

HMI cable manual

User's manual

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Translation of the original documentation

Publishing information

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1 Introduction

Information:

B&R makes every effort to keep documents as current as possible. The most current versions are available for download on the B&R website (www.br-automation.com).

1.1 Manual history

Version	Date	Comment ¹⁾
1.07	March 2023	• Updated sections "5CASDL.0xxx-00" on page 15, "5CASDL.0xxx-01" on page 18 and "5CASD3.xxxx-00" on page 29.
1.06	August 2022	• Updated sections "Technical data" on page 12 and "International and national certifications" on page 43.
1.05	May 2022	• Updated technical data of SDL cables 5CASDL.0xxx-00 and SDL cables with 45° connection 5CASDL.0xxx-01.
1.01	July 2020	• Updated compatibility table.
1.00	July 2020	• First version

1) Editorial corrections are not listed.

1.2 Information about this document

This document is not intended for end customers! The safety guidelines required for end customers must be incorporated into the operating instructions for end customers in the respective national language by the machine manufacturer or system provider.

1.2.1 Organization of notices

Safety notices

Contain **only** information that warns of dangerous functions or situations.

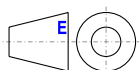
Signal word	Description
Danger!	Failure to observe these safety guidelines and notices will result in death, severe injury or substantial damage to property.
Warning!	Failure to observe these safety guidelines and notices can result in death, severe injury or substantial damage to property.
Caution!	Failure to observe these safety guidelines and notices can result in minor injury or damage to property.
Notice!	Failure to observe these safety guidelines and notices can result in damage to property.

General notices

Contain **useful** information for users and instructions for avoiding malfunctions.

Signal word	Description
Information:	Useful information, application tips and instructions for avoiding malfunctions.

1.2.2 Guidelines



European dimension standards apply to all dimension diagrams.

All dimensions in millimeters.

Unless otherwise specified, the following general tolerances apply:

Nominal dimension range	General tolerance per DIN ISO 2768 medium
Up to 6 mm	±0.1 mm
Over 6 to 30 mm	±0.2 mm
Over 30 to 120 mm	±0.3 mm
Over 120 to 400 mm	±0.5 mm
Over 400 to 1000 mm	±0.8 mm

1.2.3 Other applicable documents

Information:

Unless otherwise specified, the current version of the documents applies in each case. They are available for download on the B&R website (www.br-automation.com).

- MACFAST
- EMC manual
- Documentation of the PC or panel system used

1.3 Compatibility

	5CADVI. 0xxx-00	5CASDL. 0xxx-00	5CASDL. 0xxx-01	5CASDL. 0xx-03	5CASDL. 0xxx-13	5CASD3. xxxx-00	5CAUSB. 00xx-00	9A0014.xx
AP900	•	•	•	•	•	•	•	•
AP1000	•	•	•	•	•	•	•	•
AP5000	•	•	•	•	•	•	•	•
APC910	•	•	•	•	•	•	•	•
APC2100	•	•	•	•	•	•	•	•
APC2200	•	•	•	•	•	•	•	•
APC3100	•	•	•	•	•	•	•	•
PPC900	•	•	•	•	•	•	•	•
PPC2100							•	•
PPC2200							•	•
PPC3100	•	•	•	•	•	•	•	•

2 General safety guidelines

2.1 Intended use

In all cases, applicable national and international standards, regulations and safety measures must be taken into account and observed!

The B&R products described in this manual are intended for use in industry and industrial applications. The intended use includes control, operation, monitoring, drive and HMI tasks as part of automation processes in machines and systems.

B&R products are only permitted to be used in their original condition. Modifications and extensions are only permitted if they are described in this manual.

B&R excludes liability for damage of any kind resulting from the use of B&R products in any intended way.

B&R products have not been designed, developed and manufactured for use that involves fatal risks or hazards that could result in death, injury, serious physical harm or other loss without the assurance of exceptionally stringent safety precautions.

B&R products are explicitly not intended for use in the following applications:

- Monitoring and control of thermonuclear processes
- Weapon systems control
- Flight and traffic control systems for passenger and freight transport
- Health monitoring and life support systems

2.2 Protection against electrostatic discharge

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

2.2.1 Packaging

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

2.2.2 Regulations for proper ESD handling

Electrical assemblies with housing

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

Electrical assemblies without housing

The following applies in addition to "Electrical assemblies with housing":

- All persons handling electrical assemblies and devices in which electrical assemblies are installed must be grounded.
- Assemblies are only permitted to be touched on the narrow sides or front plate.
- Always place assemblies on suitable surfaces (ESD packaging, conductive foam, etc.). Metallic surfaces are not suitable surfaces!
- Assemblies must not be subjected to electrostatic discharges (e.g. due to charged plastics).
- A minimum distance of 10 cm from monitors or television sets must be maintained.
- Measuring instruments and devices must be grounded.
- Test probes of floating potential measuring instruments must be discharged briefly on suitable grounded surfaces before measurement.

Individual components

- ESD protective measures for individual components are implemented throughout B&R (conductive floors, shoes, wrist straps, etc.).
- The increased ESD protective measures for individual components are not required for handling B&R products at customer locations.

2.3 Regulations and measures

Electronic devices are generally not failsafe. If the programmable logic controller, operating or control device or uninterruptible power supply fails, the user is responsible for ensuring that connected devices (such as motors) are brought to a safe state.

When using programmable logic controllers as well as when using operating and monitoring devices as control systems in conjunction with a Soft PLC (e.g. B&R Automation Runtime or similar product) or Slot PLC (e.g. B&R LS251 or similar product), the safety measures that apply to industrial controllers (protection by protective equipment such as emergency stops) must be observed in accordance with applicable national and international regulations. This also applies to all other connected devices, such as drives.

All work such as installation, commissioning and servicing are only permitted to be carried out by qualified personnel. Qualified personnel are persons who are familiar with the transport, installation, assembly, commissioning and operation of the product and have the appropriate qualifications for their job (e.g. IEC 60364). National accident prevention regulations must be observed.

The safety guidelines, information about connection conditions (nameplate and documentation) and limit values specified in the technical data must be read carefully before installation and commissioning and must be strictly observed.

2.4 Transport and storage

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

2.5 Installation

- The devices are not ready for use and must be installed and wired according to the requirements of this documentation in order to comply with EMC limit values.
- Installation must be carried out according to the documentation using suitable equipment and tools.
- Devices are only permitted to be installed in a voltage-free state and by qualified personnel. The control cabinet must first be disconnected from the power supply and secured against being switched on again.
- General safety regulations and national accident prevention regulations must be observed.
- The electrical installation must be carried out in accordance with relevant regulations (e.g. line cross section, fuse protection, protective ground connection).

2.6 Operation

2.6.1 Protection against contact with electrical parts

In order to operate programmable logic controllers, operating and monitoring devices and uninterruptible power supplies, it is necessary for certain components to carry dangerous voltages over 42 VDC. Touching one of these components can result in a life-threatening electric shock. There is a risk of death, serious injury or damage to property.

Before switching on programmable logic controllers, operating and monitoring devices and uninterruptible power supplies, it must be ensured that the housing is properly connected to ground potential (PE rail). Ground connections must also be made if the operating and monitoring device and uninterruptible power supply are only connected for testing purposes or only operated for a short time!

Before switching on, live parts must be securely covered. All covers must be kept closed during operation.

2.6.2 Ambient conditions - Dust, moisture, aggressive gases

The use of operating and monitoring devices (e.g. industrial PCs, Power Panels, Mobile Panels) and uninterruptible power supplies in dusty environments must be avoided. This can otherwise result in dust deposits that affect the functionality of the device, especially in systems with active cooling (fans), which may no longer ensure sufficient cooling.

The presence of aggressive gases in the environment can also result in malfunctions. In combination with high temperature and relative humidity, aggressive gases – for example with sulfur, nitrogen and chlorine components – trigger chemical processes that can very quickly impair or damage electronic components. Blackened copper surfaces and cable ends in existing installations are indicators of aggressive gases.

When operated in rooms with dust and condensation that can endanger functionality, operating and monitoring devices such as Automation Panels or Power Panels are protected on the front against the ingress of dust and moisture when installed correctly (e.g. cutout installation). The back of all devices must be protected against the ingress of dust and moisture, however, or the dust deposits must be removed at suitable intervals.

2.6.3 Programs, viruses and malicious programs

Any data exchange or installation of software using data storage media (e.g. floppy disk, CD-ROM, USB flash drive) or via networks or the Internet poses a potential threat to the system. It is the direct responsibility of the user to avert these dangers and to take appropriate measures such as virus protection programs and firewalls to protect against them and to use only software from trustworthy sources.

2.7 Cybersecurity disclaimer for products

B&R products communicate via a network interface and were developed for secure connection with internal and, if necessary, other networks such as the Internet.

Information:

In the following, B&R products are referred to as "product" and all types of networks (e.g. internal networks and the Internet) are referred to as "network".

It is the sole responsibility of the customer to establish and continuously ensure a secure connection between the product and the network. In addition, appropriate security measures must be implemented and maintained to protect the product and entire network from any security breaches, unauthorized access, interference, digital intrusion, data leakage and/or theft of data or information.

B&R Industrial Automation GmbH and its subsidiaries are not liable for damages and/or losses in connection with security breaches, unauthorized access, interference, digital intrusion, data leakage and/or theft of data or information.

The aforementioned appropriate security measures include, for example:

- Segmentation of the network (e.g. separation of the IT network from the control network¹⁾)
- Use of firewalls
- Use of authentication mechanisms
- Encryption of data
- Use of anti-malware software

Before B&R releases products or updates, they are subjected to appropriate functional testing. Independently of this, we recommend that our customers develop their own test processes in order to be able to check the effects of changes in advance. Such changes include, for example:

- Installation of product updates
- Significant system modifications such as configuration changes
- Deployment of updates or patches for third-party software (non-B&R software)
- Hardware replacement

These tests should ensure that implemented security measures remain effective and that systems in the customer's environment behave as expected.

¹⁾ The term "control network" refers to computer networks used to connect control systems. The control network can be divided into zones, and there can be several separate control networks within a company or site. The term "control systems" refers to all types of B&R products such as controllers (e.g. X20), HMI systems (e.g. Power Panel T30), process control systems (e.g. APROL) and supporting systems such as engineering workstations with Automation Studio.

3 Technical data

3.1 DVI cables

3.1.1 5CADVI.0xxx-00

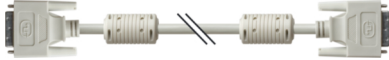
3.1.1.1 General information

5CADVI.0xxx-00 DVI cables are designed for use in fixed installations.

Caution!

The cable is only permitted to be connected/disconnected in a voltage-free state.

3.1.1.2 Order data

Order number	Short description	Figure
	DVI cables	
5CADVI.0018-00	DVI-D cable - 1.8 m	
5CADVI.0050-00	DVI-D cable - 5 m	
5CADVI.0100-00	DVI-D cable - 10 m	

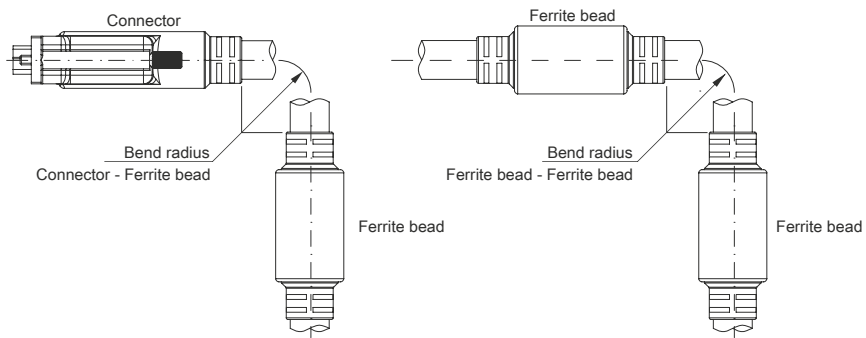
3.1.1.3 Technical data

Information:

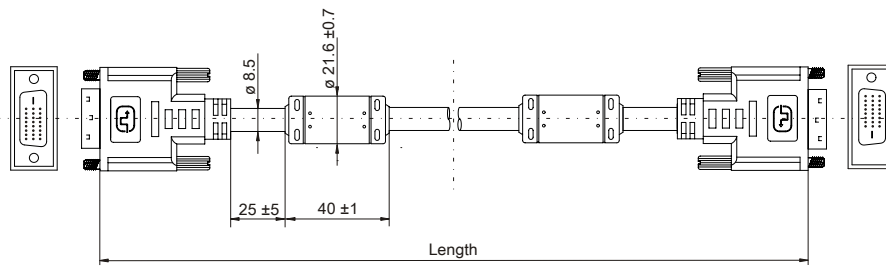
The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.

Order number	5CADVI.0018-00	5CADVI.0050-00	5CADVI.0100-00
General information			
Certifications			
CE		Yes	
UKCA		Yes	
UL		cULus E115267	
		Industrial control equipment	
KR		Yes	
Cable construction			
Wire cross section		28 AWG	
Shield		Individual cable pairs, entire cable	
Cable shield		Tinned copper braiding, optical coverage > 86%	
Outer jacket			
Material		PVC	
Color		Beige	
Labeling		AWM STYLE 20276 80°C 30 V VW1 DVI DIGITAL SINGLE LINK DER AN	
Connector			
Type		2x DVI-D (18+1), male	
Mating cycles		100	
Locating screw tightening torque		Max. 0.5 Nm	
Electrical properties			
Conductor resistance		Max. 237 Ω/km	
Insulation resistance		Min. 100 MΩ/km	
Operating conditions			
Pollution degree per EN 61131-2		Pollution degree 2	
Mechanical properties			
Dimensions			
Length	1.8 m ±50 mm	5 m ±80 mm	10 m ±100 mm
Diameter		Max. 8.5 mm	
Bend radius	≥5x cable diameter (connector to ferrite bead and ferrite bead to ferrite bead)		
Weight	Approx. 260 g	Approx. 460 g	Approx. 790 g

3.1.1.4 Bend radius specification



3.1.1.5 Dimensions

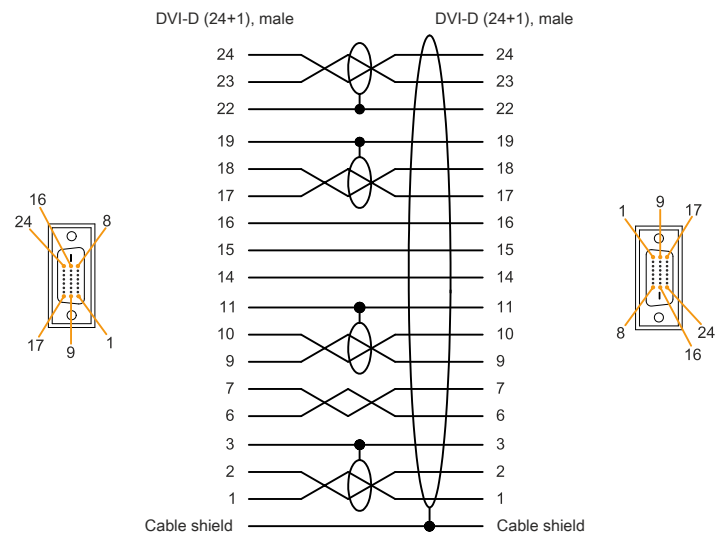


3.1.1.6 Cable pinout

If you wish to assemble a suitable cable yourself, the cable must be wired according to this pinout.

Information:

Functionality is only guaranteed for the cables available from B&R.



3.2 SDL cable

3.2.1 5CASDL.0xxx-00

3.2.1.1 General information

5CASDL.0xxx-00 SDL cables are designed for use in fixed installations. For flexible installations (e.g. swing arm systems), the use of 5CASDL.0xxx-03 SDL flex cables is required.

Caution!

The cable is only permitted to be connected/disconnected in a voltage-free state.

3.2.1.2 Order data

Order number	Short description	Figure
	SDL-cables	
5CASDL.0008-00	SDL cable - 0.8 m	
5CASDL.0018-00	SDL cable - 1.8 m	
5CASDL.0050-00	SDL cable - 5 m	
5CASDL.0060-00	SDL cable - 6 m	
5CASDL.0100-00	SDL cable - 10 m	
5CASDL.0150-00	SDL cable - 15 m	
5CASDL.0200-00	SDL cable - 20 m	
5CASDL.0250-00	SDL cable - 25 m	
5CASDL.0300-00	SDL cable - 30 m	

3.2.1.3 Technical data

Information:

The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.

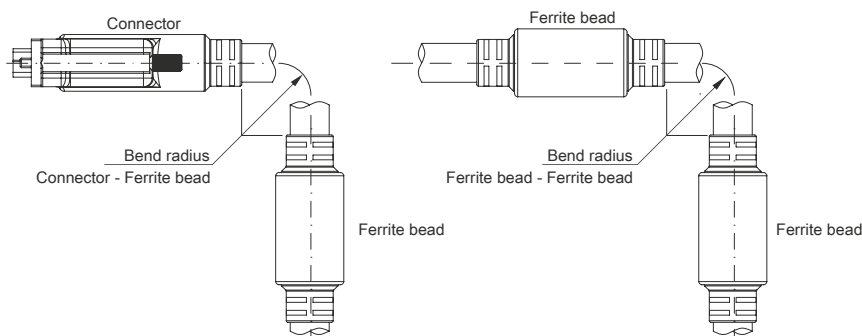
Order number	5CASDL. 0008-00	5CASDL. 0018-00	5CASDL. 0050-00	5CASDL. 0060-00	5CASDL. 0100-00	5CASDL. 0150-00	5CASDL. 0200-00	5CASDL. 0250-00	5CASDL. 0300-00
General information									
Certifications									
CE	Yes								
UKCA	Yes								
UL	cULus E115267 Industrial control equipment								
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾								
DNV	Temperature: B (0 - 55°C) Humidity: B (up to 100%) Vibration: A (0.7 g) EMC: B (bridge and open deck) ²⁾								-
LR	ENV3								-
KR	Yes								-
ABS	Yes								-
BV	EC31B Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck								-
Cable construction									
Wire cross section	28 AWG				24 AWG				
Shield	Individual cable pairs, entire cable								
Cable shield	Tinned copper braiding, optical coverage > 85%								
Outer jacket									
Material	PVC								
Color	Black								
Labeling	E74020-C (UL) AWM STYLE 20176 80°C 30 V VW-1 DVI DIGITAL LINK								
Connector									
Type	2x DVI-D (24+1), male								
Mating cycles	100								
Contacts	Gold-plated								
Mechanical protection	Metal cover with crimped strain relief								
Locating screw tightening torque	Max. 0.5 Nm								
Electrical properties									
Operating voltage	≤30 V								

Technical data

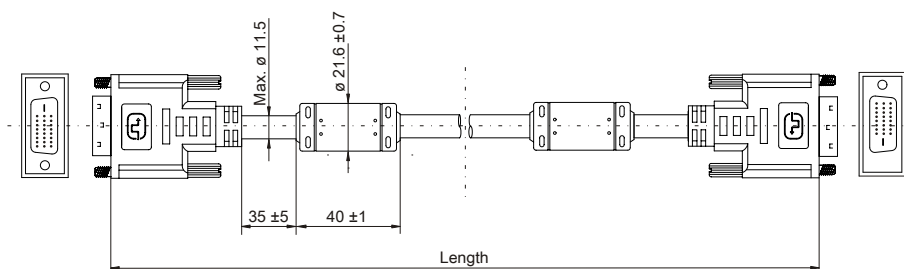
Order number	5CASDL. 0008-00	5CASDL. 0018-00	5CASDL. 0050-00	5CASDL. 0060-00	5CASDL. 0100-00	5CASDL. 0150-00	5CASDL. 0200-00	5CASDL. 0250-00	5CASDL. 0300-00
Conductor resistance									
24 AWG	-				≤93 Ω/km				
28 AWG	≤237 Ω/km				-				
Insulation resistance	Min. 10 MΩ/km								
Operating conditions									
Pollution degree per EN 61131-2	Pollution degree 2								
Ambient conditions									
Temperature									
Operation	0 to 80°C								
Mechanical properties									
Dimensions									
Length	0.8 m ±25 mm	1.8 m ±30 mm	5 m ±30 mm	6 m ±30 mm	10 m ±50 mm	15 m ±100 mm	20 m ±100 mm	25 m ±100 mm	30 m ±100 mm
Diameter	Typ. 8.6 ±0.2 mm Max. 9 mm				Typ. 11 ±0.2 mm Max. 11.5 mm				
Bend radius	≥5x cable diameter (connector to ferrite bead and ferrite bead to ferrite bead)								
Flexibility	Conditionally flexible, applies from ferrite bead to ferrite bead (tested 100 cycles at 5x cable diameter, 20 cycles/minute)								
Weight	Approx. 206 g	Approx. 300 g	Approx. 580 g	Approx. 700 g	Approx. 1500 g	Approx. 2250 g	Approx. 2880 g	Approx. 4800 g	Approx. 5520 g

- 1) Yes, but applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
- 2) Yes, but applies only if all components installed in the complete system have this certification and are listed on the associated DNV certificate for the product family.

3.2.1.4 Bend radius specification



3.2.1.5 Dimensions

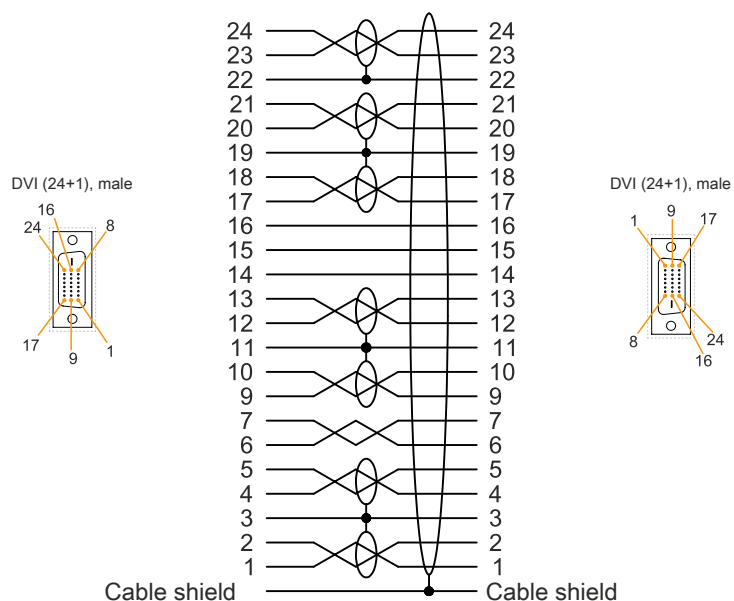


3.2.1.6 Cable pinout

Field-assembled cables must be created according to the following assignment.

Information:

Functionality is only guaranteed for the cables available from B&R.



Pin	Pinout	Pin	Pinout
1	TMDS data 2 negative	13	XUSB0 positive
2	TMDS data 2 positive	14	+5 V
3	TMDS data 2 and SDL shield	15	GND
4	SDL negative	16	Hot plug detection
5	SDL positive	17	TMDS data 0 negative
6	DDC data	18	TMDS data 0 positive
7	DDC clock	19	TMDS data 0 and XUSB1 shield
8	Not connected	20	XUSB1 negative
9	TMDS data 1 negative	21	XUSB1 positive
10	TMDS data 1 positive	22	TMDS data shield
11	TMDS data 1 and XUSB0 shield	23	TMDS clock positive
12	XUSB0 negative	24	TMDS clock negative

3.3 SDL cables with 45° connector

3.3.1 5CASDL.0xxx-01

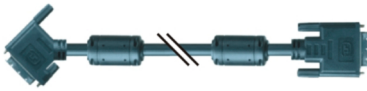
3.3.1.1 General information

5CASDL.0xxx-01 SDL cables with 45° connector are designed for use in fixed installations.

Caution!

The cable is only permitted to be connected/disconnected in a voltage-free state.

3.3.1.2 Order data

Order number	Short description	Figure
	SDL cables with 45° connector	
5CASDL.0018-01	SDL cable - 45-degree connector - 1.8 m	
5CASDL.0050-01	SDL cable - 45-degree connector - 5 m	
5CASDL.0100-01	SDL cable - 45-degree connector - 10 m	
5CASDL.0150-01	SDL cable - 45-degree connector - 15 m	

3.3.1.3 Technical data

Information:

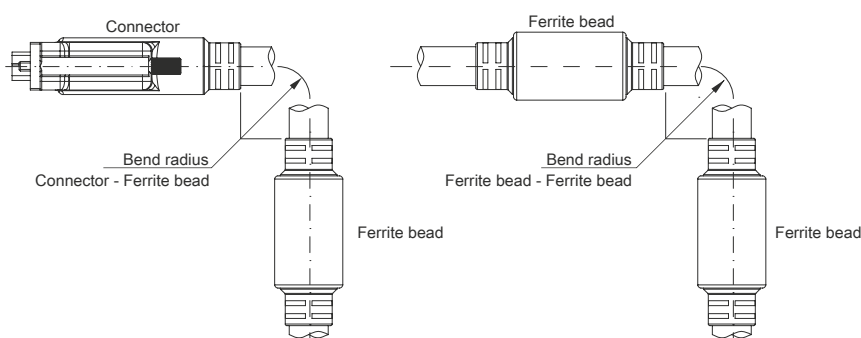
The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.

Order number	5CASDL.0018-01	5CASDL.0050-01	5CASDL.0100-01	5CASDL.0150-01
General information				
Certifications				
CE	Yes			
UKCA	Yes			
UL	cULus E115267 Industrial control equipment			
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾			
DNV	Temperature: B (0 - 55°C) Humidity: B (up to 100%) Vibration: A (0.7 g) EMC: B (bridge and open deck) ²⁾			
LR	ENV3			
KR	Yes			
ABS	Yes			
BV	EC31B Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck			
Cable construction				
Wire cross section	28 AWG		24 AWG	
Shield	Individual cable pairs, entire cable			
Cable shield	Tinned copper braiding, optical coverage > 85%			
Outer jacket				
Material	PVC			
Color	Black			
Connector				
Type	2x DVI-D (24+1), male			
Mating cycles	100			
Contacts	Gold-plated			
Mechanical protection	Metal cover with crimped strain relief			
Locating screw tightening torque	Max. 0.5 Nm			
Electrical properties				
Operating voltage	≤30 V			
Conductor resistance				
24 AWG	-		≤93 Ω/km	
28 AWG	≤237 Ω/km		-	
Insulation resistance	Min. 10 MΩ/km			
Operating conditions				
Pollution degree per EN 61131-2	Pollution degree 2			

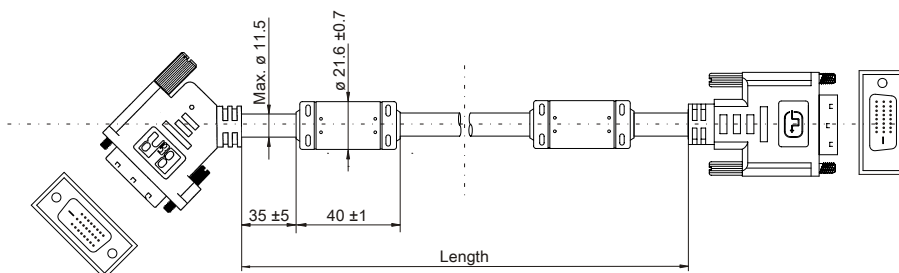
Order number	5CASDL.0018-01		5CASDL.0050-01	5CASDL.0100-01	5CASDL.0150-01
Ambient conditions					
Temperature	0 to 80°C				
Operation					
Mechanical properties					
Dimensions					
Length					
Diameter	Max. 9 mm			Max. 11.5 mm	
Bend radius					
Fixed installation					
Flexibility	Conditionally flexible, applies from ferrite bead to ferrite bead (tested 100 cycles at 5x cable diameter, 20 cycles/minute)				
Weight	Approx. 300 g	Approx. 590 g	Approx. 2800 g	Approx. 2860 g	

- 1) Yes, but applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
- 2) Yes, but applies only if all components installed in the complete system have this certification and are listed on the associated DNV certificate for the product family.

3.3.1.4 Bend radius specification



3.3.1.5 Dimensions

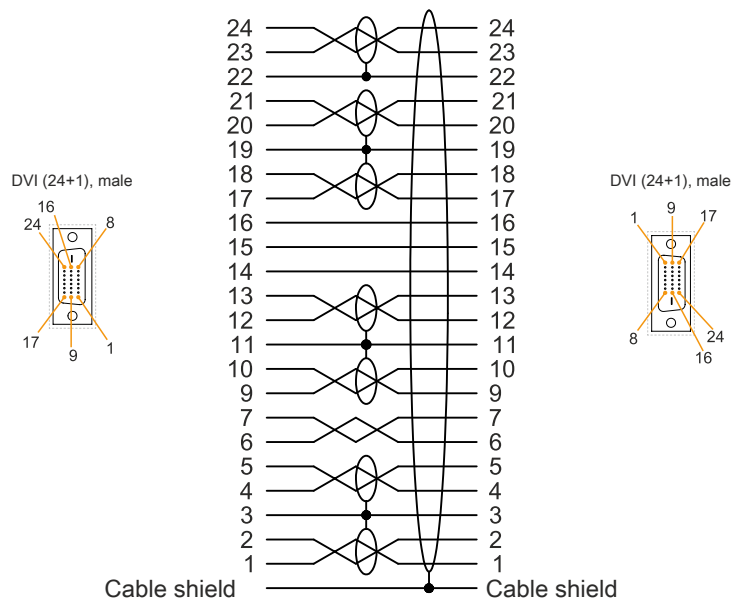


3.3.1.6 Cable pinout

Field-assembled cables must be created according to the following assignment.

Information:

Functionality is only guaranteed for the cables available from B&R.



Pin	Pinout	Pin	Pinout
1	TMD5 data 2 negative	13	XUSB0 positive
2	TMD5 data 2 positive	14	+5 V
3	TMD5 data 2 and SDL shield	15	GND
4	SDL negative	16	Hot plug detection
5	SDL positive	17	TMD5 data 0 negative
6	DDC data	18	TMD5 data 0 positive
7	DDC clock	19	TMD5 data 0 and XUSB1 shield
8	Not connected	20	XUSB1 negative
9	TMD5 data 1 negative	21	XUSB1 positive
10	TMD5 data 1 positive	22	TMD5 data shield
11	TMD5 data 1 and XUSB0 shield	23	TMD5 clock positive
12	XUSB0 negative	24	TMD5 clock negative

3.4 SDL flex cables

3.4.1 5CASDL.0xxx-03

3.4.1.1 General information

5CASDL.0xxx-03 SDL flex cables are designed for use in fixed as well as flexible installations (e.g. swing arm systems).

Caution!

The cable is only permitted to be connected/disconnected in a voltage-free state.

3.4.1.2 Order data

Order number	Short description	Figure
	SDL flex cables	
5CASDL.0018-03	SDL flex cable - 1.8 m	
5CASDL.0050-03	SDL flex cable - 5 m	
5CASDL.0100-03	SDL flex cable - 10 m	
5CASDL.0150-03	SDL flex cable - 15 m	
5CASDL.0200-03	SDL flex cable - 20 m	
5CASDL.0250-03	SDL flex cable - 25 m	
5CASDL.0300-03	SDL flex cable - 30 m	

3.4.1.3 Technical data

Information:

The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.

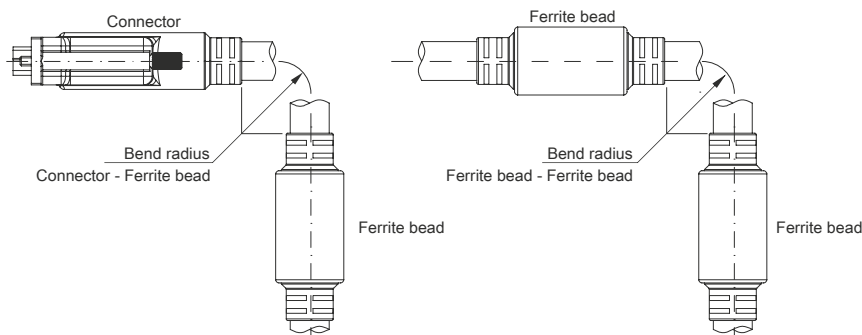
Order number	5CASDL. 0018-03	5CASDL. 0050-03	5CASDL. 0100-03	5CASDL. 0150-03	5CASDL. 0200-03	5CASDL. 0250-03	5CASDL. 0300-03
General information							
Certifications							
CE	Yes						
UKCA	Yes						
UL	cULus E115267 Industrial control equipment						
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾						
DNV	Temperature: B (0 - 55°C) Humidity: B (up to 100%) Vibration: A (0.7 g) EMC: B (bridge and open deck) ²⁾						-
LR	ENV3						-
KR	Yes						
ABS	Yes						-
BV	EC31B Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck						-
Cable construction							
Wire cross section	24 AWG (control wires) 26 AWG (DVI, USB, data)						
Properties	Halogen- and silicone-free						
Shield	Individual cable pairs, entire cable						
Cable shield	Aluminum-clad foil and tinned copper braiding						
Outer jacket							
Material	Special semi-matte TPU						
Color	Black						
Labeling	(B&R) SDL Cable (UL) AWM 20236 80°C 30V E 63216						
Connector							
Type	2x DVI-D (24+1), male						
Mating cycles	Min. 200						
Contacts	Gold-plated						
Mechanical protection	Metal cover with crimped strain relief						
Locating screw tightening torque	Max. 0.5 Nm						
Electrical properties							
Operating voltage	≤30 V						

Technical data

Order number	5CASDL. 0018-03	5CASDL. 0050-03	5CASDL. 0100-03	5CASDL. 0150-03	5CASDL. 0200-03	5CASDL. 0250-03	5CASDL. 0300-03
Test voltage							
Wire - Wire	1 kV						
Wire - Shield	0.5 kV						
Wave impedance	100 ±10 Ω						
Conductor resistance							
24 AWG	≤95 Ω/km						
26 AWG	≤145 Ω/km						
Insulation resistance	>200 MΩ/km						
Operating conditions							
Pollution degree per EN 61131-2	Pollution degree 2						
Approbation	UL AWM 20236 80°C 30 V						
Flame-retardant	Per UL 758 (cable vertical flame test)						
Oil and hydrolysis resistance	Per VDE 0282-10						
Ambient conditions							
Temperature							
Storage	-20 to 80°C						
Fixed installation	-20 to 80°C						
Flexible installation	-5 to 60°C						
Mechanical properties							
Dimensions							
Length	1.8 m ±20 mm	5 m ±45 mm	10 m ±90 mm	15 m ±135 mm	20 m ±180 mm	25 m ±225 mm	30 m ±270 mm
Diameter	Max. 12 mm						
Bend radius							
Fixed installation	≥3.5x cable diameter						
Flexible installation	≥15x cable diameter (from ferrite bead to ferrite bead)						
Flexibility	Flexible, applies from ferrite bead to ferrite bead (tested 300,000 cycles at 15x cable diameter, 4800 cycles/hour)						
Drag chain data							
Flex cycles	300,000						
Velocity	4800 cycles/hour						
Bend radius	180 mm, 15x cable diameter						
Hub	460 mm						
Weight	Approx. 460 g	Approx. 1020 g	Approx. 1940 g	Approx. 2840 g	Approx. 3740 g	Approx. 4560 g	Approx. 5590 g
Tension							
In operation	≤50 N						
During installation	≤400 N						

- 1) Yes, but applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
- 2) Yes, but applies only if all components installed in the complete system have this certification and are listed on the associated DNV certificate for the product family.

3.4.1.4 Bend radius specification



3.4.1.5 Dimensions

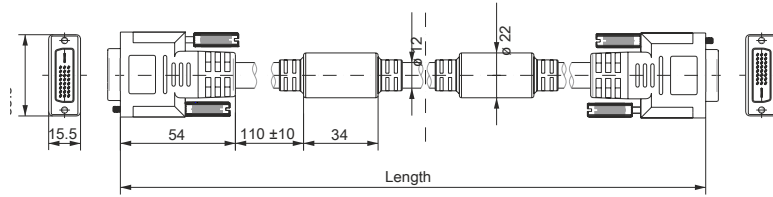


Figure 1: 5CASDL.0xxx-03 ≥ Rev. E0 - Dimensions

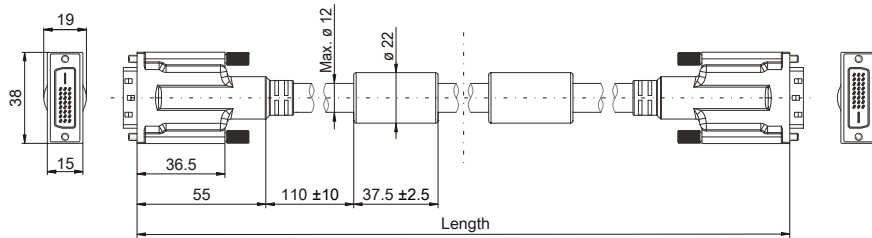


Figure 2: 5CASDL.0xxx-03 ≤ Rev. D0 - Dimensions

3.4.1.6 Structure 5CASDL.0xxx-03

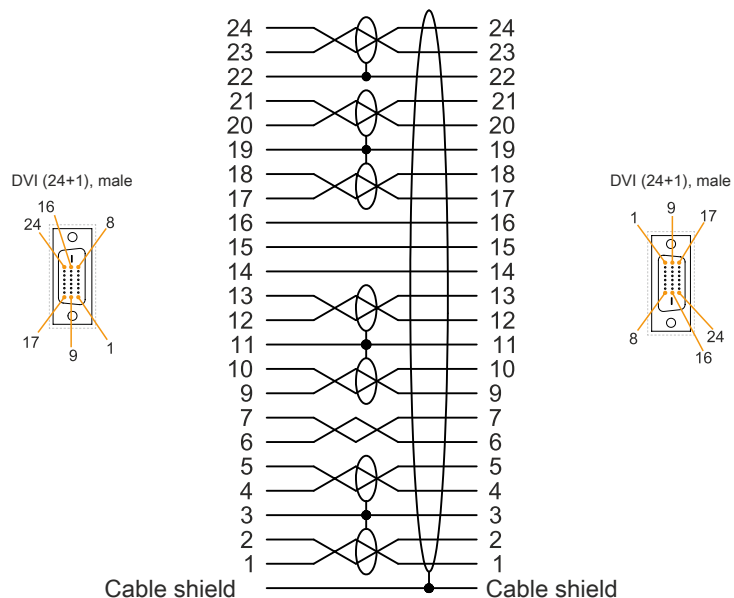
Element	Pinout	Cross section	
DVI	TMDS data 0	26 AWG	
	TMDS data 1	26 AWG	
	TMDS data 2	26 AWG	
	TMDS clock	26 AWG	
USB	XUSB0	26 AWG	
	XUSB1	26 AWG	
Data	SDL	26 AWG	
Control wires	DDC clock	24 AWG	
	DDC data	24 AWG	
	+5 V	24 AWG	
	Ground	24 AWG	
	Hot plug detection	24 AWG	

3.4.1.7 Cable pinout

Field-assembled cables must be created according to the following assignment.

Information:

Functionality is only guaranteed for the cables available from B&R.



Pin	Pinout	Pin	Pinout
1	TMDs data 2 negative	13	XUSB0 positive
2	TMDs data 2 positive	14	+5 V
3	TMDs data 2 and SDL shield	15	GND
4	SDL negative	16	Hot plug detection
5	SDL positive	17	TMDs data 0 negative
6	DDC data	18	TMDs data 0 positive
7	DDC clock	19	TMDs data 0 and XUSB1 shield
8	Not connected	20	XUSB1 negative
9	TMDs data 1 negative	21	XUSB1 positive
10	TMDs data 1 positive	22	TMDs data shield
11	TMDs data 1 and XUSB0 shield	23	TMDs clock positive
12	XUSB0 negative	24	TMDs clock negative

3.5 SDL flex cables with extender

3.5.1 5CASDL.0xx0-13

3.5.1.1 General information

5CASDL.0xx0-13 SDL flex cables with extender are designed for use in fixed as well as flexible installations (e.g. swing arm systems).

Caution!

The cable is only permitted to be connected/disconnected in a voltage-free state.

3.5.1.2 Order data

Order number	Short description	Figure
	SDL flex cables	
5CASDL.0300-13	SDL flex cable with extender - 30 m	
5CASDL.0400-13	SDL flex cable with extender - 40 m	
5CASDL.0430-13	SDL flex cable with extender - 43 m	

3.5.1.3 Technical data

Information:

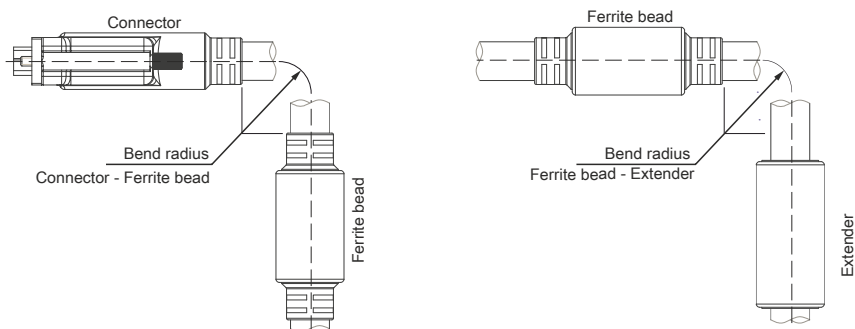
The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.

Order number	5CASDL.0300-13	5CASDL.0400-13	5CASDL.0430-13
General information			
Certifications			
CE		Yes	
UKCA		Yes	
UL		cULus E115267	
		Industrial control equipment	
HazLoc		cULus HazLoc E180196	
		Industrial control equipment	
		for hazardous locations	
		Class I, Division 2, Groups ABCD, T4 ¹⁾	
Cable construction			
Wire cross section		24 AWG (control wires)	
		26 AWG (DVI, USB, data)	
Properties		Halogen- and silicone-free	
Shield		Individual cable pairs, entire cable	
Cable shield		Aluminum-clad foil and tinned copper braiding	
Outer jacket			
Material		Special semi-matte TMPU	
Color		Black	
Labeling		(B&R) SDL Cable (UL) AWM 20236 80°C 30V E63216	
Connector			
Type		2x DVI-D (24+1), male	
Mating cycles		Min. 200	
Contacts		Gold-plated	
Mechanical protection		Metal cover with crimped strain relief	
Locating screw tightening torque		Max. 0.5 Nm	
Electrical properties			
Operating voltage		≤30 V	
Test voltage			
Wire - Wire		1 kV	
Wire - Shield		0.5 kV	
Wave impedance		100 ±10 Ω	
Conductor resistance			
24 AWG		≤95 Ω/km	
26 AWG		≤145 Ω/km	
Insulation resistance		>200 MΩ/km	
Operating conditions			
Pollution degree per EN 61131-2		Pollution degree 2	
Approbation		UL AWM 20236 80°C 30 V	
Flame-retardant		Per UL 758 (cable vertical flame test)	
Oil and hydrolysis resistance		Per VDE 0282-10	

Order number	5CASDL.0300-13	5CASDL.0400-13	5CASDL.0430-13
Ambient conditions			
Temperature			
Storage		-20 to 60°C	
Fixed installation		-20 to 60°C	
Flexible installation		-5 to 60°C	
Mechanical properties			
Dimensions			
Length	30 m ±280 mm	40 m ±380 mm	43 m ±410 mm
Diameter		Max. 12 mm	
Extender box			
Width		35 mm	
Length		125 mm	
Height		18.5 mm	
Bend radius			
Fixed installation		≥6x cable diameter (from connector to ferrite bead) ≥10x cable diameter (from ferrite bead to ferrite bead)	
Flexible installation		≥15x cable diameter (from ferrite bead to ferrite bead)	
Flexibility		Flexible, applies from ferrite bead to ferrite bead (tested 300,000 cycles at 15x cable diameter, 4800 cycles/hour)	
Drag chain data			
Flex cycles		300,000	
Velocity		4800 cycles/hour	
Bend radius		180 mm, 15x cable diameter	
Hub		460 mm	
Weight	Approx. 5430 g	Approx. 7200 g	Approx. 7790 g
Tension			
In operation		≤50 N	
During installation		≤400 N	

1) Yes, but applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.

3.5.1.4 Bend radius specification



3.5.1.5 Dimensions

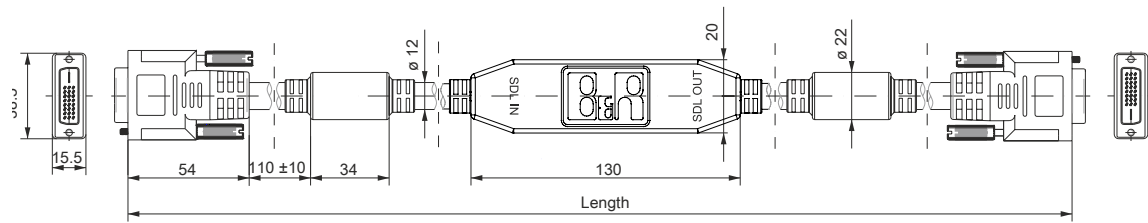


Figure 3: 5CASDL.xxxx-13 ≥ Rev. E0 - Dimensions

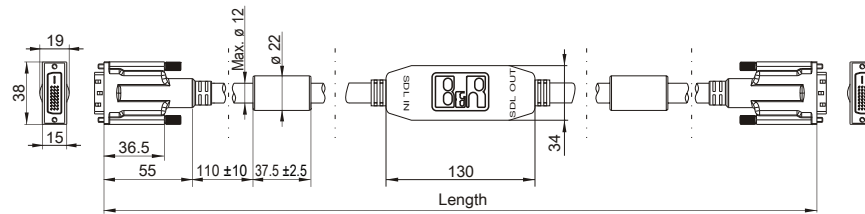


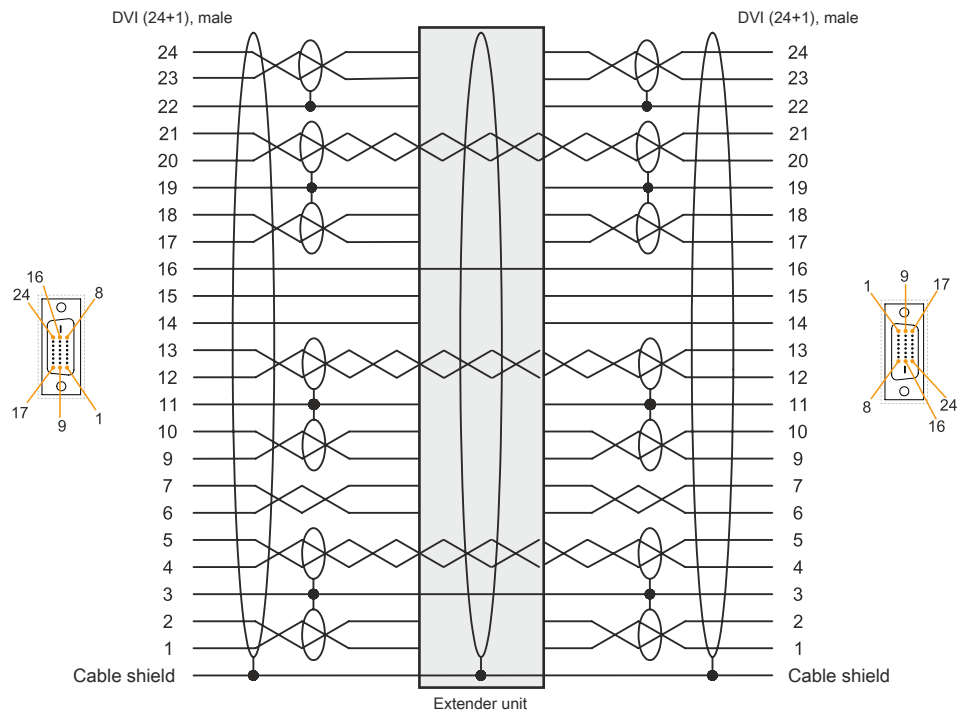
Figure 4: 5CASDL.0xx0-13 ≤ Rev. D0 - Dimensions

3.5.1.6 Cable pinout

If you wish to assemble a suitable cable yourself, the cable must be wired according to this pinout.

Information:

Functionality is only guaranteed for the cables available from B&R.



Pin	Pinout	Pin	Pinout
1	TMDS data 2 negative	13	XUSB0 positive
2	TMDS data 2 positive	14	+5 V
3	TMDS data 2 and SDL shield	15	GND
4	SDL negative	16	Hot plug detection
5	SDL positive	17	TMDS data 0 negative
6	DDC data	18	TMDS data 0 positive
7	DDC clock	19	TMDS data 0 and XUSB1 shield
8	Not connected	20	XUSB1 negative
9	TMDS data 1 negative	21	XUSB1 positive
10	TMDS data 1 positive	22	TMDS data shield
11	TMDS data 1 and XUSB0 shield	23	TMDS clock positive
12	XUSB0 negative	24	TMDS clock negative

3.5.1.7 Cable connection

The SDL flex cable with extender must be connected in the correct direction between the B&R industrial PC and Automation Panel. For this purpose, the signal direction is indicated on the extender unit.

- **SDL IN:** Connected to the source of the video signal (e.g. APC910).
- **SDL OUT:** Connected to the output device (e.g. AP1000).

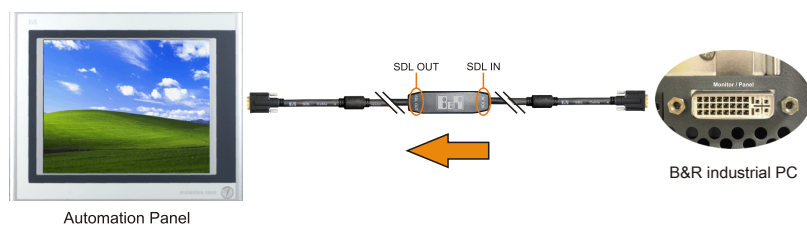


Figure 5: Example for the signal direction of the SDL flex cable with extender

3.6 SDL3/SDL4 cables

3.6.1 5CASD3.xxxx-00

3.6.1.1 General information

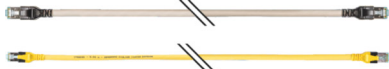
5CASD3.xxxx-00 SDL3/SDL4 cables are designed to transfer SDL3/SDL4 data and enable easy cable installation. Due to the RJ45 connector, the cable is also suitable for narrow feed-throughs, e.g. in swing arm shafts.

Caution!

The cable is only permitted to be connected/disconnected in a voltage-free state.

3.6.1.2 Order data

Revision ≥D0

Order number	Short description	Figure
	SDL3/SDL4/PoE cables	
5CASD3.0010-00	SDL3/SDL4/FT50 cable - 1 m - FT50 including Power over Ethernet	
5CASD3.0030-00	SDL3/SDL4/FT50 cable - 3 m - FT50 including Power over Ethernet	
5CASD3.0050-00	SDL3/SDL4/FT50 cable - 5 m - FT50 including Power over Ethernet	
5CASD3.0070-00	SDL3/SDL4/FT50 cable - 7 m - FT50 including Power over Ethernet	
5CASD3.0100-00	SDL3/SDL4/FT50 cable - 10 m - FT50 including Power over Ethernet	
5CASD3.0150-00	SDL3/SDL4/FT50 cable - 15 m - FT50 including Power over Ethernet	
5CASD3.0200-00	SDL3/SDL4/FT50 cable - 20 m - FT50 including Power over Ethernet	
	SDL3/SDL4/PoE cables	
5CASD3.0300-00	SDL3/SDL4/FT50 cable - 30 m - FT50 including Power over Ethernet	
5CASD3.0500-00	SDL3/SDL4/FT50 cable - 50 m - FT50 including Power over Ethernet	
5CASD3.1000-00	SDL3/SDL4/FT50 cable - 100 m - FT50 including Power over Ethernet	

Revision ≤C0

Order number	Short description	Figure
	SDL3/SDL4/PoE cables	
5CASD3.0030-00	SDL3/SDL4/FT50 cable - 3 m - FT50 including Power over Ethernet	
5CASD3.0050-00	SDL3/SDL4/FT50 cable - 5 m - FT50 including Power over Ethernet	
5CASD3.0100-00	SDL3/SDL4/FT50 cable - 10 m - FT50 including Power over Ethernet	
5CASD3.0150-00	SDL3/SDL4/FT50 cable - 15 m - FT50 including Power over Ethernet	
5CASD3.0200-00	SDL3/SDL4/FT50 cable - 20 m - FT50 including Power over Ethernet	
5CASD3.0300-00	SDL3/SDL4/FT50 cable - 30 m - FT50 including Power over Ethernet	
5CASD3.0500-00	SDL3/SDL4/FT50 cable - 50 m - FT50 including Power over Ethernet	
5CASD3.1000-00	SDL3/SDL4/FT50 cable - 100 m - FT50 including Power over Ethernet	

3.6.1.3 Technical data

Information:

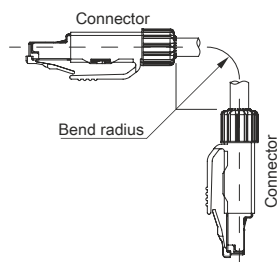
The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.

Technical data

Order number	5CASD3. 0010-00	5CASD3. 0030-00	5CASD3. 0050-00	5CASD3. 0070-00	5CASD3. 0100-00	5CASD3. 0150-00	5CASD3. 0200-00	5CASD3. 0300-00	5CASD3. 0500-00	5CASD3. 1000-00
General information										
Certifications										
CE	Yes									
UKCA	Yes									
UL	cULus E115267 Industrial control equipment									
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾									
EAC	-	Yes		-	Yes					
Cable construction										
Wire cross section	4x 2x 26/7 AWG							4x 2x 23/1 AWG		
Properties	Flame-retardant, halogen-free, lead-free									
Outer jacket										
Material	Polyurethane (PUR)									
Color	Gray or yellow ²⁾	Rev. D0 and later: Gray or yellow Up to Rev. C0: Yellow, RAL 1021 ²⁾		Gray or yellow ²⁾	Rev. D0 and later: Gray or yellow Up to Rev. C0: Yellow, RAL 1021 ²⁾					
Labeling	HARTING INDUSTRIAL CABLE S/FTP CAT 6A PUR 4x2xAWG26/7							HARTING INDUSTRIAL INSTALLATION CABLE S/FTP CAT 7 PUR 4x2xAWG23/1		
Wires										
Wire insulation	Polyethylene (PE)									
Wire colors	Green/White-green, orange/white-orange, blue/white-blue, brown/white-brown									
Shield	Aluminum foil and braided wire shield composed of tinned copper wires									
Type	Bare copper strand, 4x 2x 26/7 AWG							Bare copper strand, 4x 2x 23/1 AWG		
Connector										
Type	2x RJ45, male									
Mating cycles	Min. 750									
Contacts	8									
Electrical properties ³⁾										
Operating voltage	≤100 V							≤125 V		
Conductor resistance	≤290 Ω/km							≤75 Ω/km		
Wave impedance	100 ±5 Ω (at 100 MHz)									
Transfer properties	Category 6A / Class EA up to 500 MHz per ISO/IEC 11801 (EN 50173-1), ISO/IEC 24702 (EN 50173-3)							Category 7 / Class F up to 600 MHz per ISO/IEC 11801 (EN 50173-1), ISO/IEC 24702 (EN 50173-3)		
Insulation resistance	≥500 MΩ/km							≥5 GΩ/km		
Operating conditions										
Pollution degree per EN 61131-2	Pollution degree 2									
Flame-retardant	IEC 60332-1-2									
Oil and hydrolysis resistance	EN 60811-2-1 (90°C / 7x24 h)									
Degree of protection per EN 60529										
Cables	IP20									
RJ45 connector	IP20, only when properly connected									
Ambient conditions										
Temperature										
Storage	-40 to 80°C							-40 to 70°C		
Fixed installation	-40 to 80°C							-40 to 70°C		
Flexible installation	-40 to 80°C							-10 to 50°C		
Mechanical properties										
Dimensions										
Length	1 m	3 m	5 m	7 m	10 m	15 m	20 m	30 m	50 m	100 m
Diameter	6.7 mm							8.3 mm		
Bend radius										
Fixed installation	≥5x diameter							≥4x diameter		
Flexible installation	≥10x diameter							≥8x diameter		
Weight	59 g	162 g	300 g	350 g	500 g	700 g	950 g	2150 g	3500 g	6950 g
Tension										
In operation	≤70 N							≤110 N		
During installation	≤70 N							≤110 N		

- 1) Yes, but applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
- 2) B&R reserves the right to deliver technically equivalent products in a different color design.
- 3) At 20°C ambient temperature.

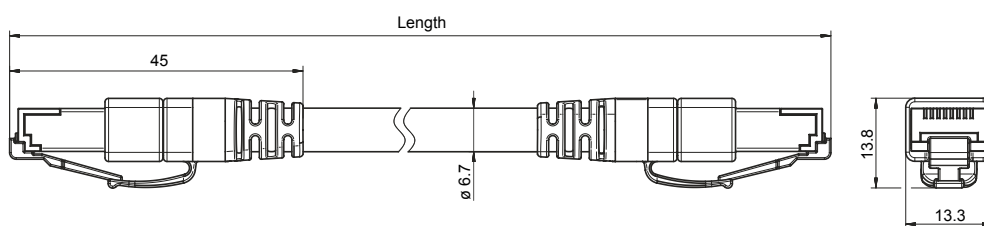
3.6.1.4 Bend radius specification



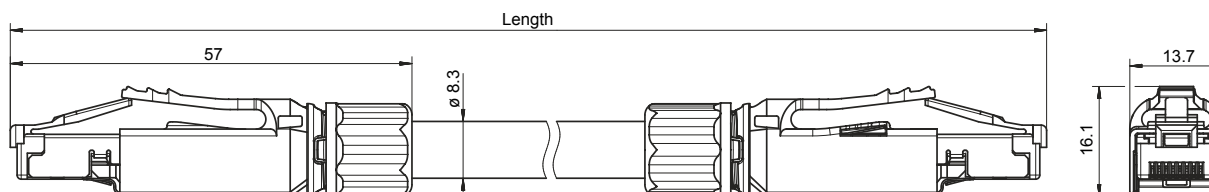
3.6.1.5 Dimensions

Rev. ≥D0

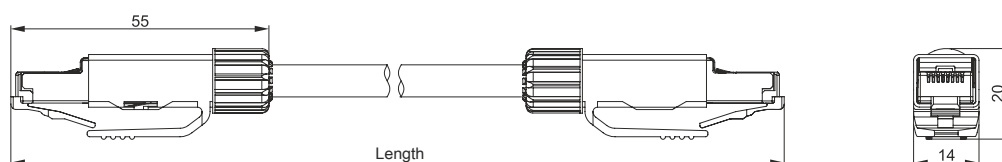
Dimensions for 1 to 20 m cables:



Dimensions for 30 to 100 m cables:



Rev. ≤C0



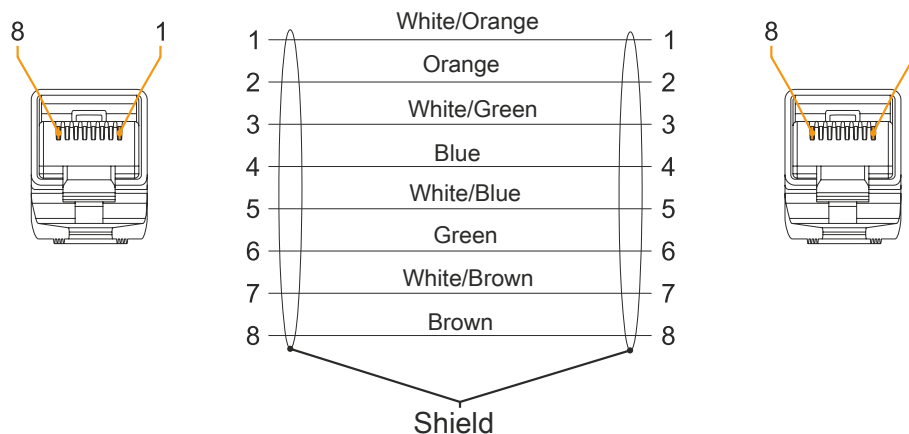
3.6.1.6 Cable pinout

If you wish to assemble a suitable cable yourself, the cable must be wired according to this pinout.

Information:

Functionality is only guaranteed for the cables available from B&R.

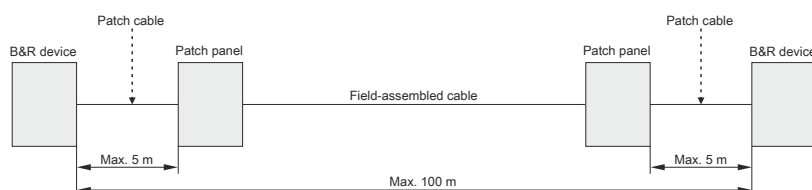
Pinout per TIA/EIA 568B



3.6.1.7 Wiring

The following information and figure apply if a field-assembled cable is used and connected to an RJ45 network connector (e.g. patch panel) instead of directly to a B&R device.

The wiring must comply with category 6A (Cat 6A) or 7 (Cat 7) requirements. The maximum total length of 100 m is not permitted to be exceeded.



3.7 USB cable

3.7.1 5CAUSB.00xx-00

3.7.1.1 General information

USB cables are designed for USB 2.0 transfer rates.

3.7.1.2 Order data

Order number	Short description	Figure
	USB cables	
5CAUSB.0018-00	USB 2.0 connection cable - Type A - type B connector - 1.8 m	
5CAUSB.0050-00	USB 2.0 connection cable - Type A - type B connector - 5 m	

3.7.1.3 Technical data

Information:

The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.

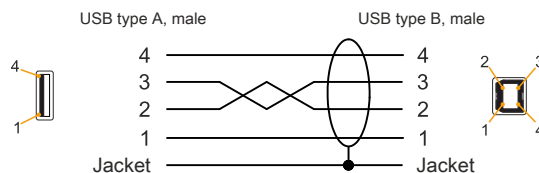
Order number	5CAUSB.0018-00	5CAUSB.0050-00
General information		
Certifications		
CE		Yes
UKCA		Yes
UL		cULus E115267 Industrial control equipment
KR		Yes
Cable construction		
Wire cross section		24, 28 AWG
Shield		Entire cable
Outer jacket		
Color		Beige
Connector		
Type		USB type A male and USB type B male
Operating conditions		
Pollution degree per EN 61131-2		Pollution degree 2
Mechanical properties		
Dimensions		
Length	1.8 m ±30 mm	5 m ±50 mm
Diameter		Max. 5 mm
Bend radius		Min. 100 mm

3.7.1.4 Cable pinout

If you wish to assemble a suitable cable yourself, the cable must be wired according to this pinout.

Information:

Functionality is only guaranteed for the cables available from B&R.



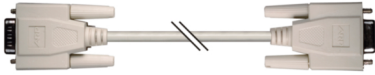
3.8 RS232 cable

3.8.1 9A0014.xx

3.8.1.1 General information

RS232 cables serve as extension cables between two RS232 interfaces.

3.8.1.2 Order data

Order number	Short description	Figure
	RS232 cables	
9A0014.02	RS232 extension cable for operating a remote panel with touch screen, 1.8 m.	
9A0014.05	RS232 extension cable for operating a remote panel with touch screen, 5 m.	
9A0014.10	RS232 extension cable for operating a remote panel with touch screen, 10 m.	

3.8.1.3 Technical data

Information:

The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.

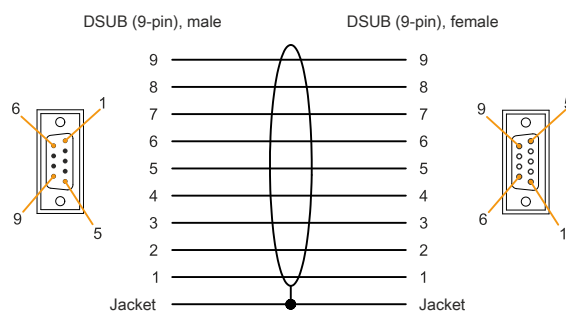
Order number	9A0014.02	9A0014.05	9A0014.10
General information			
Certifications			
CE		Yes	
Cable construction			
Wire cross section		26 AWG	
Shield		Entire cable	
Outer jacket			
Color		Beige	
Connector			
Type		9-pin DSUB connector, male/female	
Locating screw tightening torque		Max. 0.5 Nm	
Operating conditions			
Pollution degree per EN 61131-2		Pollution degree 2	
Mechanical properties			
Dimensions			
Length	1.8 m ±50 mm	5 m ±80 mm	10 m ±100 mm
Diameter		Max. 5 mm	
Bend radius		Min. 70 mm	

3.8.1.4 Cable pinout

If you wish to assemble a suitable cable yourself, the cable must be wired according to this pinout.

Information:

Functionality is only guaranteed for the cables available from B&R.



4 Installation

Danger!

- The entire power supply must be disconnected and electrostatic discharge must take place on the housing or ground connection before removing any covers or components from the device and installing or removing any accessories, hardware or cables.
- Remove the power cable from the device and from the power supply.
- All covers and components, accessories, hardware and cables must be installed or secured before the device is connected to the power supply and switched on.

4.1 Basic information

A damaged device has unpredictable properties and states. The unintentional installation or startup of a damaged device must be prevented. The damaged device must be marked as such and made inaccessible, or it must be returned for repairs immediately.

Unpacking

The following activities must be performed before unpacking the device:

- Check the packaging for visible transport damage.
- If transport damage is noticeable, document this immediately and submit a complaint. If possible, have the damage confirmed by the carrier/delivery service.
- Check the contents of the shipment for completeness and damage.
- If the contents of the packaging are incomplete, damaged or do not correspond to the order, the responsible sales office or B&R Headquarters must be informed immediately.
- The information in section "[Protection against electrostatic discharge](#)" on [page 8](#) must be observed for unpacked devices and components.
- Keep the original packaging for further transport.

Power supply

The following information is generally applicable and should be observed before performing any work on the device:

- The entire power supply must be disconnected before removing any covers or components from the device and installing or removing any accessories, hardware or cables.
- Remove the power cable from the device and from the power supply.
- All covers and components, accessories, hardware and cables must be installed or secured before the device is connected to the power supply and switched on.

Caution!

Energy regeneration is not permitted and can cause damage or the device to become defective. Built-in or connected peripheral devices (e.g. USB hubs) are not permitted to introduce any voltage into the device.

Installation

Before installation

The following activities and limitations must be observed before installing the device.

- Allow sufficient space for installation, operation and maintenance of the device.
- The device must be installed on a flat, clean and burr-free surface.
- The wall or control cabinet panel must be able to support four times the total weight of the device. If necessary, bracing must be attached to reinforce the mounting surface.

Caution!

If the load-bearing capacity of the mounting surface is insufficient, or if the fastening material is inadequate or incorrect, the device may fall and become damaged.

- To avoid overheating, the device is not permitted to be placed near other heat sources.

Information about the device's environment

- Observe the notes and regulations regarding the power supply and functional ground.
- Observe the specified bend radius when connecting cables.
- Ventilation openings are not permitted to be covered or blocked.
- The device is only permitted to be operated in closed rooms and not permitted to be exposed to direct sunlight.
- The climatic ambient conditions and environmental conditions must be taken into account – see "Environmental properties" of the device used.

General installation instructions

- When installing the device, the permissible mounting orientations must be observed - see "Mounting orientations" of the device used.
- When connecting installed or connected peripherals, follow the instructions in the peripheral device's documentation.

Transport and storage

Condensation may form under certain environmental conditions or rapid climatic changes. For improved acclimatization and to avoid damage, the device must be slowly adapted to the room temperature.

When transporting at low temperatures or in the event of large temperature fluctuations, the collection of moisture in or on the device is not permitted. Moisture can cause short circuits in electrical circuits and damage the device.

If a device is transported or stored without packaging, all environmental influences such as shocks, vibrations, pressure and moisture have an unprotected effect on the device. Damaged packaging indicates that the device has been severely affected by environmental influences and may have been damaged.

This can result in malfunctions of the device, machine or system.

Use of third-party products

If third-party devices or components are used, the relevant manufacturer's documentation must be observed. If limitations or interactions by or with third-party products are possible, this must be taken into account in the application.

4.2 Connecting to the power grid

Danger!

- The entire power supply must be disconnected and electrostatic discharge must take place on the housing or ground connection before removing any covers or components from the device and installing or removing any accessories, hardware or cables.
- Remove the power cable from the device and from the power supply.
- All covers and components, accessories, hardware and cables must be installed or secured before the device is connected to the power supply and switched on.

4.2.1 Installing the DC power cable

Danger!

The entire power supply to the B&R industrial PC or B&R Automation Panel must be interrupted. Before connecting the DC power cable, it must be checked whether it has been disconnected from the voltage source (e.g. power supply unit).

4.2.1.1 Wiring

Caution!

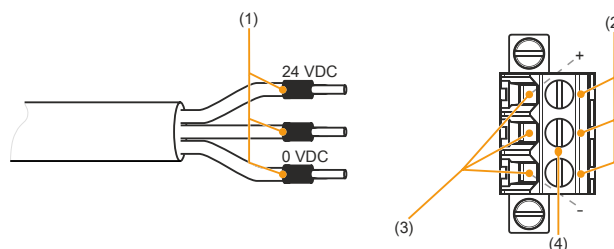
The pinout of the power supply interface must be observed!

The DC power cable must be implemented with a wire cross section of 0.75 mm² to 1.5 mm² and wire end sleeves.

Conductors of the power cable	Terminal connection symbol
+24 VDC	+
GND	
0 VDC	-

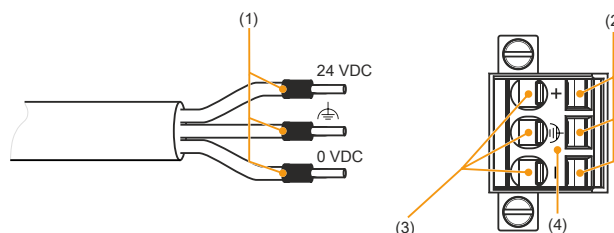
Installing screw clamp terminal block 0TB103.9

Secure the conductors with wire end sleeves ① in the terminal contacts ③ as shown in the figure below and tighten the screw clamp terminals ④ with a screwdriver (max. tightening torque 0.4 Nm). It is important to pay attention to the label on the screw clamp terminal ②.



Installing cage clamp terminal block 0TB103.91

Insert a screwdriver into the cage clamp terminals ② and secure the conductors with wire end sleeves ① in the terminal contacts ③ as shown in the figure below. Close the terminal contact by removing the screwdriver. It is important to pay attention to the label on the cage clamp terminal ④.

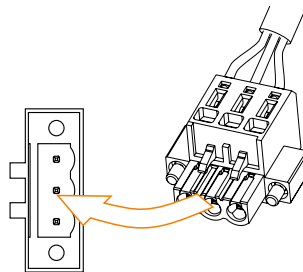


4.2.2 Connecting the power supply to a B&R device

Danger!

The entire power supply to the B&R device must be interrupted. Before connecting the power cable, it must be checked whether it has been disconnected from the voltage source (e.g. power supply unit).

1. Carry out electrostatic discharge on the housing or at the ground connection.
2. Connect the power supply connector to the B&R device and tighten the mounting screws (max. tightening torque 0.5 Nm).



4.2.3 Grounding concept - Functional ground

Functional ground is a low impedance current path between circuits and ground. It is used for equipotential bonding and thus for improving immunity to interference.

Notice!

Functional grounding does not meet the requirements of protective ground!

Suitable measures for electrical safety in the event of operation and faults must be provided separately.

Depending on availability, functional grounding can be performed via the following interfaces:

- Functional ground connection of the power supply
- Ground connection

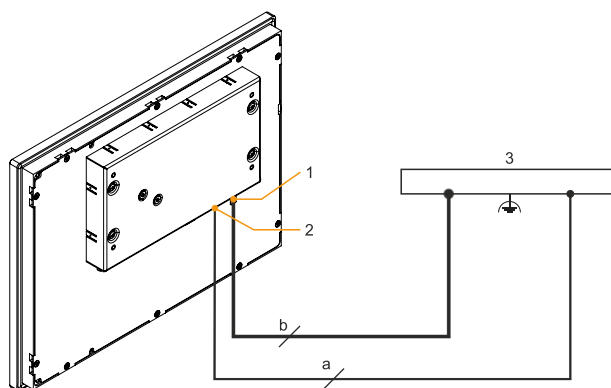
The functional ground on B&R devices is marked with the following symbol:



The following points must be observed to ensure that electrical interference is safely diverted:

- Connect the device to the central grounding point (e.g. the control cabinet or the system) using the shortest possible low-resistance path.
- Perform wiring with the recommended cable cross section according to manufacturer's documentation.
- Observe the shielding concept of the conductors. All data cables connected to the device must be shielded cables.

4.2.3.1 Wiring diagram

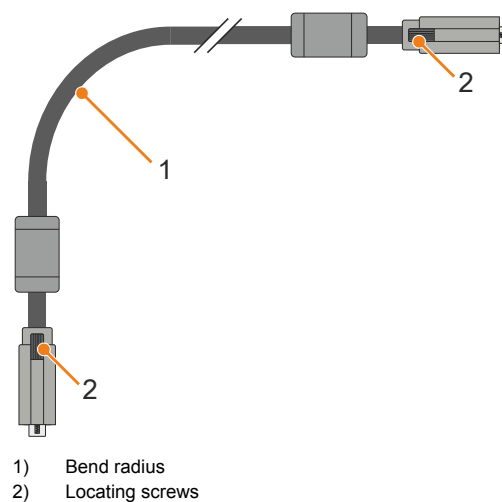


Legend					
1	Ground connection of the device	2	Functional ground connection of the power supply of the device	3	Central grounding point
a	Functional ground connection of the power supply of the device, cable diameter according to the manufacturer's documentation	b	Ground connection of the device, cable diameter according to the manufacturer's documentation	-	

4.3 Connecting cables

When connecting or installing cables, the bend radius specification must be observed. For this specification, see the technical data of the respective cable.

The maximum tightening torque of the locating screws is 0.5 Nm.



5 Maintenance

The following chapter describes the maintenance work that can be carried out by a qualified and trained end user.

Information:

Only components approved by B&R are permitted to be used for maintenance work.

5.1 Repairs/Complaints and replacement parts

Danger!

Unauthorized opening or repair of a device may result in personal injury and/or serious damage to property. Repairs are therefore only permitted to be carried out by authorized qualified personnel at the manufacturer's premises.

To process a repair/complaint, a repair order or complaint must be created via the B&R Material Return Portal on the B&R website (www.br-automation.com).

6 International and national certifications

6.1 Directives and declarations

6.1.1 CE marking



All directives applicable to the respective product and their harmonized EN standards are met.

6.1.2 EMC Directive

The products meet the requirements of EU directive "Electromagnetic compatibility 2014/30/EU" and are designed for industrial applications:

EN 61131-2:2007	Programmable controllers - Part 2: Equipment requirements and tests
EN 61000-6-2:2005	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
EN 61000-6-4:2007	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

Information:

Declarations of conformity are available on the B&R website under [Downloads > Certificates > Declarations of conformity](#).

6.2 Certifications

Danger!

A complete system can only receive certification if all individual components installed and connected in it have the corresponding certifications. If an individual component is used that does not have the corresponding certification, the complete system will also not be certified.

B&R products and services comply with applicable standards. These are international standards from organizations such as ISO, IEC and CENELEC, as well as national standards from organizations such as UL, CSA, FCC, VDE, ÖVE, etc. We pay special attention to the reliability of our products in the industrial sector.

Information:

The certifications valid for the respective product are available on the website and in the user's manual under the technical data in section "Certifications" or in the associated certificates.

6.2.1 UL certification



Products with this mark are tested by Underwriters Laboratories and listed as "industrial control equipment". The mark is valid for the USA and Canada and simplifies the certification of your machines and systems in this economic area.

UL certificates are available on the B&R website under [Downloads > Certificates > UL](#).

Ind. Cont. Eq.
E115267

6.2.2 EAC



Products with this mark are tested by an accredited test laboratory and permitted to be imported into the Eurasian Customs Union (based on EU conformity).

6.2.3 KC



Products with this mark are tested by an accredited test laboratory and permitted to be introduced into the Korean market (based on EU conformity).

6.2.4 UKCA



UK Conformity Assessed (UKCA)

All directives applicable to the respective product and their relevant standards are met. Products with this marking are permitted to be imported into Great Britain (England, Wales, Scotland).

Information:

Declarations of conformity are available on the B&R website under [Downloads > Certificates > Declarations of conformity](#).

6.2.5 RCM



Products with this mark are tested by an accredited test laboratory and certified by the ACMA. The mark is valid for Australia/Oceania and simplifies the certification of your machines and systems in this economic area (based on EU conformity).

6.2.6 DNV certification



Products with this certification are certified by the classification society DNV and suitable for the maritime sector. DNV certificates (type approvals) are generally accepted by other classification societies during ship acceptance procedures.

DNV certificates with specifications for permissible environmental conditions as well as a list of revisions from which the DNV type certification applies to individual devices are available on the B&R website ([Downloads > Certificates > Maritime](#)).

6.2.7 American Bureau of Shipping (ABS)



Products with this certification are suitable for use in the maritime sector according to the regulations of the classification society American Bureau of Shipping (ABS Rules).

Certificates with specifications for permissible environmental conditions as well as a list of revisions from which the certification applies to individual devices are available on the B&R website ([Downloads > Certificates > Maritime](#)).

6.2.8 Bureau Veritas (BV)



Products with this certification are suitable for use in the maritime sector according to the regulations of the classification society Bureau Veritas (BV).

Certificates with specifications for permissible environmental conditions as well as a list of revisions from which the certification applies to individual devices are available on the B&R website ([Downloads > Certificates > Maritime](#)).

6.2.9 Lloyd's Register (LR)



Products with this certification are suitable for use in the maritime sector according to the regulations of the classification society Lloyd's Register (LR).

Certificates with specifications for permissible environmental conditions as well as a list of revisions from which the certification applies to individual devices are available on the B&R website ([Downloads > Certificates > Maritime](#)).

6.2.10 Korean Register of Shipping (KR)



Products with this certification are suitable for use in the maritime sector according to the regulations of the classification society Korean Register of Shipping (KR).

Certificates with specifications for permissible environmental conditions are available on the B&R website ([Downloads > Certificates > Maritime](#)).

6.2.11 UL Haz. Loc. certification



Products with this mark are tested by Underwriters Laboratories and listed as "industrial control equipment for use in hazardous locations". The mark is valid for the USA and Canada and simplifies the certification of your machines and systems in this economic area.

The UL HazLoc certificates are available on the B&R website ([Downloads > Certificates > HazLoc](#)).

Ind. Cont. Eq.
for Haz. Locs.
Cl. I, Div. 2,
Groups ABCD
E180196 (T4)

6.2.11.1 Introduction

Danger!

RISK OF EXPLOSION

- As long as the electrical circuit is activated, cables or lines are not permitted to be connected or disconnected unless the area is knowingly free of flammable concentrations of vapors, gases and other flammable or combustible materials. This applies to all connections and circuits. This includes power, ground and network connections as well as series and parallel connections.
- Unshielded/Ungrounded cables are never permitted to be used in potentially explosive atmospheres.

Failure to follow this instruction can result in death, serious bodily injury or damage to property!

6.2.11.2 Assembly and installation

Explosion-protected devices must be used as intended and are only permitted to be operated by qualified and instructed specialists in accordance with these installation instructions and the additional information in the user's manual. Operation in any other way jeopardizes the safety and functionality of the devices and the connected systems. The operator is responsible for compliance with applicable safety and accident prevention regulations and standards.

The maximum ambient temperature may differ depending on the individual components used; see the associated documentation.

Before any installation or use of a device in potentially explosive atmospheres, the certification mark on the device must be checked. Additional equipment must be suitable for the place of use. Final assembly must be approved by the responsible local authorities. Wiring must be carried out in accordance with national regulations and the requirements of the authorities.

Devices must be disconnected from the power supply until installation work has been completed. The tightening torque for power supply terminals is 0.5 Nm. Cables must be suitable for a surface temperature of 75°C. AP1000 panels with SDL or SDL3 link module are only permitted to be operated with 24 VDC.

Unshielded/Ungrounded cables are never permitted to be used in potentially explosive atmospheres. Devices must be securely connected to equipotential bonding. Power supply, communication and accessory cables must be secured to the device or control cabinet. Power supply, communication and accessory cables are not permitted to exert excessive strain on connections. Possible vibrations in the environment must be taken into account.

6.2.11.3 Servicing, disturbances and disassembly

Devices must be taken out of operation and protected against accidental startup. The actual disconnection of the power supply must be checked with a suitable voltmeter.

Before removing or installing accessories, components or cables, the power supply to e.g. AP1000 panels with SDL or SDL3 link module and power supply unit must be interrupted. Defective devices are only permitted to be replaced by trained personnel. Before switching on or connecting to the power supply, all covers or components of the system must be reinstalled and secured.

Danger!

Failure to follow this instruction can result in death, serious bodily injury or damage to property!

Danger !

Le non-respect de ces instructions peut entraîner des blessures graves ou mortelles!

7 Environmentally friendly disposal

All programmable logic controllers, operating and monitoring devices and uninterruptible power supplies from B&R are designed to have as little impact on the environment as possible.

7.1 Separation of materials

To ensure that devices can be recycled in an environmentally friendly manner, it is necessary to separate out the different materials.

Component	Disposal
Programmable logic controllers Operating and monitoring devices Uninterruptible power supplies Batteries and rechargeable batteries Cables	Electronics recycling
Paper/Cardboard packaging	Paper/Cardboard recycling
Plastic packaging material	Plastic recycling

Disposal must be carried out in accordance with applicable legal regulations.