CL400 / CL500

PBK Peripheral Bus Interface Module
Module Description

Edition 102

BOSCH
Automation

CL400 / CL500

PBK Peripheral Bus Interface Module
Module Description

1070 072 133-102 (99.11) GB

Contents

1 Safety Instructions

Before you start working with the PBK Peripheral Bus Interface Module, we recommend that you thoroughly familiarize yourself with the contents of this instruction manual. Keep this manual in a place where it is always accessible to all users.

1.1 Standard operation

This instruction manual presents a comprehensive set of instructions and information required for the standard operation of the described products.

The products described hereunder

- were developed, manufactured, tested and documented in accordance with the relevant safety standards. In standard operation, and provided that the specifications and safety instructions relating to the project phase, installation and proper operation of the product are followed, there should arise no risk of danger to personnel or property.
- are certified to be in full compliance with the following standards:
  - with the EMC Directives (89/336/EEC, 93/68/EEC, and 93/44/EEC)
  - Low-voltage Directive (73/23/EEC)
  - Harmonized standards EN 50081-2 and EN 50082-2
- are designed for operation in an industrial environment (class A emissions), i.e.,
  - not directly connected to the public low-voltage power supply,
  - connected via a transformer to the medium to high-voltage network.

  The following shall apply to the operation of the described products within a private residence, in business areas, on retail premises or in small-industry settings:
  - Installation in a control cabinet and/or an enclosure providing a high screening factor.
  - All cables exiting from the screened area must be protected by suitable filtering and screening measures.
  - The user will be required to obtain a single operating license issued by the appropriate national authority or approval body. In Germany, this is the Federal Institute for Posts and Telecommunications and/or its local branch offices.

☞ **This is a Class A device. In a residential area, this device may cause radio interference. If this is the case, the user or operator may be required to provide appropriate remedial measures at his own expense.**

The prerequisites for trouble-free service and safe operation of the product are proper transport, handling and storage, placement and installation, plus careful operation of the equipment.

1.2 Qualified personnel

The requirements pertaining to qualified personnel are based on the job specifications as outlined by the ZVEI (central association of the electrical industry) and VDMA (association of German machine and plant builders) professional associations in Germany. Please refer to the following German-language publication:
Weiterbildung in der Automatisierungstechnik
Hrsg.: ZVEI und VDMA
MaschinenbauVerlag
Postfach 71 08 64
60498 Frankfurt

This instruction manual is specifically designed for PLC specialists. They will require specific knowledge of Programmable Logic Controllers and of the peripheral bus for the CL400/CL500 control units.

Interventions in the hardware and software of our products which are not described in this instruction manual may only be performed by specially trained Bosch personnel.

Unqualified interventions in the hardware or software or non-compliance with the warnings listed in this instruction manual or indicated on the product may result in serious personal injury or damage of property.

Installation and maintenance of the products described hereunder is the exclusive domain of trained electricians as per VDE 1000-10, who are familiar with the contents of this manual.

Trained electricians are persons of whom the following is true:

- They are capable, due to their professional training, skills and expertise, and based upon their knowledge of and familiarity with applicable technical standards, of assessing the work to be carried out, and of recognizing possible hazards.
- They possess, subsequent to several years' experience in a comparable field of endeavour, a level of knowledge and skills that may be deemed commensurate with that attainable in the course of a formal professional education in this area.

With regard to the foregoing, please read the information about our comprehensive training program. You'll find a listing of our seminars on the front inside cover of this instruction manual. The professional staff at our training centre will be pleased to provide detailed information. You may contact the centre by telephone at (+49) (0) 6062 78-258.

1.3 Safety markings on components

Danger: High voltage!

Danger: Battery acid!

Electrostatically sensitive devices!

Disconnect at mains before opening!

Pin for connecting PE conductor only!

Functional earthing/low noise earth

For screened conductor only!

1.4 Safety instructions in this manual

DANGEROUS ELECTRICAL VOLTAGE
This symbol is used to warn of the presence of a **dangerous electrical voltage**. Insufficient compliance with or failure to observe this warning may result in **personal injury**.

DANGER
This symbol is used wherever insufficient or lacking compliance with instructions may result in **personal injury**.

CAUTION
This symbol is used whenever insufficient or lacking compliance with instructions may result in **damage to equipment or data files**.

☞ This symbol is used to alert the user to an item of special interest.

1.5 Safety instructions concerning the described product

DANGER
Fatal injury hazard through ineffective Emergency-STOP safety devices!
Emergency-STOP devices must remain effective and accessible in all system operating modes. The release of functional locks imposed by Emergency-STOP devices must never be allowed to cause an uncontrolled system restart! Before restoring power to the system, test the Emergency-STOP circuit!

DANGER
Danger to Personnel and Equipment!
Test every new program prior to initial system startup!

DANGER
Retrofits or modifications may adversely affect the safety of the products described!

The consequences may be severe personal injury, damage to equipment or environmental hazards. Therefore, any system retrofitting or modification utilizing third-party components will require express approval by Bosch.

DANGEROUS ELECTRICAL VOLTAGE
Unless otherwise indicated, maintenance procedures must always be carried out with the system switched OFF! The system must be protected and secured against inadvertent restart.

In the event that measuring or testing procedures must be carried out while the system is active, these shall be performed by trained electricians.

CAUTION
Danger to the module!
Do not insert or remove the module while the controller is switched ON! This may destroy the module. Prior to inserting or removing the module, switch OFF or remove the power supply module of the controller, external power supply and signal voltage!

CAUTION
Only Bosch approved spare parts may be used!

CAUTION
Danger to the module!
All ESD protection measures must be observed when using the module! Prevent electrostatic discharges!

Observe the following protective measures for electrostatically sensitive devices (ESD)!

- The personnel responsible for storage, transport and handling must be trained in.
- ESDs must be stored and transported in the dedicated protective packaging specified for this purpose.
- Out of principle, ESDs may only be handled at special ESD work station equipped for this particular purpose.
- Personnel, work surfaces and all devices and tools that could come into contact with ESDs must be on the same potential (e.g. earthed).
- An approved earthing wrist strap shall be worn. It must be connected to the work surface via a cable with an integrated 1 MΩ resistor.
- ESDs may under no circumstances come into contact with objects susceptible to accumulating an electrostatic charge. Most items made of plastics belong to this category.
- When installing ESDs in or removing them from an electronic device, the power supply of the device must be switched OFF.

1.6 Documentation, version and trademark

Documentation

The present instruction manual provides information about installation and operation of the PBK Peripheral Bus Interface Module. These instructions do not include industry-standard planning and installation procedures.

Overview of instruction manuals:

Instruction manuals	Language	Part no.
PBK Peripheral Bus Interface Module, Module Description	German	1070 070 127
	English	1070 072 133
	Spanish	1070 072 330
MOBY I/F Channel Module, Module Description	German	1070 070 139
	English	1070 072 136
	Spanish	1070 072 331
PBK5MIF Software Module, Module Description	German	1070 072 035
	English	1070 072 135
	Spanish	1070 072 332

★ This asterisk symbol indicates that the instruction manual is describing an activity you shall be required to perform.

Amendments

Changes in this instruction manual from the previous manual version are denoted by black vertical bars in the right-hand margin.

This symbol is used in illustrations to alert you to changes.

☞ **The “A.2 Amendments” section lists the changes made since the previous edition.**

Trademarks

All trademarks referring to software that is installed on Bosch products when shipped from the factory represent the property of the respective manufacturers.

When shipped from the factory, all installed software is protected by copyright. It may therefore be duplicated only with prior permission by Bosch or in accordance with the licensing agreements with the respective manufacturer or copyright owner.

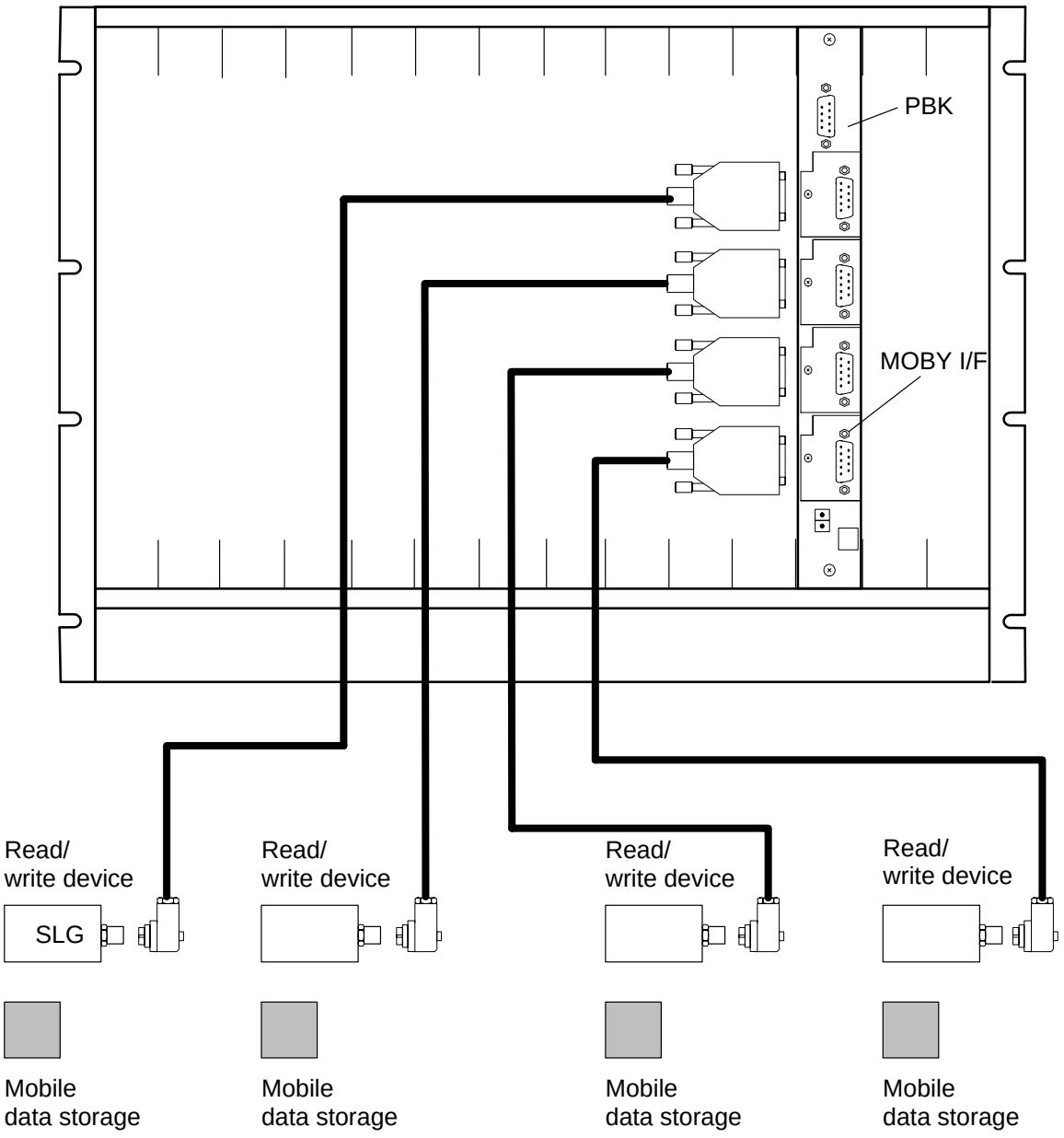
MOBY® is a registered trademark of Siemens AG.

Notes:

2 PBK Module Functions

The PBK Peripheral Bus Interface Module handles the tasks of adpating and storing the data between the channel modules and the control unit. As the PBK module is connected to the peripheral bus of the CL400/CL500 control units, it can be utilized across the entire I/O range of the respective control unit.

Sample application with read/write device and mobile data storage.



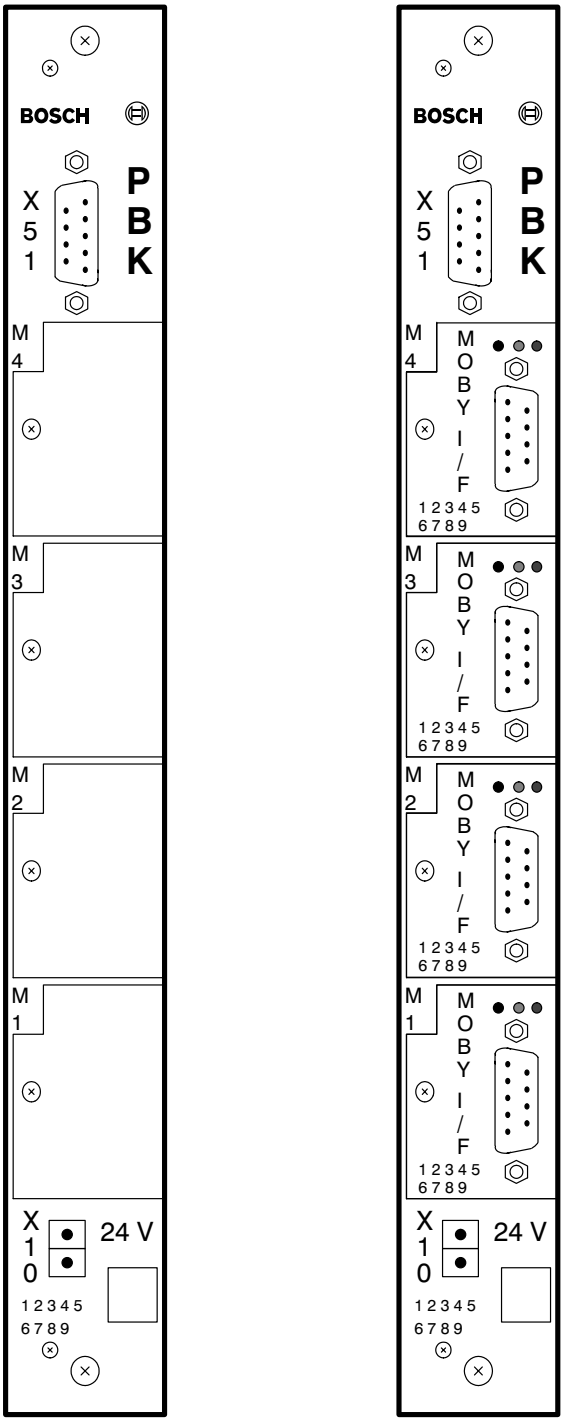
With the use of the channel modules and the PBK interface module, intelligent sensor technology can be connected to the peripheral bus of the control unit.

The following channel modules are currently available:

- MOBY® I/F
  - Order no. 1070 071 281
  - Module Description, Order no. 1070 070 139

The PBK serves as the carrier module for a maximum of 4 channel modules.

PBK module, empty (at left), and fitted with 4 MOBY I/F channel modules (at right)



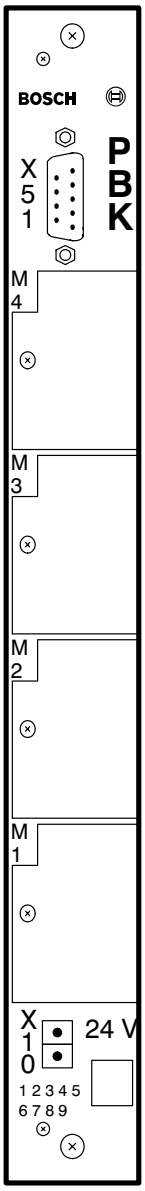
Notes:

3 PBK Module Operation

CAUTION
Danger to the module!
All ESD protection measures must be observed when using the module! Prevent electrostatic discharges!

3.1 Hardware Configuration

PBK Front Panel



X51
Connector for STG service and testing device
RS-422 interface

M4 channel module slot

M3 channel module slot

M2 channel module slot

M1 channel module slot

X10
24 V power supply

Installing channel modules

CAUTION
Ensure that channel module installation instructions are precisely followed! Faulty installation procedures may destroy the channel modules.

★ Switch OFF controller power supply unit and 24 V power supply.

★ Remove the connector of the 24 V power supply from the front panel of the PBK.

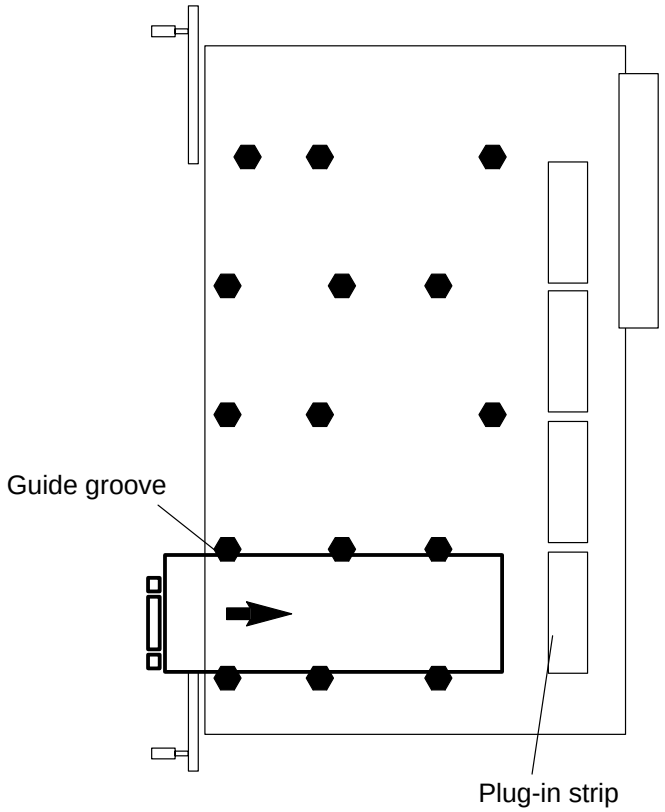
★ Loosen both knurled screws on the PBK, and pull the module out of the module rack.

The module slot labelled “M 1” must always be equipped. To ensure improved heat dissipation, the equipping shall start at the bottom and progress upward.

★ Unscrew dummy cover.

★ Carefully push the channel module into the slot. When doing so, it is essential that

- it is squarely aligned in the guide grooves.
- it is fully seated in the plug-in strip.



★ Fasten channel module to the front panel.

CAUTION
Prior to Power-On, check the channel modules for correct seating!
Channel modules may be destroyed by canted installation!

★ Close all empty PBK module slots with dummy covers.

★ Set start address and address range as described in section 3.2.

★ Slide the PBK into the module rack, and tighten knurled screws.

★ Connect 24 V power supply to the PBK front panel.

3.2 Settings

2 settings must be made on the PBK:

- Address range.
- Module start address.

To make these settings, the PBK must be removed from the module rack.

★ Switch OFF controller power supply unit and 24 V power supply.

★ Remove the connector of the 24 V power supply from the front panel of the PBK.

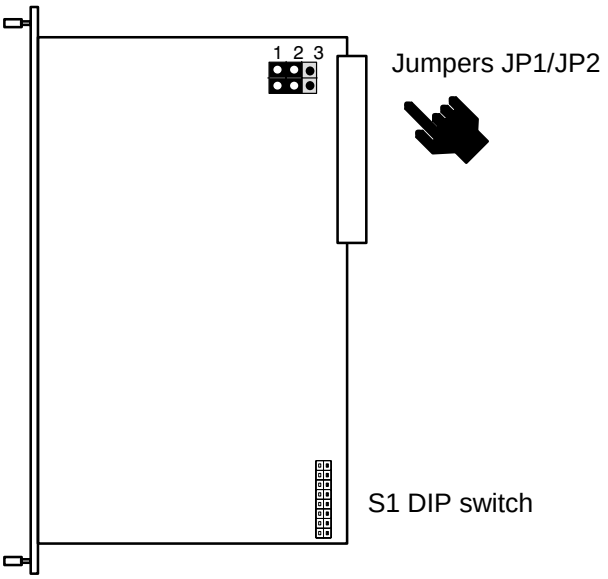
CAUTION
Danger to the module!
All ESD protection measures must be observed when using the module! Prevent electrostatic discharges!

★ Loosen both knurled screws on the PBK, and pull the module out of the module rack.

Start Address

The PBK module occupies 4 input and 4 output bytes on the control unit. The “S1” DIP switch, switch segments 1 through 6**,** is used to set the start address. The associated central processing unit is selected via DIP switch segments 76 and 8.

S1 DIP switch and Jumpers JP1/JP2

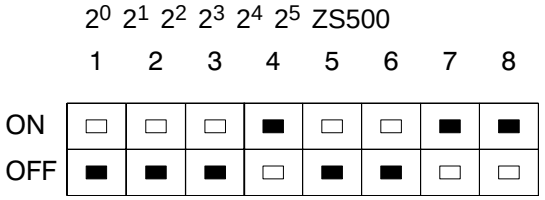


Start Address

The address range through byte 60 is available. In addition, switch segments 7 and 8 must be used to select the associated central processing unit.

Example:

CL500:
Start address: 8
ZS3



Setting the Central Processing Unit

Central processing unit	7	8
ZS 0	OFF	OFF
ZS 1	ON	OFF
ZS 2	OFF	ON
ZS 3	ON	ON

Address Range

For the address range, there is a choice between

- I/O field and
- EI/EO field.

The address range is selected by positioning jumpers JP1 and JP2.

☞ **Both jumpers JP1 and JP2 must be set identically!**

Address Range	JP1 position	JP2 position
I/O field	2-3	2-3
EI/EO field	1-2	1-2

☞ **The input and output bytes of the PBK module may not be directly addressed in the PLC program! The data exchange with the PBK must be handled via a function module (e.g., PBK5MIF)!**

3.3 Operating Power

12 V Power Supply

The 12 V power for the PBK is provided by the peripheral bus of the control unit. On the 12 V power supply, the typical current draw of the PBK is 150 mA.

The current load of the installed channel modules must be added to this figure. The MOBY® I/F channel module has a current draw of typically 70 mA.

24 V Power Supply X10

The only function of the 24 V connector labelled “X10” on the front panel of the PBK is to supply 24 V operating power to the channel modules. This voltage is provided to the channel modules via a filter and a 2 A fuse. The channel modules use this power to supply the peripheral sensors.

☞ **On the PBK module, the chassis ground (0 V) of both the 24 V power supply and the 12 V power supply of the peripheral bus are electrically connected. For this reason, a separate 24 V power supply must be provided for the PBK to prevent malfunctions.**

The referred 24 V power supply must meet the following requirements:

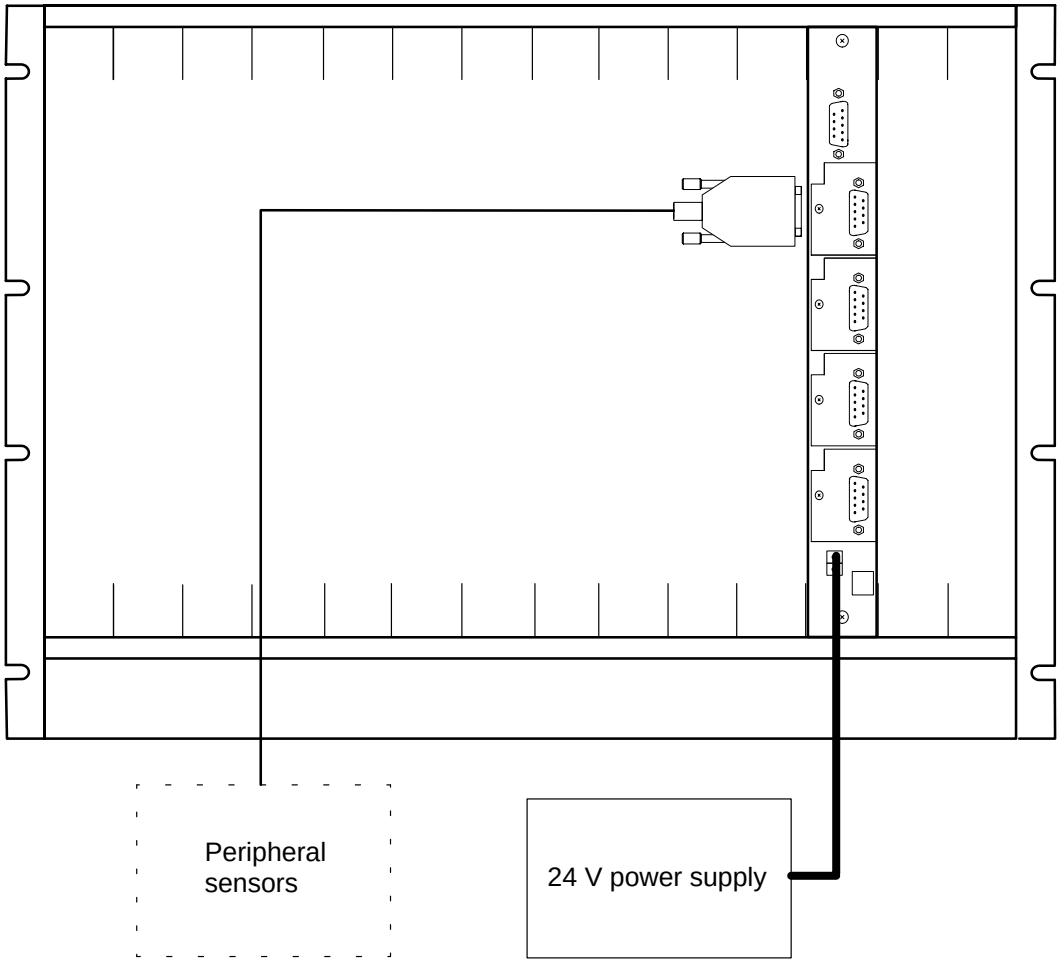
- Transformer featuring protective separation, as per DIN VDE 0551.
- Transformer with shielding winding.
- Ripple factor, as per DIN 19 240, max. 5 %.

☞ **As the minimum input voltage of the SLG Read/write modules for the MOBY I/F is 22 V, a power supply as per IEC 65 A is therefore not sufficient to provide power to the MOBY I/F read/write units!**

In that case, the 24 V power supply will be rated as functional extra-low voltage (FELV), as per DIN VDE 0100 Part 410, Sect. 4.2 and/or DIN VDE 0113 Part 1, Sect. 5.1.2.3b.

All cables connecting the 24 V power supply must meet the following conditions:

- Installation must be at a distance from cables carrying higher voltages.
- Insulation must be designed for the highest occurring voltage, as per DIN VDE 0113 Part 1, Sect. 10.1.4.



To extend the maximum permitted distance between the channel module and the peripheral sensors, a separate power supply for sensor operating power may be required. In this case, the data cables establish an electrical connection between the sensor power supply unit on the one hand, and the peripheral bus of the control unit and/or the 24 V power supply of the PBK on the other. This interconnection may cause a meshing of electrical potentials that is susceptible to failure. This problem can be prevented through the deployment of power supply units featuring electrical isolation.

2 A Fuse

The 24 V power supply providing the power for peripheral sensors is protected by a 2 A fuse onboard the PBK.

Fuse type: M 2A/250V, 5 * 20 mm

Changing the Fuse

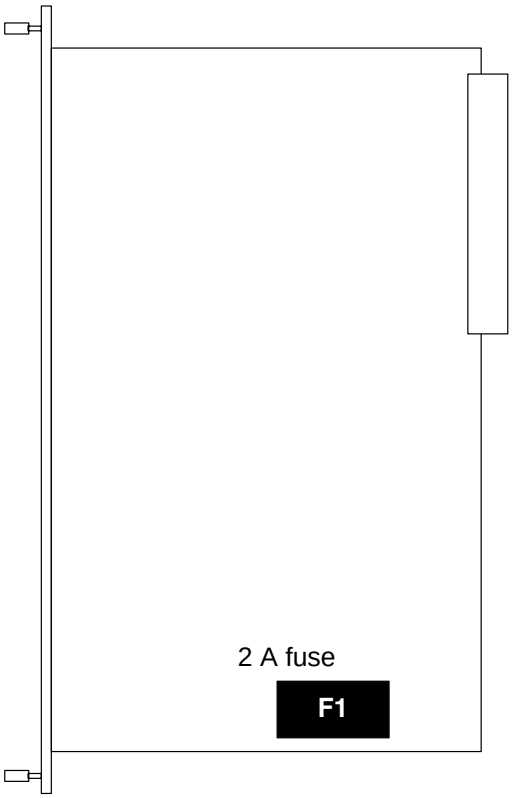
★ Switch OFF both the power supply module for the control unit and the 24 V power supply.

★ Remove the connector of the 24 V power supply from the front panel of the PBK.

CAUTION
Danger to the module!
All ESD protection measures must be observed when using the module! Prevent electrostatic discharges!

★ Loosen both knurled screws of the PBK, and pull the module out of the module rack.

★ Replace the defective fuse.



★ Push the PBK into the module rack, and tighten knurled screws.

★ Connect 24 V power supply to the PBK front panel.

★ Switch ON the power supply module of the control unit.

3.4 Installation Instructions

☞ **Careful observance of the following installation instructions will enhance the interference immunity / reliability of the system!**

Ground Connection

To dissipate the interference potential that is active between the PLC and reference earth, the PLC must be connected to ground via a low-impedance connection.

Earthing strips provide considerably better HF characteristics qualities than standard cables and should therefore be preferred.

Screening

To protect the PBK from electrostatic discharges, all slots must be filled with channel modules or dummy covers, with mounting screws tightened securely to the front cover.

Fan

Whether or not a fan unit shall be required for the operation of the PBK will depend on its channel module population. Refer also to Module Description, MOBY I/F channel module, Order no. 1070 070 139.

For the MOBY I/F channel module, the following applies:

- Provided that the 24 V power supply of the Read/write units is not connected via the 24 V connection at the PBK front panel but externally, a fan will not be required.
- If the PBK module supplies the 24 V operating power to the Read/write units, the following currents are permitted:
  - with fan: Each MOBY I/F channel module, max. 400 mA
  - without fan: Total current of all MOBY I/F channel modules, max. 550 mA

Notes:

4 Specifications

Specifications	PBK
Part no.	1070 068 309
Dimensions	1 module slot
Current draw from • internal 12 V power supply • external 24 V power supply	 typ. 150 mA 400 mA, each MOBY I/F channel module
Protection type, as per DIN 40 050	IP 20, installed in module rack
Moisture class, as per DIN 40 040	F
Shock and vibration resistance	Installation in stationary, non-vibrating devices
Weight without channel modules	450 g
Storage temperature	– 20 through + 70 °C
Ambient temperature	0 through 55 °C
X51 Plug connector	RS-422 Interface for STG
X10 Plug connector	2 pin plug connector with screw terminals, for cable cross-sections through 1.5 mm
Settling time subsequent to control unit Power-On	typ. 100 ms
Electromagnetic compatibility Prerequisites: module rack is grounded, PBK screw-mounted in module rack, all slots are populated with channel modules or closed with dummy cover.	as per IEC 1131 and IEC 801
Electrostatic discharges, IEC 801-2	15 kV, ESD 4
Transient protection, IEC 801-4, Burst test on 24 V power supply	4 kV, level 4

Notes:

A Appendix

A.1 Abbreviations

Abbreviation	Explanation
DOS	Disk Operating System
EI	extended input field
EO	Extended output field
ESD	Electrostatically Sensitive Devices
ESD	Electrostatic discharge Abbreviation used with all designations referring to electrostatic discharges, e.g., ESD protection, ESD hazard, etc.
I	Input
MDS	Mobile Data Storage
O	Output
PBK	Peripheral Bus Interface Module
PBK5MIF	CL500 Function module for the PBK module and the MOBY I/F channel module
PE	Protective Earth
SLG	Read/write unit
STG 4F	Service and Testing unit
ZS	Central processing unit of controller

A.2 Amendments

In this revised edition 102, amendments have been made to the former edition 101 on the following pages.

All altered paragraphs or diagrams are marked by a correction bar. Changes to diagrams are additionally identified by the following symbol.

Chapter	Page	Change
2	2 – 2	Order no. for channel modules and Module Description was added.
3	3 – 2	Paragraph discussing module slot assignment was changed.
	3 – 3	Paragraph about start address and address range was amended.
	3 – 4	Paragraph on DIP switch, start address setting was amended.
	3 – 5	“ZS 500” was added to illustration.
	3 – 5	New “ZS 500 Settings” table was added.
	3 – 5	“Jumper Settings” table was corrected.
	3 – 6	Note “CAUTION – Power supply as per IEC 65 A is insufficient” was added.
	3 – 9	Reference to Module Description for channel module was added.
4	4 – 1	Table was amended by adding Order no.
4	4 – 1	Table was completed by adding X51 and X10 plug connectors.

A.3 Index

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1070 072 133-102 (99.11) GB · HB SP· AT/PLS · Printed in Germany