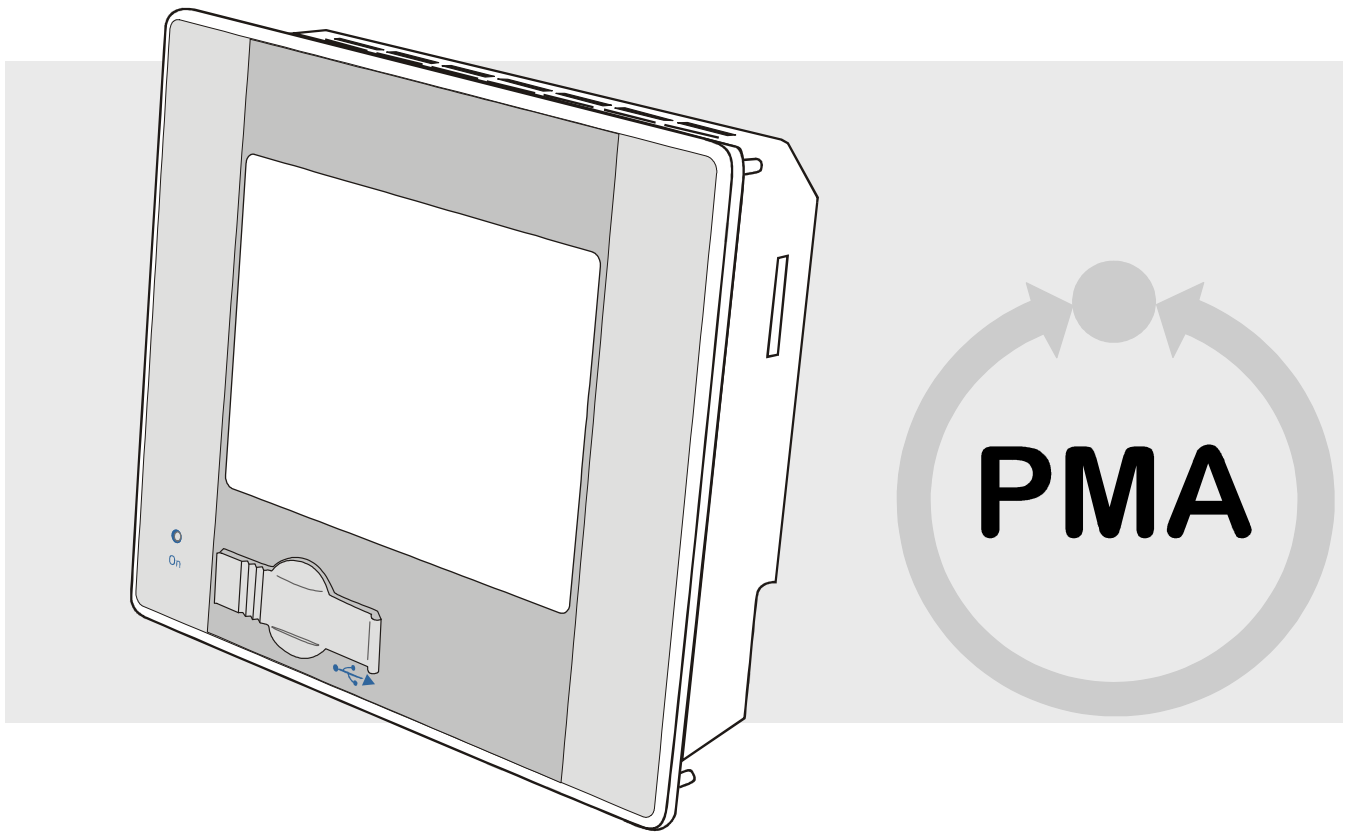


PMA Prozess- und Maschinen-Automation GmbH

# Operator's Guide

KS 108, KS 118, KS 128



preliminary



**Operator's guide, please read before using product**

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# I Operator guide

## I-1 General

### I-1.1 Information on the operator's guide

Compliance with all safety instructions and handling instructions specified in the operator's guide is the prerequisite for safe work and proper handling of the device.

In addition, guidelines, standards, local accident prevention regulations, and safety regulations must be complied with for the implementation area of the device.

The operator's guide is a component of the product and must be kept accessible in the immediate vicinity of the device at all times for installation, operating, maintenance, and cleaning personal.

The graphic illustrations in this guide are used to present the explained subject matter and consequently are not necessarily shown to scale and can deviate slightly from the actual version of the device.

### I-1.2 Manufacturer

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### I-1.3 Guarantee conditions

The current guarantee provisions and information concerning the guarantee are in our general terms and conditions, for example on the Internet at (<http://www.pma-online.de/de/pdf/agbs.pdf>).

### I-1.4 Customer service

Our customer service organization is available to provide technical information, see chapter "Manufacturer's address".

Moreover our employees are always interested in new information and experiences associated with the applications and which can be of value in improving our products.

## I-1.5 Explanation of symbols

### **Warning instructions**

Warning instructions are indicated in this operator guide by symbols. The instructions are introduced by signal words that express the scope of the hazard.

Strictly comply with the instructions and act with prudence to avoid accidents, personal injury and property damage.



#### **DANGER!**

...indicates an immediately dangerous situation that can cause death or serious injuries, if not avoided.



#### **WARNING!**

...indicates a possible dangerous situation that can cause death or serious injuries, if not avoided.



#### **CAUTION!**

...indicates a possible dangerous situation that can cause insignificant or minor injuries, if not avoided.



#### **CAUTION!**

...indicates a possible dangerous situation that can cause property damage, if not avoided.



#### **CAUTION!**

#### **ESD-sensitive components!**

... indicates a situation that can damage or destroy components through electrostatic discharge.

### **Tips and recommendations**



#### **NOTE!**

... indicates tips and recommendations as well as information for efficient and malfunction-free operation.

## I-1.6 Limitation of liability

All information and instructions in this guide have been compiled under due consideration of applicable standards and guidelines, the current state of the technology, as well as our extensive knowledge gained in years of experience.

Manufacturer accepts no liability for damages due to:

- Failure to heed the instructions in the guide
- Non-intended use
- Deployment of untrained personnel
- Unauthorized conversions
- Technical changes
- The use of non-approved replacement parts

The actual scope of delivery can deviate from the explanations and presentations provided in this guide in the case of special versions, if additional options are ordered, or due to the latest technical changes.

In all other cases the obligations set forth in the supply contract, manufacturer's terms and conditions, as well as the valid legal regulations at the time the contract was concluded, apply.



### **NOTE!**

*This operator guide must be read carefully prior to starting any work on and with the device! The manufacturer accepts no liability for damage and malfunctions that arise from failure to heed the instructions in the operator guide.*

## I-1.7 Copyright

Treat the operator guide with confidentiality. It has been prepared exclusively for personnel working with the device. Supplying the operator guide to third parties without the written approval of the manufacturer is prohibited.



### **NOTE!**

*Content information, text, drawings, graphics, and other presentations are protected by copyright, and are subject to intellectual property rights. Any abusive utilization is punishable.*

Duplication in any manner - including excerpts - as well as utilization and/or communication of the content are prohibited without manufacturer's written declaration. Offenders are liable for damages. The right to enforce additional claims remains reserved.

## I-1.8 Transport, packaging, and storage

### I-1.8.1 Transport

Keep the original packaging in order to ship the device in the original packaging if there is a guarantee case. Protect the device from severe mechanical stress in transport. Always transport the device in the original packaging. The installed components are sensitive to impact and strong vibration.

### I-1.8.2 Unpacking

Proceed as follows to unpack the device:

- We recommend inspecting the device for transport damage immediately after it is delivered. Only acknowledge receipt with reservation (for example on the freight document), if there is reason to suspect damage. Note the presumed damage on the freight document and inform the manufacturer.

- Carefully remove the packaging.

It is a good idea to keep the packaging. It can be used for later necessary transport of the device, (for example if there is a device defect).

If there is no appropriate agreement concerning take-back of packaging material, then the packaging remains with the customer.



**NOTE!**

*Cardboard and plastics (foil and foam) have been used as packaging material. If the packaging will be disposed of, then environmentally responsible disposal must be ensured in accordance with applicable disposal guidelines.*

### I-1.8.3 Storage



**CAUTION!**

**Condensation of water!**

Condensation of water is possible due to temperature fluctuations. This can destroy the device or subsequent malfunctions can result.

Therefore:

- After storage or transport in cold weather, or if there are extreme temperature fluctuations, the device must slowly adjust to the ambient temperature at the implementation site before it is started up.
- If condensation has formed, then the device should only be placed in service after a waiting period of 12 hours.

The following guidelines apply for storage:

- Relative humidity: Max. 85 %
- Ensure that the packages are not stored outside
- Store in a dust-free environment
- Storage temperature -20 to +70 °C
- Avoid mechanical impact and damage



## I-1.9 Disposal

If no return or disposal agreements have been made, then the professionally dismantled components must be recycled:

- Scrap metallic material remnants.
- Take plastic elements to plastic recycling facilities.
- Sort the other components for disposal, based on material condition.



**NOTE!**

*Electrical scrap, electronic components, lubricants and other auxiliary substances are subject to guidelines for special waste and should only be disposed of by approved specialized companies.*

## I-2 Safety

This section provides an overview of all important safety aspects for optimal protection of personnel, as well as for safe and malfunction-free operation.

Significant dangers can arise if the handling instructions and safety instructions listed in this guide are not heeded.

### I-2.1 General

The device and the associated software have been developed in accordance with the acknowledged rules of standard engineering practice, and they are operationally safe.

This device has been manufactured and tested in accordance with VDE 0411-1 / EN 61010-1, and it left the plant in perfect safety-related condition.

However this device can cause hazards if it is not used by properly trained personnel, or if it is used improperly, or if it is not used as intended.

- Every person who is assigned to perform work on or with the device must have read and understood the operator guide prior to starting work on the device. This also applies if the person concerned has already worked with such a device or with a similar device, or if he has been trained by the manufacturer.
- Knowledge of the content of the operator guide is one of the prerequisites to protect personnel from hazards, as well as for avoiding errors, and thus is a prerequisite for safe and malfunction-free device operation.
- To avoid danger and to assure optimal performance, neither changes nor conversions should be made to the device unless they have been expressly approved by the manufacturer.
- All safety warning signs and operating warning signs on the device must be maintained in legible condition. Damaged or signs or signs that have become illegible must be replaced immediately.
- The setting values or value ranges that are specified in the operator guide must be complied with.
- The owner is recommended to have personnel verifiably confirm that they have understood the content of the operator guide (see the section "Instruction" in this regard).

## I-2.2 Owner's responsibility

The device is implemented commercially. Thus the owner of the device is subject to legal industrial safety obligations.

In addition to the industrial safety instructions in this operator guide, the safety, accident prevention, and environmental protection regulations, applicable at the site of implementation must be complied with. In particular:

- Owner must inform himself of applicable industrial safety regulations and determine additional hazards that arise due to the special work conditions prevailing at the site where the device is implemented, in a risk analysis. The risk analysis must be implemented in the form of work instructions for device operation.
- Owner must check throughout the entire implementation period of the device, whether the work instructions that owner has created satisfy current legislation, and must adapt them if necessary.
- Owner must clearly regulate and specify the responsibilities for installation, operation, maintenance, and cleaning.
- Owner must ensure that all employees who work with the device have read and understood the operator guide.

Moreover owner must train personnel and inform them of dangers at regular intervals.

In addition owner is responsible to ensure that the device is always in a technically perfect condition; therefore the following applies:

- Owner must ensure that the maintenance intervals described in this operator guide are complied with.
- Owner must have all safety devices inspected regularly for function and completeness.
- Owner must provide personnel with the required protective gear.

## I-2.3 Operating personnel

### I-2.3.1 Requirements



**WARNING!**

**Danger of injury if personnel are not qualified!**

Improper handling of the device can cause serious personal injury and property damage.

Therefore:

- Only have those persons who have been designated in the respective chapters of this operator guide perform special activities.
- If in doubt obtain the assistance of specialists.

In the operator's guide the following qualifications are cited for various activity areas:

■ **Instructed person**

has been instructed by owner in a training session concerning the assigned tasks and possible hazards in the event of improper behavior.

■ **Skilled personnel**

are personnel who, due to their specialized training, knowledge, and experience, as well as knowledge of applicable regulations, are capable of executing the tasks assigned to them and of recognizing possible hazards on their own.

■ **Qualified electrician**

is a person who due to his specialized training, knowledge, and experiences, as well as knowledge of applicable standards and regulations, is capable of performing work on electrical equipment, and who can recognize possible hazards on his own.

The certified electrician has been especially trained for the work environment where he is active and knows the relevant standards and regulations.

In Germany the qualified electrician must satisfy the provisions of the accident prevention regulation BGV A3 (for example certified master craftsman for electrical fittings). Similar regulations apply in other countries.

Only persons, from whom can be expected that they reliably perform their work, are approved as personnel.

Persons whose reaction capability is influenced by drugs, alcohol, or medication are not approved.

Comply with the age-specific and job-specific regulations applicable at the implementation site.

### I-2.3.2 Instruction

Personnel must be instructed regularly by operator. For better tracking training execution must be logged.

Such a log can look like this:

Date	Name	Type of instruction	Instruction performed by	Signature
04.04.2006	Heinz Lehrling	First safety instruction for XY	Willi Meister	
17.05.2006	Horst Werker	Annual safety instruction 2006 for XY	Willi Meister	
...	...	...	...	

Table 1: Instruction log

## I-2.4 Safety integrated systems

Use of the device (as with all other PLC's) in safety integrated systems requires special measures. If safety integrated implementation is planned, then the user must take the applicable standards (e.g. DIN EN 61508) into consideration, and in addition should consult with PMA.

## I-2.5 Special dangers

The following section lists the residual risks that arise due to the risk analysis.

Heed the safety instructions listed here, and the warning instructions in subsequent chapters of this guide, to reduce health hazards and dangerous situations.

### I-2.5.1 Device failure, maintain, decommissioning



#### **DANGER!**

**Danger of injury due to unforeseeable system function sequences and movement sequences!**

System components can be placed in movement during maintenance work, configuration work, or function checks, if they are not disconnected from the device.

Therefore:

If the device is taken out of service, if new or changed applications are loaded on the device, or if maintenance or a function check is performed, the following must be heeded:

- All system components must be disconnected from the device!
- All switched off system components must be safeguarded from being inadvertently switched on again!
- In general the effects of switching off the system must be taken into consideration and appropriate measures must be taken.



#### **DANGER!**

**Danger of injury due to uncontrolled/unforeseeable operating sequences!**

As with any electronic controller system, device failure can result in an uncontrolled and/or unforeseeable operating sequence. Death, serious injury, or significant property damage can be the result.

Therefore:

- Ensure that appropriate measures are in place every time the device is used.

### I-2.5.2 Explosion protection



#### **Warning!**

**Explosion hazard due to live components!**

In hazardous environments live devices can trigger explosions. The device does not have explosion protection.

Therefore:

- The device should not be used in hazardous atmospheres.

### I-2.5.3 Electric components

**CAUTION!****Electrical hazard for components!**

Device components can be damaged or destroyed by electric voltages.

Consequently when working inside the device ensure the following:

- Disconnect the device from the power supply.
- Ensure that no objects or tools fall into the device.

### I-2.5.4 Batteries

**WARNING!****Danger of injury if batteries are handled improperly!**

Batteries must be handled with particular care.

Therefore:

- Do not throw batteries into a fire or expose them to high temperatures. There is an explosion hazard.
- Do not charge batteries. There is an explosion hazard.
- Liquid that escapes from batteries, if they are used improperly, can cause skin irritations. Avoid contact with the liquid. If there is contact with the liquid rinse thoroughly. If the liquid gets into the eyes immediately rinse with water for 10 minutes and seek medical attention without delay.

### I-2.5.5 Application development

**WARNING!!****Danger of injury or danger of property damage through unforeseeable program sequence!**

As with any electronic controller system, software errors can result in an uncontrolled and/or unforeseeable operating sequence. Death, serious injury, or significant property damage can be the result.

Therefore:

- Ensure that the system is only used after an extensive test (see EN 61131 in this regard).
- Virtually all function blocks should only be called once during a sampling step. If they are called multiple times then a new instance of the function block will not be created, rather there is only an additional reference to an existing function block (the existing instance). Under behavior is the result.

## I-2.6 Environmental protection



### **CAUTION!**

#### **Incorrect handling causes environmental hazards!**

Incorrect handling of environmentally harmful substances, particularly improper disposal, can cause significant damage for the environment.

Therefore:

- Always comply with the instructions listed below.
- Initiate suitable measures immediately if environmentally harmful substances inadvertently get into the environment. If in doubt inform the responsible municipal authorities about the damage

## I-2.7 Intended use

The operational safety of the device is only ensured if the device is used as intended in accordance with the instructions in the operator's guide.

- The device is designed for use as a multi-function controller or for controlling and/or regulating machines and industrial processes. It should only be used within overvoltage category I (IEC 364-4-443), in low voltage systems where the rated supply voltage does not exceed 1000 V AC voltage (50/60 Hz), or 1500 V DC.
- Intended use includes correct compliance with the mounting, operating, maintenance, and cleaning instructions.
- Any use extending beyond intended use, or any other type of device utilization is prohibited and is considered as non-intended use! Claims of any type against the manufacturer and/or manufacturer's authorized agents for damages due to non-intended use of the device are excluded. The owner is solely liable for all damages due to non-intended use.

## I-3 Structure and function, technical data

### I-3.1 Device description

The device is a real-time capable control module with a touch-sensitive color display and a broad spectrum of data interfaces. The device is programmed in accordance with the IEC 61131-3 standard with the CoDeSys development environment.

The device is designed for front panel mounting or control cabinet mounting in rough industrial environments. Maintenance requirements are minimal due to the fan-less design and flash memory.

### I-3.2 Models

The device is available in the following models.

<b>Automation Unit KS 1x8</b>	<b>K 1 x 8 - x 3 0 - 0 0 x 0 x - x xx</b>					
<b>DISPLAY FORMAT (TFT)</b>	↑	↑			↑	↑
5,7" QVGA (320 x 240)	0					
10,4" VGA (640 x 480) <sup>1)</sup>	1					
12,1" SVGA (800 x 600) <sup>1)</sup>	2					
<b>BASIC UNIT</b>						
KS 1x8 flexible		2				
KS 1x8 PLC		3				
<b>INTERFACE</b>						
Default Interface <sup>2)</sup>				0		
Additional Interface <sup>3)</sup>				1		
<b>DEFAULT SETTINGS</b>						
Standard settings					0	
Setting according to specification					9	
<b>ADMITTANCES</b>						
CE compliant						0
UL / cUL-certified (applied for)						U
<b>FRONT MEMBRANE</b>						
PMA-Standard						00
Customer-specific front membrane (from 100 St.)						xx

1) Default: → s. a. footer 2 and 3; applies exclusive for the units PLC and flexible

2) Standard Interface: 1 x CAN (galv. isolated), 1 x RS485 (galv. isolated), 1 x RS232, 1 x Ethernet, 1 x USB (front side)

3) Additional Interface: 1 x CAN (not galv. isolated), 1 x RS232 and 1 x USB (back side)



### I-3.3 Accessories

Following Accessories is available :

Accessories	KS 108 flexible	KS 108 PLC
CoDeSys ( Software-IDE )	<b>x</b>	<b>x</b>
Ethernet-Switch ( 3-5fach, for DIN rail )	<b>x</b>	<b>x</b>
Engineering manual	<b>x</b>	<b>x</b>
Remote I/O-Components	<b>x</b>	<b>x</b>

### I-3.4 Device overview

- 1 Display (berührungssensitiv)
- 2 Operation indicator, only KS 108
- 3 Cover USB-Interface
- 4 Stud bolts
- 5 MMC-/SD-Card-Slot

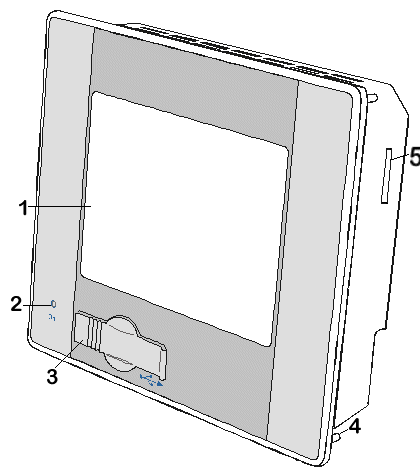


Fig. 1: Device view KS 108 (Front)

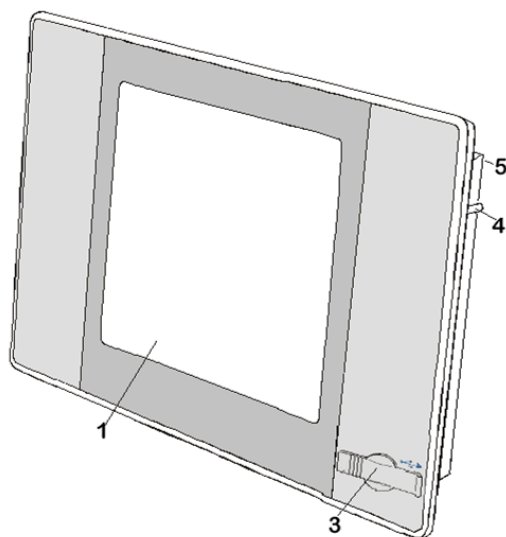


Fig. 2: Device view KS 118 (Front)

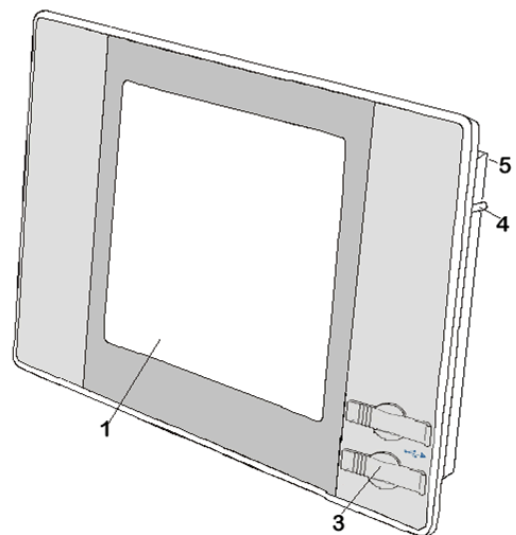





Fig. 3: Device view KS 128 (Front)

## I-3.5 Technical data

Feature	KS 108 	KS 118 	KS 128 
<b>Display</b>			
Type	CSTN, Color	TFT, Color	
Service life CCFL (backlit display)	60 000 h		
Diagonal	5,7"	10,4"	12,1"
Resolution (Pixel)	320 x 240 QVGA		
Colors (Bit per Pixel)	256 (8 Bit pro Pixel)		
Touchscreen	resistive		
<b>CPU, application memory</b>			
CPU Freescale PowerPC	266 MHz	400 MHz	
Program memory (flash)	16 MB / 8 MB for applications	32 MB / 24 MB for applications	
Program memory and data memory (RAM)	64 MB / 32 MB for applications	128 MB / 96 MB for applications	
Retain memory	16 KB		
Real-time clock	Yes, battery backed ( SONY CR1620 )		
<b>Size and weight</b>			
Dimensions (W x H x T)	194 mm x 172 mm x 50 mm (incl. front panel) mounting depth 100.0 mm	360 mm x 260 mm x 77 mm (incl. front panel) mounting depth 130.0 mm	440 mm x 300 mm x 77 mm (incl. front panel) mounting depth 130.0 mm
Weight	Approx. 1.5 kg	Approx. 5 kg	Approx. 6 kg

Feature	KS 108	KS 118	KS 128
<b>Operating conditions</b>			
Ambient temperature	Operating Temperature 0° C to 50° C, Stock Temperature -20°C to 70° C		
Relative humidity	Max. 85% non condensing		
<b>Resistance to vibration</b>			
Vibration	Test: Fc : 10 ... 150 Hz, 1g Sinusoidal (EN 60068-2-6)		
Shock resistance	Test: Ea :15 g, 10 ms duration, half sine (EN 60068-2-27)		
<b>EMC, protection class</b>			
Noise radiation	EN 61000-6-4, EN 61326-1, industrial		
Interference immunity	EN 61000-6-2, EN 61326-1, industrial		
<b>General</b>			
Safety	EN 61010-1 (VDE 0411-1), EN 61131-2: Overvoltage category: II Fouling degree: 2 Protection class: III (safety extra-low voltage)		
Dielectric strength	EN 61131-2, DC 500 V test voltage		
Protection class	Front IP 65, back IP 20		
CE marking	Satisfies the EMC and low voltage directive		
<b>Energy supply (24 V power pack unit)</b>			
Supply voltage	+24 V DC (18 V ... 32 V) SELV max. ripple 4 V <sub>ss</sub>		
Power consumption	Type. 1.0 A, max. 2,0 A at +24 V DC Fusing depending on I/O load, max. 12A		
Reverse polarity protection	Yes		
Galvanic isolation	Yes		
<b>Ethernet interface</b>			
Number/ type of interface	1 x 10/100 Base T		
Connection	RJ45		
Potential isolation	Yes		
<b>USB interface</b>			
Number/ type of interface	1 x Host USB rev. 1.1 (forside), optional 1 x Host USB 1.1 (backside)	1 x Host USB rev. 1.1 (forside), optional 1 x Host USB 1.1 (backside)	2 x Host USB rev. 1.1 (forside), optional 1 x Host USB 1.1 (backside)
<b>CAN bus interface</b>			
Number/ type of interface	1 x standard CAN ISO 11898, optional 1 x standard CAN ISO 11898	2 x standard CAN ISO 11898	2 x standard CAN ISO 11898
Galvanic isolation	Yes, only once (X6)		
Transmission rate	Max. 1Mbit/s		
Terminating resistor	reversible		

Feature	KS 108	KS118	KS 128
<b>Serial interfaces</b>			
Number/ type of interfaces	1 x RS232, 1 x RS485, optional 1 x RS232		2 x RS232, 1 x RS485,
Galvanic isolation	Yes, at RS485		
Terminating resistor	reversible		
<b>SD card slot</b>			
SD card compatibility	256 MB (Kingston/SanDisk Extreme) 512 MB (Kingston)		
<b>Software</b>			
Operating system	LINUX		
Runtime system	CoDeSys		
Development Enviroment	CoDeSys		

## I-3.6 Type plate

### I-3.6.1 Clarification of the type plate

- 1: Product line
- 2: Model / order no.
- 3: Identification number
- 4: Hardware version
- 5: Supply voltage
- 6: Serial number : Id no.: 00041, Date: 0626
- 7: Barcode
- 8: CE marking
- 9: Production Date : Year: 06, CW: 26
- 10: Corporate logo



Fig. 4: Type plate

## I-3.7 Interfaces

### I-3.7.1 Overview

- 1 Status LED - supply voltage
- 2 Mode selector switch
- 3 Status LED - program status
- 4 Network connection (Ethernet)
- 5 USB interface
- 6 First Serial interface (RS 232)
- 7 Second Serial interface (RS 232)
- 8 Switch - terminating resistor
- 9 First CAN interface
- 10 Switch - terminating resistor
- 11 Second CAN interface
- 12 Switch - serial interface terminating resistor
- 13 Serial interface (RS 485)
- 14 Power supply

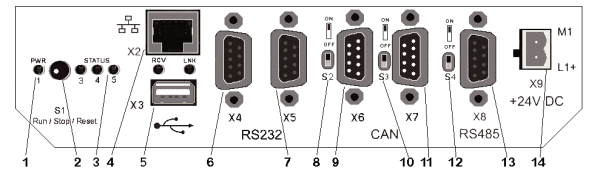


Fig. 5: Interface overview

### I-3.7.2 Power supply

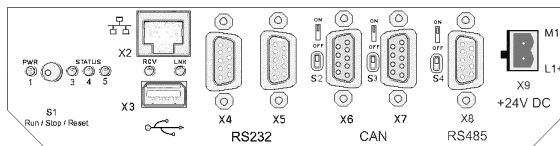


Fig. 6: Power supply

The device will provide with 24 V DC (18 V to 32 V). In addition it has integrated reverse polarity protection and inrush current limitation.

#### Pinning:

Overview	Feature	Description
	L1+	External power supply 24 V DC (18 V ... (32 V).
	M1	External power supply GND

**I-3.7.3 10/100 Base-T network connection (Ethernet)**

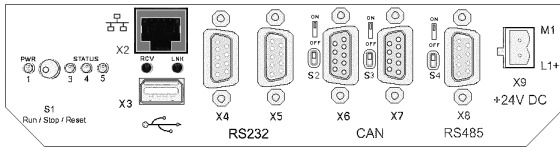


Fig. 7: Ethernet interface (RJ45)

**Pinning:**

Overview	Feature	Description
	1	TX+
	2	TX-
	3	RX+
	4	75 Ohm
	5	75 Ohm
	6	RX-
	7	75 Ohm
	8	75 Ohm
Connection		RJ-45
LED "LNK"	Green	ON – ready for operation
LED "RCV"	Green	FLASHING - Data Receive

**I-3.7.4 USB**

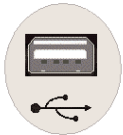


Fig. 8: USB interface

**Pinning:**

Feature	Description
B1	VCC
B2	D-
B3	D+
B4	GND

The number and the arrangement of the USB interface is subject to kind of device i. e.

- KS 108 : once foreside and optional once backside
- KS 118 : once foreside and once backside
- KS 128 : twice foreside and once backside

The addressing takes place flexible and will numbered consecutively of 0 to 8 (on Hub) according to quantity the used device which successive realized on the USB interface.

**! CAUTION!**  
**Damage to USB devices is possible!**  
 A max. amperage of 0.5 A is available on the USB port. Devices that require more current will not function under some circumstances and can be damaged.  
 Therefore:  
 – Only use devices that do not require more than 0.5 A.

### I-3.7.5 CAN bus

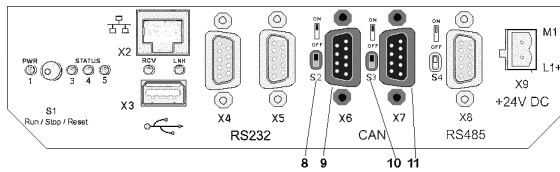


Fig. 9: CAN interface

The CAN interface [X6 : CAN0, X7 : CAN1] (Fig. 9/ Pos. 9 und Pos. 11) corresponds to the ISO 11898 standard and can be operated to a maximum baud rate of 1Mbit/s. The interface has an additional isolating element.



#### NOTE!

A terminating resistor must be located at the beginning and end of a CAN bus topology. Therefore: If the device is located at the beginning or end of the CAN bus topology, then the terminating resistor for the CAN bus must be activated with the switch (Fig. 9/ Pos.8 or Pos. 10).

To do this push the switch up to the "ON" position.

#### Pinning:

PIN	Description
1	NC (Do not connect)
2	CAN_L
3	CAN_GND
4	NC (Do not connect)
7	CAN_H
8 9	NC (Do not connect)

### I-3.7.6 Serial interfaces

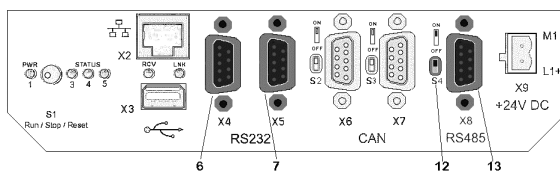


Fig. 10: Serial interface

The device has two serial interfaces:

- RS 232 [ X4:COM1, X5:COM2] (Fig. 10/ Pos. 6 and Pos. 7).
- RS 485 [ X8:COM3] (Fig. 10/ Pos. 13). This interface is isolated

#### RS232 pin assignment:

PIN	Description
1	NC (Do not connect)
2	RXD
3	TXD
4	NC (Do not connect)
5	GND
6-9	NC (Do not connect)

#### RS485 pin assignment:

PIN	Description
1	RTXD-
2-3	NC (Do not connect)
4	RTXD-
5	GND
6-9	NC (Do not connect)

**NOTE!**

*Will that SD Card drive enabled then don't stand the second serial interface (X5) no longer at hand.*

**NOTE!**

*Will switch on the attached terminal resistance [S4] (Fig. 10 / Pos. 12) can to lead to that the RS485 data receiver faulty signs on the RS485 interface recognizes !*

*That error pattern is not always clearly. It to be able arise e. g. follow mistakes at receiving of Data :*

- It become receive faulty Data,*
- It become receive none Data,*
- It become receive uncompleted Data,*
- It become receive additional Data, which faulty send on the bus, e. g. unavailable Startbits,*

*The typical voltage at an unloaded RS485 Bus (no user, no terminal resistance) couches at about 4V. Each user stressed the Bus and wages to any corresponding depression of the voltage level.*

*Recommended is a voltage between the Bus line at Kommunikationsruhe of > 200mV. These voltage could measure with a multimeter. When the 200 mV undershot, get the data receiver problems the wire condition clearly to recognize and generated defect.*

*Solution possibility: Across additional pullup and pulldown resistor can be achieve a corresponding voltage difference.*

## I-3.8 Declaration of conformity

### I-3.8.1 CE-Marking (European Union)

Meets the European Directives regarding "Electromagnetic Compatibility" and "Low-voltage equipment".  
The unit meets the following European guidelines:

- EMC-Rule 89/336/EEC

Evidence of conformity is provided for European guidelines:

- EN 61131-2:2004-2
- EN 61000-6-2:2005.
- EN 61000-6-4:2002.



## I-4 Mounting and commissioning



### DANGER!

#### Danger due to improper installation and commissioning!

Installation and commissioning require trained, specialized personnel with adequate experience. Installation errors can result in life threatening situations or cause significant property damage.

Therefore:

- Only have installation and commissioning performed exclusively by expert employees.
- An installation test must always be performed before startup.
- All switched off plant components must be safeguarded from being inadvertently activated!

### I-4.1 Scope of delivery

Before mounting check the scope of supply for completeness:

- Device
- Connecting plug for Power supply
- Operator's guide

### I-4.2 Mounting

#### I-4.2.1 Mounting cutout KS 108

The device is designed for front mounting.



#### NOTE!

The material thickness of the bearing material should not exceed 6 mm. Otherwise the device cannot be (reliably) fastened with the stud bolts.

The mounting cutout must have the following format (all specifications are in mm):

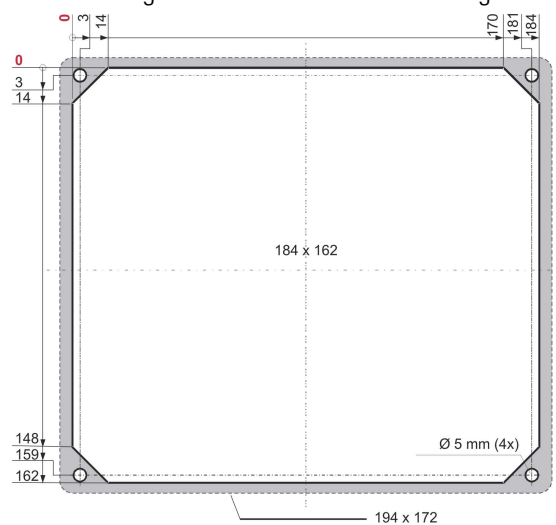


Fig. 11: Mounting cutout

- The device is fastened with four stud bolts (Fig. 11). Four bores with a diameter of 5 mm are provided for the stud bolts.

- The front frame (shown in the illustration above in gray) has dimensions of 194 x 172 mm, thus it will have an overhang relative to the mounting cutout.

### I-4.2.2 Mounting cutout KS 118

The mounting cutout must have the following format (all specifications are in mm):

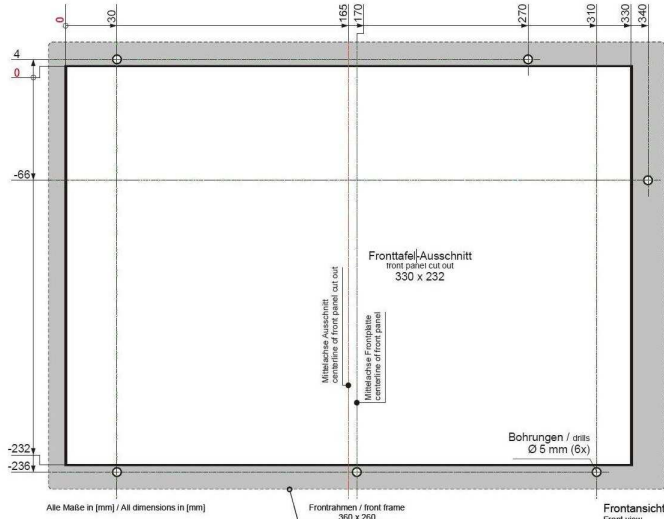


Fig. 12: Mounting cutout

- The device is fastened with six stud bolts (Fig. 12). Six bores with a diameter of 5 mm are provided for the stud bolts.
- The front frame (shown in the illustration above in gray) has dimensions of 360 x 260 mm, thus it will have an overhang relative to the mounting cutout.

### I-4.2.3 Mounting cutout KS 128

The mounting cutout must have the following format (all specifications are in mm):

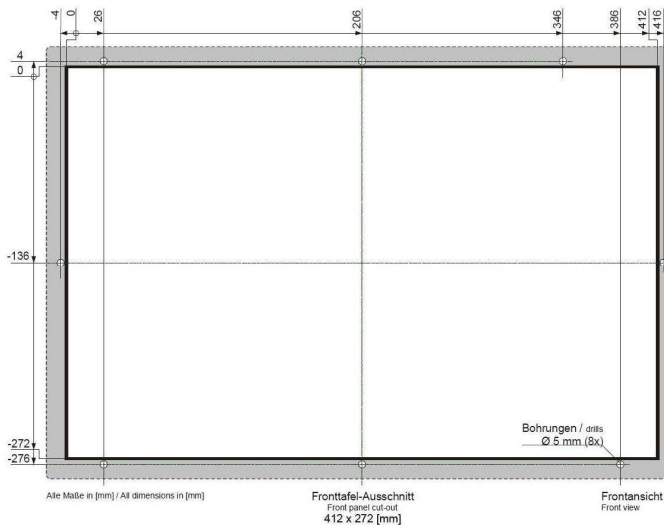


Fig. 13: Mounting cutout

- The device is fastened with eighth stud bolts (Fig. 13). Eighth bores with a diameter of 5 mm are provided for the stud bolts.
- The front frame (shown in the illustration above in gray) has dimensions of 412 x 272 mm, thus it will have an overhang relative to the mounting cutout.

### I-4.2.4 Mounting execute



#### NOTE!

When mounting ensure that

- There is at least 20 mm clearance to the nearest device, or to the nearest wall.
- There is at least 50 mm clearance between the rear of the KS 108 respectively 77 mm at the rear of the KS 118 and KS 128 space on the wall for power and interface cables. The entire mounting depth varies between 100 mm at KS 108 and 130 mm at the devices KS 118 and KS 128.

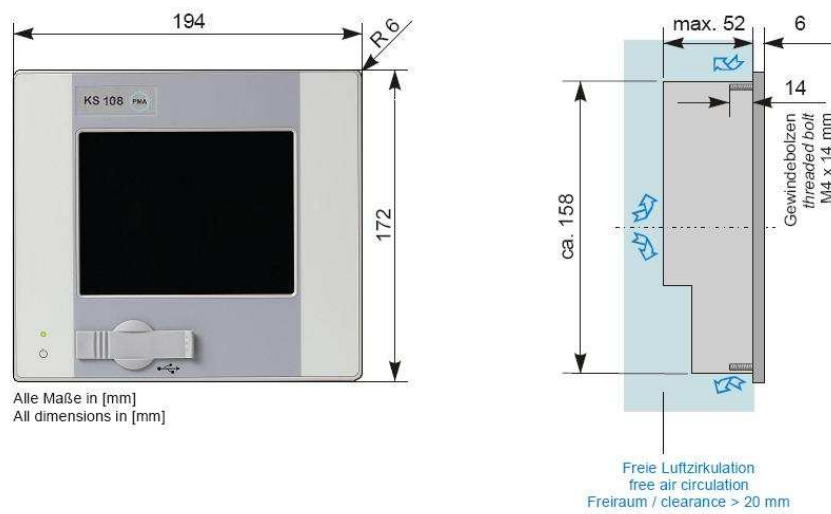


Fig. 14: Mounting

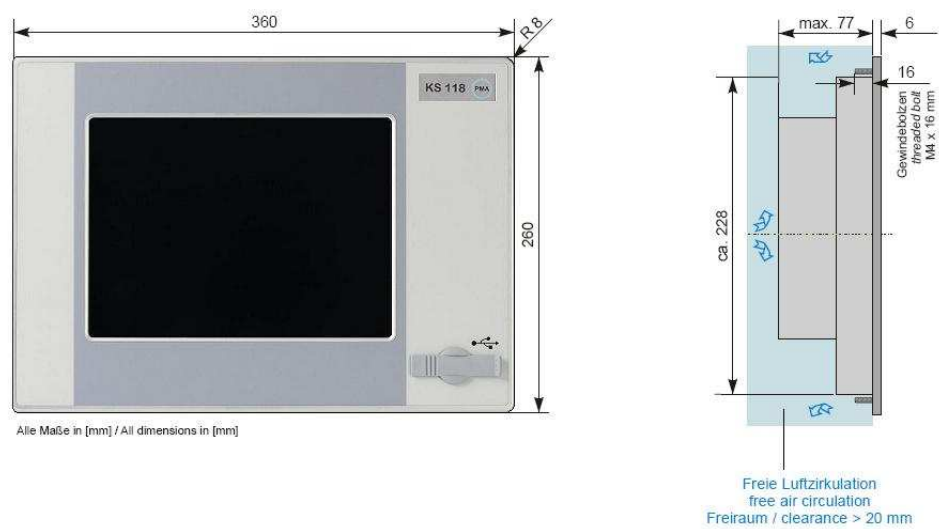


Fig. 15: Mounting

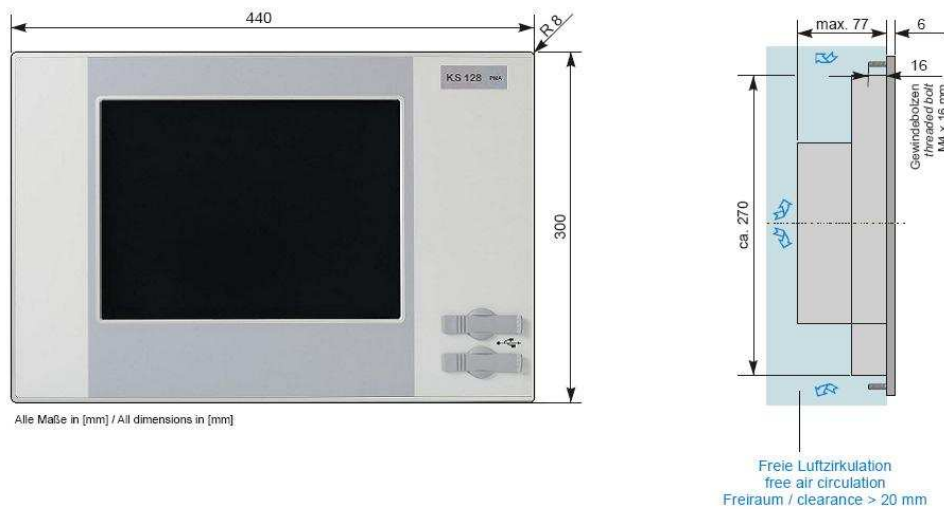


Fig. 16: Mounting

Mount the devices as follows:

1. **Preparation:** Remove the fastening nuts and washers from the stud bolts.
2. **Assembling:** Slide the device into the mounting cutout from the front.
3. **Mounting:** Fasten the device in the mounting cutout. Place a washer on each of the stud bolts. Now mount the nuts on the stud bolts and tighten them.

### I-4.2.5 Connecting the device



#### **DANGER!**

**Injury hazard due to unforeseeable system function sequences and movement sequences**

System parts can be placed in motion when mounting, if they are not appropriately secured.

Therefore:

If the device is mounted the following must be heeded:

- All system parts that are switched off must be safeguarded from being switched on inadvertently!
- In general, the effects of switching off the system must be considered, and appropriate measures must be taken.

#### **Connecting the protective earth**

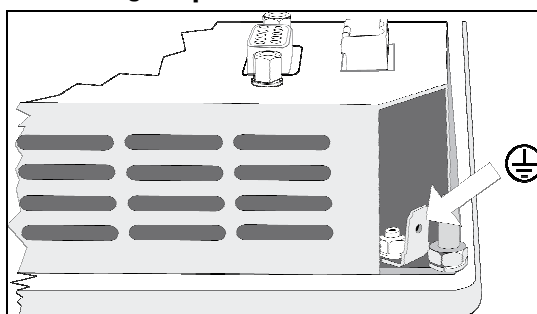


Fig. 17: PE

1. **Connect protective earth:** Connect the tab of the protective earth connection (Fig. 17) to the protective earth.  
To do this use a line with a core cross-section of at least Cu 1.5 mm<sup>2</sup>.

### Connecting the power supply

The device requires an external power supply with the following specifications:

External power supply specifications for the device	
Output voltage	+24 VDC SELV (18 ... 32 VDC)
Residual ripple	max. 4 Vss The DC voltage level should not exceed 18 V
Power output	Max. 2.0 A at +24 V DC at 25 °C



#### CAUTION!

#### Danger of damaging the device!

Connecting to the wrong power supply can damage the device.

Therefore:

- Ensure that the specifications for the power supply are complied with.
- All cables and connections must be executed in such a manner that malfunctions cannot be caused by inductive and capacitive interference.
- The feed lines must have sufficient current-carrying capacity and withstand strength.
- Ensure that polarity of the power supply is not reversed.

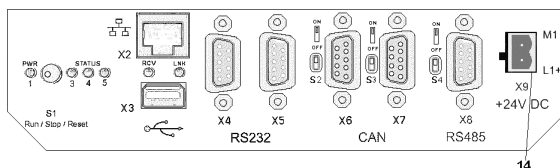


Fig. 18: Power supply

1. **Connect the power supply:** Connect the power supply line with the interface X9 on the rear of the device (Fig. 18 / Pos. 14).

### Connecting the interfaces



#### CAUTION!

#### Danger of malfunction or damage to the device!

Incorrect configuration/use of the interfaces can result in malfunctions or damage to devices!

Therefore:

- Comply with the instructions concerning the interfaces provided in the chapter "Interfaces"!
- For USB devices: Ensure that only those types of USB devices are used that require a current of no more than 0.5 A.
- For CAN bus topologies: Ensure that a terminating resistor is installed at the end of a CAN bus topology.

1. **Connect the interfaces:** Connect the required interfaces (Ethernet, CAN, etc.) to the device.

## I-4.3 Commissioning



### **DANGER!**

**Danger of injury if operating personnel are not qualified to work on the device!**

Improper handling of the device can cause serious personal injury and property damage.

Therefore:

- The device should only be placed in service by specialized personnel.  
Specialized personnel are considered to be persons who have adequate knowledge of the device, the automated processes, and the equipment.

### I-4.3.1 Checking the installation

The installation must be checked before the device is placed in service. This is done based on an installation log that must be created for the respective application case.

Here all installation tasks must be checked, however at least the following:

- Protective grounding
- Fuses for the power supply cable and for the master switch
- Agreement of device specification and PLC programming with the actual operating conditions.
- Agreement of the application with local and national guidelines

### I-4.3.2 Switching on the device

Proceed as follows to switch on the device.

1. **Switch on:** Switch on the device using the power switch.  
After switching on the start screen will be displayed after a short while.  
Then you will either see the service menu or you will see the application that will be executed.



#### *NOTE!*

*Additional information on the operating status is provided in the following section.*

### I-4.3.3 Setting the operating status



### **DANGER!**

**Danger of injury due to unforeseeable plant function sequences and movement sequences!**

If the device is used with other devices/equipment then consequential actions can be induced on these devices/actuators, etc. by switching on the device.

Therefore:

- Prior to switching on the device at any time consider the effects of switching on the device and ensure that appropriate measures have been taken!

**DANGER!****Danger of injury due to an incorrect or defective program!**

The device is freely programmable. Signal processing and signal output, and thus the behavior of connected devices/equipment are determined by the loaded program

Therefore:

- Prior to starting up the device it is strictly necessary to ensure that the correct program is loaded.
- Only place programs in service if their error-free status has been ensured.

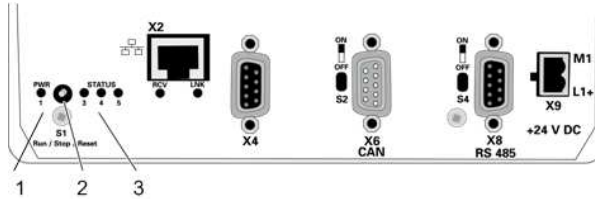


Fig. 19: Mode selector switch

Use the mode selector switch (Fig. 19/ Pos. 2) to set the operating status of the device. In addition you can reset the device with this switch.

You can choose from the following options:

- **"Run"**: Move the switch to the left until the stop.
- **"Stop"**: Move the switch to the center position.  
The service menu will be displayed. In addition the operating status will be displayed with the message "Stop switch active".
- **"Reset"**: Move the switch to the right to restart the device.  
The switch will automatically return to the "Stop" position. As long as the switch is in the position "Reset", the message "PLC STOPPED" will be displayed on the screen. All Variable also the Retain variables will be erase at restart.

**NOTE!**

*In rare cases an application cannot be restarted by a reset. In this case it is necessary to disconnect the power supply and to restart the device in this manner.*

**Operating status display**

With the operating status LED's (Fig. 19/ Pos. 2) the operating status, the status of the supply voltage, as well as possible error message are displayed.

The following states are defined here:

Status LED 1	Status LED 3	Status LED 4	Status LED 5	Description
On/green	Any	Any	Any	The supply voltage is correct.
Off	Any	Any	Any	The supply voltage is incorrect.
On	On	Off	Any	Status of the application program: "Run"
On	Off	On	Any	Status of the application program: "Stop"
On	Off	Flashes	Any	Status of the application program: "Error Stop" An error has occurred. Proceed as follows to resolve the error: 1. Determine the cause of error. This is shown on the display of this device on the service menue. 2. Resolve the cause of the error. 3. Execute a reset. To do this move the switch (Fig. 19/ Pos. 1) to the right.
On	Flashes	On	Any	Status of the application program: "Breakpoint Stop" The application is in debug mode and has been stopped at a breakpoint. Additional instructions in this regard are available in the CoDeSys documentation.
On	Any	Any	On	Mode: FORCE "FORCE" means that over the CoDeSys environment is running on the device and in this process at least one variable will be overwritten with a value (forced).

Table 2: Operating status display

**I-4.3.4 Loading the program from USB stick**



**DANGER!**

**Danger of injury due to unforeseeable system function sequences and movement sequences!**

System components can be placed in movement during maintenance work, configuration work, or function checks, if they are not disconnected from the device.

Therefore:

If the device is taken out of service, if new or changed applications are loaded on the device, or if maintenance or a function check is performed, the following must be heeded:

- All system components must be disconnected from the device!
- All switched off system components must be safeguarded from being inadvertently switched on again!
- In general the effects of switching off the system must be taken into consideration and appropriate measures must be taken.

New application programs (firmware updates) can be transferred to the device via USB stick. Proceed as follows for this:



1. **Copy to USB stick:** Normally you will receive updates with via e-mail. Save the attachment onto the USB stick.

Ensure in this process that a directory with the name "autoinst" has been created on the topmost directory level. Ensure that the files "update.tgz" and "autoinst.ini" are located in this directory.

**NOTE!**

*An update can only be executed if the USB stick contains the directory structure and files described above!*

2. **Switch off the device:** Switch off the device.
3. **Insert the USB stick:** Lift the cover of the USB connection (Fig. 20/ Pos.1) on the front of the device and turn it to the side. Now insert the USB stick (Fig. 20/ Pos. 2) in the connection (Fig. 20/ Pos.3).

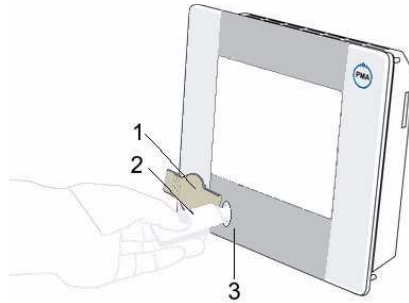


Fig. 20: Using the USB-Stick

4. **Switch on the device:** Now switch on the device again, The update starts automatically. First you will see the PMA logo and then a terminal window with status messages about the update. After the update the message "USB stick can be unplugged" will be displayed. The device will now be restarted automatically.

**NOTE!**

*The update is executed based on a script. Depending on script execution the messages can be different. It is also possible that a different message will be displayed to conclude the update.*

5. **Remove the USB stick:** Remove the USB stick.

**NOTE!**

*If the device does not restart automatically after the update, then it must be restarted manually. To do this switch the device off using the power switch and then switch it on again.*

### I-4.3.5 Making settings in the service menu

**DANGER!**

**Danger of injury due to unforeseeable plant function sequences and movement sequences!**

If the device is used with other devices/equipment then consequential actions can be induced on these devices/actuators, etc. by switching on the device.

Therefore:

- Prior to switching on the device at any time consider the effects of switching on the device and ensure that appropriate measures have been taken!

The device has a service menu where the following device settings can be made:

- Network configuration (Ethernet)
- Application program (PLC)

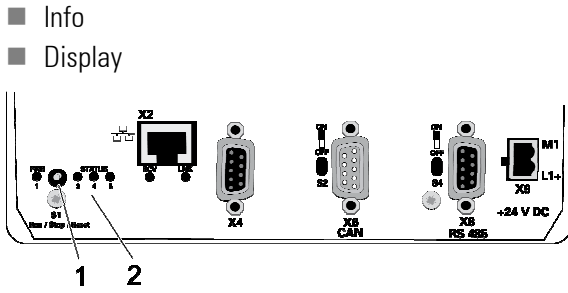


Fig. 21: Operating mode selector switch

Move the operating mode selector switch on the rear of the device (Fig. 21/ Pos. 1) into the center position ("Stop").

All programs will be stopped. New programs cannot be started. The service menu is displayed.

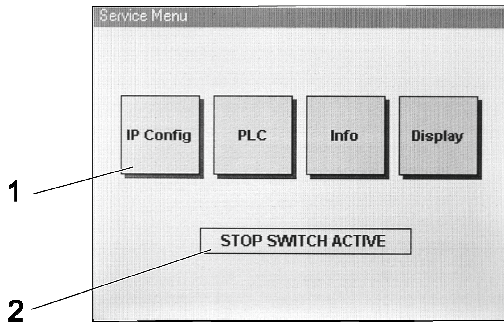


Fig. 22: Service menu

The service menu consists of two areas.

- **Menu option buttons:** Buttons to call the menu options in the upper area of the dialog window (Fig. 22/ Pos. 1).
- **System messages:** Status messages and error messages of the device can be displayed in the lower area of the dialog window (Fig. 22/ Pos. 2).  
An overview of messages is provided in the next section.

### System messages

#### Status messages

Display	Description
STOP SWITCH ACTIVE	The operating mode selector switch on the rear of the device (Fig. 21/ Pos. 1) is in the "Stop" position. The application program can only be started if the operating mode selector switch is in the "Run" position.
PLC STOPPED	The operating mode selector switch is in the "Run" position. However the device has been set to the condition "Stop" by the development environment.
PLC NO PROGRAM	The operating mode selector switch is in the "Run" position. However there no application program available.
PLC ERROR STOP	The operating mode selector switch is in the "Run" position. The application program could not be started due to an error.

### Error messages

Error messages are displayed under the status messages. The following error messages are displayed:

Display	Description
BOOTPROJECT_REJECTED_RETAIN_ERROR	The application program stored as boot project and the last loaded application are different programs. The last used application program has only been loaded in RAM and has not been stored as boot project. The intent of this message is to prevent a possibly out of date application program from starting.
RETAIN_IDENTITY_MISMATCH	The device could not restore the retain variables. Execute a reset to start the saved PLC program with reset variables and retain variables.

## I-4.4 Configure network

If you are using an Ethernet connection for communication with the device then you must configure network settings. Proceed as follows for this:

Start the service menu and click on the IP ADDRESS " button to start the network configuration. You will see the "Ethernet" dialog.

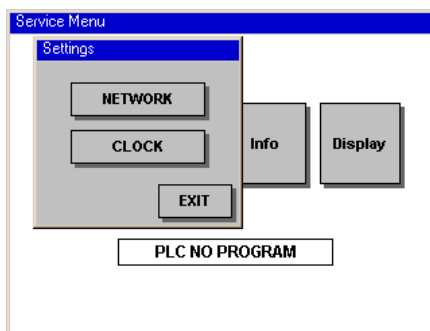


Fig. 23: Service menu ("Setting" dialog)

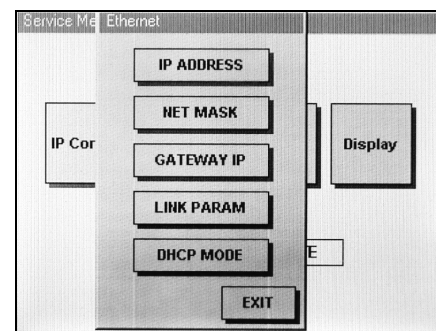


Fig. 24: Service menu ("Ethernet" dialog)

Settings show in Menu Fig. 23 to take effect to Restart.

As Hint will open a Messagebox Fig. 25.

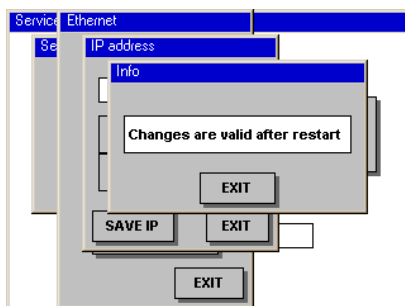


Fig. 25: Service menu ("info" dialog)

**Enter IP address**

With the device you can either assign a permanent IP address, or you can have an address assigned dynamically via a DHCP server. Further information on the "DHCP" option is provided below. Proceed as follows to assign a permanent IP address:

1. **Open the IP address dialog:** In the "Ethernet" dialog, click on the "IP address" button.
2. **Enter the IP address:** Enter the individual bytes of the IP address with the button  or . The first button increases the value the second reduces the value.
3. **Save entry:** Click on the "Save IP" button to save your entry.

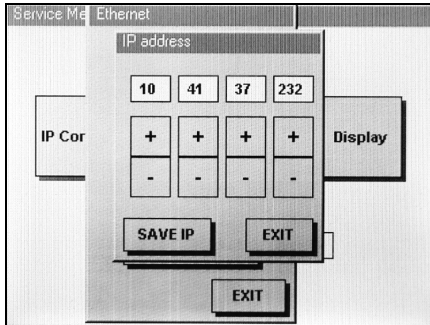


Fig. 26: Service menu ("IP address" dialog)

**Enter the network mask**

1. **Open the Net mask dialog:** In the "Ethernet" dialog, click on the "Net mask" button.
2. **Enter the IP address:** Enter the individual bytes of the IP address with the  or  button. The first button increases the value the second reduces the value.
3. **Save entry:** Click on the "Save Mask" button to save your entry.

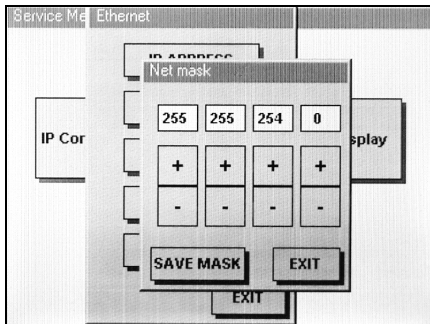


Fig. 27: Service menu ("Net mask" dialog)

**Enter the gateway IP address:**

1. **Open the Gateway IP dialog:** In the "Ethernet" dialog, click on the "Gateway IP" button.
2. **Enter the IP address:** Enter the individual bytes of the IP address with the  or  button. The first button increases the value the second reduces the value.
3. **Save entry:** Click on the "Save G-IP" button to save your entry.

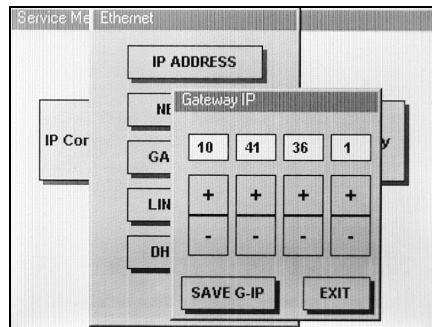


Fig. 28: Service menu ("Gateway IP" dialog)

### Configure network connections

Normally you can use the "Auto" setting. However problems can occur depending on the switch you are using. In this case you must explicitly specify the type of network connection.

The following options are available:

Option	Explanation
Auto	The communication parameters will be determined automatically.
100base-Tx FD	100 Mbit/s, full duplex
100base-Tx HD	100 Mbit/s, half duplex
10base-T FD	10 Mbit/s, full duplex
10base-T HD	10 Mbit/s, half duplex

Proceed as follows to configure the connection type:

1. **Open the Link Mode dialog:** In the "Ethernet" dialog, click on the "Link Mode" button.
2. **Select network type:** Select the type of network connection with the  or  button. The first button moves the selection cursor up, the second button moves the cursor down.
3. **Save entry:** Click on the "Save" button to save your entry.

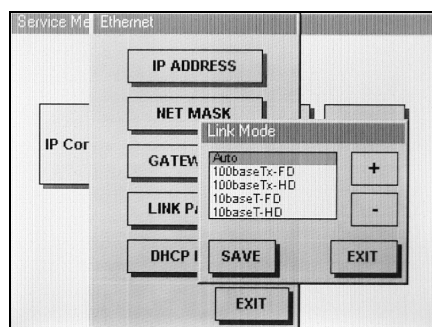


Fig. 29: Service menu (dialog "Link Mode")

### Configure DHCP mode

If the device will not be working with a fixed IP address, but rather with an IP address that is dynamically assigned by a DHCP server, then the steps below are necessary:

1. **Open the DHCP Mode dialog:** In the "Ethernet" dialog, click on the "DHCP Mode" button.
2. **Select DHCP mode:** Select the DHCP mode with the button .
3. **Save entry:** Click on the "Save" button to save your entry.

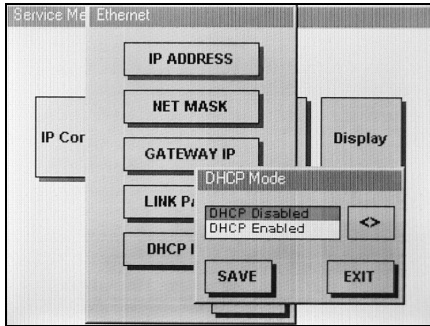


Fig. 30: Service menu ("DHCP Mode" dialog)



**NOTE!**

The DHCP Mode is closed as the IP Address = 0.0.0.0 is put.

**I-4.4.1 Set real-time clock on Service menu**

Over the Dialog "Settings" to get to after press the button " CLOCK" on the page "RTC", here to be able edit all provided parameters.

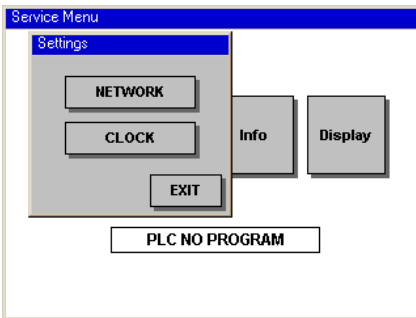


Fig. 31: Service-Menü (Dialog „Settings“)

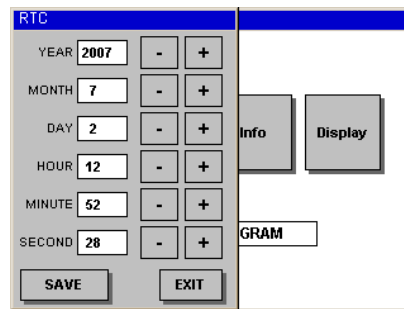


Fig. 32: Service-Menü (Dialog „RTC“)

**I-4.4.2 Start the application program / execute a reset**

- **Reset:** In the "PLC" (= Programmable Logic Controller) dialog, click on the "Reset PLC" button to reset the application program. Use this command to acknowledge an occurring error.
- **Start program:** Click on the "RUN PLC" button to start the application program.



**NOTE!**

You can only start an application program if a program is located on the device and the operating mode selector switch on the rear of the device (Fig. 21/ Pos. 1) is in the "Run" position (i.e. the left position).

If a program error occurred before starting the application program, then you must also execute the "Reset" command first.

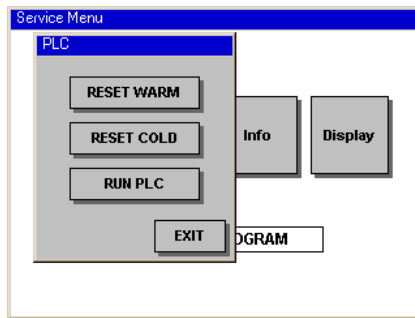


Fig. 33: Service menu ("PLC" dialog)

### I-4.4.3 Display system information

Click on the "Info" button to view the system information.

The information displayed here includes the serial number of the device, network settings, and software release versions (e.g. of the firmware, the LINUX kernel, or of the C-compiler).

This information is particularly useful when contacting the PMA Customer Support Organization with questions.

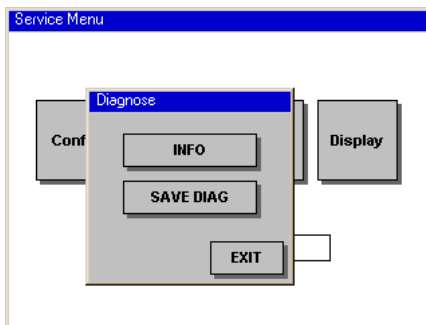


Fig. 34: Service-Menü (Dialog „Diagnose“)

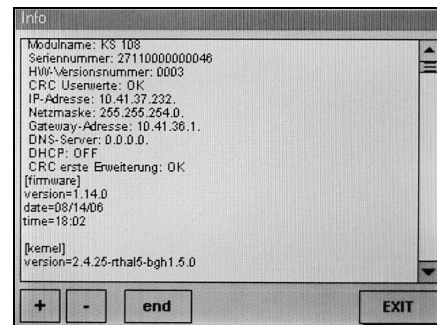


Fig. 35: Service menu ("Info" dialog)

#### **System information navigation:**

Click on the  or  buttons, to move up or down a line. Use the "End" button to close the display.

### I-4.4.4 Diagnose message save

Click at the Service Menu on the button „Info“ and in the Dialog "Diagnose" (Fig. 34) on the button " SAVE DIAG ", up Message of operating system and the application to save.

1. **Storage medium present:** On Dialog "INFO" will prepared that Saving, as well will spent the message (Fig. 36) "Storage medium plugged?". Plug in an pen drive or care for it that is available a SD card.
2. **Storage medium choose:** In window "Select a device" could you choose with button  or , where should save the data. You could only then choose, if e. g. various storage medium available (pen drive, SD card).
3. **Data save:** On Dialog "INFO" push on the button "START", after that appears the message "Please wait". After a few second occur the message "Finished" which the end of the storing displayed. The pen drive may remove after push the button "EXIT", the SD card must not on no account remove in the continuously action (See next paragraph).



**CAUTION!**

**Danger of data loss!**

Removing the SD card in operation can cause data loss. The file structure of the SD card, as well as device data structure can be damaged.

Therefore:

- Always switch the device off first, and then remove the card!

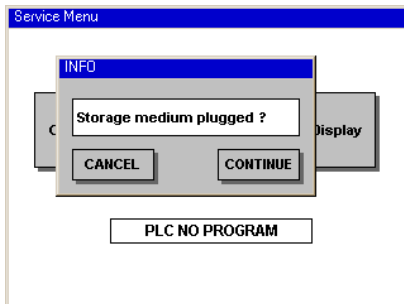


Fig. 36: Service menu (Dialog „Info“)

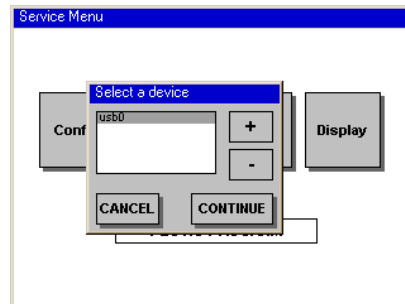


Fig. 37: Service menu (Dialog „Select a device“)

**I-4.4.5 Adjust display contrast**

1. **Open the "Contrast" dialog:** In the service menu, click on the "Display" button.
2. **Adjust contrast:** Use the  and  buttons to set the contrast.
3. **Save entry:** Click on the "Save " button to save your entry.

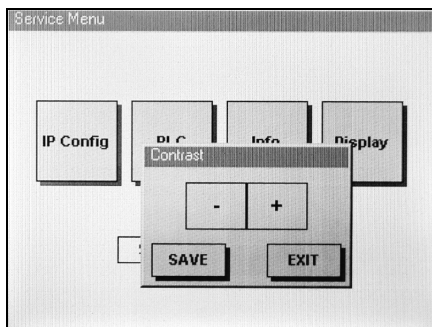


Fig. 38: Service menu ("Contrast" dialog)

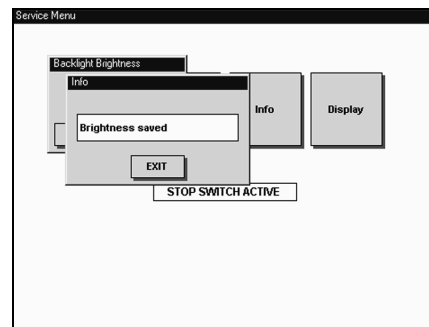


Fig.. 39: Service-menu ("Info" dialog)

Your settings will taken over if you leave the MessageBox (Fig.. 39) with "EXIT".



### I-4.4.6 Using an SD card

Both the alarm processing and the data logger require an SD card to save their data. Proceed as follows to install an SD card:



#### **CAUTION!** Danger of data loss!

Removing the SD card in operation can cause data loss. The file structure of the SD card, as well as device data structure can be damaged.

Therefore:

- Always switch the device off first, and then remove the card!

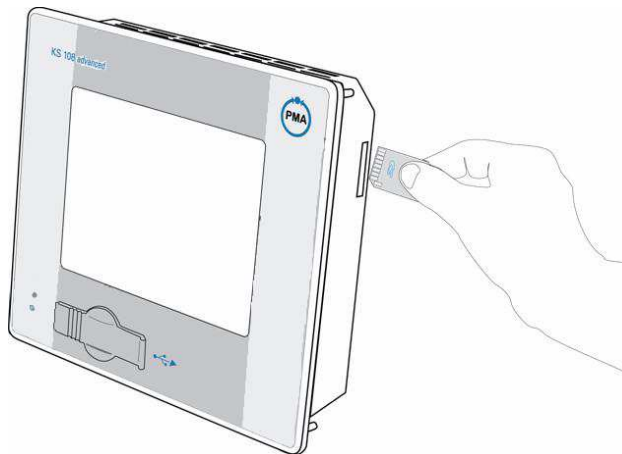


Fig. 40: Using the SD card

#### **Insert card**

1. **Switch off device:** Switch off the device.
2. **Insert card:** Carefully insert the SD card into the card slot. When inserting ensure that the beveled side is facing down and that the contacts are pointing to the front.

#### **Removing the card**

1. **Switch off device:** Switch off the device.
2. **Remove card:** Switch off the device. First push the card that you want to remove carefully into the device until the card is unlocked. Now let go of the card. If the card has been unlocked it will be pushed several millimeters out of the card slot.



#### **NOTE!**

*Will that SD Card drive enabled then don't stand the second serial interface (X5) no longer at hand.*

## I-5 Maintenance and cleaning

### I-5.1 Maintenance

#### I-5.1.1 Real-time clock

The device have a battery backed real-time clock, whereas it monitors the charge level of the buffer battery.



*Note!*

*The real-time clock can check either about the integrated Web-server or the CoDeSys library*



#### **CAUTION!**

**Damage on the real-time clock are possible!**

Backup battery voltage values which exceed 3,2 V or are below 2,0 V will affect the real-time clock's function.

therefore:

- Overvoltage : Check the battery type and device hardware.
- Undervoltage : Replace the Battery.

#### I-5.1.2 Battery to exchange

The installed battery must replaced every 5 years. This is the only maintenance task required.

The following battery charges level are important:

Voltage	
3,2 V	Typical value for a new battery. <b>This value may not be exceeded!</b>
3,0 V	Nominal battery voltage
2,5 V	The battery should be replaced.
2,0 V	The battery must be replaced immediately in order to ensure the proper function of the real-time clock.



#### **DANGER!**

**Explosion hazard!**

therefore:

- Never throw batteries into a fire, never attempt to solder at any point on the battery case and never attempt to recharge batteries. Do not attempt to dismantle or disassemble batteries.
- Replace batteries only with batteries which have the same rating.
- Make sure the battery is facing the right way when installed.



*NOTE*

*The battery voltage can check about the integrated Web-Server of the device or CoDeSys-Library. In Application should built-in a check-up the battery level, so that the Application can warn the user on time.*

The real-time clock's back-up battery can be replaced without the risk of data loss provided the device supply voltage is switched on.

**NOTE!**

*The Battery is held in place by a spring clip. Never lift the spring clip retainer as this can destroy the clip.*

- Push the old battery out to the side.
- Insert the new battery from the side, check for correct polarity and battery type.

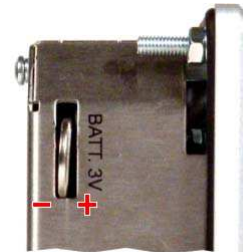


Fig. 41: Battery compartment

**WARNING!**

Only use a CR1620 ( 3V lithium battery ) manufactured by SONY.

The use of any other battery may result in fire or explosion.

## I-5.2 Cleaning

**DANGER!**

**Danger of injury due to unforeseeable plant function sequences and movement sequences!**

Unintentional or uncoordinated contact of touch sensitive displays can cause malfunctions or unforeseeable plant reactions.

Therefore:

- Switch off the device, the plant, or all plant components, prior to cleaning the device!
- All switched off plant components must be safeguarded from being inadvertently switched on again!
- In general the effects of switching off the plant must be taken into consideration and appropriate measures must be taken.

**CAUTION!**

**Device damage due to improper cleaning!**

The use of improper cleaning agents or cleaning improperly can cause significant device damage. The display in particular is extremely sensitive.

Therefore:

- Never use a high-pressure cleaner or steam jet to clean the device.
- Do not use aggressive cleaning agents, solvents, cleanser, or hard objects to clean the device.
- Always use extremely light contact pressure to clean the front panel and the display.

**Procedure**

Clean the front panel of the device with a lint-free, soft, slightly damp cloth.

### I-5.2.1 Cleaning at strong Contamination



**NOTE!**

*At strong Contamination you can clean the screen to DIN 42115 Part 2 with Ethanol respectively Isopropyl..*

Cleaning the foreside of the device with a lintfree, soften and easy wet cloth.

### I-5.2.2 Resistance of the touch screen

The active area of the touch screen is resistant to the following chemicals if exposed to them for a period of one hour at a temperature of 21° C:

Industrial chemicals	Household chemicals
Acetone	Ammonia-based glass cleaner
Dichloromethane	Laundry detergent
Methyl ethyl ketone	Cleansers (Fantastic, Formular 409, Joy,etc.)
Isopropyl alcohol	Vinegar
Hexane	Coffee
Terpentine	Tea
Naphtha	Grease
Lead-free gasonline	Cooking oil
Diesel oil	Salt
Motor oil	
Transmission fluid	
Antifreeze	

### I-5.2.3 General resistance of the front foil sheeting material

AUTOTEX is based on a polyester foil with a biaxial arrangement and therefore exhibits better resistance to solvents. It is stronger and more durable than other sheeting materials as polycarbonat or PVC, commonly employed for touch pads and front face panels.

Autotex is resistant to the following chemicals in according with DIN 42 115, Part 2, and exhibit no alterations for exposure periods of more than 24 hours:

Ethanol	Formaldehyde 37% -42%	I.I.I. trichloro ethane
Cyclohexanol	Acetaldehyde	Ethyl acetate
Diacetone alcohol	Aliphatic hydrocarbons	Diethyl ether
Glycol	Toluene	N-butyl acetate
Isopropanol	Xylene	Amyl acetate
Glycerin	Thinners (white spirits)	Butyl cellosolve
Methanol	Formic ensäure < 50%	Ether
Triacetin	Acetic acid < 50%	Sodium chloride < 20%
Dowandol DRM/PM	Phospohric acid < 30%	Hydrogen peroxide < 25%
Acetone	Hydrochloric acid < 36%	Potash soap
Methyl ethyl ketone	Nitric acid < 10%	Laundry soap
Dioxan	Trichloro acetic acid < 50%	Tensides
Cyclohexanon	Sulfuric acid < 10%	Softeners
MIBK	Drilling emulsions	Ferric chloride (FeCl <sub>2</sub> )
Isophoron	Diesel oil	Ferrous chloride (FeCl <sub>3</sub> )
Ammonia < 40%	Varnish	Dibutyl phthalate
Caustic soda < 40%	Paraffin	Dioctyl phthalate
Potassium hydroxide < 30%	Castor oil	Sodium carbonate
Alkali carbonat	Silicon oil	
bichromate	Turpentine oil replacements	
Potassium ferrocyanide	Brake fluid	
Acetonitril	Decon	
Sodium bisulfate	Aircraft fuel	
	Gasoline r	
	Water	
	Salt water	

AUTOTEX is resistant to glacial acetic in according with DIN 42 115, Part 2, for exposure times of < 1 hour and will exhibit no visible damage.

### I-5.2.4 Resistance to household Chemicals

AUTOTEX is resistant to the following products and will exhibit no visible damage for exposure periods of 24 hours at 50° C:

Top Job	Grape juice	Ariel	Ajax
Jet Dry	Milk	Persil	Vim
Gumption	Coffee	Wisk	Domestos
Fantastic		Lenor	Vortex
Formula 409		Downey	Windex

Very close examinations would reveal mild discoloration after exposure to the following materials:

- Mustard
- Tomato juice
- Ketchup
- Lemon juice

### I-5.2.5 Environment Value



#### **WARNING!**

**Autotex is not UV resistant film!**

As is the case for all polyester-based sheeting, AUTOTEX is not for extended exposure to direct sunlight.

Therefore:

- Use that device not in the open or expose it direct sunlight.

## I-5.3 After maintenance

After maintenance work, before placing the device in service, you must ensure that proper operation is possible. Ensure that:

- No foreign objects are in the device.
- All connections have been established correctly.
- The enclosure cover is mounted.
- The PE is correctly connected.



#### **WARNING!**

**Danger of injury if personnel are not qualified to work on the device!**

Improper handling of the device can cause serious injury and property damage.

Therefore:

- Only qualified personnel should perform maintenance work on the device.

## I-6 Troubleshooting

**WARNING!**

**Danger of injury if personnel are not qualified to work on the device!**

Improper handling of the device can cause serious injury and property damage.

Therefore:

- Only qualified personnel should perform maintenance work on the device.

**DANGER!**

**Danger of injury due to unforeseeable system function sequences and movement sequences!**

System components can be placed in movement during maintenance work, configuration work, or function checks, if they are not disconnected from the device.

Therefore:

If the device is taken out of service, if new or changed applications are loaded on the device, or if maintenance or a function check is performed, the following must be heeded:

- All system components must be disconnected from the device!
- All switched off system components must be safeguarded from being inadvertently switched on again!
- In general the effects of switching off the system must be taken into consideration and appropriate measures must be taken.

**DANGER!**

**Danger of injury due to uncontrolled/unforeseeable operating sequences!**

As with any electronic controller system, device failure can result in an uncontrolled and/or unforeseeable operating sequence. Death, serious injury, or significant property damage can be the result.

Therefore:

- Ensure that appropriate measures are in place every time the device is used.

## I-6.1 Malfunction table

Malfunction	Presumable cause	Recommended measure
Device does not start	Power supply disrupted	<ul style="list-style-type: none"> <li>■ Check whether the power supply cable is connected, and whether the power supply is working.</li> <li>■ Check the pin assignment of the power supply for correct polarity.</li> <li>■ Check whether the supply voltage corresponds to the device's connection values.</li> </ul>
Device does not boot completely	Device is defective	<ul style="list-style-type: none"> <li>■ First try to reboot the device.</li> <li>■ If that does not help: Contact your distributor</li> </ul>

If the measures described above are not successful, please contact your distributor.



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