

# **5AP920.1505-K44**

## **Technical documentation**

Version: **1.10 (January 2014)**

Model no.: **5AP920.1505-K44**

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# 1 Rear view



Figure 1: 5AP920.1505-K44 - Rear view



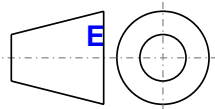
## 2.2 Organization of safety notices

Safety notices in this manual are organized as follows:

Safety notice	Description
<b>Danger!</b>	Disregarding these safety guidelines and notices can be life-threatening.
<b>Caution!</b>	Disregarding these safety guidelines and notices can result in severe injury or substantial damage to equipment.
<b>Warning!</b>	Disregarding these safety guidelines and notices can result in injury or damage to equipment.
<b>Information:</b>	This information is important for preventing errors.

Table 3: Organization of safety notices

## 2.3 Guidelines



European dimension standards apply to all dimension diagrams in this document.

All dimensions are specified in mm.

Range of nominal sizes	General tolerance according to DIN ISO 2768 (medium)
Up to 6 mm	$\pm 0.1$ mm
For 6 to 30 mm	$\pm 0.2$ mm
For 30 to 120 mm	$\pm 0.3$ mm
For 120 to 400 mm	$\pm 0.5$ mm
For 400 to 1000 mm	$\pm 0.8$ mm

Table 4: Range of nominal sizes

## 3 Safety guidelines

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### 3.1 Intended use

Programmable logic controllers (PLCs), operating/monitoring devices (industrial PCs, Power Panels, Mobile Panels, etc.), and B&R uninterruptible power supplies have been designed, developed and manufactured for conventional use in industrial environments. They were not designed, developed and manufactured for any use involving serious risks or hazards that could lead to death, injury, serious physical damage or loss of any kind without the implementation of exceptionally stringent safety precautions. In particular, such risks and hazards include the use of these devices to monitor nuclear reactions in nuclear power plants, their use in flight control or flight safety systems as well as in the control of mass transportation systems, medical life support systems or weapons systems.

### 3.2 Protection against electrostatic discharge

Electrical components that can be damaged by electrostatic discharge (ESD) must be handled accordingly.

#### 3.2.1 Packaging

- **Electrical components with a housing**  
...Do not require special ESD packaging but must be handled properly (see "Electrical components with a housing").
- **Electrical components without a housing**  
...Must be protected by ESD-suitable packaging.

#### 3.2.2 Guidelines for proper ESD handling

##### Electrical components with a housing

- Do not touch the connector contacts on connected cables.
- Do not touch the contact tips on circuit boards.

##### Electrical components without a housing

The following applies in addition to the points listed under "Electrical components with a housing":

- Any persons handling electrical components or devices with installed electrical components must be grounded.
- Components may only be touched on their narrow sides or front plate.
- Components should always be stored in a suitable medium (ESD packaging, conductive foam, etc.). Metallic surfaces are not suitable storage surfaces!
- Components should not be subjected to electrostatic discharge (e.g. through the use of charged plastics).
- Ensure a minimum distance of 10 cm from monitors and TV sets.
- Measurement devices and equipment must be grounded.
- Measurement probes on potential-free measurement devices must be discharged on sufficiently grounded surfaces before taking measurements.

##### Individual components

- ESD protective measures for individual components are thoroughly integrated at B&R (conductive floors, footwear, arm bands, etc.).
- These increased ESD protective measures for individual components are not necessary for customers handling B&R products.

### 3.3 Policies and procedures

Electronic devices are never completely failsafe. If the programmable control system, operating/monitoring device or uninterruptible power supply fails, the user is responsible for ensuring that other connected devices, e.g. motors, are brought to a secure state.

When using programmable logic controllers or operating/monitoring devices as control systems together with a Soft PLC (e.g. B&R Automation Runtime or comparable product) or Slot PLC (e.g. B&R LS251 or comparable product), safety precautions relevant to industrial control systems (e.g. the provision of safety devices such as emergency stop circuits, etc.) must be observed in accordance with applicable national and international regulations. The same applies for all other devices connected to the system, such as drives.

All tasks such as the installation, commissioning and servicing of devices are only permitted to be carried out by qualified personnel. Qualified personnel are those familiar with the transport, mounting, installation, commissioning and operation of devices who also have the appropriate qualifications (e.g. IEC 60364). National accident prevention regulations must be observed.

The safety notices, connection descriptions (type plate and documentation) and limit values listed in the technical data are to be read carefully before installation and commissioning and must be observed.

### 3.4 Transport and storage

During transport and storage, devices must be protected against undue stress (mechanical loads, temperature, humidity, aggressive atmospheres, etc.).

### 3.5 Installation

- Installation must be performed according to this documentation using suitable equipment and tools.
- Devices may only be installed by qualified personnel without voltage applied. Before installation, voltage to the control cabinet must be switched off and prevented from being switched on again.
- General safety guidelines and national accident prevention regulations must be observed.
- Electrical installation must be carried out according to applicable guidelines (e.g. line cross sections, fuses, protective ground connections).

### 3.6 Operation

### 3.7 Environmentally friendly disposal

All B&R programmable controllers, operating/monitoring devices and uninterruptible power supplies are designed to inflict as little harm as possible on the environment.

## 4 Complete system - Technical data

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### 4.1 Introduction

The Automation Panel series is a generation of B&R display units ranging from 10.4" to 19" that breaks new ground when it comes to the modularity of interfaces to PC systems. This pioneering technology allows image information to be transferred independently of the display unit so that future innovations in the area of transmission technology can be implemented by simply adding a new Automation Panel Link card.





### 4.1.1 Automation Panel Link plug-in cards

Automation Panel Link plug-in cards provide the interface between a B&R Industrial PC and the Automation Panel 900. These cards receive and process the graphics signals from the B&R Industrial PC (e.g. via the Automation PC 810 monitor/panel output) and pass them along to the Automation Panel 900. Touch screen, USB and SDL data is transferred in the other direction to the respective interface on the B&R Industrial PC (e.g. Automation PC 810) via the cable.

A plug-in card is simply inserted into the Automation Panel 900 slot provided and fastened into place using the two locating screws (max. torque 0.5 Nm).

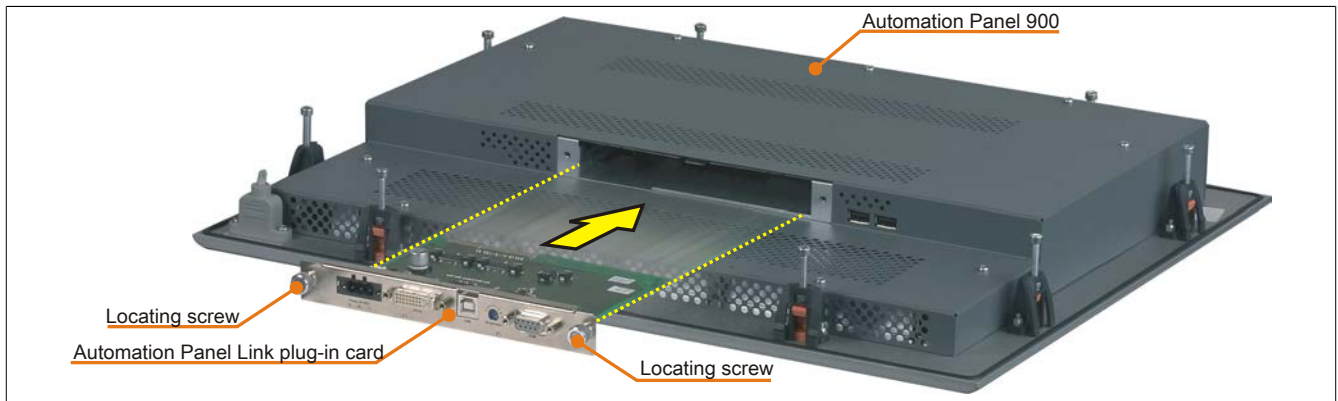


Figure 2: Automation Panel and Automation Panel Link plug-in card

## 4.2 +24 VDC supply voltage

Input voltage: 24 VDC  $\pm$ 25%

The pinout is listed in the following table and printed on the sticker. The supply is internally protected so that the device cannot be damaged if there is an overload or if the voltage supply is connected incorrectly. When dimensioning the power supply, the maximum power consumption of the Automation Panel being used must be taken into consideration.

The 3-pin male connector required for the supply voltage connection is not included in delivery. It can be ordered from B&R using model number 0TB103.9 (screw clamp) or 0TB103.91 (cage clamp).

Supply voltage	
Protected against reverse polarity	
Pin	Description
1	+
2	Functional ground
3	-
Accessories	
0TB103.9	Connector 24 V 5.08 3-pin screw clamp
0TB103.91	Male connector 24 V 5.08 3-pin cage clamp

3-pin, male

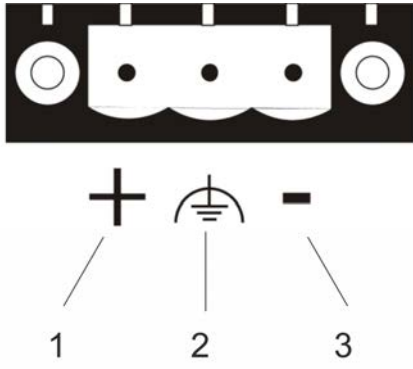


Table 5: 24 VDC supply voltage connection

## 4.3 USB interfaces

The Automation Panel 5AP920.1505-K44 has three USB ports (type A). The contact element on the front is protected against external influences by a metal cap. It can be used if the Automation Panel Link plug-in card has been correctly connected to a USB interface on the slot CPU.

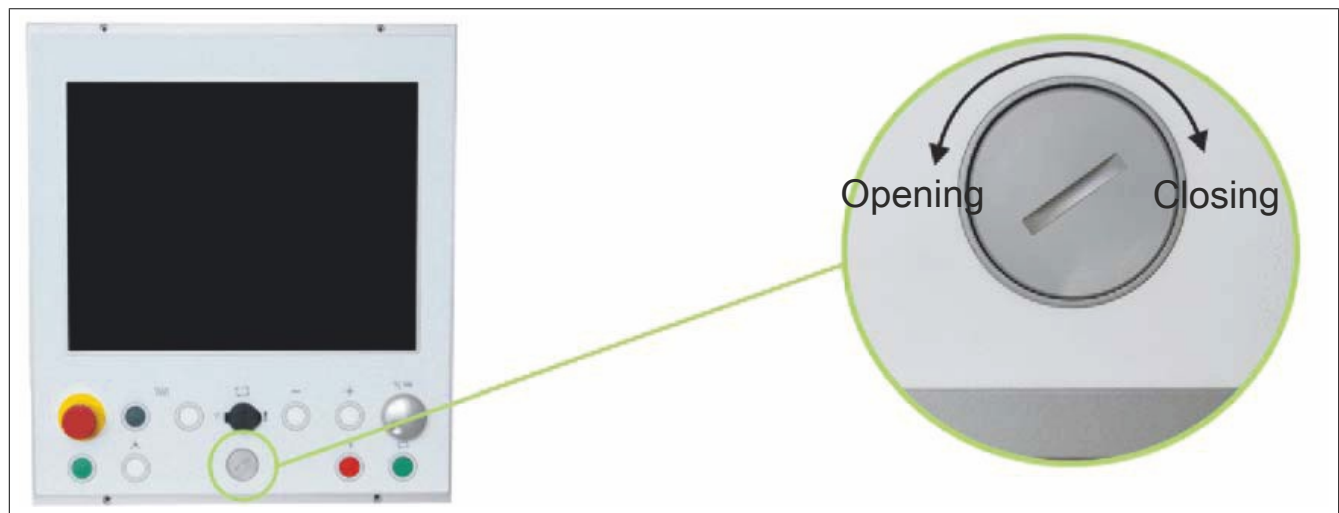


Figure 3: USB interfaces (front)

USB devices can only be connected to the Automation Panel directly (i.e. without a hub).

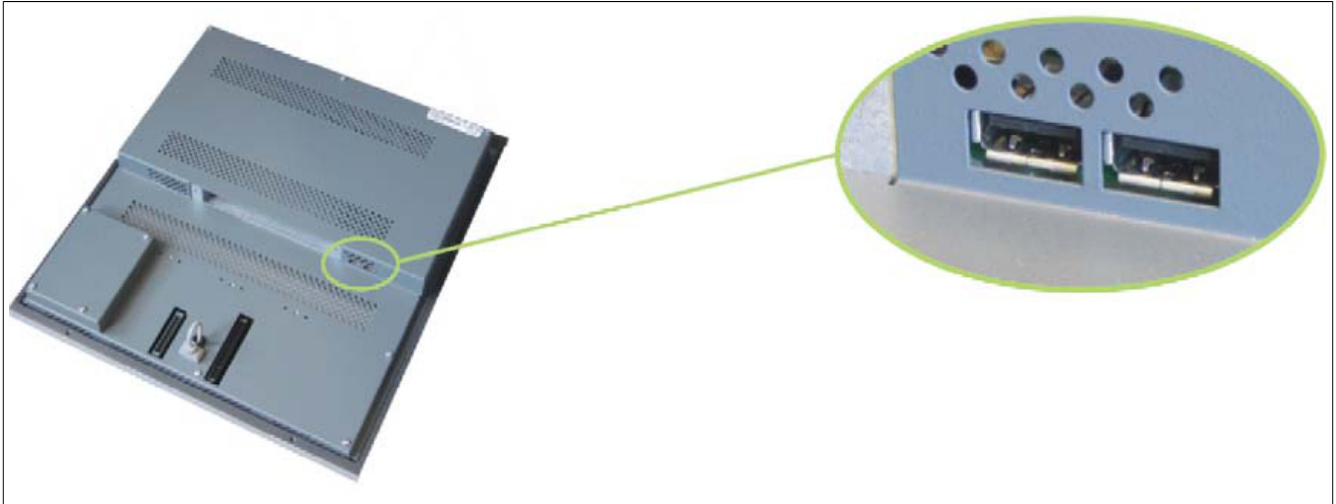


Figure 4: USB interfaces (back)

### USB transfer rate

The USB transfer rate depends on the type of Automation Panel Link card and transmission technology being used.

#### Information:

With a DVI Automation Panel Link plug-in card, USB 2.0 is supported up to a cable length of 5 meters. SDL (Smart Display Link) Automation Panel Link plug-in cards only support USB 1.1, regardless of the cable length. USB 2.0 is not supported.

### 4.4 Fastening cables

The Automation Panel comes with cable clamps that can be used to fasten connected cables to the back of the Automation Panel (on the bottom).

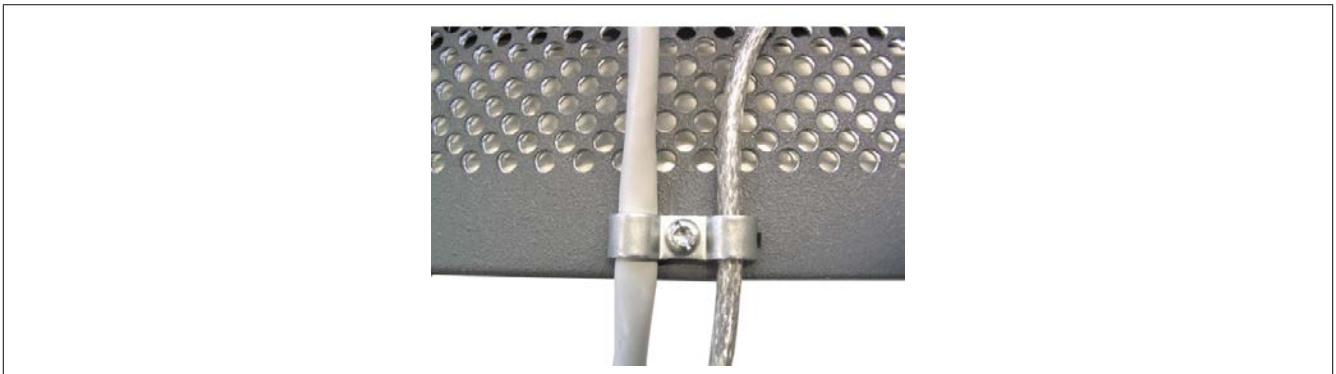


Figure 5: Cable clamps

## 4.5 Additional features

### 4.5.1 General information

Two multi-pin connectors intended for connecting the illuminated rings and switching elements for the keys and command devices are located on the back of the panel. The status of the connection cannot be read via the Automation Panel since the keys are not integrated electronically.

### 4.5.2 Key switch


RAFIX 22FS key switch 2x90° fixed position	
Manufacturer	Rafi
Quantity	1
Service life	0.3 million momentary / 50,000 fixed position
Angle of rotation	2x 90°
Manufacturer number	1.30.255.402/0000
	

Table 6: RAFIX 22FS key switch

Contact element 1.20.126.003/0000	
Quantity	1
Manufacturer number	1.20.126.003/0000
Min operating voltage	5 V
Max. operating voltage	35 V
Min. operating current	1 mA
Max. operating current	100 mA
Service life	1 million mech. and elec. at 24 VDC / 1 A

Table 7: Contact element 1.20.126.003/0000

#### Note:

Two keys for switching angle 2x90° and two keys for 1x90° are included in delivery.

### 4.5.3 E-stop 1.30.253.501/0300


E-stop 1.30.253.501/0300	
Manufacturer	RAFI
Type	Rafix 22FS
Quantity	1
Manufacturer number	1.30.253.501/0300
Service life	50,000 actuations
Actuating force	100 N
	

Table 8: E-stop 1.30.253.501/0300

#### Note:

Additional technical data can be found on the manufacturer's website: [www.rafi.de](http://www.rafi.de)

#### 4.5.4 Illuminated ring keys

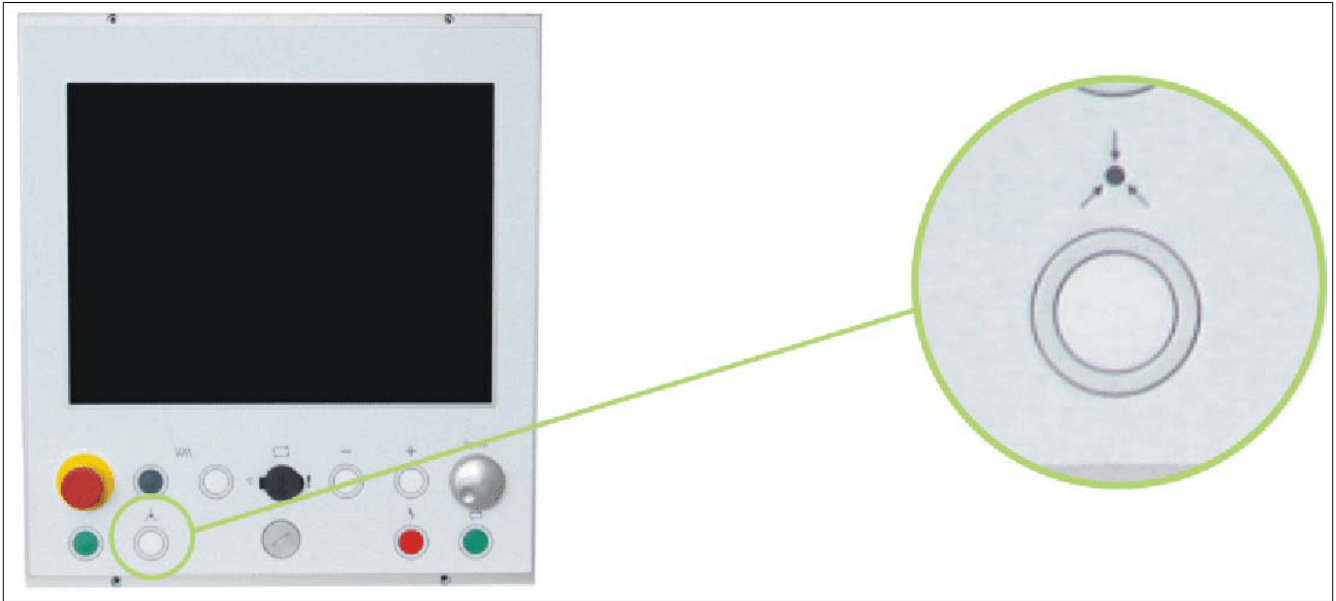


Figure 6: 5AP920.1505-K44 - Illuminated ring keys

The key contacts are connected directly to the multi-pin connector without any safety electronics. As a result, the specified electrical data must be strictly adhered to.

#### **Warning!**

**For the illuminated rings, the series resistors are dimensioned to 24 VDC; a higher voltage will shorten the service life or destroy the series resistors.**

#### 4.5.5 Rotary encoder

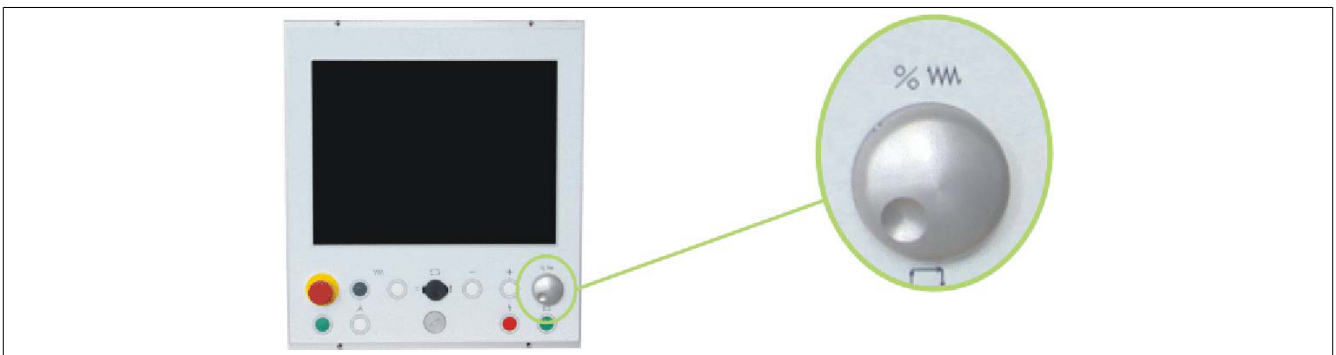


Figure 7: 5AP920.1505-K44 - Rotary encoder

#### **Warning!**

**The contacts and power supply for the rotary encoder are connected directly to the multi-pin connector without any safety electronics. As a result, the specified electrical data must be strictly adhered to. A higher voltage will lead to the immediate destruction of the component.**

#### **Pin 9 (LAG)**

When turned to the right, a lagging low pulse (TTL) is output to pin 10. When turned to the left, a leading low pulse is output to pin 10.

#### **Pin 10 (LEAD)**

When turned to the right, a leading low pulse is output to pin 9. When turned to the left, a lagging low pulse is output to pin 9.

The phase shift between pin 9 and 10 amounts to 250  $\mu$ s regardless of the speed.

The switching contact integrated in the rotary encoder is potential-free.

## 4.5.6 Pinout

### 4.5.6.1 12-pin connector

12-pin connector		
PIN	Comment	Description
1	Key switch (position 1)	Auto
2	Key switch (position 2)	!
3	JOG -	
4	JOG +	
5	STOP	
6	LED (red)	
7	Start right	
8	Start LED right (green)	
9	Rotary encoder LAG	5V TTL
10	Rotary encoder LEAD	5V TTL
11	Rotary encoder supply	GND
12	Rotary encoder supply	+5V DC
Accessories (included in delivery)		
7TB712.9	12-pin screw clamp	

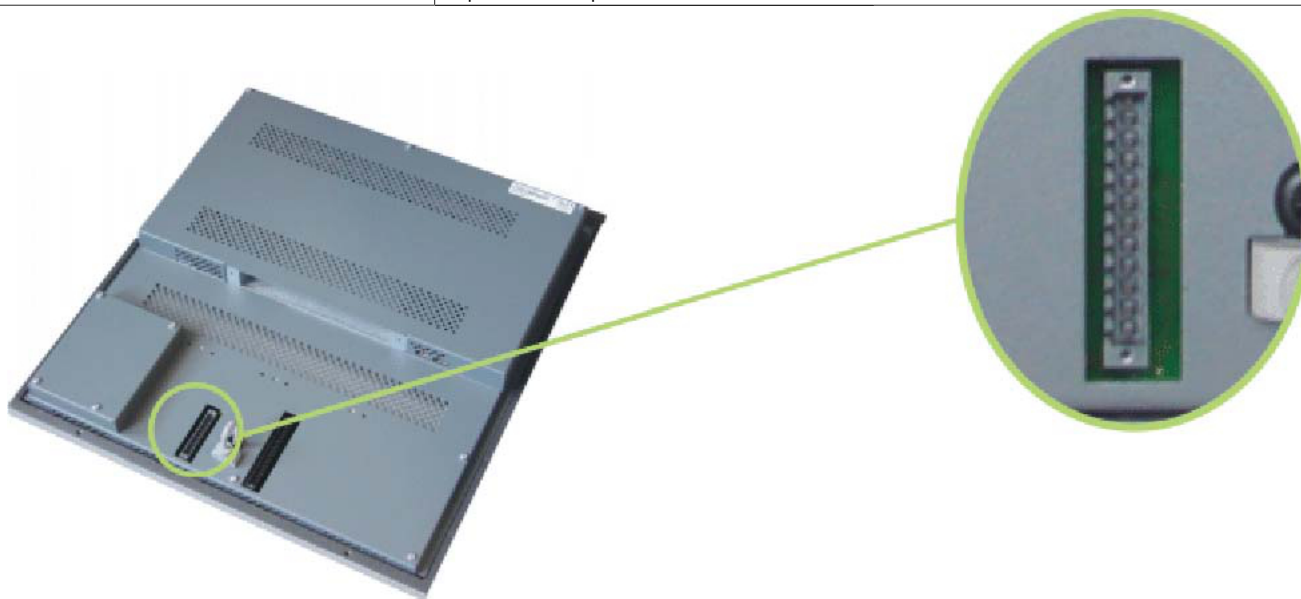


Figure 8: 5AP920.1505-K44 - 12-pin multi-pin connector

Table 9: 12-pin connector

## 4.5.6.2 18-pin connector

18-pin connector	
PIN	Description
1	N.C. 1_1
2	N.C. 2_1
3	N.C. 1_2
4	N.C. 2_2
5	Wave (red)
6	Wave (white)
7	LED wave (white)
8	Start left
9	POS
10	Rotary encoder key
11	Rotary encoder key
12	COM
13	COM
14	GND
15	GND
16	+24V DC
17	+24V DC
18	+24V DC
Accessories (included in delivery)	
7TB718.9	18-pin connector

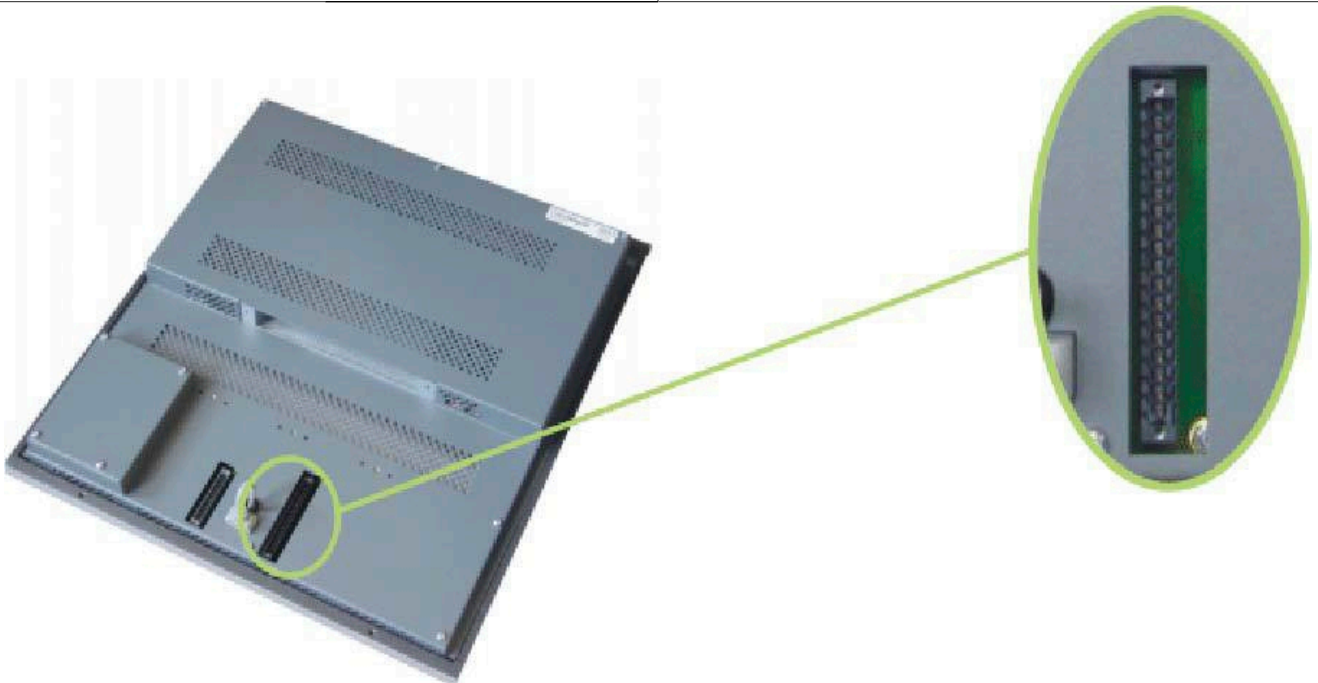


Figure 9: 5AP920.1505-K44 - 18-pin multi-pin connector

Table 10: 18-pin connector

## 4.6 Technical data

<b>Product ID</b>	<b>5AP920.1505-K44</b>
<b>General information</b>	
B&R ID code	\$A0DE
Certification	
CE	Yes
cULus	Yes
<b>Interfaces</b>	
USB <sup>1)</sup>	
Quantity	3 (2x back, 1x front)
Type	USB 2.0 <sup>2)</sup>
Design	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)
Current load	Max. 500 mA per connection
<b>Display</b>	
Type	Color TFT
Display size	15" (381 mm)
Colors	16.7 million
Resolution	XGA, 1024 x 768 pixels
Contrast	400:1
Viewing angles	
Horizontal	Direction R / Direction L = 85°
Vertical	Direction U / Direction D = 85°
Backlight	
Brightness	250 cd/m <sup>2</sup>
Half-brightness time <sup>3)</sup>	50,000 h
Filter glass	
Transmittance	-
Coating	-
Touch screen <sup>4)</sup>	
Technologies	Analog, resistive
Controller	Elo, serial, 12-bit
Transmittance	Up to 78%
<b>Keys</b>	
Illuminated ring keys	3 (red / white / green)
Short stroke keys	5
<b>Features</b>	
Key switch	
Quantity	1
Type	RAFIX 22FS 1.30.255.402/0000, fixed position
E-stop	
Type	RAFIX 22FS 1.30.253.501/0300
Rotary encoder	
Quantity	1
Type	EBE 2107893
<b>Inserts</b>	
Compatible installation for PPC300 insert	No
<b>Electrical characteristics</b>	
Nominal voltage	24 VDC ±25%
Nominal current	Max. 3.2 A <sup>5)</sup>
Starting current	Typ. 6 A, max. 30 A for <300 µs
Power consumption	Typ. 24 W, max. 31 W or 41 W with USB (without insert)
Electrical isolation	Yes
<b>Operating conditions</b>	
EN 60529 protection	Back: IP20 (only with an inserted Automation Panel Link card) Front: IP65 / NEMA 250 type 4X indoor, dust and sprayed water protection
<b>Environmental conditions</b>	
Temperature	
Operation	Without Rittal housing Mounting orientation 0°: 0 to 50°C Mounting orientations to -45° display above: 0 to 50°C Mounting orientations to +45° display below: 0 to 45°C
Storage	-25 to 60°C
Transport	-25 to 60°C
Relative humidity	
Operation	T ≤ 40°C: 5% to 90%, non-condensing T > 40°C: 5% to 75%, non-condensing
Storage	T ≤ 40°C: 5% to 90%, non-condensing T > 40°C: 5% to 75%, non-condensing
Transport	T ≤ 40°C: 5% to 90%, non-condensing T > 40°C: 5% to 75%, non-condensing

Table 11: 5AP920.1505-K44 - Technical data



Product ID	5AP920.1505-K44
Vibration	
Operation (continuous)	5 to 9 Hz: 1.75 mm amplitude / 9 to 150 Hz: 0.5 g
Operation (occasional)	5 to 9 Hz: 3.5 mm amplitude / 9 to 150 Hz: 1 g
Storage	Max. 58 – 500 Hz and 1 g (9.8 m/s <sup>2</sup> 0-peak)
Transport	Max. 58 – 500 Hz and 1 g (9.8 m/s <sup>2</sup> 0-peak)
Shock	
Operation	Max. 15 g (147 m/s <sup>2</sup> 0-peak) and 11 ms duration
Storage	Max. 50 g (147 m/s <sup>2</sup> 0-peak) and 11 ms duration
Transport	Max. 50 g (147 m/s <sup>2</sup> 0-peak) and 11 ms duration
Altitude	
Operation	Max. 3000 m <sup>6)</sup>
<b>Mechanical characteristics</b>	
Housing	
Materials	Metal
Front <sup>7)</sup>	
Frame	Naturally anodized aluminum
Design	Customer-specific
Panel membrane	
Materials	Polyester
Gasket	Flat gasket around display front
Dimensions	
Width	330 mm
Height	435 mm
Depth	45 mm
Weight	5.9 kg

Table 11: 5AP920.1505-K44 - Technical data

- 1) USB devices can only be connected to the Automation Panel directly (i.e. without a hub).
- 2) Depends on the transmission technology, the transfer distance and the Automation Panel Link plug-in card being used.
- 3) At an ambient temperature of 25°C. Reducing the brightness by 50% can result in an approximately 50% increase in the half-brightness time.
- 4) Touch screen drivers for approved operating systems are available in the Downloads section of the B&R website.
- 5) The specified value applies to Automation Panel devices with an inserted Automation Panel Link card.
- 6) The maximum ambient temperature is typically derated by 1°C per 1000 meters (starting at 500 meters above sea level).
- 7) There may be visible deviations in the color and surface appearance depending on the process or batch.

## 4.7 Dimensions

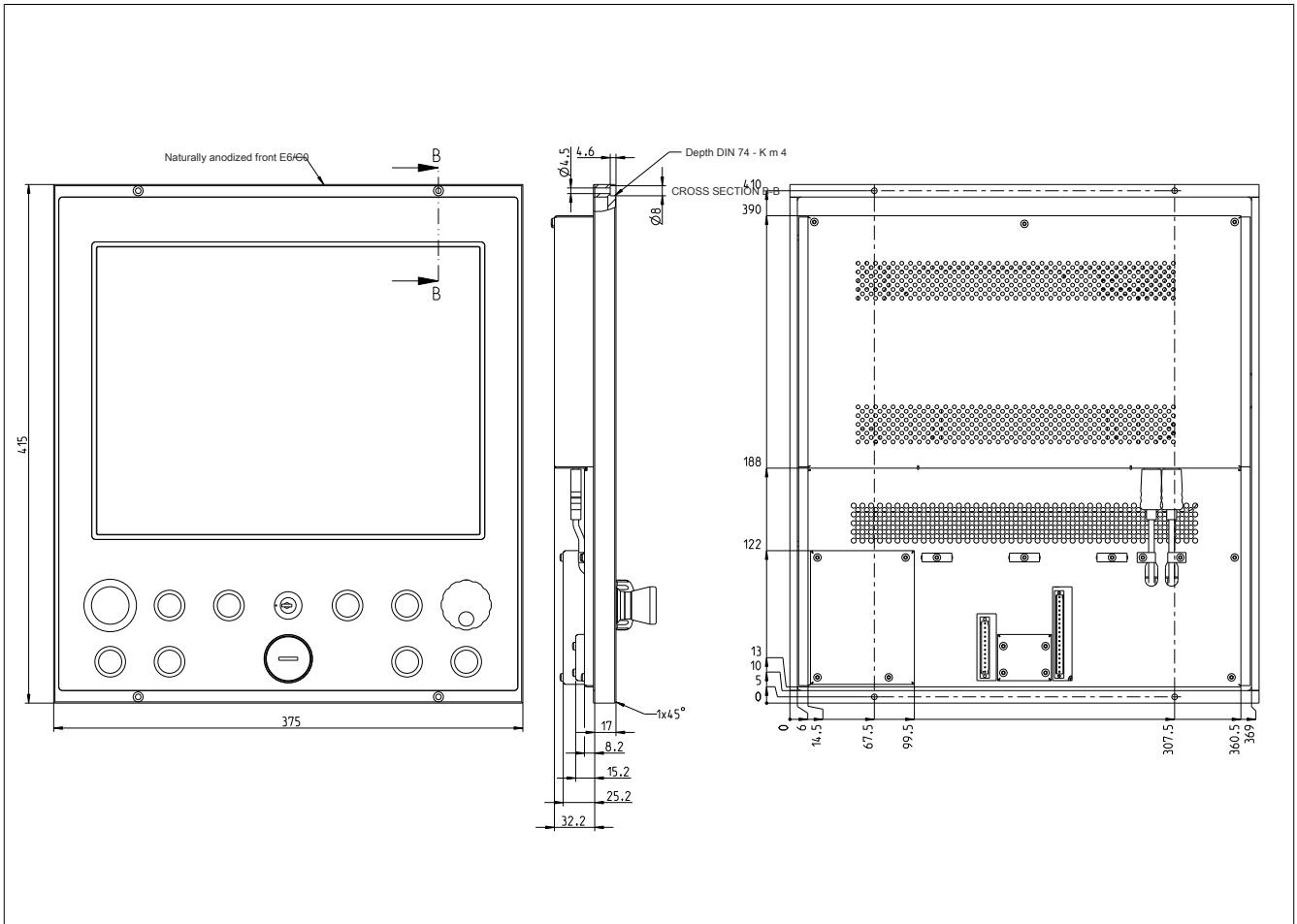


Figure 10: 5AP920.1505-K44 - Dimensions



## 4.9 Panel overlay design

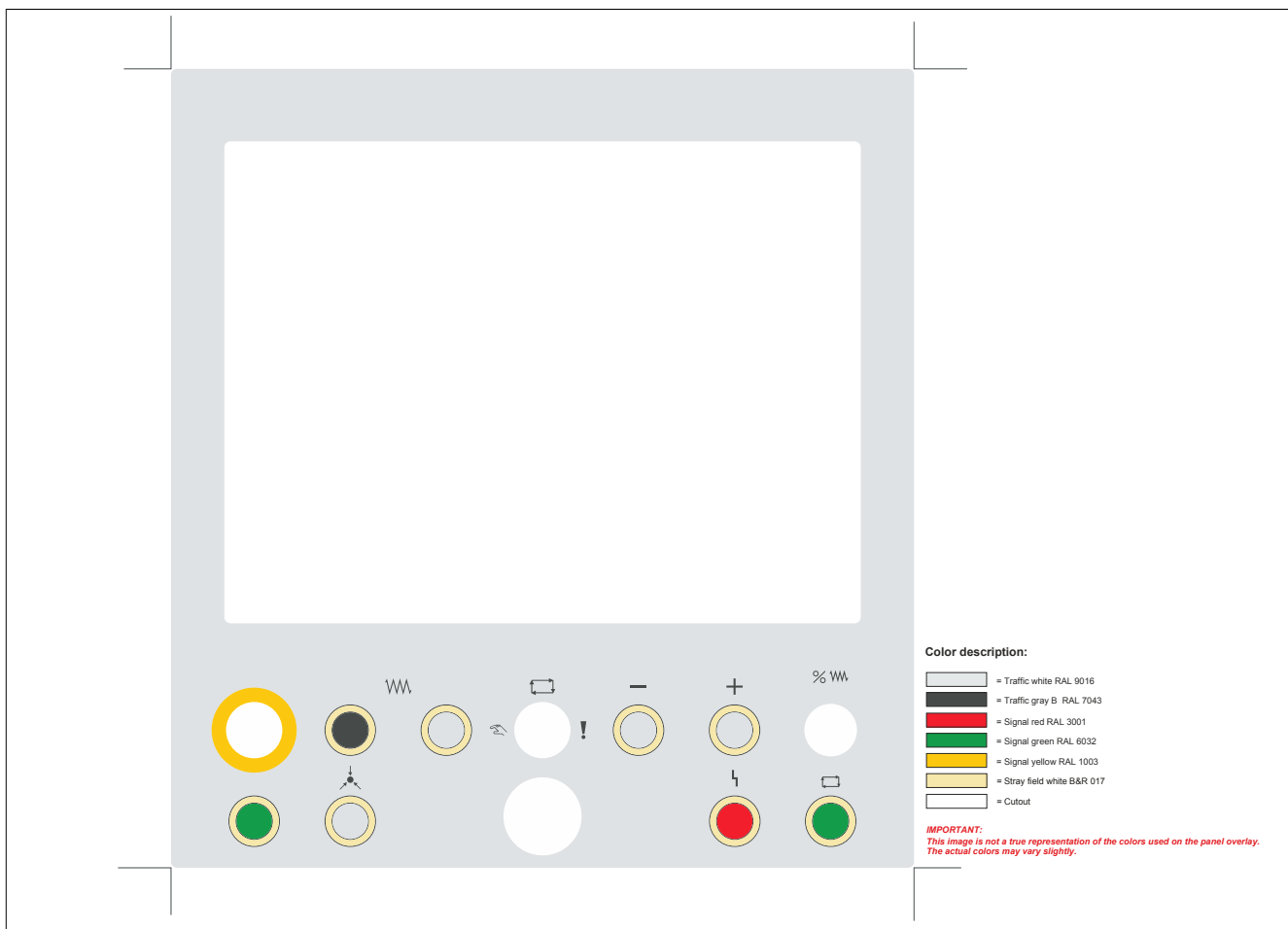


Figure 12: 5AP920.1505-K44 - Panel overlay design

## 5 Touch screen calibration

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B&R touch screen devices are equipped with a touch controller that supports hardware calibration. As a result, devices are pre-calibrated when delivered. This is an advantageous feature when replacing devices of the same model or type since it avoids having to recalibrate the new device. Nevertheless, calibrating the device is still recommended in order to achieve the best results and to better adapt the touch screen to the user's preferences.

Regardless of this, the touch screen will have to be calibrated once during or following the installation of the touch screen driver.

### 5.1 Windows XP Professional

After installing Windows XP Professional on the device, the touch screen driver must be installed in order to operate the touch screen. The necessary driver is available in the Downloads section of the B&R website ([www.br-automation.com](http://www.br-automation.com)).

### 5.2 Windows XP Embedded

After starting Windows XP Embedded on the device for the first time (first boot agent), the touch screen driver must be installed in order to operate the touch screen. The necessary driver is available in the Downloads section of the B&R website ([www.br-automation.com](http://www.br-automation.com)).

### 5.3 Windows Embedded Standard 2009

After starting Windows Embedded Standard 2009 on the device for the first time (first boot agent), the touch screen driver must be installed in order to operate the touch screen. The necessary driver is available in the Downloads section of the B&R website ([www.br-automation.com](http://www.br-automation.com)).

### 5.4 Windows CE

Windows CE starts the touch screen calibration sequence during its first boot in its default configuration (i.e. delivered state).

### 5.5 Automation Runtime / Visual Components

The touch screen must be calibrated once for the customer application when commissioning the device and project.

## 6 Tips for extending the service life of the display

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### 6.1 Backlight

The service life of the backlight is specified by its "half-brightness time". For example, a specified operating time of 50,000 hours means that the display would still retain 50% of its brightness after this time.

#### 6.1.1 How can the service life of the backlight be extended?

- By setting the display brightness to the lowest value that is still comfortable for the eyes
- By using dark images
- By reducing the brightness by 50%, which can result in an approximately 50% increase in the half-brightness time

### 6.2 Screen burn-in

Screen burn-in refers to the "burning in" of a static image on a display after being displayed for a prolonged period of time. Nevertheless, static images are not the only cause of screen burn-in. Screen burn-in is also referred to as burn-in effect, image retention, memory effect, memory sticking or ghost image.

There are basically two types:

- Area type: This type of screen burn-in is indicated by a dark gray image. The effect will disappear if the display is switched off for a long period of time.
- Line type: This type of screen burn-in can cause lasting damage.

#### 6.2.1 What causes screen burn-in?

- Static images
- No screensaver
- Sharp transitions in contrast (e.g. black/white)
- High ambient temperatures
- Operation outside of specifications

#### 6.2.2 How can screen burn-in be avoided?

- By constantly changing between static and dynamic images
- By avoiding excessive brightness differences between foreground and background elements
- By using colors with similar brightness
- By using complementary colors in follow-up images
- By using a screensaver

### 6.3 Pixel errors

#### Information:

Displays may contain defective pixels (dead/stuck pixels) that result from the manufacturing process. These flaws are not grounds for claiming reclamation or warranty.

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