SAM Electronics

2 Installation Instructions

Generator Protection Module

GPM 500

Dok. 271.195998.BG2 Revision: – (2005-03 / 02)

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List of Abbreviations

AO	Analogue Output
AC	Alternating Current
AI	Analogue Input
ANSI	American National Standards Institute
BAT	Bedienungs- und Anzeige-Tableau (Touch screen Display)
CAN	Controller Area Network
CPU	Central Processing Unit
DO	Digital Output
DC	Direct Current
DCC	DC/DC-Converter
DI	Digital Input
DIF	Differenzstrom-Erfassung (Differential-Current Detection)
DIO	Digital-I/O card
GOV	Governor-Motor Control
GPM	Generator Protection Module
IP	Internet Protocol
LCD	Liquid Crystal Display
MBM	Modbus Masterbaustein (Modbus master unit)
NEG	Netzgerät (Power supply unit)
OV	Objektverzeichnis
PDO	Prozessdatenobjekt
RTU	Remote Transmission Unit
SDO	Servivedatenobjekt
SLE	Strom und Leistungserfassung (Current and Power Acquisition)
SPS	Speicherprogrammierbare Steuerung (Storage-programmable logic controller)
TCP	Transmission Control Protocol
TRV	Trennverstärker (Isolated Voltage Acquisition)
USS	Unterspannungsspulenstützung (Voltage Backup for Undervoltage Coils)
ZKG	Zentralkarte (Central unit)
ZM	Zentralmodul (Central Module)

2 Installation

2.1 General Safety Notes

1. The GPM500 modules must be installed by the responsible, trained personnel only.
2. The applicable safety, environmental and operating safety regulations must be obeyed.
3. The constructor must observe the accident prevention regulations in accordance with the statutory provisions.
4. The repair work on and in the units must be carried out by the personnel only having been specially trained for this purpose.
5. It is to be ensured that the measuring inputs of the GPM500 are voltage-free and dead respectively. Special care is to be taken in connection with the terminals marked red.
6. If maintenance and repair work can be carried out only if parts of the unit / of the equipment are under tension, then at least the following additional measures are required:
   - Insulating cover of the parts being under tension.
   - Presence of a second, trained person who, in case of danger, can switch off the equipment and provide aid.
   - Use of insulated tools.
   - Working on an insulated standing surface.
7. When replacing the assemblies the following safety regulations are to be observed:



CAUTION
Electronic assemblies can be damaged, if they are replaced during operation. Assemblies are to be replaced only with power off!
In doing so, it must be borne in mind that the GPM500 has got two redundant supplies.

Due to the fact that the installation of an assembly at a wrong mounting position might cause damage to the equipment, the following procedure is to be applied:

- Replace only one assembly each. Before inserting the new assembly it is to be made sure that the jumpers of the new assembly are correctly set. For this purpose, the jumpers must be compared to the corresponding figures.
- Defective assemblies must be marked as such at the front panel, e.g. by means of an adhesive label.



CAUTION
This unit contains electrostatic sensitive devices.
Observe the precautions during handling in accordance with DIN EN 61 340-5-1!

- The GPM500 modules contain components (MOS) being sensitive to electrostatic discharges (ESD). They might be destroyed or pre-damaged in case of an improper handling. The pre-damage does not necessarily lead to an immediate failure, but it might permanently change a component and considerably shorten its life. In order to avoid this, they must be protected by appropriate technical and organisational measures.
- The corresponding handling rules as per DIN EN 61 340-5-1 are to be observed.
- Further fundamentals with respect to the handling of electrostatic sensitive devices are contained in DIN EN 61 340.

8. Fuse-links may be replaced only if the circuit has been switched off.
9. Spare fuse-links must have the same electrical values.
10. If a fuse-link has been replaced or a miniature circuit-breaker has been switched on again for the first time and the equipment fails again, then the cause of the failure is to be eliminated before re-starting the equipment.

Safety and Warning Notes Concerning Installation and Commissioning

Please read the complete instructions so as to ensure a safe operation of the unit and to be able to use all functions!

Installation and commissioning must be performed by the correspondingly qualified personnel only. In doing so, the relevant national regulations (e.g. VDE, DIN) are to be observed.

In particular, prior to commissioning it is to be ensured that:

– All connections have been professionally established!
– The protection against electric shock is guaranteed!
– The unit can be switched under off-circuit conditions in accordance with the provisions of EN 60950 (e.g. by the primary line protection)!
– All supply leads are sufficiently fused and dimensioned!
– All output leads are dimensioned according to the max. output current of the unit or separately fused!
– A sufficient ventilation is ensured!

The GPM500 is a built-in unit. After the installation the terminal area must be covered so as to ensure a sufficient protection against the inadmissible touching of live parts!

This is achieved by the installation in a switchgear cabinet or distribution box.

2.2 Identification of the Modules

The individual modules of the GPM500 are identified by means of labels. The labels are glued on the side and on the top side of a module each.

The side labels are always glued on the side with the protruding bus connectors.

The side label contains the

- Module designation
- Terminal assignment,

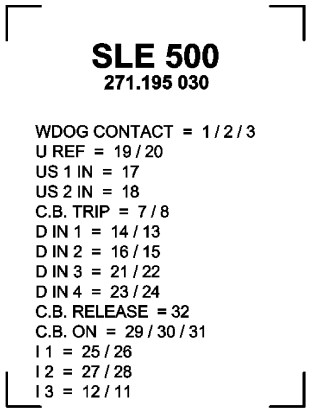
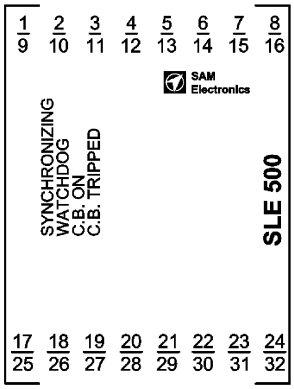
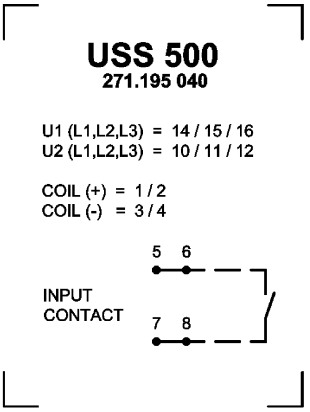
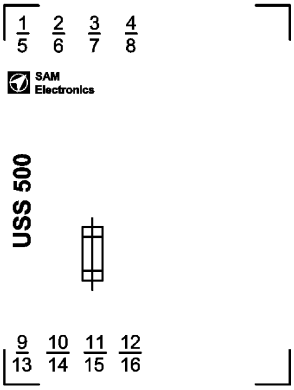
The front label contains the

- Terminal numbers
- LED status displays
- Notes on fuses installed.

The serial number label contains:

- Manufacturer
- Manufacturer's code
- Module designation
- Identity No.
- Serial No.

In the following the side and front labels of the SLE 500 module and of the USS 500 module are shown as examples.

Module	Side	Top side
SLE500		
	Abb. 2-1 Labelling fields of the SLE500	
USS500		
	Abb. 2-2 Labelling fields of the USS500	

2.3 Scope of Delivery

The scope of delivery comprises:

- Module
- Grooved pins
- Information sheet (for module types requiring special treatment)

2.4 Installation of the Modules

2.4.1 Installation in General

Prior to the Beginning of the Installation Work

- Disconnect the switchboard from the supply.
- Provide a safeguard to prevent unintentional re-closing.
- Verify the safe isolation from supply.
- Earth and short-circuit.
- Cover or safeguard adjacent parts being under tension.
- Observe the given mounting notes.
- With respect to this unit/system operator action is allowed by the correspondingly qualified personnel only.
- During the installation work attention is to be paid that the personnel is statically discharged before it touches the switchboard.
- Connecting leads and signal lines are to be installed such that the functions are not affected by inductive and capacitive interference.
- Protective relaying equipment and its controls are to be installed such that they are protected against the accidental operation.
- To avoid that a break of a lead or of a conductor strand on the signal side can lead to undefined conditions in the protection system, there are to be taken corresponding safety precautions on the hardware side.
- As far as the 24 V supply is concerned, a safe electrical separation of the extra-low voltage is to be ensured.
- Variations and deviations of the system voltage from the nominal value respectively must not exceed the tolerance limits given in the technical data. Otherwise, functional failures and dangerous conditions cannot be excluded.
- EMERGENCY-OFF devices in accordance with IEC/EN 60 204-1 must remain effective in all operating modes of the protection equipment. Unlocking of the EMERGENCY-OFF devices must not lead to an uncontrolled or undefined restart.
- Take precautions so that after voltage dips and voltage failures the interrupted program execution can be correctly resumed. In this connection there must not occur any dangerous operating conditions, not even for short time. If necessary, EMERGENCY-OFF is to be enforced.



WARNING
Open equipment

The GPM500 modules are open items of equipment, i.e. the modules must be installed in casings, cabinets or in electrical operating areas only and the casings, cabinets or operating areas must be accessible by means of a key or tool only.

The access to the casings, cabinets or electrical operating areas must be possible for instructed and authorised personnel only.

2.4.2 Mounting Position

The preferred mounting position of the modules is a horizontal one on a horizontally mounted top-hat rail on a vertical wall. If the ambient temperature is restricted and if a sufficient heat dissipation is guaranteed respectively, then all other mounting positions (e.g. on a vertical top-hat rail on a vertical wall) are, however, possible in exceptional cases, too.

2.4.3 Mounting on Top-hat Rail Including Establishing of the Bus Connections



WARNING
If avoidable, do not work with power ON!
Apart from that, observe the regulations for work on live parts.

The modules can be snapped onto 35 mm mounting rails as per EN 60715 (EN 50022-35).

Make a large-area, low-impedance connection of the top-hat rail to the mounting plate.

Use commercially available, corrosion-resistant top-hat rails.

2.4.4 Minimum Distances



CAUTION
For a sufficient cooling a minimum distance to the other modules of 3 cm below the GPM500 and of 2 cm to the side of the NEG510 must be complied with.

2.4.5 Module Arrangement

If the module types being listed in the following are used, then the order of the modules is mandatory. Modules types which are not used (optional) can be omitted.

Arrangement from the left to the right side:

NEG502 or combined power supply module NEG501/510, ZKG500, GOV500, DIO500#1, DIO500#2, (optionally DIO500#3, DIO500#4, DIO500#5, DIO500#6...), SLE500, TRV500/501, (optionally TRV502, optionally DIF500).
(Fig. 2-3 and 2-4)

The modules from NEG502 or NEG501/510 to SLE500 are to be connected to one another via the internal CAN bus. Modules SLE500 to DIF500 are plugged together in order to connect the analog bus, i.e. the analog signals of the modules (current and voltage signals).

Optional modules DCC500 and USS500 do not need any bus connection to the other modules and can be arranged at another place. It can e.g. be advantageous to arrange the DCC500 module behind the front in the direct vicinity of the BAT500.

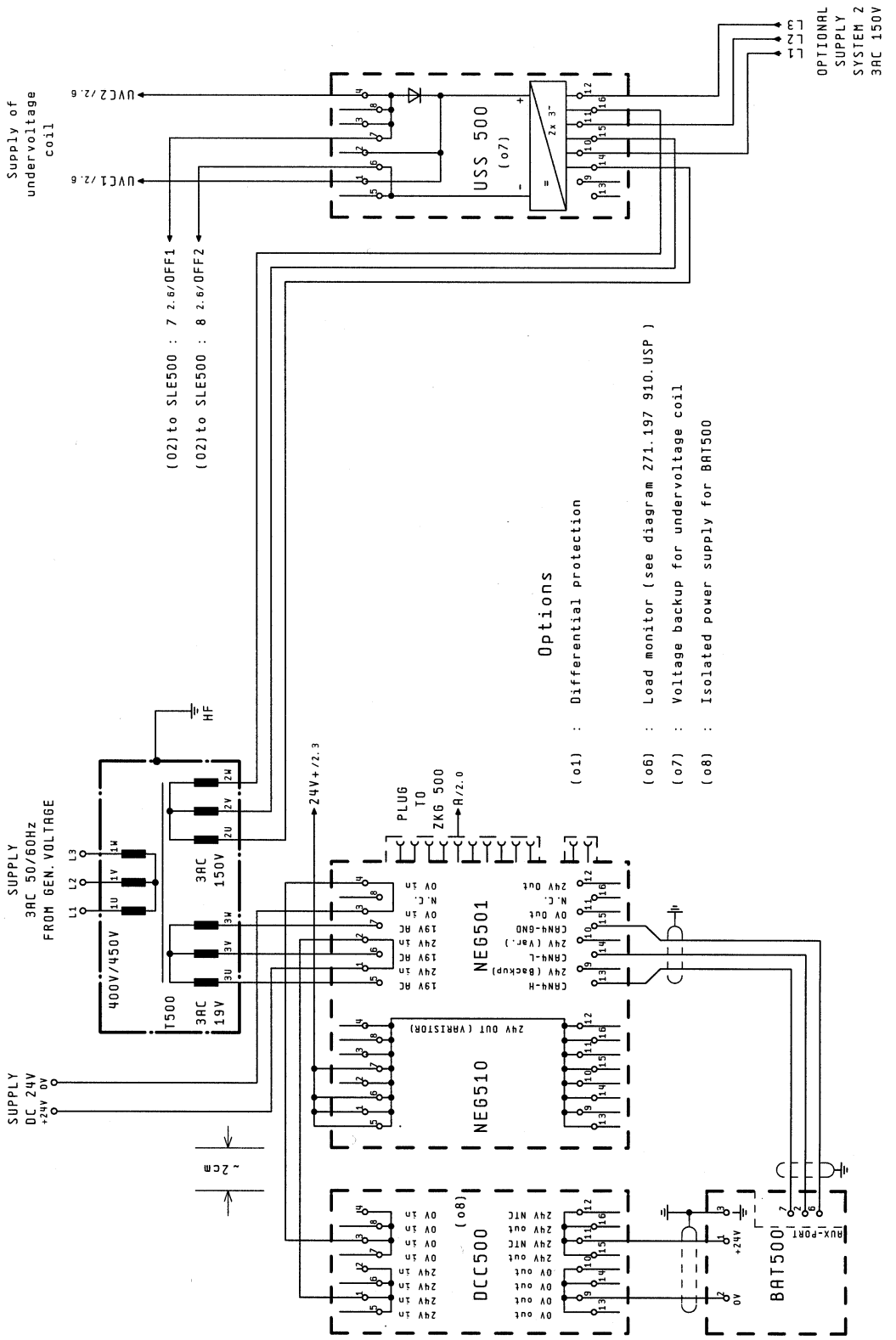


Abb. 2-3 Module Installation (1 of 2)

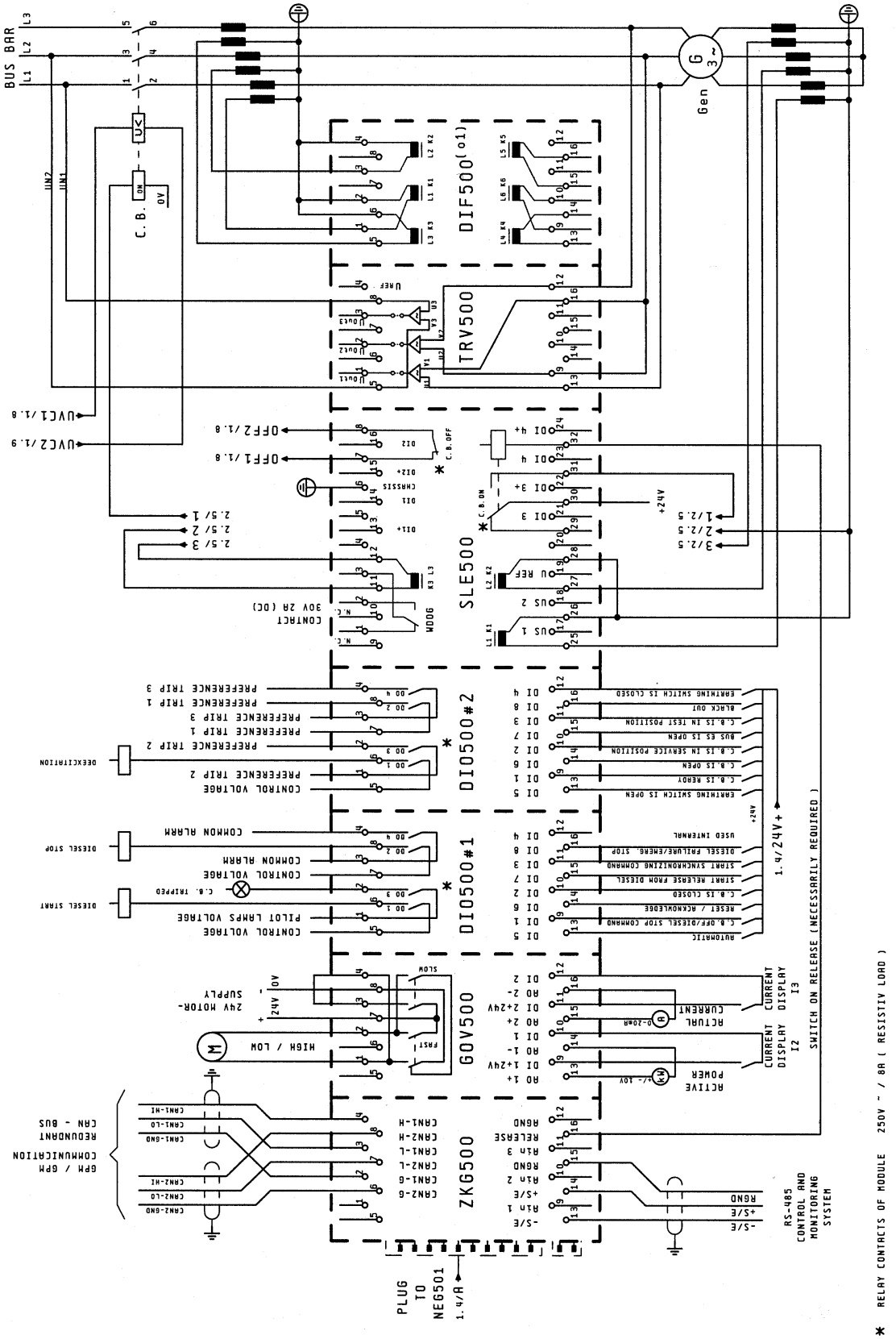


Abb. 2-4 Module Installation (2 of 2)

Scope of Delivery, Unpacking the Modules:

The scope of delivery includes the module and grooved pins as accessories kit.

Mounting:

1. Put the module with the top-hat rail guide onto the top edge of the top-hat rail.
2. Press the module down and let it snap into place.

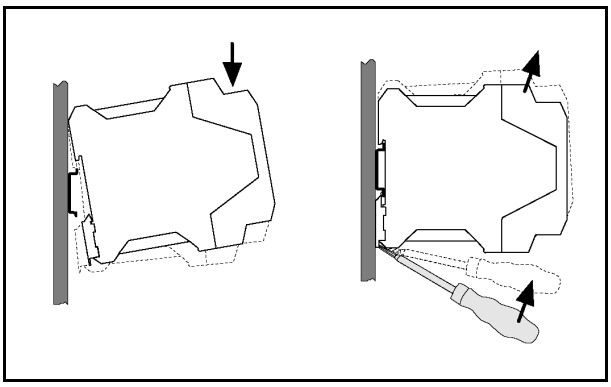


Abb. 2-5 Mounting and Dismounting

Dismounting:

1. Pull down to open the clip-on catch with the aid of a screwdriver.
2. Detach the module at the bottom edge of the top-hat rail.

Connecting the Modules

1. Insert the grooved pins (DIN 1474 3 x 16 mm). Insert at least 2 grooved pins into the upper two blind holes. It would, however, be better to insert 4 grooved pins into the upper and lower blind holes.
2. Push each module against the neighbouring module until the modules lie next to one another.
   When the modules are connected to one another, then the internal CAN bus connection is established, too.

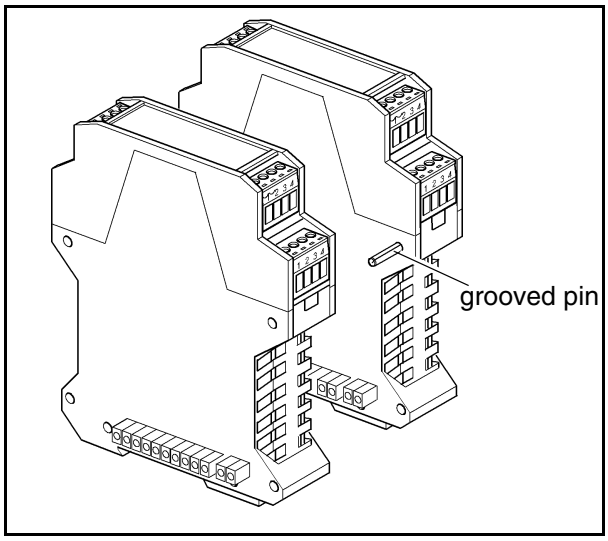


Abb. 2-6 Connecting the Modules Using Grooved Pins

2.5 Installation of the BAT

CAUTION
The BAT must not be permanently exposed to direct sunlight because this might cause the premature ageing of the protective film of the surface.

Do not use any etching chemicals during the installation.
Check the protective film of the surface for the reaction to chemicals used before starting with the installation.

Do not use any tools (screwdriver or similar) to work on the display of the BAT500.

2.5.1 Scope of Delivery

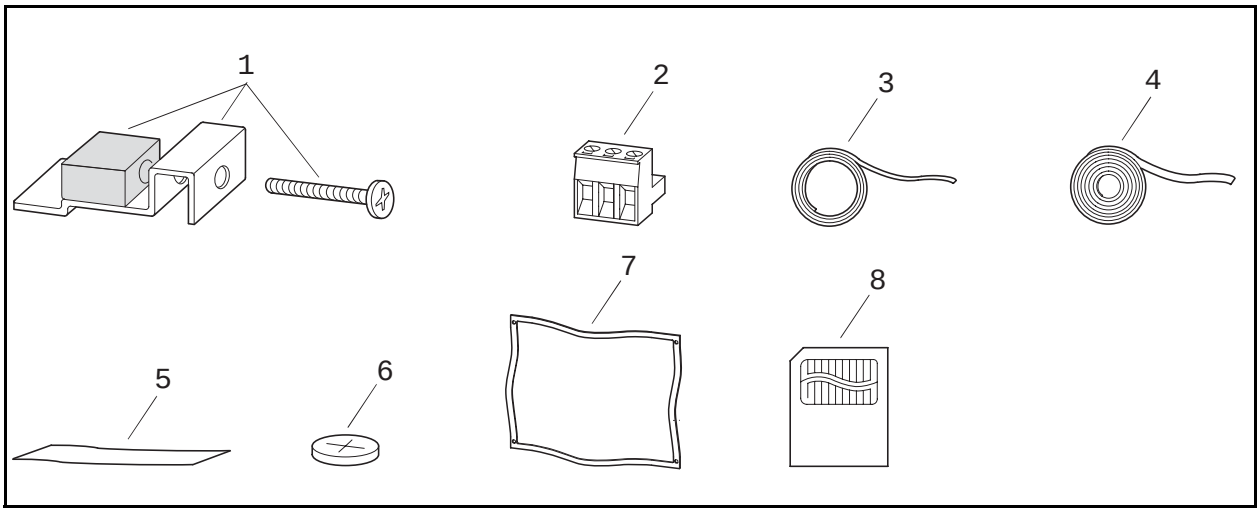


Abb. 2-7 BAT500 Accessories

Part	Designation
1	Clamp with fastening screw (4 sets)
2	Connector
3	Narrow seal
4	Broad seal
5	Battery protection (installed)
6	Battery (installed)
7	Seal
8	Memory card

2.5.2 Preparing the Mounting Cutout

The BAT500 requires a prepared rectangular mounting cutout.

The dimensions of the mounting cutout are 176 x 136 mm (w x h).
The edges must be smooth.

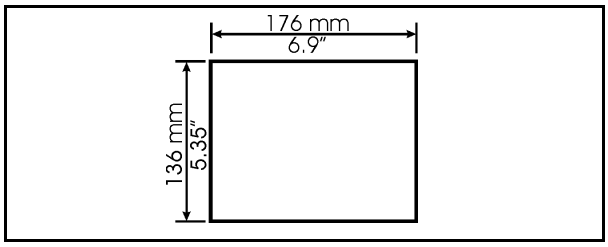


Abb. 2-8 Preparing the Mounting Cutout

2.5.3 Installing the Seal

Two strips (1 x narrow, 1 x broad) of sealing material are used as seals.

Narrow seal:

This strip is inserted into the mounting cutout into which the BAT500 will be installed later.

1. Start to fit the narrow seal approx. in the middle of the lower edge.
2. Fit the seal in the clockwise direction. Make sure that the seal has a sufficient clearance.
3. The two ends of the seal must not overlap.
4. Replace the seal every time the BAT500 is dismounted.

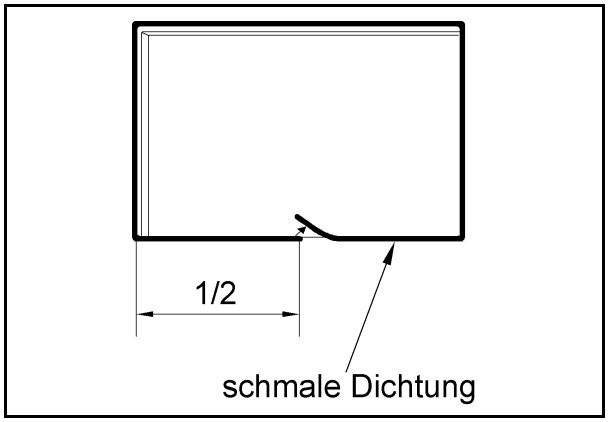


Abb. 2-9 Fitting the Narrow Seal

Broad seal:

This strip is fitted at the BAT500 directly behind the bezel.

1. Start to fit the broad seal approx. at one third of the lower edge.
2. Fit the seal in the clockwise direction. Make sure that the seal has a sufficient clearance.
3. The two ends of the seal must not overlap.
4. Replace the seal every time the BAT500 is dismounted.

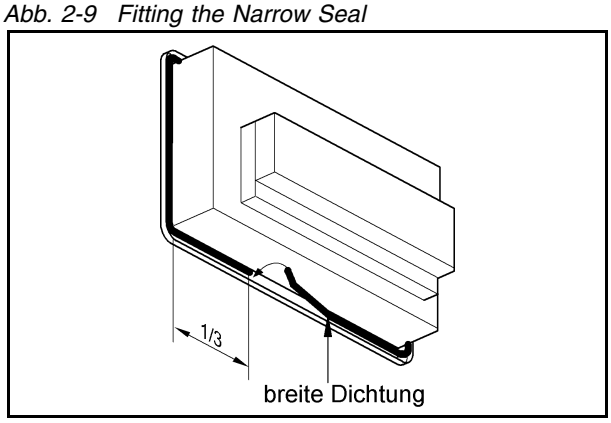


Abb. 2-10 Fitting the Broad Seal

2.5.4 Inserting the BAT500 into the Mounting Cutout

1. Insert the BAT500 with inserted memory card into the mounting cutout.

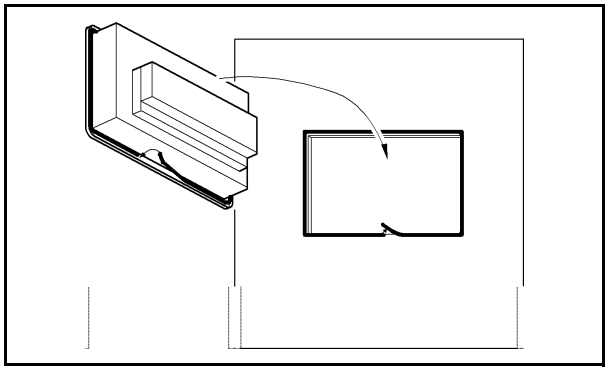


Abb. 2-11 Inserting the BAT500 into the Mounting Cutout

2. Attach the four clamps with fastening screws (fig. Hyperlinkparanumonlyefault ¶ Font/1) and tighten them. (fig. Hyperlinkparanumonly-efault ¶ Font/1).

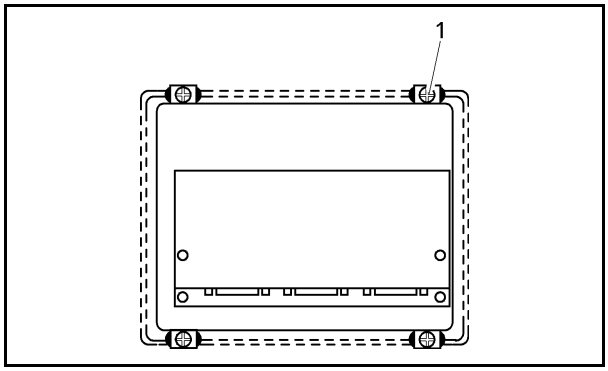


Abb. 2-12 Rear Side of the BAT500

2.5.5 Inserting the Memory Card

If the BAT500 has not been delivered with inserted, programmed memory card, attention is to be paid to the following when inserting the memory card:

- Handle the memory card with care when inserting it into the BAT500.
- Prior to the installation the contacts on the memory card must be clean. All impurities caused by oil or grease must be carefully removed.



CAUTION
Impurities on the golden contacts of the memory card can lead to malfunctions of the electrical contacts.

The memory card must not get in touch with any chemicals because in case of contact this might cause a permanent damage.

The use of synthetic cloth might cause a permanent damage to the memory card because electrostatic discharges are caused.

Do not touch the contact surface with your fingers.

- If the memory card is to be removed and to be transported, the transport is to be carried out in an anti-static container.

1. Insert the memory card in the slot provided for this purpose on the rear side of the BAT500 from below. In doing so, the contacts must be visible from the rear side.
2. Following the insertion the interlock of the slot is to be closed.

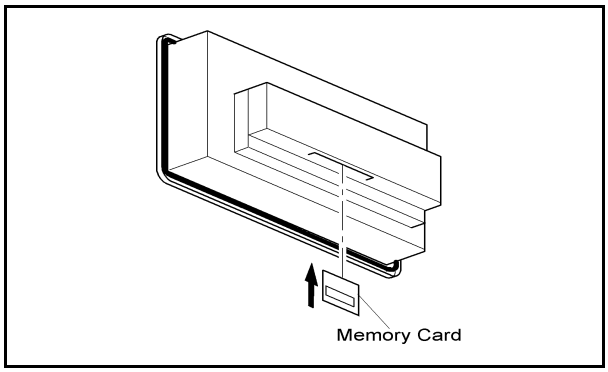


Abb. 2-13 Inserting the Memory Card

2.5.6 Activating the Battery

In the scope of delivery there is included a battery. In the condition as delivered the battery is deactivated by means of a red plastic strip.

1. Remove the red plastic strip.
   This way the battery is activated.
2. When the 24V DC voltage has been applied, the red LED is illuminated twice and then extinguishes.
   In case the LED is flashing the battery is to be checked.

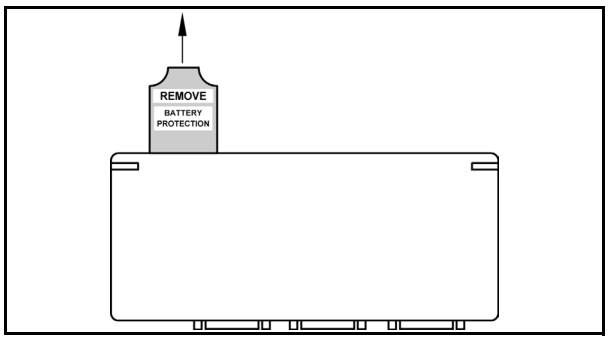


Abb. 2-14 Battery with the Red Plastic Strip

2.5.7 Removing the Protective Film

NOTE
The BAT500 can be operated also with the protective film on it.
For this reason, do not remove the protective film until after completion of all work steps.

1. Loosen the protective film at the front at the places marked with "REMOVE" and completely remove it.

2.5.8 Cleaning the Surface



CAUTION
The BAT500 must be cleaned using a soft cloth and a neutral cleaning agent only.
Do not use any solvents.

2.6 Wiring of the Modules



WARNING
Do never work with power ON! Danger to life!

The modules are equipped with connectors. This way the units can be quickly connected and visibly disconnected in case of need.



CAUTION
Connectors must be plugged or withdrawn in the de-energised condition only!

Use a screwdriver with an appropriate blade width of approx. 3.5 mm for wiring.

Strip the line ends according to the figure to obtain a reliable and shockproof connection.

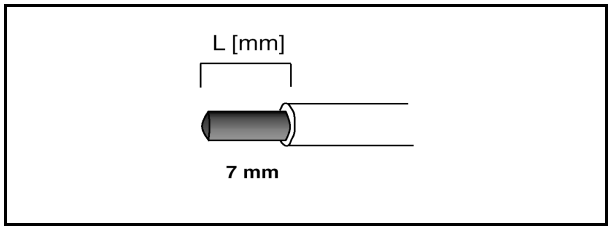


Abb. 2-15 Stripping the Line Ends

Cross-section of the flexible line [mm²]	AWG	Tightening torque [Nm]	Tightening torque [lb in]	Stripping length L [mm]
0.2 - 2.5	24 - 4	0.5 - 0.6	4.4 - 5.3	7

2.6.1 Description of the Terminals

Modules ZGK500, GOV500, DIO500, TRV500/501/502, DIF500, DCC500 and USS500 have got 16 external terminals each.

Module SLE500 and power supply module NEG502 and combined power supply module NEG501/510 respectively have got 32 external terminals.

2.6.2 Description of the Connectors/Coding

All GPM500 assemblies are equipped with a plug coding.

All GPM500 modules are connected by means of 4-pole connectors. When coding with two coding pairs each (clip/coding pin) the following 6 possible combinations are obtained:

	Terminal			
Coding number	1	2	3	4
1	U	U	R	R
2	R	U	U	R
3	R	R	U	U
4	U	R	U	R
5	U	R	R	U
6	R	U	R	U

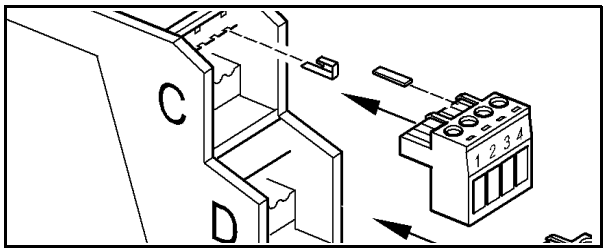


Abb. 2-16 Detailed View of a Plug-and-Socket Connection

R = Clip on the board connector
U = Coding pin on the connector

In the opposite figure the position of the individual connectors is shown.

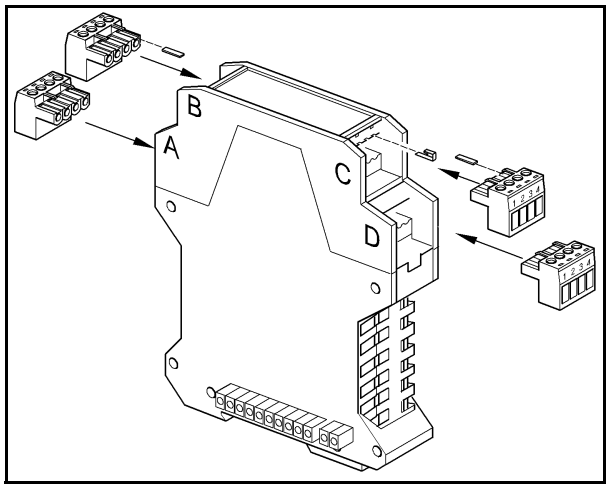


Abb. 2-17 Position of the Individual Connectors

In the following table the coding of the plug-and-socket connections is given by the above-mentioned coding numbers (1-6).

Plug-and socket connection	DCC	NEG502 510 / 501 left	NEG502 510 / 501 right	ZKG	DIO	GOV	SLE left	SLE right	TRV	DIF	USS
A	1	5	3	1	5	3	1	5	3	1	5
B	2	6	4	2	6	4	2	6	4	2	6
C	3	1	5	3	1	5	3	1	5	3	1
D	4	2	6	4	2	6	4	2	6	4	2

2.6.2.1 NEG500 – Terminal Assignment

No.	Assignment
1	+24 V DC supply voltage
2	+24 V DC supply voltage
3	0 V (-24V) DC supply voltage
4	0 V (-24V) DC supply voltage
5	19 V AC supply voltage (L1)
6	19 V AC supply voltage (L2)
7	19 V AC supply voltage (L3)
8	Unassigned / unused
9	+24 V output (filtered and backed-up)
10	+24 V output for digital input contacts (varistor..)
11	0 V (-24V) DC output voltage
12	+24 V output (filtered, backed-up)
13	External CAN bus: CAN4-H
14	External CAN bus: CAN4-L
15	External CAN bus: CAN4-GND
16	Unassigned / unused

2.6.2.2 Terminal Assignment – NEG502 and Combined Power Supply Module NEG501/510 Respectively

NEG 502 Left and NEG510 Respectively – Terminal Assignment

No.	Assignment
1	+24 V (varistor-protected)
2	+24 V (varistor-protected)
3	+24 V (varistor-protected)
4	+24 V (varistor-protected)
5	+24 V (varistor-protected)
6	+24 V (varistor-protected)
7	+24 V (varistor-protected)
8	+24 V (varistor-protected)
9	+24 V (varistor-protected)
10	+24 V (varistor-protected)
11	+24 V (varistor-protected)
12	+24 V (varistor-protected)
13	+24 V (varistor-protected)
14	+24 V (varistor-protected)
15	+24 V (varistor-protected)
16	+24 V (varistor-protected)

NEG 502 Right and NEG501 Respectively – Terminal Assignment

No.	Assignment
1	+24 V DC supply voltage
2	+24 V DC supply voltage
3	0 V (-24V) DC supply voltage
4	0 V (-24V) DC supply voltage
5	19 V AC supply voltage (L1)
6	19 V AC supply voltage (L2)
7	19 V AC supply voltage (L3)
8	Unassigned / unused
9	+24 V output (filtered and backed-up)
10	+24 V output for digital input contacts (varistor..)
11	0 V (-24V) DC output voltage
12	+24 V output (filtered, backed-up)
13	External CAN bus: CAN4-H
14	External CAN bus: CAN4-L
15	External CAN bus: CAN4-GND
16	Unassigned / unused

2.6.2.3 ZKG500 – Terminal Assignment

No.	Assignment
1	Diagnostic contact (normally open contact)
2	External CAN bus: CAN1-GND
3	External CAN bus: CAN1-L
4	External CAN bus: CAN1-H
5	Diagnostic relay contact (normally open contact)
6	External CAN bus: CAN2-GND
7	External CAN bus: CAN2-L
8	External CAN bus: CAN2-H
9	Analog input channel 1 + (0...+10V)
10	Analog input channel 2 + (0...+10V)
11	Analog input channel 3 + (0...+10V)
12	Analog input channels 1,2,3 - (GND)
13	RS-485 bus: -S/E
14	RS-485 bus: +S/E
15	RS-485 bus: RGND
16	Digital output +24 V optocoupler

2.6.2.4 GOV500 – Terminal Assignment

No.	Assignment
1	GOV motor connection (DC / AC motor)
2	GOV motor connection (DC / AC motor)
3	GOV motor connection (AC motor)
4	GOV motor connection (DC motor)
5	+24 V (internal, backed-up)
6	0 V (internal)
7	GOV motor supply (+24V / L1)
8	GOV motor supply (0V / L2)
9	Digital input channel 1 (+24 V) sensor contact connection
10	Digital input channel 1 (DE input) sensor contact connection
11	Digital input channel 2 (+24 V) sensor contact connection
12	Digital input channel 2 (DE input) sensor contact connection
13	Analog output 1 (reference potential)
14	Analog output 1 (output)
15	Analog output 2 (reference potential)
16	Analog output 2 (output)

2.6.2.5 DIO500 – Terminal Assignment

No.	Assignment
1	Digital output channel 3 contact (normally closed contact or normally open contact)
2	Digital output channel 3 contact (normally closed contact or normally open contact)
3	Digital output channel 4 contact (normally closed contact or normally open contact)
4	Digital output channel 4 contact (normally closed contact or normally open contact)
5	Digital output channel 1 contact (normally closed contact or normally open contact)
6	Digital output channel 1 contact (normally closed contact or normally open contact)
7	Digital output channel 2 contact (normally closed contact or normally open contact)
8	Digital output channel 2 contact (normally closed contact or normally open contact)
9	Digital input channel 1 (or open circuit channel 1)
10	Digital input channel 2 (or open circuit channel 2)
11	Digital input channel 3 (or open circuit channel 3)
12	Digital input channel 4 (or open circuit channel 4)
13	Digital input channel 5 (or input value channel 1)
14	Digital input channel 6 (or input value channel 2)
15	Digital input channel 7 (or input value channel 3)
16	Digital input channel 8 (or input value channel 4)

2.6.2.6 SLE500 – Terminal Assignment

No.	Assignment
1	Watchdog relay contact (normally closed contact)
2	Watchdog relay contact (normally open contact)
3	Watchdog relay contact (common)
4	CAN0-GND
5	– Not assigned –
6	External CHASSIS terminal
7	Circuit-breaker ON contact
8	Circuit-breaker ON contact
9	– Not assigned –
10	– Not assigned –
11	Internal current transformer terminal K3
12	Internal current transformer terminal L3
13	Digital input channel 1 (+ 24 V)
14	Digital input channel 1 (input)
15	Digital input channel 2 (+ 24 V)
16	Digital input channel 2 (input)
17	US1 (external voltage input of buffer amplifier)
18	US2 (external voltage input of buffer amplifier)
19	2.5 V (analog reference voltage)
20	2.5 V (analog reference voltage)
21	Digital input channel 3 (input)
22	Digital input channel 3 (+ 24 V)
23	Digital input channel 4 (input)
24	Digital input channel 4 (+ 24 V)
25	Internal current transformer terminal L1
26	Internal current transformer terminal K1
27	Internal current transformer terminal L2
28	Internal current transformer terminal K2
29	Circuit-breaker ON (normally closed contact)
30	Circuit-breaker ON (common)
31	Circuit-breaker ON (normally open contact)
32	Circuit-breaker ON enabling

2.6.2.7 TRV500 – Terminal assignment

No.	Assignment
1	Analog output channel 1
2	Analog output channel 2
3	Analog output channel 3
4	Reference voltage (2.5V) for analog outputs
5	- Input channel 3 (V3)
6	– Unassigned –
7	– Unassigned –
8	+ Input channel 3 (U3)
9	+ Input channel 2 (U2)
10	– Unassigned –
11	– Unassigned –
12	- Input channel 2 (V2)
13	+ Input channel 1 (U1)
14	– Unassigned –
15	– Unassigned –
16	- Input channel 1 (V1)

2.6.2.8 DIF500 – Terminal Assignment

No.	Assignment
1	Current transformer input L1 DIF1 (I1 = ID1)
2	Current transformer input K1 DIF1 (I1 = ID1)
3	Current transformer input L2 DIF1 (I2 = ID2)
4	Current transformer input K2 DIF1 (I2 = ID2)
5	Current transformer input L3 DIF1 (I3 = ID3)
6	Current transformer input K3 DIF1 (I3 = ID3)
7	– Not connected –
8	– Not connected –
9	Current transformer input L6 DIF2 (I3 = IE3)
10	Current transformer input K6 DIF2 (I3 = IE3)
11	– Not connected –
12	– Not connected –
13	Current transformer input L4 DIF2 (I1 = IE1)
14	Current transformer input K4 DIF2 (I1 = IE1)
15	Current transformer input L5 DIF2 (I2 = IE2)
16	Current transformer input K5 DIF2 (I2 = IE2)

2.6.2.9 USS500 – Terminal Assignment

No.	Assignment
1	Undervoltage coil terminal (+)
2	Undervoltage coil terminal (+)
3	Undervoltage coil terminal (–)
4	Undervoltage coil terminal (–)
5	Input contact supply (–)
6	Input contact supply (–)
7	Input contact (coil side)
8	Input contact (coil side)
9	– Not assigned –
10	L1 system 2
11	L2 system 2
12	L3 system 2
13	– Not assigned –
14	L1 system 1
15	L2 system 1
16	L3 system 1

2.6.2.10 DCC500 – Terminal Assignment

No.	Assignment
1	+24 V external supply
2	+24 V external supply
3	0 V external supply
4	0 V external supply
5	+24 V external supply
6	+24 V external supply
7	0 V external supply
8	0 V external supply
9	0 V isolated output
10	0 V isolated output
11	+24 V isolated output (with NTC thermistor)
12	+24 V isolated output (with NTC thermistor)
13	0 V isolated output
14	0 V isolated output
15	+24 V isolated output
16	+24 V isolated output

2.7 Connection of the BAT500 Operator Control and Display Panel

On the rear side the BAT500 has got one power supply connector (POWER) as well as three further ports:

– AUX port (for the CAN bus connection to the ZKG500)
– PLC port (not used)
– PC/printer port (for programming)

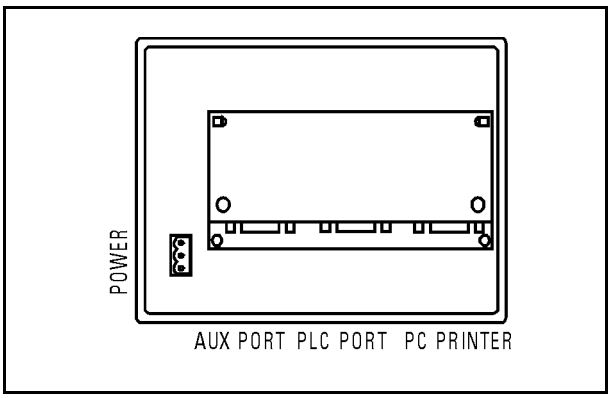


Abb. 2-18 Ports on the BAT500

The power supply connectors are shown in the opposite figure.

The BAT500 must always be earthed.

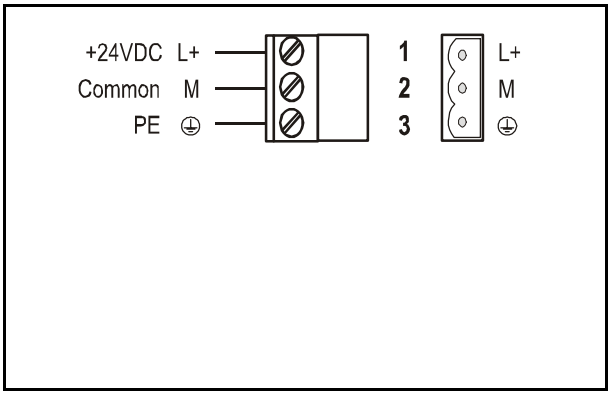


Abb. 2-19 Power Supply Connectors

The power supply must have a double or a reinforced insulation.

All electrical components of the system must be earthed.

Earthing must be in accordance with the valid, applicable regulations.

NOTE
In case of non-earthed 24 V systems the BAT500 is to be supplied on a floating basis with a DCC500 because the BAT500 establishes a connection between M and casing.

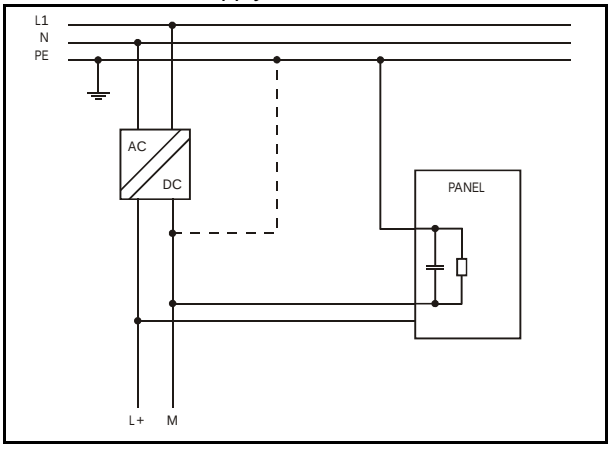


Abb. 2-20 Earthing

Connecting the AUX Port

The AUX port is a 9-pole sub D port. The cable of the CAN bus (to the NEG module, CAN4) is to be connected to the AUX port. The bus is to be terminated via a 120 Ω resistor at the BAT500. The use of the prefabricated CANopen cable (identity No. 271.188.464) with integrated terminating resistor is recommended.

Pin	Assignment
2	CAN – L
6	CAN – GND
7	CAN – H

2.8 EMC Notes

Using Screened Cables

The following lines must always be screened:

– Bus lines
– Analog lines

The cable screen must be earthed as closely to the connection as possible.

Producing the Reference Potential Surfaces

Always connect the cable screen to the earth potential at both ends.

Bear in mind that the earth potential can have a different potential at the earthing points.

In this case an additional equipotential bonding conductor with a cross-section of at least 10 mm² is to be installed.

Connection of External Screened Cables

Connect the screened cable coming from externally to the local reference potential surface. Establish the connection directly after the entry into the system (switchgear cabinet, rack, mounting plate).



NOTE
The cable screen must not serve as equipotential bonding. The free cable ends are to be kept as short as possible!

Connection of Screened Data and Signal Lines

1. Route the screened data and signal lines to the left or to the right side of the unit the shortest possible way.
2. Establish a low-impedance, large-area connection of the screen braid to the reference potential surface. In this connection the use of spring-loaded screen terminals on a screen bus is recommended.
3. Strip the screen braid end as closely to the signal line entry of the unit as possible.
4. When using metal plugs the screen braid must be connected to the metal sleeve of the plug.
5. The optimum EMC characteristics are achieved, if the cable screens have a low-impedance connection to the frame potential at both ends.
6. Establish a low-impedance connection of the top-hat rail to the switchgear cabinet / earth potential. Because the potentials of the modules refer to the potential of the top-hat rail.

Low-impedance Connection

A low-impedance connection is achieved as follows:

- Large-area, well conducting metal-metal connection;
- Use of flexible grounding strips (RF litz wire);
- Short connection cables with large surface and contact surface;
- In case of varnished, anodised or insulated metal parts the insulating layer is to be removed in the area of the junction.
- Protect the junctions from corrosion (e.g. by greasing).



CAUTION
Use appropriate grease only.

When connecting the reference surfaces the relevant regulations are to be observed.



NOTE
A usual PE conductor with a small cross-section is insufficient!