2 diagnostic bits in ascending series starting at Bit 0, one for Low-AB (output 0...3) and one for High-AB (output 4...7).

For not all modules occupy all bits, the next free bit is used for monitoring the applying load voltage "diagnostic load voltage on".

Example

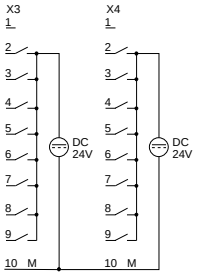
The module 153-6PL00 (DI 16xDC 24V / DO 16xDC 24V) has the following diagnostic byte:



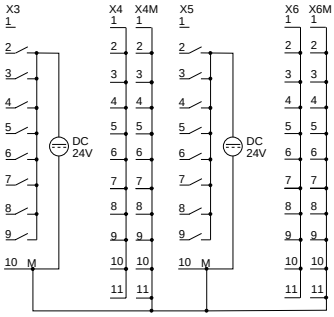
Circuit diagrams

Digital input

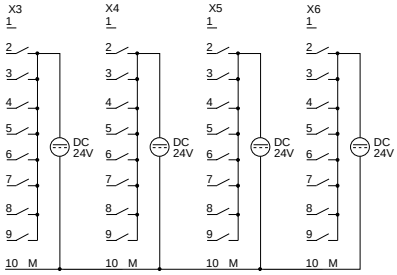
VIPA 151-4PH00



VIPA 151-6PH00

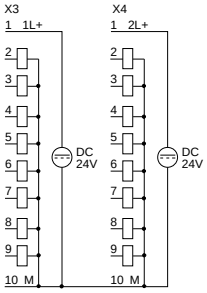


VIPA 151-6PL00

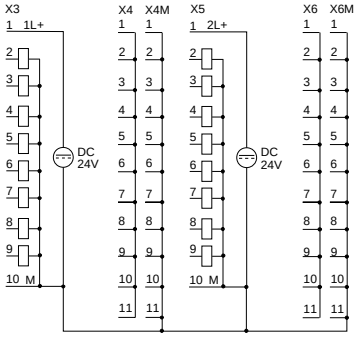


Digital output

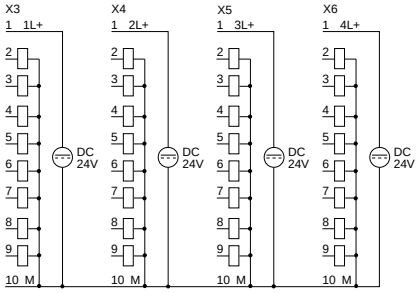
VIPA 152-4PH00



VIPA 152-6PH00

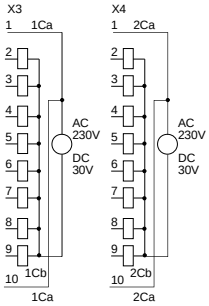


VIPA 152-6PL00



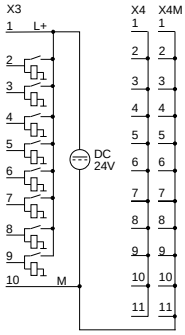
Relay output

VIPA 152-6PH50

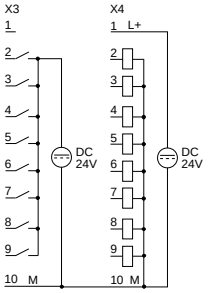


Digital in-/output

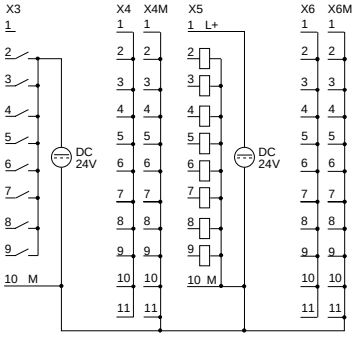
VIPA 153-4PF00



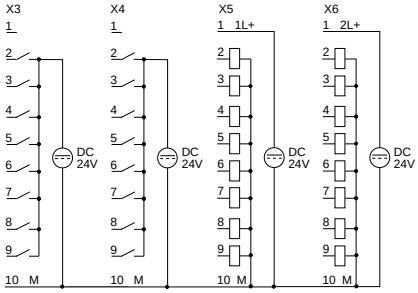
VIPA 153-4PH00



VIPA 153-6PH00

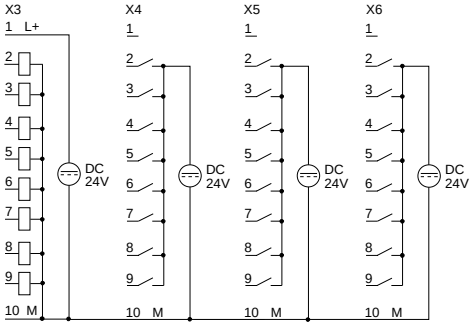


VIPA 153-6PL00

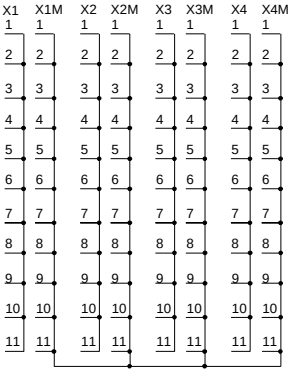


Clamps

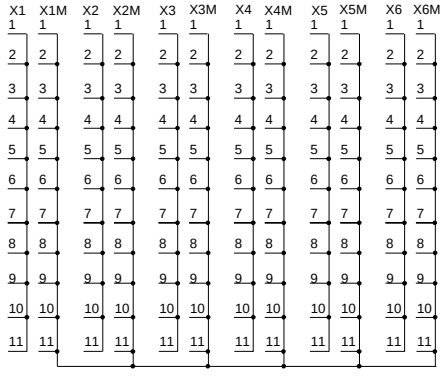
VIPA 153-6PL10



VIPA 101-4FH50



VIPA 101-6FH50



Technical Data

SM 151 *PROFIBUS DP slave with digital input*

151-4PH00

Order no.	**151-4PH00**
Type	SM 151
Technical data power supply	
Power supply (rated value)	DC 24 V
Power supply (permitted range)	DC 20.4...28.8 V
Reverse polarity protection	✓
Current consumption (no-load operation)	-
Current consumption (rated value)	55 mA
Inrush current	40 A
I^2t	0.15 A^2s
Technical data digital inputs	
Number of inputs	16
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	DC 24 V
Reverse polarity protection of rated load voltage	-
Current consumption from load voltage L+ (without load)	-
Rated value	DC 24 V
Input voltage for signal "0"	DC 0...5 V
Input voltage for signal "1"	DC 15...28.8 V
Input voltage hysteresis	-
Frequency range	-
Input resistance	-
Input current for signal "1"	7 mA
Connection of Two-Wire-BEROs possible	✓
Max. permissible BERO quiescent current	1.5 mA
Input delay of "0" to "1"	3 ms
Input delay of "1" to "0"	3 ms
Number of simultaneously utilizable inputs horizontal configuration	16
Number of simultaneously utilizable inputs vertical configuration	16
Input characteristic curve	IEC 61131-2, type 1
Initial data size	2 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
Supply voltage display	yes
Group error display	red SF LED
Channel error display	none
Isolation	
Between channels	-
Between channels of groups to	-
Between channels and backplane bus	-
Between channels and power supply	-
Max. potential difference between circuits	-

Order no.	**151-4PH00**
Max. potential difference between inputs (Ucm)	-
Max. potential difference between Mana and Mintern (Uiso)	-
Max. potential difference between inputs and Mana (Ucm)	-
Max. potential difference between inputs and Mintern (Uiso)	-
Max. potential difference between Mintern and outputs	-
Insulation tested with	DC 500 V
Hardware configuration	
Racks, max.	-
Modules per rack, max.	-
Number of digital modules, max.	-
Number of analog modules, max.	-
Communication	
Fieldbus	PROFIBUS-DP to EN 50170
Type of interface	RS485
Connector	Sub-D, 9-pin, female
Topology	Linear bus with bus termination at both ends
Electrically isolated	✓
Number of participants, max.	125
Node addresses	1 - 99
Transmission speed, min.	9.6 kbit/s
Transmission speed, max.	12 Mbit/s
Address range inputs, max.	2 Byte
Address range outputs, max.	0 Byte
Number of TxPDOs, max.	-
Number of RxPDOs, max.	-
Datasizes	
Input bytes	1
Output bytes	0
Parameter bytes	7 + 5
Diagnostic bytes	0
Housing	
Material	PPE / PA 6.6
Mounting	Profile rail 35 mm
Mechanical data	
Dimensions (WxHxD)	101.6 x 76 x 48 mm
Weight	217 g
Environmental conditions	
Operating temperature	0 °C to 60 °C
Storage temperature	-25 °C to 70 °C
Certifications	
UL508 certification	yes

151-6PH00

Order no.	**151-6PH00**
Type	SM 151
Technical data power supply	
Power supply (rated value)	DC 24 V
Power supply (permitted range)	DC 20.4...28.8 V
Reverse polarity protection	✓
Current consumption (no-load operation)	-
Current consumption (rated value)	55 mA
Inrush current	40 A
I^2t	0.15 A^2s
Technical data digital inputs	
Number of inputs	16
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	DC 24 V
Reverse polarity protection of rated load voltage	-
Current consumption from load voltage L+ (without load)	-
Rated value	DC 24 V
Input voltage for signal "0"	DC 0...5 V
Input voltage for signal "1"	DC 15...28.8 V
Input voltage hysteresis	-
Frequency range	-
Input resistance	-
Input current for signal "1"	7 mA
Connection of Two-Wire-BEROs possible	✓
Max. permissible BERO quiescent current	1.5 mA
Input delay of "0" to "1"	3 ms
Input delay of "1" to "0"	3 ms
Number of simultaneously utilizable inputs horizontal configuration	16
Number of simultaneously utilizable inputs vertical configuration	16
Input characteristic curve	IEC 61131-2, type 1
Initial data size	2 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
Supply voltage display	yes
Group error display	red SF LED
Channel error display	none
Isolation	
Between channels	-
Between channels of groups to	-
Between channels and backplane bus	-
Between channels and power supply	-
Max. potential difference between circuits	-
Max. potential difference between inputs (Ucm)	-
Max. potential difference between Mana and Mintern (Uiso)	-
Max. potential difference between inputs and Mana (Ucm)	-
Max. potential difference between inputs and Mintern (Uiso)	-

Order no.	**151-6PH00**
Max. potential difference between Mintern and outputs	-
Insulation tested with	DC 500 V
Hardware configuration	
Racks, max.	-
Modules per rack, max.	-
Number of digital modules, max.	-
Number of analog modules, max.	-
Communication	
Fieldbus	PROFIBUS-DP to EN 50170
Type of interface	RS485
Connector	Sub-D, 9-pin, female
Topology	Linear bus with bus termination at both ends
Electrically isolated	✓
Number of participants, max.	125
Node addresses	1 - 99
Transmission speed, min.	9.6 kbit/s
Transmission speed, max.	12 Mbit/s
Address range inputs, max.	2 Byte
Address range outputs, max.	0 Byte
Number of TxPDOs, max.	-
Number of RxPDOs, max.	-
Datasizes	
Input bytes	2
Output bytes	0
Parameter bytes	7 + 5
Diagnostic bytes	0
Housing	
Material	PPE / PA 6.6
Mounting	Profile rail 35 mm
Mechanical data	
Dimensions (WxHxD)	152.4 x 76 x 48 mm
Weight	288 g
Environmental conditions	
Operating temperature	0 °C to 60 °C
Storage temperature	-25 °C to 70 °C
Certifications	
UL508 certification	yes

151-6PL00

Order no.	**151-6PL00**
Type	SM 151
Technical data power supply	
Power supply (rated value)	DC 24 V
Power supply (permitted range)	DC 20.4...28.8 V
Reverse polarity protection	✓
Current consumption (no-load operation)	-
Current consumption (rated value)	55 mA
Inrush current	40 A
I^2t	0.15 A^2s
Technical data digital inputs	
Number of inputs	32
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	DC 24 V
Reverse polarity protection of rated load voltage	-
Current consumption from load voltage L+ (without load)	-
Rated value	DC 24 V
Input voltage for signal "0"	DC 0...5 V
Input voltage for signal "1"	DC 15...28.8 V
Input voltage hysteresis	-
Frequency range	-
Input resistance	-
Input current for signal "1"	7 mA
Connection of Two-Wire-BEROs possible	✓
Max. permissible BERO quiescent current	1.5 mA
Input delay of "0" to "1"	3 ms
Input delay of "1" to "0"	3 ms
Number of simultaneously utilizable inputs horizontal configuration	32
Number of simultaneously utilizable inputs vertical configuration	32
Input characteristic curve	IEC 61131-2, type 1
Initial data size	4 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
Supply voltage display	yes
Group error display	red SF LED
Channel error display	none
Isolation	
Between channels	-
Between channels of groups to	-
Between channels and backplane bus	-
Between channels and power supply	-
Max. potential difference between circuits	-
Max. potential difference between inputs (Ucm)	-
Max. potential difference between Mana and Mintern (Uiso)	-
Max. potential difference between inputs and Mana (Ucm)	-
Max. potential difference between inputs and Mintern (Uiso)	-

Order no.	**151-6PL00**
Max. potential difference between Mintern and outputs	-
Insulation tested with	DC 500 V
Hardware configuration	
Racks, max.	-
Modules per rack, max.	-
Number of digital modules, max.	-
Number of analog modules, max.	-
Communication	
Fieldbus	PROFIBUS-DP to EN 50170
Type of interface	RS485
Connector	Sub-D, 9-pin, female
Topology	Linear bus with bus termination at both ends
Electrically isolated	✓
Number of participants, max.	125
Node addresses	1 - 99
Transmission speed, min.	9.6 kbit/s
Transmission speed, max.	12 Mbit/s
Address range inputs, max.	4 Byte
Address range outputs, max.	0 Byte
Number of TxPDOs, max.	-
Number of RxPDOs, max.	-
Datasizes	
Input bytes	4
Output bytes	0
Parameter bytes	7 + 5
Diagnostic bytes	0
Housing	
Material	PPE / PA 6.6
Mounting	Profile rail 35 mm
Mechanical data	
Dimensions (WxHxD)	152.4 x 76 x 48 mm
Weight	260 g
Environmental conditions	
Operating temperature	0 °C to 60 °C
Storage temperature	-25 °C to 70 °C
Certifications	
UL508 certification	yes

SM 152 *PROFIBUS DP slave with digital output*

152-4PH00

Order no.	**152-4PH00**
Type	SM 152
Technical data power supply	
Power supply (rated value)	DC 24 V
Power supply (permitted range)	DC 20.4...28.8 V
Reverse polarity protection	✓
Current consumption (no-load operation)	-
Current consumption (rated value)	55 mA
Technical data digital outputs	
Number of outputs	16
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	DC 24 V
Reverse polarity protection of rated load voltage	-
Current consumption from load voltage L+ (without load)	50 mA
Total current per group, horizontal configuration, 40°C	-
Total current per group, horizontal configuration, 60°C	-
Total current per group, vertical configuration	-
Output voltage signal "1" at min. current	L+ (-0.8 V)
Output voltage signal "1" at max. current	L+ (-1.5 V)
Output current at signal "1", rated value	1 A
Output current, permitted range to 40°C	-
Output current, permitted range to 60°C	-
Output current at signal "0" max. (residual current)	-
Output delay of "0" to "1"	150 µs
Output delay of "1" to "0"	100 µs
Minimum load current	-
Lamp load	5 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	✓
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	1.5 A
Number of operating cycle of relay outputs	-
Switching capacity of contacts	-
Output data size	2 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	none
Supply voltage display	yes
Group error display	red SF LED
Channel error display	none
Isolation	
Between channels	-

Order no.	**152-4PH00**
Between channels of groups to	-
Between channels and backplane bus	-
Between channels and power supply	-
Max. potential difference between circuits	-
Max. potential difference between inputs (Ucm)	-
Max. potential difference between Mana and Mintern (Uiso)	-
Max. potential difference between inputs and Mana (Ucm)	-
Max. potential difference between inputs and Mintern (Uiso)	-
Max. potential difference between Mintern and outputs	-
Insulation tested with	DC 500 V
Hardware configuration	
Racks, max.	-
Modules per rack, max.	-
Number of digital modules, max.	-
Number of analog modules, max.	-
Communication	
Fieldbus	PROFIBUS-DP to EN 50170
Type of interface	RS485
Connector	Sub-D, 9-pin, female
Topology	Linear bus with bus termination at both ends
Electrically isolated	✓
Number of participants, max.	125
Node addresses	1 - 99
Transmission speed, min.	9.6 kbit/s
Transmission speed, max.	12 Mbit/s
Address range inputs, max.	0 Byte
Address range outputs, max.	2 Byte
Number of TxPDOs, max.	-
Number of RxPDOs, max.	-
Datasizes	
Input bytes	0
Output bytes	2
Parameter bytes	7 + 5
Diagnostic bytes	13
Housing	
Material	PPE / PA 6.6
Mounting	Profile rail 35 mm
Mechanical data	
Dimensions (WxHxD)	101.6 x 76 x 48 mm
Weight	206 g
Environmental conditions	
Operating temperature	0 °C to 60 °C
Storage temperature	-25 °C to 70 °C
Certifications	
UL508 certification	yes

152-6PH00

Order no.	**152-6PH00**
Type	SM 152
Technical data power supply	
Power supply (rated value)	DC 24 V
Power supply (permitted range)	DC 20.4...28.8 V
Reverse polarity protection	✓
Current consumption (no-load operation)	-
Current consumption (rated value)	55 mA
Technical data digital outputs	
Number of outputs	16
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	DC 24 V
Reverse polarity protection of rated load voltage	-
Current consumption from load voltage L+ (without load)	50 mA
Total current per group, horizontal configuration, 40°C	-
Total current per group, horizontal configuration, 60°C	-
Total current per group, vertical configuration	-
Output voltage signal "1" at min. current	L+ (-0.8 V)
Output voltage signal "1" at max. current	L+ (-1.5 V)
Output current at signal "1", rated value	1 A
Output current, permitted range to 40°C	-
Output current, permitted range to 60°C	-
Output current at signal "0" max. (residual current)	-
Output delay of "0" to "1"	150 µs
Output delay of "1" to "0"	100 µs
Minimum load current	-
Lamp load	5 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	✓
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	1.5 A
Number of operating cycle of relay outputs	-
Switching capacity of contacts	-
Output data size	2 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	none
Supply voltage display	yes
Group error display	red SF LED
Channel error display	none
Isolation	
Between channels	-
Between channels of groups to	-
Between channels and backplane bus	-

Order no.	**152-6PH00**
Between channels and power supply	-
Max. potential difference between circuits	-
Max. potential difference between inputs (Ucm)	-
Max. potential difference between Mana and Mintern (Uiso)	-
Max. potential difference between inputs and Mana (Ucm)	-
Max. potential difference between inputs and Mintern (Uiso)	-
Max. potential difference between Mintern and outputs	-
Insulation tested with	DC 500 V
Hardware configuration	
Racks, max.	-
Modules per rack, max.	-
Number of digital modules, max.	-
Number of analog modules, max.	-
Communication	
Fieldbus	PROFIBUS-DP to EN 50170
Type of interface	RS485
Connector	Sub-D, 9-pin, female
Topology	Linear bus with bus termination at both ends
Electrically isolated	✓
Number of participants, max.	125
Node addresses	1 - 99
Transmission speed, min.	9.6 kbit/s
Transmission speed, max.	12 Mbit/s
Address range inputs, max.	0 Byte
Address range outputs, max.	2 Byte
Number of TxPDOs, max.	-
Number of RxPDOs, max.	-
Datasizes	
Input bytes	0
Output bytes	2
Parameter bytes	7 + 5
Diagnostic bytes	13
Housing	
Material	PPE / PA 6.6
Mounting	Profile rail 35 mm
Mechanical data	
Dimensions (WxHxD)	152.4 x 76 x 48 mm
Weight	268 g
Environmental conditions	
Operating temperature	0 °C to 60 °C
Storage temperature	-25 °C to 70 °C
Certifications	
UL508 certification	yes

152-6PL00

Order no.	**152-6PL00**
Type	SM 152
Technical data power supply	
Power supply (rated value)	DC 24 V
Power supply (permitted range)	DC 20.4...28.8 V
Reverse polarity protection	✓
Current consumption (no-load operation)	-
Current consumption (rated value)	55 mA
Technical data digital outputs	
Number of outputs	32
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	DC 24 V
Reverse polarity protection of rated load voltage	-
Current consumption from load voltage L+ (without load)	50 mA
Total current per group, horizontal configuration, 40°C	-
Total current per group, horizontal configuration, 60°C	-
Total current per group, vertical configuration	-
Output voltage signal "1" at min. current	L+ (-0.8 V)
Output voltage signal "1" at max. current	L+ (-1.5 V)
Output current at signal "1", rated value	1 A
Output current, permitted range to 40°C	-
Output current, permitted range to 60°C	-
Output current at signal "0" max. (residual current)	-
Output delay of "0" to "1"	150 µs
Output delay of "1" to "0"	100 µs
Minimum load current	-
Lamp load	5 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	✓
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	1.5 A
Number of operating cycle of relay outputs	-
Switching capacity of contacts	-
Output data size	4 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	none
Supply voltage display	yes
Group error display	red SF LED
Channel error display	none
Isolation	
Between channels	-
Between channels of groups to	-
Between channels and backplane bus	-

Order no.	**152-6PL00**
Between channels and power supply	-
Max. potential difference between circuits	-
Max. potential difference between inputs (Ucm)	-
Max. potential difference between Mana and Mintern (Uiso)	-
Max. potential difference between inputs and Mana (Ucm)	-
Max. potential difference between inputs and Mintern (Uiso)	-
Max. potential difference between Mintern and outputs	-
Insulation tested with	DC 500 V
Hardware configuration	
Racks, max.	-
Modules per rack, max.	-
Number of digital modules, max.	-
Number of analog modules, max.	-
Communication	
Fieldbus	PROFIBUS-DP to EN 50170
Type of interface	RS485
Connector	Sub-D, 9-pin, female
Topology	Linear bus with bus termination at both ends
Electrically isolated	✓
Number of participants, max.	125
Node addresses	1 - 99
Transmission speed, min.	9.6 kbit/s
Transmission speed, max.	12 Mbit/s
Address range inputs, max.	0 Byte
Address range outputs, max.	4 Byte
Number of TxPDOs, max.	-
Number of RxPDOs, max.	-
Datasizes	
Input bytes	0
Output bytes	4
Parameter bytes	7 + 5
Diagnostic bytes	13
Housing	
Material	PPE / PA 6.6
Mounting	Profile rail 35 mm
Mechanical data	
Dimensions (WxHxD)	152.4 x 76 x 48 mm
Weight	299 g
Environmental conditions	
Operating temperature	0 °C to 60 °C
Storage temperature	-25 °C to 70 °C
Certifications	
UL508 certification	yes

152-6PH50

Order no.	**152-6PH50**
Type	SM 152
Technical data power supply	
Power supply (rated value)	DC 24 V
Power supply (permitted range)	DC 20.4...28.8 V
Reverse polarity protection	✓
Current consumption (no-load operation)	-
Current consumption (rated value)	200 mA
Technical data digital outputs	
Number of outputs	16
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	DC 30 V/ AC 230 V
Reverse polarity protection of rated load voltage	-
Current consumption from load voltage L+ (without load)	-
Total current per group, horizontal configuration, 40°C	8 A
Total current per group, horizontal configuration, 60°C	8 A
Total current per group, vertical configuration	8 A
Output voltage signal "1" at min. current	-
Output voltage signal "1" at max. current	-
Output current at signal "1", rated value	5 A
Output current, permitted range to 40°C	-
Output current, permitted range to 60°C	-
Output current at signal "0" max. (residual current)	-
Output delay of "0" to "1"	-
Output delay of "1" to "0"	-
Minimum load current	-
Lamp load	-
Parallel switching of outputs for redundant control of a load	-
Parallel switching of outputs for increased power	-
Actuation of digital input	-
Switching frequency with resistive load	max. 100 Hz
Switching frequency with inductive load	-
Switching frequency on lamp load	-
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	-
Output data size	2 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	none
Supply voltage display	yes
Group error display	red SF LED
Channel error display	none
Isolation	
Between channels	-
Between channels of groups to	8
Between channels and backplane bus	✓

Order no.	**152-6PH50**
Between channels and power supply	-
Max. potential difference between circuits	-
Max. potential difference between inputs (Ucm)	-
Max. potential difference between Mana and Mintern (Uiso)	-
Max. potential difference between inputs and Mana (Ucm)	-
Max. potential difference between inputs and Mintern (Uiso)	-
Max. potential difference between Mintern and outputs	-
Insulation tested with	DC 500 V
Hardware configuration	
Racks, max.	-
Modules per rack, max.	-
Number of digital modules, max.	-
Number of analog modules, max.	-
Communication	
Fieldbus	PROFIBUS-DP to EN 50170
Type of interface	RS485
Connector	Sub-D, 9-pin, female
Topology	Linear bus with bus termination at both ends
Electrically isolated	✓
Number of participants, max.	125
Node addresses	1 - 99
Transmission speed, min.	9.6 kbit/s
Transmission speed, max.	12 Mbit/s
Address range inputs, max.	0 Byte
Address range outputs, max.	2 Byte
Number of TxPDOs, max.	-
Number of RxPDOs, max.	-
Datasizes	
Input bytes	0
Output bytes	2
Parameter bytes	7 + 5
Diagnostic bytes	13
Housing	
Material	PPE / PA 6.6
Mounting	Profile rail 35 mm
Mechanical data	
Dimensions (WxHxD)	152.4 x 76 x 48 mm
Weight	310 g
Environmental conditions	
Operating temperature	0 °C to 60 °C
Storage temperature	-25 °C to 70 °C
Certifications	
UL508 certification	yes

SM 153 *PROFIBUS DP Slave with digital in-/output*

153-4PF00

Order no.	**153-4PF00**
Type	SM 153, PB-DP slave
Technical data power supply	
Power supply (rated value)	DC 24 V
Power supply (permitted range)	DC 20.4...28.8 V
Reverse polarity protection	✓
Current consumption (no-load operation)	-
Current consumption (rated value)	55 mA
Technical data digital inputs	
Number of inputs	0 (8
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	DC 24 V
Reverse polarity protection of rated load voltage	-
Current consumption from load voltage L+ (without load)	-
Rated value	DC 24 V
Input voltage for signal "0"	DC 0...5 V
Input voltage for signal "1"	DC 15...28.8 V
Input voltage hysteresis	-
Frequency range	-
Input resistance	-
Input current for signal "1"	7 mA
Connection of Two-Wire-BEROs possible	✓
Max. permissible BERO quiescent current	1.5 mA
Input delay of "0" to "1"	3 ms
Input delay of "1" to "0"	3 ms
Number of simultaneously utilizable inputs horizontal configuration	8
Number of simultaneously utilizable inputs vertical configuration	8
Input characteristic curve	IEC 61131-2, type 1
Initial data size	1 Byte
Technical data digital outputs	
Number of outputs	8 (0
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	DC 24 V
Reverse polarity protection of rated load voltage	✓
Current consumption from load voltage L+ (without load)	50 mA
Total current per group, horizontal configuration, 40°C	-
Total current per group, horizontal configuration, 60°C	-
Total current per group, vertical configuration	-
Output voltage signal "1" at min. current	L+ (-0.8 V)
Output voltage signal "1" at max. current	L+ (-1.5 V)
Output current at signal "1", rated value	1 A
Output current, permitted range to 40°C	-
Output current, permitted range to 60°C	-
Output current at signal "0" max. (residual current)	-
Output delay of "0" to "1"	150 µs
Output delay of "1" to "0"	100 µs
Minimum load current	-
Lamp load	5 W

Order no.	**153-4PF00**
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. 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	1.5 A
Number of operating cycle of relay outputs	-
Switching capacity of contacts	-
Output data size	1 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
Supply voltage display	yes
Group error display	red SF LED
Channel error display	none
Isolation	
Between channels	-
Between channels of groups to	-
Between channels and backplane bus	-
Between channels and power supply	-
Max. potential difference between circuits	-
Max. potential difference between inputs (Ucm)	-
Max. potential difference between Mana and Mintern (Uiso)	-
Max. potential difference between inputs and Mana (Ucm)	-
Max. potential difference between inputs and Mintern (Uiso)	-
Max. potential difference between Mintern and outputs	-
Insulation tested with	DC 500 V
Hardware configuration	
Racks, max.	-
Modules per rack, max.	-
Number of digital modules, max.	-
Number of analog modules, max.	-
Communication	
Fieldbus	PROFIBUS-DP to EN 50170
Type of interface	RS485
Connector	Sub-D, 9-pin, female
Topology	Linear bus with bus termination at both ends
Electrically isolated	✓
Number of participants, max.	125
Node addresses	1 - 99
Transmission speed, min.	9.6 kbit/s
Transmission speed, max.	12 Mbit/s
Address range inputs, max.	1 Byte
Address range outputs, max.	1 Byte

Order no.	**153-4PF00**
Number of TxPDOs, max.	-
Number of RxPDOs, max.	-
Datasizes	
Input bytes	1
Output bytes	1
Parameter bytes	7 + 5
Diagnostic bytes	13
Housing	
Material	PPE / PA 6.6
Mounting	Profile rail 35 mm
Mechanical data	
Dimensions (WxHxD)	101.6 x 76 x 48 mm
Weight	221 g
Environmental conditions	
Operating temperature	0 °C to 60 °C
Storage temperature	-25 °C to 70 °C
Certifications	
UL508 certification	yes

153-4PH00

Order no.	**153-4PH00**
Type	SM 153, PB-DP slave
Technical data power supply	
Power supply (rated value)	DC 24 V
Power supply (permitted range)	DC 20.4...28.8 V
Reverse polarity protection	✓
Current consumption (no-load operation)	-
Current consumption (rated value)	55 mA
Technical data digital inputs	
Number of inputs	8 (16
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	DC 24 V
Reverse polarity protection of rated load voltage	-
Current consumption from load voltage L+ (without load)	-
Rated value	DC 24 V
Input voltage for signal "0"	DC 0...5 V
Input voltage for signal "1"	DC 15...28.8 V
Input voltage hysteresis	-
Frequency range	-
Input resistance	-
Input current for signal "1"	7 mA
Connection of Two-Wire-BEROs possible	✓
Max. permissible BERO quiescent current	1.5 mA
Input delay of "0" to "1"	3 ms
Input delay of "1" to "0"	3 ms
Number of simultaneously utilizable inputs horizontal configuration	8
Number of simultaneously utilizable inputs vertical configuration	8
Input characteristic curve	IEC 61131-2, type 1
Initial data size	1 Byte
Technical data digital outputs	
Number of outputs	8 (4
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	DC 24 V
Reverse polarity protection of rated load voltage	✓
Current consumption from load voltage L+ (without load)	50 mA
Total current per group, horizontal configuration, 40°C	-
Total current per group, horizontal configuration, 60°C	-
Total current per group, vertical configuration	-
Output voltage signal "1" at min. current	L+ (-0.8 V)
Output voltage signal "1" at max. current	L+ (-1.5 V)
Output current at signal "1", rated value	1 A
Output current, permitted range to 40°C	-
Output current, permitted range to 60°C	-
Output current at signal "0" max. (residual current)	-
Output delay of "0" to "1"	150 µs
Output delay of "1" to "0"	100 µs
Minimum load current	-
Lamp load	5 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	✓
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	1.5 A
Number of operating cycle of relay outputs	-
Switching capacity of contacts	-
Output data size	1 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
Supply voltage display	yes
Group error display	red SF LED
Channel error display	none
Isolation	
Between channels	-
Between channels of groups to	-
Between channels and backplane bus	-
Between channels and power supply	-
Max. potential difference between circuits	-
Max. potential difference between inputs (Ucm)	-
Max. potential difference between Mana and Mintern (Uiso)	-
Max. potential difference between inputs and Mana (Ucm)	-
Max. potential difference between inputs and Mintern (Uiso)	-
Max. potential difference between Mintern and outputs	-
Insulation tested with	DC 500 V
Hardware configuration	
Racks, max.	-
Modules per rack, max.	-
Number of digital modules, max.	-
Number of analog modules, max.	-
Communication	
Fieldbus	PROFIBUS-DP to EN 50170
Type of interface	RS485
Connector	Sub-D, 9-pin, female
Topology	Linear bus with bus termination at both ends
Electrically isolated	✓
Number of participants, max.	125
Node addresses	1 - 99
Transmission speed, min.	9.6 kbit/s
Transmission speed, max.	12 Mbit/s
Address range inputs, max.	1 Byte
Address range outputs, max.	1 Byte
Number of TxPDOs, max.	-
Number of RxPDOs, max.	-
Datasizes	

Input bytes	1
Output bytes	1
Parameter bytes	7 + 5
Diagnostic bytes	13
Housing	
Material	PPE / PA 6.6
Mounting	Profile rail 35 mm
Mechanical data	
Dimensions (WxHxD)	101.6 x 76 x 48 mm
Weight	220 g
Environmental conditions	
Operating temperature	0 °C to 60 °C
Storage temperature	-25 °C to 70 °C
Certifications	
UL508 certification	yes

153-6PH00

Order number	153-6PH00
Type	SM 153, PB-DP slave
Technical data power supply	
Power supply (rated value)	DC 24 V
Power supply (permitted range)	DC 20.4...28.8 V
Reverse polarity protection	✓
Current consumption (no-load operation)	-
Current consumption (rated value)	55 mA
Technical data digital inputs	
Number of inputs	8
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	DC 24 V
Reverse polarity protection of rated load voltage	-
Current consumption from load voltage L+ (without load)	-
Rated value	DC 24 V
Input voltage for signal "0"	DC 0...5 V
Input voltage for signal "1"	DC 15...28.8 V
Input voltage hysteresis	-
Frequency range	-
Input resistance	-
Input current for signal "1"	7 mA
Connection of Two-Wire-BEROs possible	✓
Max. permissible BERO quiescent current	1.5 mA
Input delay of "0" to "1"	3 ms
Input delay of "1" to "0"	3 ms
Number of simultaneously utilizable inputs horizontal configuration	8
Number of simultaneously utilizable inputs vertical configuration	8
Input characteristic curve	IEC 61131-2, type 1
Initial data size	1 Byte
Technical data digital outputs	
Number of outputs	8
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	DC 24 V
Reverse polarity protection of rated load voltage	-
Current consumption from load voltage L+ (without load)	55 mA
Total current per group, horizontal configuration, 40°C	-
Total current per group, horizontal configuration, 60°C	-
Total current per group, vertical configuration	-
Output voltage signal "1" at min. current	L+ (-0.8 V)
Output voltage signal "1" at max. current	L+ (-1.5 V)
Output current at signal "1", rated value	1 A
Output current, permitted range to 40°C	-
Output current, permitted range to 60°C	-
Output current at signal "0" max. (residual current)	-
Output delay of "0" to "1"	150 µs
Output delay of "1" to "0"	100 µs
Minimum load current	-
Lamp load	5 W
Parallel switching of outputs for redundant control of a load	not possible
Parallel switching of outputs for increased power	not possible

Order number	**153-6PH00**
Actuation of digital input	✓
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	1.5 A
Number of operating cycle of relay outputs	-
Switching capacity of contacts	-
Output data size	1 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
Supply voltage display	yes
Group error display	red SF LED
Channel error display	none
Isolation	
Between channels	-
Between channels of groups to	-
Between channels and backplane bus	-
Between channels and power supply	-
Max. potential difference between circuits	-
Max. potential difference between inputs (Ucm)	-
Max. potential difference between Mana and Mintern (Uiso)	-
Max. potential difference between inputs and Mana (Ucm)	-
Max. potential difference between inputs and Mintern (Uiso)	-
Max. potential difference between Mintern and outputs	-
Insulation tested with	DC 500 V
Hardware configuration	
Racks, max.	-
Modules per rack, max.	-
Number of digital modules, max.	-
Number of analog modules, max.	-
Communication	
Fieldbus	PROFIBUS-DP to EN 50170
Type of interface	RS485
Connector	Sub-D, 9-pin, female
Topology	Linear bus with bus termination at both ends
Electrically isolated	✓
Number of participants, max.	125
Node addresses	1 - 99
Transmission speed, min.	9.6 kbit/s
Transmission speed, max.	12 Mbit/s
Address range inputs, max.	1 Byte
Address range outputs, max.	1 Byte
Number of TxPDOs, max.	-
Number of RxPDOs, max.	-
Datasizes	

Order number	**153-6PH00**
Input bytes	1
Output bytes	1
Parameter bytes	7 + 5
Diagnostic bytes	13
Housing	
Material	PPE / PA 6.6
Mounting	Profile rail 35 mm
Mechanical data	
Dimensions (WxHxD)	152.4 x 76 x 48 mm
Weight	268 g
Environmental conditions	
Operating temperature	0 °C to 60 °C
Storage temperature	-25 °C to 70 °C
Certifications	
UL508 certification	yes

153-6PL00

Order number	**153-6PL00**
Type	SM 153, PB-DP slave
Technical data power supply	
Power supply (rated value)	DC 24 V
Power supply (permitted range)	DC 20.4...28.8 V
Reverse polarity protection	-
Current consumption (no-load operation)	-
Current consumption (rated value)	55 mA
Technical data digital inputs	
Number of inputs	16
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	DC 24 V
Reverse polarity protection of rated load voltage	-
Current consumption from load voltage L+ (without load)	-
Rated value	DC 24 V
Input voltage for signal "0"	DC 0...5 V
Input voltage for signal "1"	DC 15...28.8 V
Input voltage hysteresis	-
Frequency range	-
Input resistance	-
Input current for signal "1"	7 mA
Connection of Two-Wire-BEROs possible	✓
Max. permissible BERO quiescent current	1.5 mA
Input delay of "0" to "1"	3 ms
Input delay of "1" to "0"	3 ms
Number of simultaneously utilizable inputs horizontal configuration	16
Number of simultaneously utilizable inputs vertical configuration	16
Input characteristic curve	IEC 61131-2, type 1
Initial data size	2 Byte
Technical data digital outputs	
Number of outputs	16
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	DC 24 V
Reverse polarity protection of rated load voltage	-
Current consumption from load voltage L+ (without load)	55 mA
Total current per group, horizontal configuration, 40°C	-
Total current per group, horizontal configuration, 60°C	-
Total current per group, vertical configuration	-
Output voltage signal "1" at min. current	L+ (-0.8 V)
Output voltage signal "1" at max. current	L+ (-1.5 V)
Output current at signal "1", rated value	1 A
Output current, permitted range to 40°C	-
Output current, permitted range to 60°C	-
Output current at signal "0" max. (residual current)	-
Output delay of "0" to "1"	150 µs
Output delay of "1" to "0"	100 µs
Minimum load current	-
Lamp load	5 W
Parallel switching of outputs for redundant control of a load	not possible
Parallel switching of outputs for increased power	not possible

Order number	**153-6PL00**
Actuation of digital input	✓
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	1.5 A
Number of operating cycle of relay outputs	-
Switching capacity of contacts	-
Output data size	2 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
Supply voltage display	yes
Group error display	red SF LED
Channel error display	none
Isolation	
Between channels	-
Between channels of groups to	-
Between channels and backplane bus	-
Between channels and power supply	-
Max. potential difference between circuits	-
Max. potential difference between inputs (Ucm)	-
Max. potential difference between Mana and Mintern (Uiso)	-
Max. potential difference between inputs and Mana (Ucm)	-
Max. potential difference between inputs and Mintern (Uiso)	-
Max. potential difference between Mintern and outputs	-
Insulation tested with	DC 500 V
Hardware configuration	
Racks, max.	-
Modules per rack, max.	-
Number of digital modules, max.	-
Number of analog modules, max.	-
Communication	
Fieldbus	PROFIBUS-DP to EN 50170
Type of interface	RS485
Connector	Sub-D, 9-pin, female
Topology	Linear bus with bus termination at both ends
Electrically isolated	✓
Number of participants, max.	125
Node addresses	1 - 99
Transmission speed, min.	9.6 kbit/s
Transmission speed, max.	12 Mbit/s
Address range inputs, max.	2 Byte
Address range outputs, max.	2 Byte
Number of TxPDOs, max.	-
Number of RxPDOs, max.	-
Datasizes	

Order number	**153-6PL00**
Input bytes	2
Output bytes	2
Parameter bytes	7 + 5
Diagnostic bytes	13
Housing	
Material	PPE / PA 6.6
Mounting	Profile rail 35 mm
Mechanical data	
Dimensions (WxHxD)	152.4 x 76 x 48 mm
Weight	264 g
Environmental conditions	
Operating temperature	0 °C to 60 °C
Storage temperature	-25 °C to 70 °C
Certifications	
UL508 certification	yes

153-6PL10

Order no.	**153-6PL10**
Type	SM 153, PB-DP slave
Technical data power supply	
Power supply (rated value)	DC 24 V
Power supply (permitted range)	DC 20.4...28.8 V
Reverse polarity protection	✓
Current consumption (no-load operation)	-
Current consumption (rated value)	55 mA
Technical data digital inputs	
Number of inputs	24
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	DC 24 V
Reverse polarity protection of rated load voltage	-
Current consumption from load voltage L+ (without load)	-
Rated value	DC 24 V
Input voltage for signal "0"	DC 0...5 V
Input voltage for signal "1"	DC 15...28.8 V
Input voltage hysteresis	-
Frequency range	-
Input resistance	-
Input current for signal "1"	7 mA
Connection of Two-Wire-BEROs possible	✓
Max. permissible BERO quiescent current	1.5 mA
Input delay of "0" to "1"	3 ms
Input delay of "1" to "0"	3 ms
Number of simultaneously utilizable inputs horizontal configuration	24
Number of simultaneously utilizable inputs vertical configuration	24
Input characteristic curve	IEC 61131-2, type 1
Initial data size	3 Byte
Technical data digital outputs	
Number of outputs	8
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	DC 24 V
Reverse polarity protection of rated load voltage	-
Current consumption from load voltage L+ (without load)	50 mA
Total current per group, horizontal configuration, 40°C	-
Total current per group, horizontal configuration, 60°C	-
Total current per group, vertical configuration	-
Output voltage signal "1" at min. current	L+ (-0.8 V)
Output voltage signal "1" at max. current	L+ (-1.5 V)
Output current at signal "1", rated value	1 A
Output current, permitted range to 40°C	-
Output current, permitted range to 60°C	-
Output current at signal "0" max. (residual current)	-
Output delay of "0" to "1"	150 µs
Output delay of "1" to "0"	100 µs
Minimum load current	-
Lamp load	5 W
Parallel switching of outputs for redundant control of a load	not possible

Order no.	**153-6PL10**
Parallel switching of outputs for increased power	not possible
Actuation of digital input	✓
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	1.5 A
Number of operating cycle of relay outputs	-
Switching capacity of contacts	-
Output data size	1 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
Supply voltage display	yes
Group error display	red SF LED
Channel error display	none
Isolation	
Between channels	-
Between channels of groups to	-
Between channels and backplane bus	-
Between channels and power supply	-
Max. potential difference between circuits	-
Max. potential difference between inputs (Ucm)	-
Max. potential difference between Mana and Mintern (Uiso)	-
Max. potential difference between inputs and Mana (Ucm)	-
Max. potential difference between inputs and Mintern (Uiso)	-
Max. potential difference between Mintern and outputs	-
Insulation tested with	DC 500 V
Hardware configuration	
Racks, max.	-
Modules per rack, max.	-
Number of digital modules, max.	-
Number of analog modules, max.	-
Communication	
Fieldbus	PROFIBUS-DP to EN 50170
Type of interface	RS485
Connector	Sub-D, 9-pin, female
Topology	Linear bus with bus termination at both ends
Electrically isolated	✓
Number of participants, max.	125
Node addresses	1 - 99
Transmission speed, min.	9.6 kbit/s
Transmission speed, max.	12 Mbit/s
Address range inputs, max.	3 Byte
Address range outputs, max.	1 Byte
Number of TxPDOs, max.	-
Number of RxPDOs, max.	-

Order no.	153-6PL10
Datasizes	
Input bytes	3
Output bytes	1
Parameter bytes	7 + 5
Diagnostic bytes	13
Housing	
Material	PPE / PA 6.6
Mounting	Profile rail 35 mm
Mechanical data	
Dimensions (WxHxD)	152.4 x 76 x 48 mm
Weight	264 g
Environmental conditions	
Operating temperature	0 °C to 60 °C
Storage temperature	-25 °C to 70 °C
Certifications	
UL508 certification	yes