PowerPlex® Keypads

Installation and Operating Instructions

User Manual ***PowerPlex***®
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About this manual

This manual describes start-up of the ***PowerPlex***® keypad series (PP-M-KP100 and PP-M-KP200) in connection with compatible ***PowerPlex***® components. We assume that all ***PowerPlex***® compatible components and devices were installed correctly. The instruction is meant to be used by all professional electricians who want to integrate this control panel into an E-T-A ***PowerPlex***® system. The ***PowerPlex***® keypads allow easy and intuitive operation and monitoring of the ***PowerPlex***® installations.

Besides this document further information on the E-T-A ***PowerPlex***® can be found Components in the following manuals (English):

PowerPlex® Manual Volume 1	Volume 1: System Description
PowerPlex® Manual Volume 2	Volume 2: Hardware Installation and Maintenance
PowerPlex® Manual Volume 3	Volume 1: System set-up and configuration
PowerPlex® Manual Compact Modules	Instructions for installation: ***PowerPlex***® Compact Modules
PowerPlex® Manual Mini Modules	Instructions for installation: ***PowerPlex***® Mini Modules
PowerPlex® Manual Touch Panel 7.0"	Instructions for installation: ***PowerPlex***® Touch Panel 7.0"

All manuals contain important instructions for connection and safe operation of the ***PowerPlex***® devices. Safety instructions have to be observed. All users have to be informed about all safety instructions. The documents have to be accessible for the user.

Qualified personnel

The system must only be installed, connected and configured in connection with this document. Installation and operation of the device/system must only be carried out by qualified personnel. With regard to the safety instructions of this documentation, qualified persons are persons authorised to operate devices, systems and circuits according to the standards and rules of safety engineering.

Safety instructions

Please follow the installation and configuration instructions given in this document carefully. Failure to comply may lead to serious damages of the product or the system. E-T-A is unable to accept responsibility for customer or third party liability, warranty claims or damage caused by incorrect installation or improper handling in disregard of the Installation and Operating Instructions.

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Symbols

The following conventions and symbols will accompany you throughout the entire manual. They are defined as follows:

	**Warning:** You are in a situation which might cause injury. Before working with one of the devices you have to be aware of the risks of electrical circuitries and you ought to be familiar with standard procedures of accident prevention.
	**Caution:** There is a risk in this situation to do something which might cause damage of the devices or data loss.
	**Information:** Here you receive information which might be particularly useful for the application.

Table 1: Symbols used

1. Introduction

You chose ***PowerPlex***®, a comprehensive, future-oriented on-board system which combines safety, user convenience and reliability. It is a decentralised power distribution and control system, regulating, controlling and monitoring various loads, switches and sensors and connecting them via CAN. All ***PowerPlex***® modules ensure reliable control and monitoring of the electrical installations on board, either alone or in combination with other ***PowerPlex***® components. Besides the protection against overcurrent they allow readout of data of the connected level sensors and temperature sensors as well as of shunts.

All modules of a system communicate and interact via a SAE-J1939-compliant CAN bus. ***PowerPlex***® is configured by using the ***PowerPlex***® Configuration Software and the configuration is transferred to the modules by means of USB/CAN converters.

Thanks to its system properties ***PowerPlex***® is the perfect solution for smart electrical networks on boats and in vehicles. Typical applications include:

- Buses, special vehicles, mobile homes etc.
- Watercraft, e.g. leisure boats, workboats

Benefits for the OEM

The E-T-A ***PowerPlex***® system allows switching and controlling of various loads, timer functions, real load status indication, overcurrent protection and wire break detection. Each function can be configured separately to meet the requirements of the loads.

Based on the CAN communication the ***PowerPlex***® system allows to make individual wiring between load and control unit a thing of the past. The transmission of switch commands and status information is based on the peer-to-peer CAN bus communication. A direct cable connection between the actuator, e.g. a light switch, and the load, e.g. a lamp, is no longer required. The obvious advantages for the OEM include the reduced wiring and production costs as well as a convenient system setup by means of a Windows based configuration software. All control functions of the system are freely configurable with regard to complexity and size of the system. Change or system extension at a later date are also extremely easy.

PowerPlex® **Scope of operation** – ***PowerPlex***® takes over the following tasks:

- **Distributes the DC 12 V or DC 24 V power supply** to all spots of the boat where loads are installed, such as lighting and heating control, bilge and water pumps, windscreen wiper motors etc.
- **Collects all status information** of all sensors and actuators everywhere in the vehicle, such temperature and tank level measuring points, ON/OFF status signals of the actuators.
- **Switches devices and equipment ON and OFF**, according to selectable, pre-set scenarios, at the touch of a button.
- **Monitors devices and equipment** regarding their out-of-range conditions, indicates possible failures and responds by reversing the pertinent control unit, as e.g. switching on a pump, if the water tank level falls below a certain limit.
- **Protects devices and equipment** against hazardous overcurrent and short circuit by isolating the faulty load from the system and failure indication to the system.
- **Offers back-up protection and switching** in the improbable case of a ***PowerPlex***® system or component failures.

2. System components: Overview

The ***PowerPlex***® system of E-T-A is a comprehensive on-board system combining safety, convenience and reliability. ***PowerPlex***® allows individual and flexible concepts of switching the illumination, acoustic and special signals and lots more. It automatically switches loads and immediately indicates undesired conditions of the devices or of the entire electrical installation. Thus it is ensured, that everything works precisely - which is reassuring, as the loads often are not in plain sight. E-T-A ***PowerPlex***® is a decentralised power distribution system with electronic protection – clearly reflecting trends of the future.

Fig. 1 shows a typical ***PowerPlex***® solution with an application-specific number of ***PowerPlex***® components - modules and control units – installed at various positions.

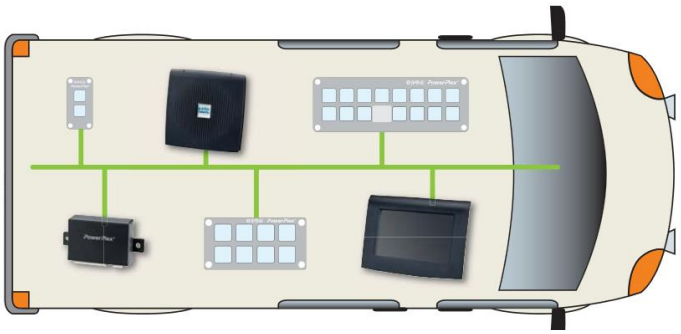


Fig. 1: Exemplary system design in an ambulance

PowerPlex® communication is based on the CAN bus principle by means of “nodes”, which communicate with each other via a serial 2-wire connection. Hence the key components of a ***PowerPlex***® system are these nodes distributed over the vehicle or boat. The overall ***PowerPlex***® term for these interconnected nodes is “module".

Various hardware components are required for installation and start-up of a ***PowerPlex***® system:

Please check the delivered components upon receipt with regard to completeness. You require the following hardware components for installation and start-up of a ***PowerPlex***® system:

- one or more ***PowerPlex***® modules (e.g. DC power module, Compact module) allowing for the module-specific requirements
- USB-CAN converters (cable and driver) for transferring the configuration.
- USB cables for the USB service interface for transferring application-specific user interfaces onto ***PowerPlex***® Touch Panels.

In addition you require a CAN bus cable for connecting the ***PowerPlex***® components to the bus. Many manufacturers offer standard cables for this purpose. For more information on the required cable properties please see chapter 7 of the manual.

PowerPlex® reliably and precisely connects, regulates, controls and monitors electrical loads, switches and sensors via CAN. It controls status indications, operating conditions and execution of commands. Perfectly matched software and hardware components offer a comprehensive total solution with maximum potential of individualisation.

Each module protects the loads and cable harnesses against overcurrent. In addition the modules collect data of level sensors and temperature sensors as well as of shunts. Usually a ***PowerPlex***® system consists of several modules of different kinds. The selection depends on the size of the electrical system to be monitored and controlled as well as of the current ratings of the loads.

Use our ***PowerPlex***® Configuration Software in order to “programme” various control configurations. As requested you can store them on the computer and load them into various ***PowerPlex***® control systems. As soon as a ***PowerPlex***® configuration has been completed, it will be transferred to the ***PowerPlex***® modules (”nodes”) via the CAN bus interface. Via this CAN bus interface you also connect the ***PowerPlex***® software for testing, analysing and debugging purposes of the ***PowerPlex***® installation.

Fig. 2 shows the entire ***PowerPlex***® product range to enable you to design your own ***PowerPlex***® system solution:

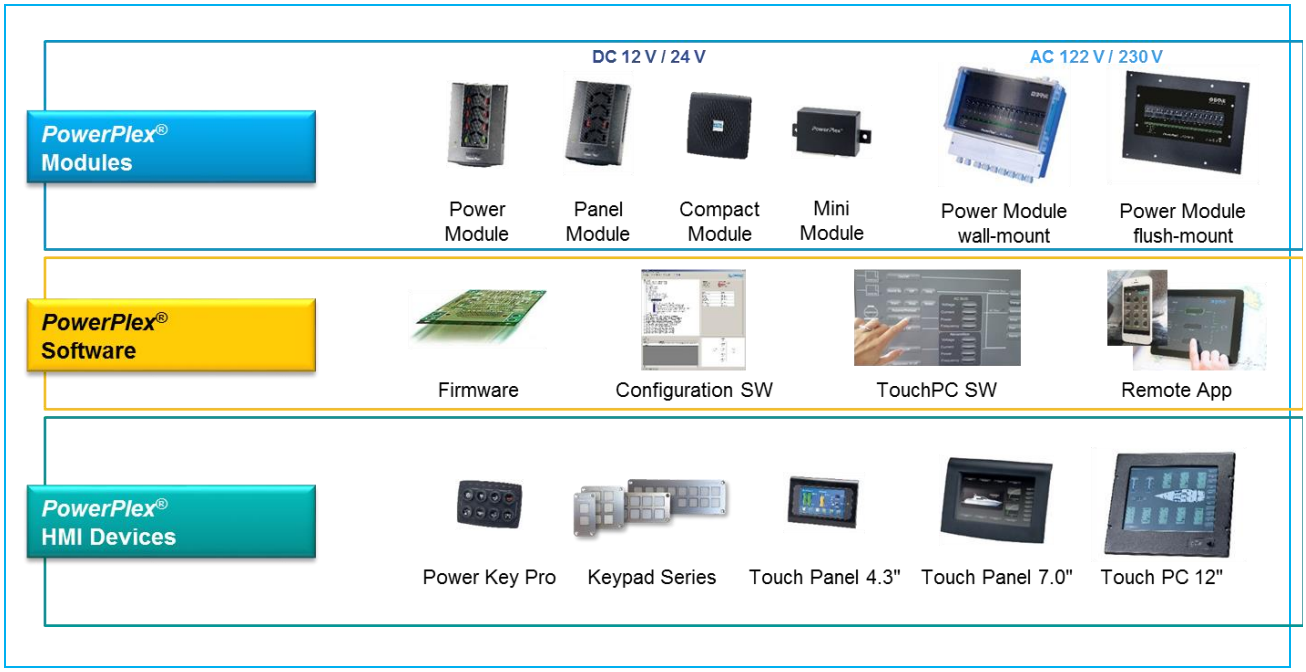


Fig. 2: Overview of PowerPlex® components

More components required for setting up a ***PowerPlex***® system are shown in .

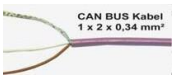
Accessories	Description
	***PowerPlex***® **Configuration Software** Windows-based configuration software for defining addresses, characteristics and functions of the ***PowerPlex***® modules, assignment of the inputs and outputs to the modules and execution of system tests and analyses.
	**CAN-USB converter plus driver** CAN-USB adapter for connecting the CAN bus hardware to the USB interface of the computer with the ***PowerPlex***® configuration software and/or to the USB interface of a touch panel which could be connected to the ***PowerPlex***®.
	**Terminating resistors** Two 120 Ω resistors terminate the CAN bus network, one on each end of the CAN bus.
	**CAN bus cable** A trunk CAN bus cable in pairs with two conductors (CAN-H and CAN-L) and the shield (SHLD) connect two ***PowerPlex***® modules with each other.
	**Power supply** 12 V DC or 24 V DC battery voltage supply
	**Line protection** Protection of the L (+) connection from a ***PowerPlex***® module to the battery or to the CAN bus. *Recommendation:* Thermal-magnetic E-T-A 8345 circuit breaker type.

Table 2: Additional accessories

3. PowerPlex® system: General

3.1. *PowerPlex®* Modules

PowerPlex® modules are the key components of a ***PowerPlex®*** network. According to the CAN bus terminology they are the “nodes” of the network and form the points of switching, transmission and control.

PowerPlex® for DC system include high-end power semi-conductors with integral protective elements for switching and protection of electrical loads. The modules are free of mechanical components and thus insusceptible to wear and shock and vibration resistant.

E-T-A offers various ***PowerPlex®*** modules for DC 12 V and DC 24 V systems. gives an example of the difference between two modules.

DC Modules		Mini Module 	Power Module 
Voltage ratings		DC 12 V / 24 V	DC 12 V / 24 V
max. total current		12 A per module	102 A per module
Inputs	digital	8, configurable	8
	analog		4
Outputs		8 (max. 1.5 A)	4 (max. 1 A) 6 (max. 8 A, FLPC) 2 (max. 25 A, FLPC)
Degree of protection		IP22	IP22
Part number		PP-M-MM300-000-0-Z-00	PP-M-DC024-000-0-0-00

Table 3: Different PowerPlex® Modules

3.2. *PowerPlex®* CAN Bus

A ***PowerPlex®*** network can embrace up to 30 different ***PowerPlex®*** modules. The smallest ***PowerPlex®*** system would consist of two modules communicating via the CAN bus cable (see Fig. 3).

The loads controlled by the modules - in this case a light and bilge pump - are normally installed at some place in the vehicle which may not be necessarily close to the input signal. The decentralised control structure of ***PowerPlex®*** allows monitoring and switching of the devices anywhere on the vehicle or boat from any chosen installation site.

A level sensor monitors the bilge and supplies the analog information on module 1. From there the information is transferred to module 2 via the CAN bus. As soon as the measured analog input value (i.e. the “pumping level”) has exceeded a pre-set limit value , module 2 will send a switch command to the load (i.e. the “bilge pump”) so as to switch on the pump and to reduce the water level of the bilge back to an acceptable level. The status information of the bilge pump will be sent back to module 1 in order to switch on the display “bilge pump running”.

In addition module 2 monitors the position of a light switch – ON or OFF – at one of the digital inputs and sends the switching signal to module 1, which switches the light ON or OFF depending on the switching status .

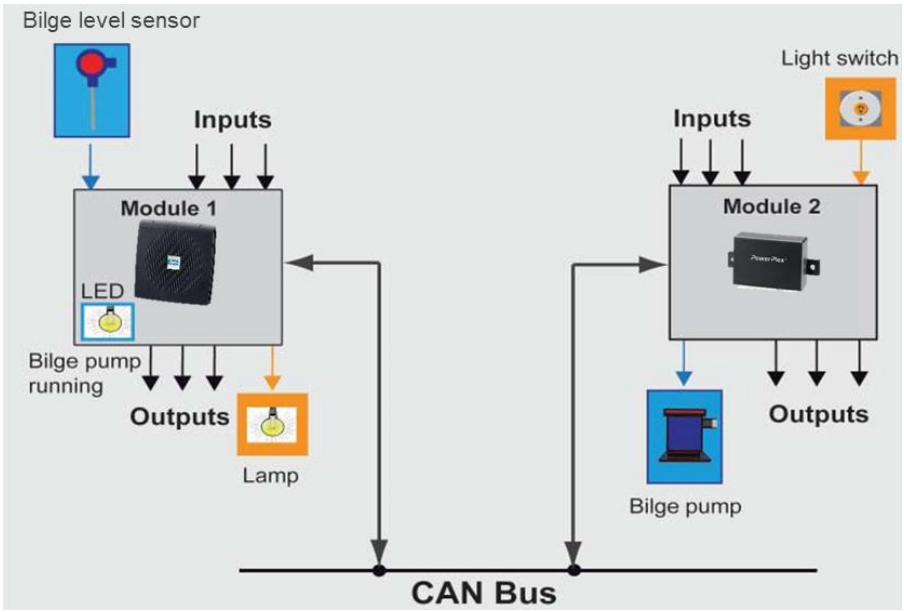


Fig. 3: Two PowerPlex® modules connected via CAN bus cable

An example demonstrates the principle of using the sensor and switching signal information at the module inputs as well as the sending, switching or the display of commands to the outputs of the same or a different module.

A typical ***PowerPlex***® control system will of course connect a much higher number of modules and their inputs and outputs which will be distributed over the entire vehicle. Fig. 4 shows the electrical connection of several ***PowerPlex***® modules in a serial CAN bus topology. Each module has to be connected to the DC voltage supply and the CAN bus.

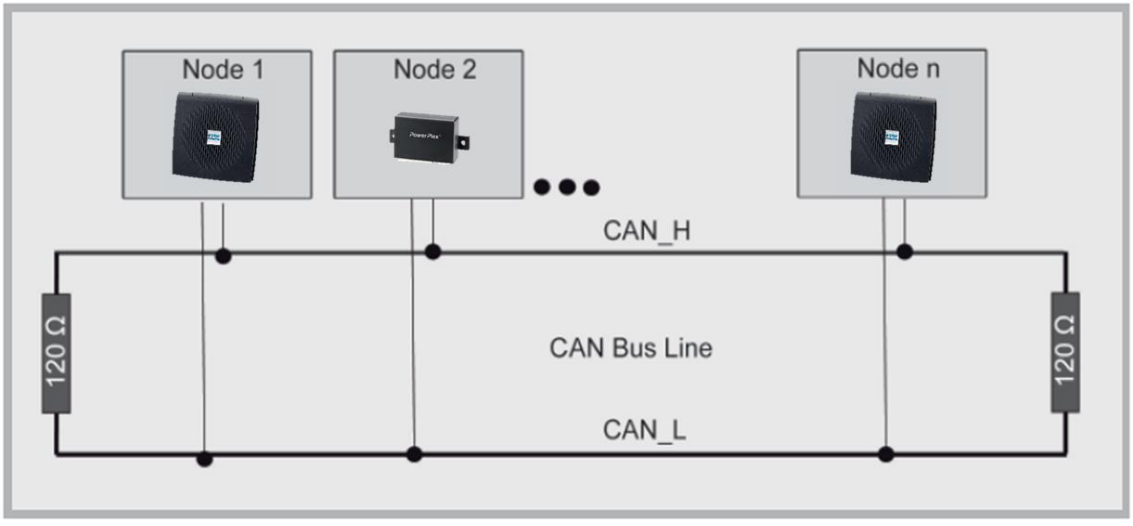


Fig. 4: Various PowerPlex® modules connected via serial CAN bus topology

Note:
The first and last Modules of the CAN bus topology have to be connected with a 120 Ω terminating resistor between the CAN high and CAN low signals. This helps avoiding interferences on the bus.

3.3. Put down the serial number

Each ***PowerPlex***® component has a unique serial number. Before mounting the ***PowerPlex***® modules, we recommend to prepare a list. This list should include: ***PowerPlex***® component (module type), pertinent serial number and installation area.

You find the serial number of the ***PowerPlex***® Keypad on the label attached to the housing. The serial number consists of 7 letters and numbers. It is used as an identification for new, not yet projected modules which have the CAN bus address “0” for a start. The serial numbers are required for system set-up. By means of the ***PowerPlex***® configuration software the pertinent CAN bus addresses will be assigned.

Note:
Please note the 7-digit serial number of each ***PowerPlex***® component. It is required for the subsequent system configuration with the ***PowerPlex***® configuration software.

Later, when you start configuring the modules and when you define their roles in the CAN network, the assignment between serial number, CAN bus address and installation area has to be made.

The use of CAN bus address labels helps keeping an overview for module identification, above all in the event of comprehensive projects.

3.4. The CAN bus address

Any ***PowerPlex***® component within a ***PowerPlex***® network has its own, unique CAN bus address in a range of 1 to 30 for a clear identification. Assignment of the CAN bus addresses is during the system set-up by means of the ***PowerPlex***® Configuration Software (cf. ***PowerPlex***® Manual Volume 3: System set-up and configuration).

We recommend to mark the modules in the ***PowerPlex***® system with the corresponding CAN bus addresses so as to be able to keep track.

4. General: *PowerPlex*® Keypads

Growing demands regarding safety and convenience lead to the installation of more and more electrical loads in vehicles and boats. With the ***PowerPlex***® Keypads in Fig. 5 E-T-A offers another possibility of modern control of your ***PowerPlex***® system.

Fig. 5: PowerPlex® Keypads

By pressing the buttons, the user is able to operate all vital system conditions of the application. A keypad interacts via the CAN bus with at least one or more ***PowerPlex***® modules.

Above all in special vehicles such as ambulances and fire brigades, input devices are required to send messages and visually indicate the status signals of the loads.

4.1. Technical data

The ***PowerPlex***® Keypads should be cross-linked with at least one ***PowerPlex***® module via a CAN bus. summarizes the vital information.

Technical Data	
Voltage ratings	DC 12 V / 24 V
Operating voltage	9 ... 32 V DC
Quiescent current	typically 12.5…15 mA at DC 24 V
LED current per button	blue: typically 18 mA at DC 24 V, 100% brightness green: typically 5.5 mA at DC 24 V, 100% brightness red: typically 15 mA at DC 24 V, 100% brightness
Degree of protection	IP53, from the front IP00, from the rear
Operating temperature	-20…+70°C (-4… 158°F)
Storage temperature	-30…+80°C (-22… 176°F)
Humidity (IEC 60068-2-30 Db)	40°C , 95% RH, 240 hours
Vibration (IEC 60068-2-6, Fc)	10 Hz … 57 Hz ± 0.38 mm 57 Hz … 200 Hz acceleration 5 g
Shock (IEC 60068-2-27, Ea)	25 g (11 ms)
EMC	EMC Directive 2004/108/EU, CE Logo to EN 61000-6/-2/4
Mass	**series -100** 2-fold: 41 g 6-fold: 53 g 8-fold: 53 g **series -200** 15-fold: 113 g
Interface	
CAN to	SAE J1939 , 250 kbit/s,
The CAN terminals at each end of the bus have to be terminated with a 120 Ω resistor.	
Keyfields	
Size of frame	15 x 15 mm², backlit
Illuminant	RGB Multi LEDs, configurable colour matching
Brightness	max. typically 400 mcd/button
Pushing force	3.5 N
Typical life	min. 145,000 cycles
Film	
Design	E-T-A Standard
Chemical resistance	alcohols, thinned acids, disinfectants (by Merz) to DIN 42115
Symbols	Individual design available by means of slide-in foils (not included in the scope of delivery, dimensional drawings upon request)

Table 4: Selection of technical data
**) For further information please see the relevant data sheet.*

4.2. Scope of delivery

Standard scope of delivery of the ***PowerPlex***® Keypad is without accessories.

For completion we recommend the following accessories:

- USB/CAN Converter: XPP-USBCO
  XPP-USBC1 (opto-decoupled)
- Connection package: XPP-CP-120
  (includes 4-pole connector housing, 4x crimp contact sleeves 20 – 24 AWG (0.22 – 0.5mm²))

5. Mounting method

The ***PowerPlex***® Keypads has been designed for stationary installation.

> **Note:**
> This is an installation of class A. This installation may cause interferences in residential areas. In such a case the operator can be requested to carry out appropriate measures.

5.1. Installation check list

When planning and installing the ***PowerPlex***® system please observe the limited number of system components. Our recommendation is some 30 ***PowerPlex***® modules per system. Maximum values depend on the configuration scope so that more modules per system could be possible.

Mounting covers the following installation steps listed in :

step	action
1	Application-specific system planning
2	Determine the installation site and prepare all necessary devices and tools
3	Put down the serial number
4	Run the cables
5	Prepare the necessary cut-outs for cables and device in the mounting plate
6	Connect the device for start-up
7	Mount and connect all remaining ***PowerPlex***® components if not done before.
8	Start the system by switching on
9	Check the system behaviour by a complete system test

Table 5: Installation check list

5.2. Recommended installation site

Basically the installation site of all ***PowerPlex***® components can be chosen totally freely. The ***PowerPlex***® HMI devices should be installed in an area which offers maximum benefit for the user. The ***PowerPlex***® modules on the other hand should be installed close to the connected loads to reduce wiring efforts.

> **Important:**
> - Leave enough space for heat dissipation.
> - Please make sure to install the ***PowerPlex***® modules in enclosed rooms.
> - Please observe the mounting version so as to reach the required degree of protection.

General requirements of installation site

When choosing the mounting site, various factors that might influence the performance of the device have to be taken into account. gives you an overview of the major factors.

	Ventilation Please ensure sufficient ventilation by leaving enough space at all sides of the device and ensure that the vent holes are not blocked. Leave enough space between the devices.
	Installation area Ensure a tight installation on the mounting area. Please consider the vehicle-specific properties and do not mount components in places where might affect the safety features of the vehicle. In addition make sure that the mounting surface is flat and even and not too rough so as to ensure the requested protection degree.
	Cable bushing Ensure installation at a site where the cables can be laid and connected properly.
	Electrical noise pulses The installation site should provide sufficient distance to any devices that might emit noise pulses.

Table 6: General requirement of the installation site

5.3. General notes on wiring

The selection of the correct cable types is important for the reliable power distribution, control and monitoring by means of a ***PowerPlex***® system. Please ensure to use cables of superior quality with the suitable cross sections so as to avoid voltage drops. Please also so the separate chapter 7 concerning the integration of the device into the CAN bus network.

The cables should be laid very carefully so as to achieve the maximum performance of the ***PowerPlex***® installation. gives general hints which have to be observed regarding wiring of a ***PowerPlex***® system and the connected loads.

Item	Note
1	The cables should not be kinked or bent sharply. Please provide sufficient bending radii.
2	Cables must be protected against damages and heat. Avoid the proximity to moveable or hot parts and to machines.
3	Cables should be secured by means of brackets or cable clips. Excessive cable lengths should be disposed of appropriately.
4	Depending on the site of the cables, waterproof bushings might be useful.
5	Ensure a suitable strain relief.
6	Check cables with regard to intact insulation, above all after cable laying.

Table 7: General notes on wiring

If AC and DC current is used for installation, an adequate insulation must be ensured.

	Note: Please do not forget the 120 Ω terminating resistor when the ***PowerPlex***® Keypads is connected as first and/or last participant on the CAN bus.

5.4. Required installation dimensions - mounting cut-out

The ***PowerPlex***® Keypads are meant for front panel mounting. The ***PowerPlex***® Keypads are screwed onto the mounting plate from the front, e.g. in the side trim panel. The required dimensions are shown in Fig. 6.

The CAN bus cable as well as the supply cables are connected to the keypads from the rear by means of mating plugs. This has to be considered in the planning stage and ensures ease of mounting, preventing a possible kinking of the cables.

Delivery of a standard ***PowerPlex***® Keypad does not include any mating plugs. They can be ordered separately as accessories XPP-CP-120: Please order the corresponding bushing housings (4-pole) and the requested female pins (20-24AWG), see chapter 4.2).

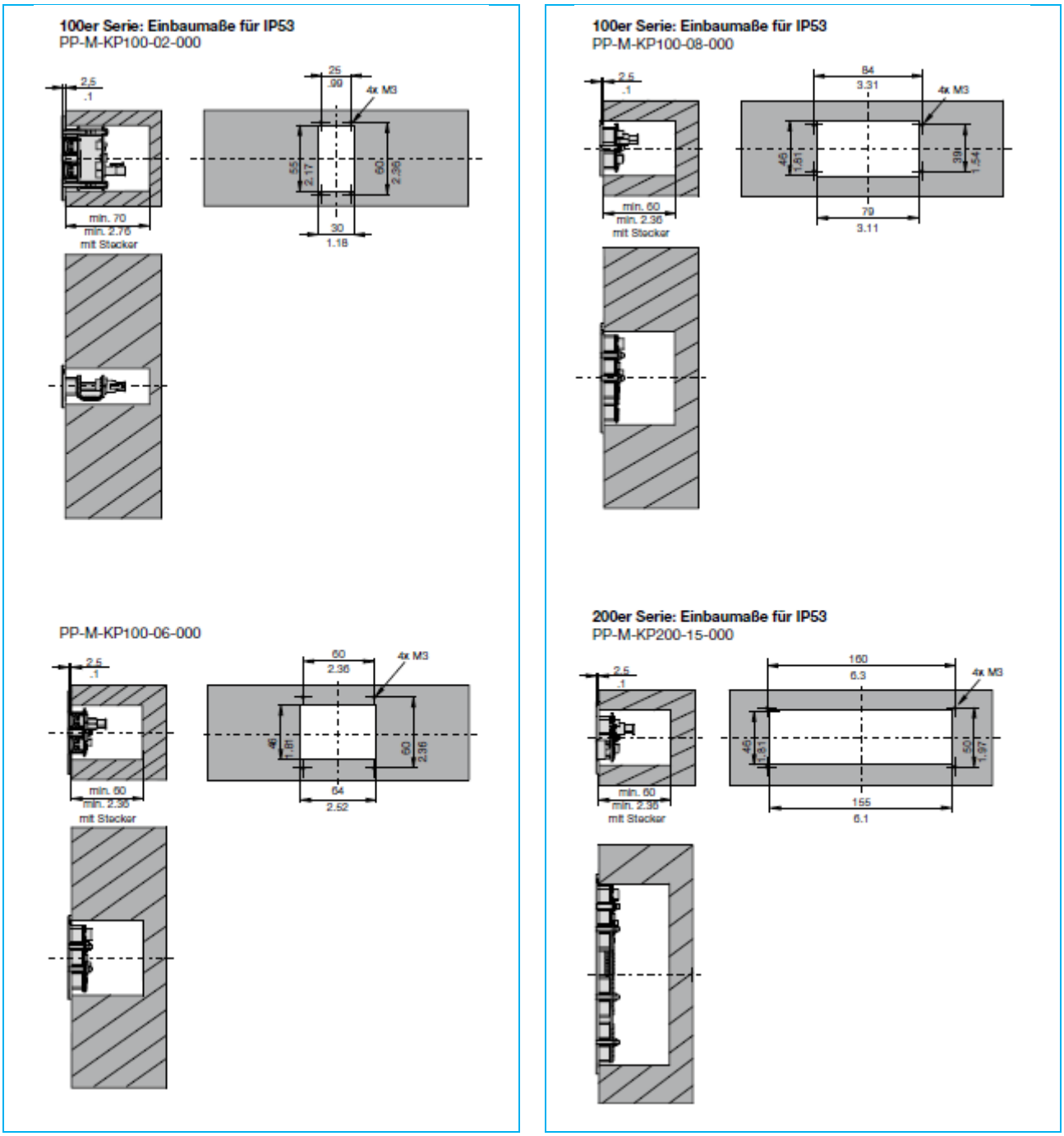


Fig. 6: Dimensions for the required mounting cut-out

5.5. Dimensions and space requirements

According to EMC conditions there must always be sufficient space between the different electrical devices. Space requirement of a device depends on its dimensions shown in Fig. 7.

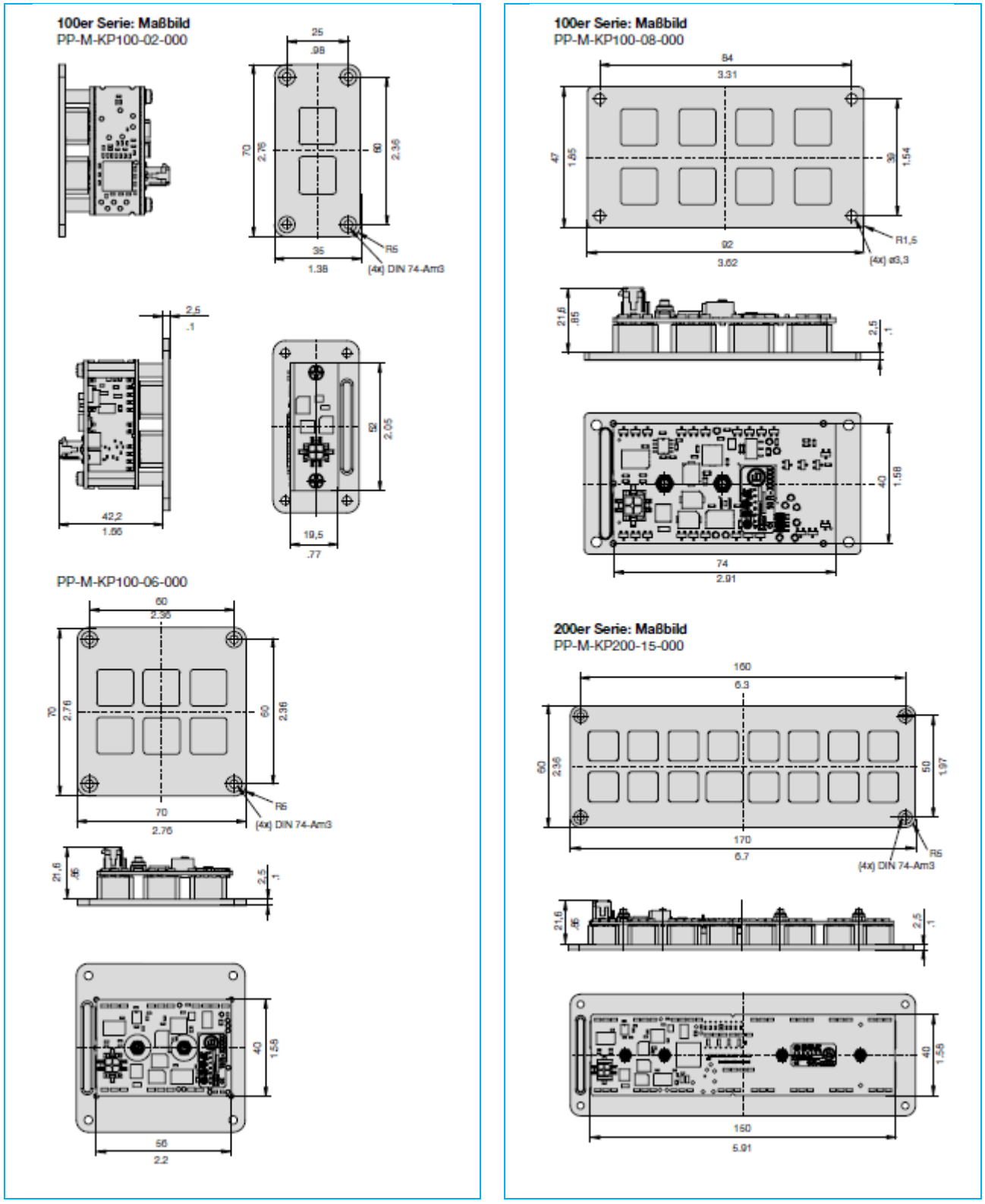


Fig. 7: Dimensions of the different PowerPlex® Keypads

5.6. Mounting of the device

Before you start installation, please make sure that

- the installation site was selected under consideration of the product-specific requirements
- the cable connections were identified correctly and cable laying was thoroughly planned
- the power supply was disconnected and protected against inadvertent reset

step	action
1	Mark the intended installation site following the installation dimensions
2	Drill the mounting holes into the wall with an adequate tool.
5	Depending on the accessibility of the cable connections we recommend to connect all cables (current, CAN etc.) before mounting the device. Important: A cable connection must only be established if the main switch is OFF. Check the cables with regard to correct polarity and ensure that the max. permissible operating voltage is not exceeded. Please do not forget the terminating resistor if the device is the first or last participant on the CAN bus.

Table 8: Mounting of the device

Pin assignment:

The pins of the ***PowerPlex***® Keypads are on the bottom side. The pin assignment is shown in Table 9. Please note that the mating connectors are not included in the delivery scope as standard.

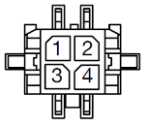
terminal	interface	assignment	pin no.
	CAN interface	CAN-L	1
		CAN-H	2
	Power supply (DC 12V/24V; DC 9… 32V)	U_{Batt-}	3
		U_{Batt+}	4

Table 9: Pin assignment on the 4-pole terminal

6. Marking of the keypads

The keypads are normally marked according application specification. On rear of every ***PowerPlex***® Keypad there is a slot for a slide-in foil. We recommend to use foils that are max. 0.2 mm thick. The type of material can be freely selected.

Basically any type of symbol can be used for marking the foils. The relevant standard DIN ISO 7000 “Graphical symbols for use on equipment” holds a great number of standardised symbols for various applications. Printing or marking on the keys has to be done by the customer by observing the dimensions listed in Fig. 8.

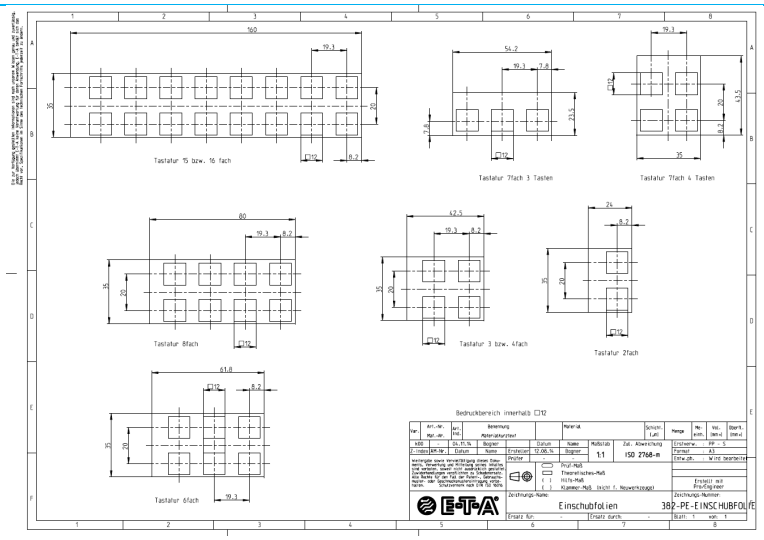


Fig. 8: Dimensions for creating a printing template
**) For a larger picture please see appendix*

7. Integration of the device in the CAN bus network

To set up the CAN bus network all ***PowerPlex***® components are connected with each other (→ Fig. 9).

A CAN bus has to be closed at the beginning and the end with a 120Ω resistor each. Bus terminating resistors are not installed in the Keypad. If a ***PowerPlex***® Keypad is operated as first or past participant on a CAN bus, an additional 120-Ω-terminating resistor has to be inserted between the pins 1 and 2.

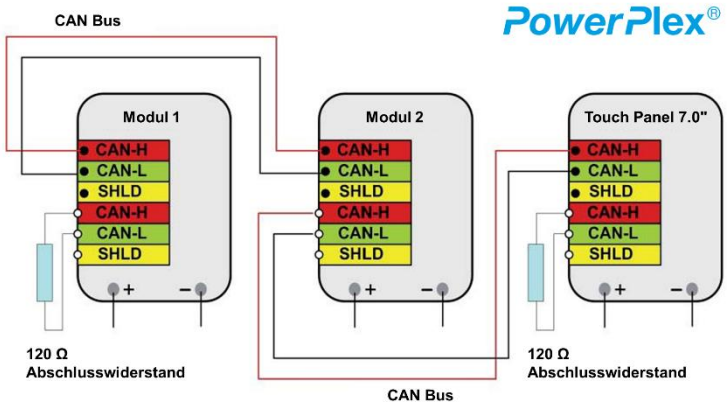


Fig. 9: Connection of the PowerPlex® components in the CAN bus system

A CAN bus cable typically is a twisted pair cable with two wires, CAN-H and CAN-L, and shield SHLD. Table 10 lists the major properties which the CAN bus cable to be used should have. They correspond to a typical CAN bus cable.

MECHANICAL PROPERTIES*	
Diameter - inner conductor	0.97 mm
Nominal cross section	0.5 mm²
Conductor material	copper, blank
Structure of conductor	multi-stranded copper conductor
Number of cores	2
Total shield	Tinned copper braiding
Core colours	CAN-H white CAN-L: brown
Outer diameter of cable	7.0 mm
Colour of overjacket	purple
Mass	69 kg/km
Min. bending radius	laid out: 90 mm static: 48 mm
Operating temperature	-40 °C… +70 °C (-40 °F… +158 °F)
ELECTRICAL PROPERTIES*	
Surge impedance	120 Ω
Conductor resistance	37 Ω/km max.
Insulation resistance	1 GΩ/km
Test voltage	1.5 kV
OTHER PROPERTIES*	
Resistance against ambient effects	UV resistant, weatherproof, oil-resistant, coolant-resistant, microbe-resistant
Mechanical strength	abrasion-proof, notch-resistant, low adhesion
Chemical resistance	acid- and alkali-proof
Thermal resistance	thermal load: 1.09 MJ/m

Table 10: Major properties of the CAN bus cable to be used
**) Fa. Helukabel: CAN.BUS 1X2X0.50, www.helukabel.de*

Caution
Please make sure that beginning and end of the CAN bus network are closed off with a 120-Ω resistor, i.e. both the first and the last ***PowerPlex***® component has to have a 120-Ω terminating resistor. This is of major importance for the correct and reliable function of the ***PowerPlex***® installation.

Note:
The terminating resistors are not included in the scope of delivery They can be ordered separately as accessories.

For more information on CAN networks please see ***PowerPlex***® **Manual Volume1**.

8. Connection to power supply

After interconnecting all ***PowerPlex***® components of your system via a CAN bus cable, the installation only has to be connected to electrical power supply. ***PowerPlex***® is suitable for DC 12 V or DC 24 V.

Important:

- Please make sure that all electrical installations were carried out in accordance with EN ISO 10133.
- Please make sure that the power supply is disconnected and protected against inadvertent re-connection during the works on the system.
- Please avoid big differences between the lengths of the (+) and (-) cables.

Connecting the device

The pins 3 and 4 of the 4-pin connector are used for connecting the ***PowerPlex***® Keypads to the power supply (DC 12 V / DC 24 V). A mating plug provides ease of connection.

Important:
The device has to be directly connected with the power supply via a suitable overcurrent protection. It must not be linked up within the system via some other ***PowerPlex***® component to ensure impeccable start-up of the entire system.

9. *PowerPlex*® Configuration Software

The ***PowerPlex***® Configuration Software is a part of ***PowerPlex***®. The software is listed in the data sheet under “accessories”.

When order your ***PowerPlex***® components, please verify if the configuration software is required or not. Possibly you already have the software from an earlier ***PowerPlex***® project. You can also download the configuration software form our E-T-A website.

NOTE:
The ***PowerPlex***® Configuration Software is not automatically part of the delivery of ***PowerPlex***® components. It is available for download on our E-T-A website.

9.1. Computer Requirements

The ***PowerPlex***® analysis and configuration software runs on any computer or laptop running with a Windows® operating system. Please check your computer with regard to the following requirements (Table 11).

Technical data	
Operating system	Windows®, Windows® XP
processor	Pentium III or higher
RAM	minimum: 256 MBytes recommendation: 512 MBytes
hard disk storage unit	minimum: 500 MBytes
screen resolution	minimum: 500 MBytes
input device	mouse or similar
Interfaces	USB 2.0

Table 11: Requirements of the configuration PC

step	action
1	Check if the hard disk of the computer provides sufficient disk space
2	De-install previous versions before installing a new version of the ***PowerPlex***® Configuration Software on your Windows®-based computer (→ chapter 9.2, Software installation)

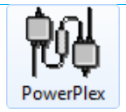
Note:
You require admin access rights for installing the ***PowerPlex***® Configuration Software.

9.2. Software installation

The ***PowerPlex***® Configuration Software can directly be downloaded from the E-T-A website. A user name and a password are required which will be assigned upon request. On demand the configuration software can also be made available on a USB flash drive.

No further entries are required during the installation process. The ***PowerPlex***® Configuration Software can also be started from a USB flash drive.

If a previous version of the ***PowerPlex***® Configuration Software is still installed on the computer, please de-install it before using the new version.

step	action	
1	Download the ***PowerPlex***® Configuration Software from the website, store in a new folder on your computer.	
2	Double click on the software archive in this folder. Extract all files into the same or a different folder.	
3	For starting the ***PowerPlex***® Configuration Software, go to the folder with the extracted programme files and double click on POWERPLEX.EXE.	

9.3. Short instruction First steps

The following chapter explains the basic, interactive elements of the ***PowerPlex***® analysis and configuration software.

Note:
Please look at the ***PowerPlex***® **Manuel Volume3** “System Setup and Configuration” to obtain detailed information about “How to configure a ***PowerPlex***® System”,

Starting window

The starting window opens immediately after programme start. It offers all functions for the configuration of a ***PowerPlex***® system. They include

- Editing, defining and changing of ***PowerPlex***® modules
- Specification and management of module inputs and outputs
- Setting up links between inputs and outputs
- Printing of system information
- Installation of system configuration on to ***PowerPlex***® components via the CAN bus interface

Fig. 10 shows the individual buttons of the starting window.

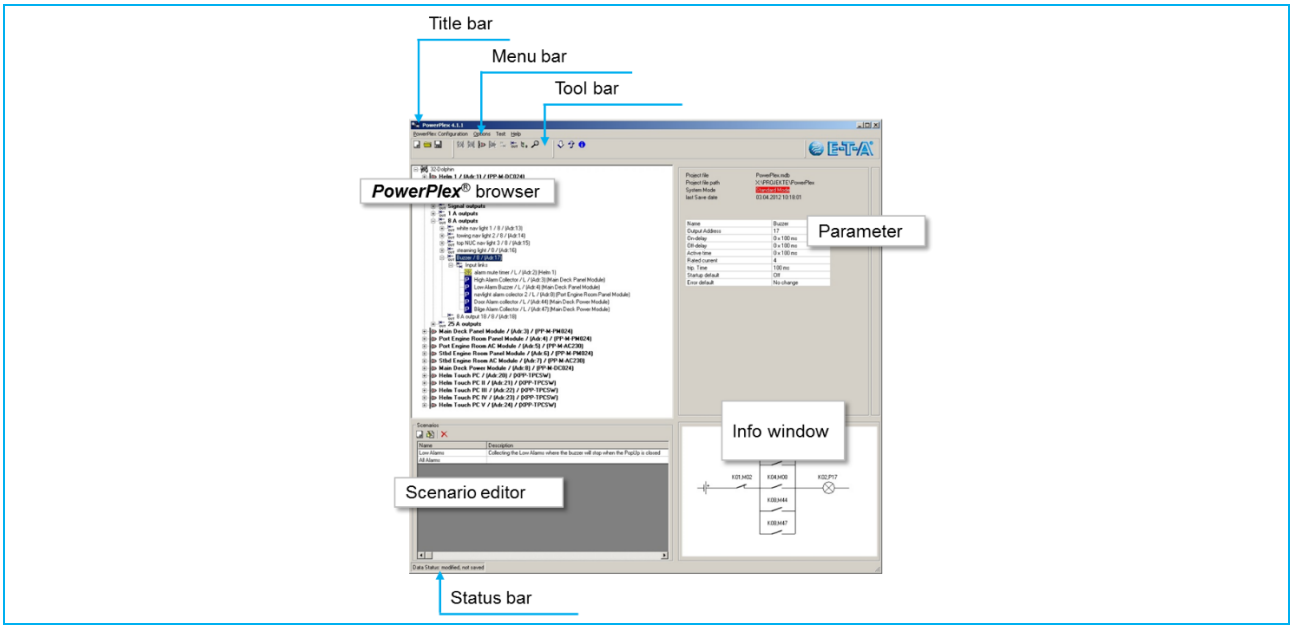


Fig. 10: PowerPlex® System-Setup: Starting window

Windows Section	Description
Title bar	shows the name of the programme and the version number used
Menu bar	offers interactive menus for setting up, changing and testing ***PowerPlex***® configurations.
Toolbar	offers interactive symbols for fast access to programme functions such as editing, saving, deleting ...
Browser	shows the ***PowerPlex***® components of the configuration in tree shape. It steers you through the configuration, i.e. Modules, inputs, outputs, input-output-assignments during editing.
Diagnostics window	shows diagnostic data during testing and debugging
Parameters	shows major parameters for selection
Status bar	shows the status of the ***PowerPlex***® configuration: • loaded or not loaded • new, but not yet saved • changed, but not yet saved • ...
Scenario editor	supports editing, changing and removing of switching scenarios.
Info window	shows information on programme execution and the progress of the data transmission. It also informs on errors that occurred.

Table 12: Contents of the PowerPlex® starting window.

The menu bar

The ***PowerPlex***® menu bar provides you with access to all menus for editing of configurations and programme parameters.

Fig. 11: Menu bar

The *PowerPlex*® Configuration Menu

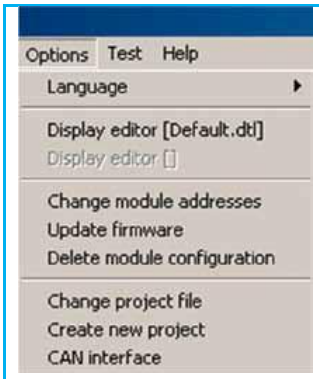
The ***PowerPlex***® Configuration Menu holds all commands required for the configuration:

New	Sets up a new ***PowerPlex***® configuration.
Load	Loads an existing configuration for further processing.
Import	Imports an earlier configuration which was exported and saved previously in a *.mux file format.
Save	Saves the edited configuration under the indicated name. A newly set up configuration can only be saved after a module has been inserted.
Save As…	Saves the edited configuration under a new name.
Export	Exports the configuration into a *.mux file format.
Transmit	Transmits the edited configuration to the ***PowerPlex***® system.
Print	Opens a dialogue window for selection of the documents to be printed.
Exit	Closes the programme, after storage or waived storage.

Table 13: Configuration Menu

The Options Menu

The options menu in the menu bar offers all commands required for changing system or programme settings.



Language	Select the language for the user interface of the configuration software. The language will change during the online mode.
Display Editor	Opens the display editor which is useful when designing user interfaces of an integral touchscreen.
Change module addresses	Allows access to the modules for changing their bus address *)
Update Firmware	Updates the firmware of the ***PowerPlex***® modules. *)
Delete module configuration	Deletes the current configuration of a selected module or of all modules in a ***PowerPlex***® system. In a new dialogue window you will be requested to enter the bus address(es) of the module(s). *)
Change Project File	Select a new project file (*.mdb file) where the configuration shall be saved.
Create New Project	Creates a new project (*.mdb file) and asks for confirmation if this new project file is to be the container for new configurations.
CAN interface	Chooses the driver of the CAN interface which was used for the configuration PC ↔ used ***PowerPlex***® connection: virtual, Sontheim CANusb Light, PEAK PCI, PEAK USB, HSP-USBCAN

Table 14: Options menu
**) This action calls out a connection between the configuration PC and CAN bus interface of the PowerPlex® hardware.*

The tool bar

The major commands offered via the menu bar can alternatively be displayed and activated by symbols in the tool bar. These buttons are shortcuts for quick access to actions most frequently used.

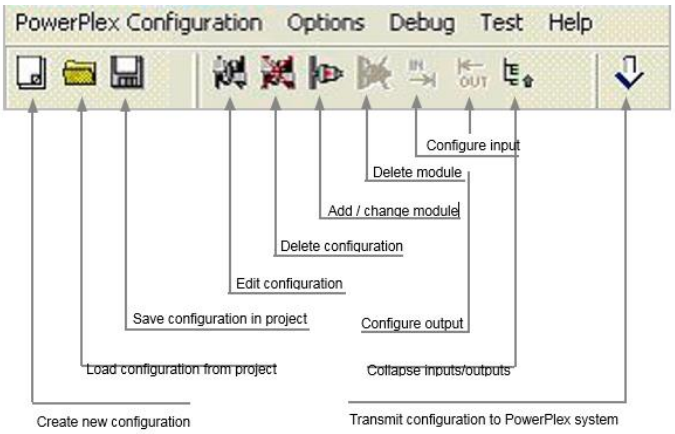


Fig. 12: Tool bar

10. CAN/USB converter and driver

For transmission of a complete or modified ***PowerPlex***® configuration to a ***PowerPlex***® Keypad and other ***PowerPlex***® hardware, you have to connect your configuration PC with the ***PowerPlex***® network (CAN bus). The following USB/CAN adapters are supported by the ***PowerPlex***® software: CAN/USB-light adapter von Sontheim, PEAK USB, PEAK PC.

Fig. 13: CAN/USB converter (example: Peak)

Note:

The driver of the selected CAN/USB adapter must also be installed on the configuration PC.

11. Important information and safety instructions

The following table lists various information and safety instructions for start-up and use of the module.

	**Warning: Installation and operation of the module** This device has to be installed and operated in compliance with the given instructions. Failure to observe the instructions can cause personal injury, damages of the boat or vehicle or reduced operational performance.
	**Warning: Switch off main switch** Before starting installation, the main switch of the boat or vehicle has to be switched off. A cable connection must only be established if the main switch is OFF.
	**Warning: Possible ignition hazard** The device must NOT be used in inflammable surroundings.
	**Warning: high voltage** The cover must NEVER be opened. Access to the inner components is not allowed unless indicated otherwise in this manual.
	**Caution Grounding** The device must be grounded before switching on.
	**Caution Water ingress** Disclaimer of warranty in the event of water ingress. Waterproofness of the module depends on the correct installation. E-T-A does not accept any liability in this case.

Table 15: Important information

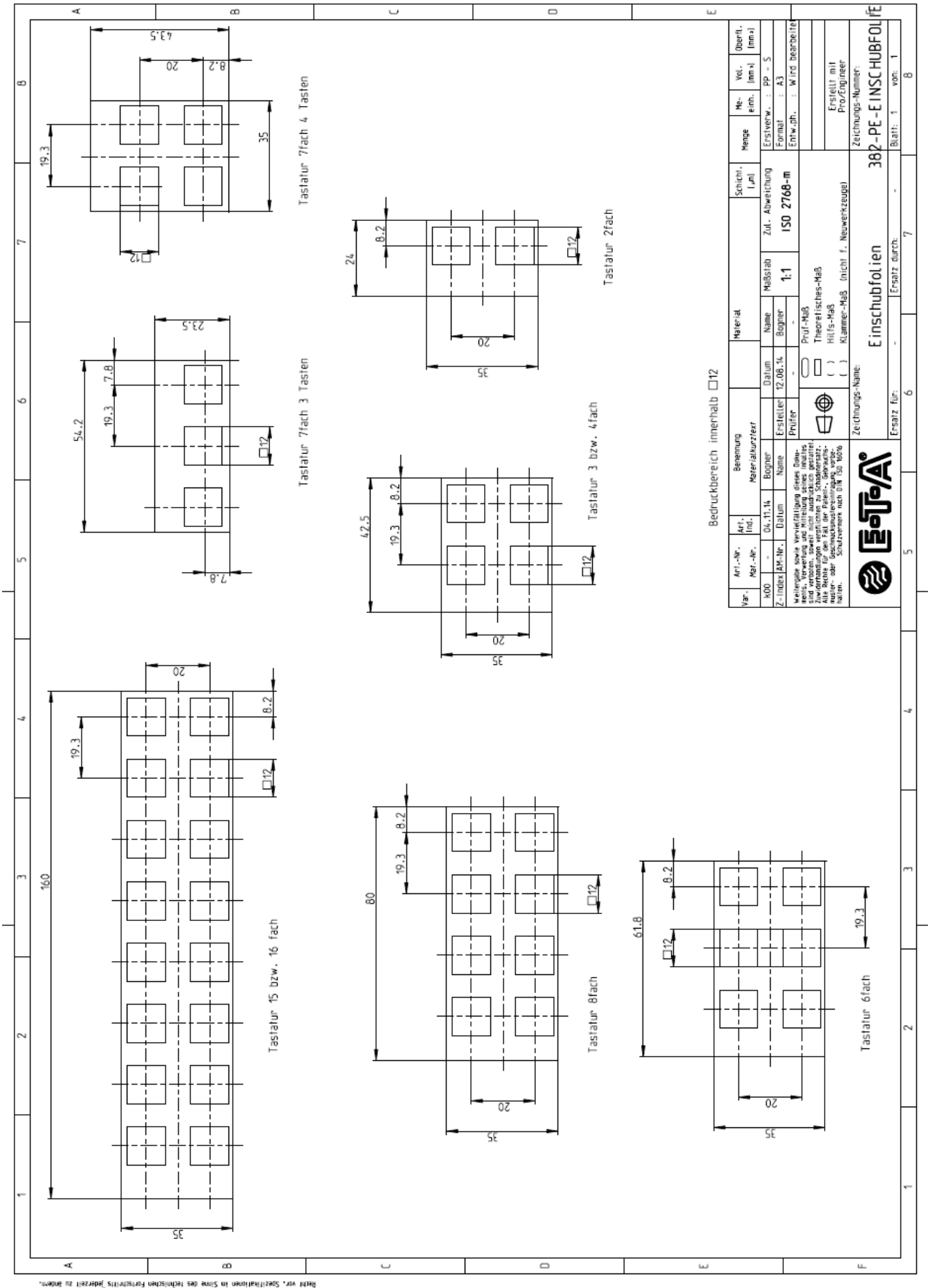
EMC installation directives

The ***PowerPlex***® hardware and accessories comply with the EMC directives. Thus electromagnetic interferences between the devices are avoided which would otherwise affect the system performance. A professional installation is mandatory. In order to ensure the best EMC conditions, the widest possible distance between the different electrical devices should be applied.

Technical Accuracy

All technical data in this manual were correct in all conscience at the time of printing. E-T-A cannot be held liable for any (inadvertent) errors. Due to continuous product improvements at E-T-A there could be discrepancies between the actual product and the manual. Product changes or amendments of the technical specifications will be carried our without prior notification. The latest versions of the ***PowerPlex***® manuals are available on our website (www.e-t-a.de).

Appendix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