

SDL3 Converter

User's manual

Version: **1.00 (April 2015)**
Model no.: **MASDL3CON-ENG**

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Chapter 1 • General information

1 Manual history

Version	Date	Change
V0.10 PRELIMINARY	2014-12-17	• First version
1.00	2015-04-15	• Updated technical data for the 5COSD3.1000-00 SDL3 Converter, see "Technical data" on page 22. • Updated section "Functional ground - Grounding concept" on page 28. • Updated figures for the SDL3 Converter.

Table 1: Manual history

2 Safety guidelines

2.1 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.

2.2 Protection against electrostatic discharge

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

2.2.1 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**
...are protected by ESD-suitable packaging.

2.2.2 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 are only permitted to 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.
- Measuring instruments and equipment must be grounded.
- Probes on potential-free measuring instruments 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.

2.3 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.

2.4 Transport and storage

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

2.5 Installation

- These devices are not ready for use upon delivery and must be installed and wired according to the specifications in this documentation in order for the EMC limit values to apply.
- Installation must be performed according to this documentation using suitable equipment and tools.
- Devices are only permitted to 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 in accordance with applicable guidelines (e.g. line cross sections, fuses, protective ground connections).

2.6 Operation

2.6.1 Protection against touching electrical parts

To operate programmable logic controllers, operating and monitoring devices, and uninterruptible power supplies, certain components must carry dangerous voltage levels. Touching one of these parts can result in a life-threatening electric shock. This could lead to death, severe injury or damage to equipment.

Before turning on the programmable logic controller, operating/monitoring devices or uninterruptible power supply, the housing must be properly grounded (PE rail). Ground connections must be established even when testing or operating operating/monitoring devices or the uninterruptible power supply for a short time!

Before turning the device on, all parts that carry voltage must be securely covered. During operation, all covers must remain closed.

2.6.2 Environmental conditions - Dust, moisture, corrosive gases

The use of operating/monitoring devices (e.g. industrial PCs, Power Panels, Mobile Panels, etc.) and uninterruptible power supplies in very dusty environments should be avoided. Dust collection on the devices can affect functionality and may prevent sufficient cooling, especially in systems with active cooling systems (fans).

The presence of corrosive gases can also lead to malfunctions. When combined with high temperature and humidity, corrosive gases – e.g. with sulfur, nitrogen and chlorine components – can induce chemical reactions that can damage electronic components very quickly. Signs of the presence of corrosive gases are blackened copper surfaces and cable ends on existing equipment.

For operation in dusty or moist conditions, correctly installed (e.g. cutout installations) operating/monitoring devices like the Automation Panel or Power Panel are protected on the front. The back of all devices must be protected from dust and moisture and cleaned at suitable intervals.

2.6.3 Viruses and dangerous programs

This system is subject to potential risk each time data is exchanged or software is installed from a data medium (e.g. diskette, CD-ROM, USB flash drive, etc.), a network connection or the Internet. The user is responsible for assessing these dangers, implementing preventive measures such as virus protection programs, firewalls, etc. and making sure that software is only obtained from trusted sources.

2.7 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.

2.7.1 Separation of materials

It is necessary to separate different materials so the device can undergo an environmentally friendly recycling process.

Component	Disposal
Programmable logic controllers Operating/Monitoring devices Uninterruptible power supply Batteries and rechargeable batteries Cables	Electronics recycling
Cardboard box / Paper packaging	Cardboard box / Paper recycling
Plastic packaging	Plastic recycling

Table 2: Environmentally friendly separation of materials

Disposal must comply with applicable legal regulations.

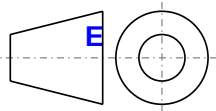
3 Organization of safety notices

Safety notices in this manual are organized as follows:

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

Table 3: Description of the safety notices used in this documentation

4 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	±0.1 mm
For 6 to 30 mm	±0.2 mm
For 30 to 120 mm	±0.3 mm
For 120 to 400 mm	±0.5 mm
For 400 to 1000 mm	±0.8 mm

Table 4: Range of nominal sizes

5 Overview

Product ID	Short description	on page
	Converter	
5COSD3.1000-00	SDL/SDL3 Converter	22
	DVI cables	
5CADVI.0018-00	DVI-D cable - 1.8 m	48
5CADVI.0050-00	DVI-D cable - 5 m	48
	SDL cables	
5CASDL.0018-00	SDL cable - 1.8 m	39
5CASDL.0050-00	SDL cable - 5 m	39
5CASDL.0100-00	SDL cable, 10 m	39
	SDL cables with 45° connectors	
5CASDL.0018-01	SDL cable - 45° connector - 1.8 m	42
5CASDL.0050-01	SDL cable with 45° male connector, 5 m	42
5CASDL.0100-01	SDL cable with 45° male connector, 10 m	42
	SDL flex cables	
5CASDL.0018-03	SDL flex cable - 1.8 m	45
5CASDL.0050-03	SDL flex cable, 5 m	45
5CASDL.0100-03	SDL flex cable, 10 m	45
	SDL3 cable	
5CASD3.0100-00	SDL3 cable, 10 m	36
5CASD3.0150-00	SDL3 cable, 15 m	36
5CASD3.0200-00	SDL3 cable, 20 m	36
5CASD3.0300-00	SDL3 cable, 30 m	36
5CASD3.0500-00	SDL3 cable, 50 m	36
5CASD3.1000-00	SDL3 cable, 100 m	36
	Terminal blocks	
0TB103.9	Connector 24 VDC - 3-pin female - Screw clamps 3.31 mm ²	34
0TB103.91	Connector 24 VDC - 3-pin female - Cage clamps 3.31 mm ²	34
	USB cables	
5CAUSB.0018-00	USB 2.0 connection cable type A - type B, 1.8 m	51
5CAUSB.0050-00	USB 2.0 connection cable type A - type B, 5 m	51

Chapter 2 • Technical data

1 Introduction

1.1 SDL3 Converter for Automation PCs

Smart Display Link 3 offers even more advantages when used together with an external converter. For example, SDL3 can be used to connect Automation Panels to all Automation PC 910, Automation PC 620 and Automation PC 810 systems as well as to all Panel PCs. Upgrading systems to SDL3 in the course of retrofitting or modifications is extremely easy.

The integrated SDL3 interface makes it possible to connect two Automation Panels to an Automation PC 910 in dual independent display mode.

1.2 About this user's manual

This user's manual contains all necessary information regarding the SDL3 Converter.

Information regarding SDL3 link modules and SDL3 transmitters can be found in the Automation Panel and Automation PC user's manuals.

1.3 System components / Configuration

1.3.1 Configuration

Operation with SDL cable

Configuration													
SDL3 Converter	Select 1												
	5COSD3.1000-00												
SDL3 cables	Select 1												
	5CASD3.0100-00 5CASD3.0300-00 5CASD3.0150-00 5CASD3.0500-00 5CASD3.0200-00 5CASD3.1000-00												
SDL cables	Select 1												
	<table><tr><td>SDL cables</td><td>SDL cables with 45° connector</td><td>SDL flex cables</td></tr><tr><td>5CASDL.0018-00</td><td>5CASDL.0018-01</td><td>5CASDL.0018-03</td></tr><tr><td>5CASDL.0050-00</td><td>5CASDL.0050-01</td><td>5CASDL.0050-03</td></tr><tr><td>5CASDL.0100-00</td><td>5CASDL.0100-01</td><td>5CASDL.0100-03</td></tr></table>	SDL cables	SDL cables with 45° connector	SDL flex cables	5CASDL.0018-00	5CASDL.0018-01	5CASDL.0018-03	5CASDL.0050-00	5CASDL.0050-01	5CASDL.0050-03	5CASDL.0100-00	5CASDL.0100-01	5CASDL.0100-03
SDL cables	SDL cables with 45° connector	SDL flex cables											
5CASDL.0018-00	5CASDL.0018-01	5CASDL.0018-03											
5CASDL.0050-00	5CASDL.0050-01	5CASDL.0050-03											
5CASDL.0100-00	5CASDL.0100-01	5CASDL.0100-03											
USB cables	Select 1 (optional)												
	5CAUSB.0018-00 5CAUSB.0050-00												
Terminal blocks	Select 1												
	Power connectors 0TB103.9 0TB103.91												

Figure 1: Configuration for SDL operation

Operation with DVI cable

Configuration	
SDL3 Converter	Select 1
	5COSD3.1000-00
SDL3 cables	Select 1
	5CASD3.0100-00 5CASD3.0300-00 5CASD3.0150-00 5CASD3.0500-00 5CASD3.0200-00 5CASD3.1000-00
DVI cables	Select 1
	5CADVI.0018-00 5CADVI.0050-00
USB cables	Select 1
	5CAUSB.0018-00 5CAUSB.0050-00
Terminal blocks	Select 1
	Power connectors 0TB103.9 0TB103.91

Figure 2: Configuration for DVI operation

2 Complete system

2.1 Connection options

2.1.1 SDL3 mode

Smart Display Link 3 (SDL3) technology is used to transfer data from all communication channels between a B&R Industrial PC and a panel up to 100 m over a standard Ethernet cable. A male RJ45 connector designed for tight spaces such as feed-throughs and swing arm systems is used to connect to the device.

2.1.1.1 Operating SDL3 with an SDL3 Converter via SDL

When operating SDL3 with an SDL3 Converter (5COSD3.1000-00) via SDL, communication between a B&R Industrial PC and the SDL3 Converter is handled using an SDL cable and an optional USB type A/B cable. The Automation Panel is connected to the SDL3 Converter using an SDL3 cable up to 100 m in length.

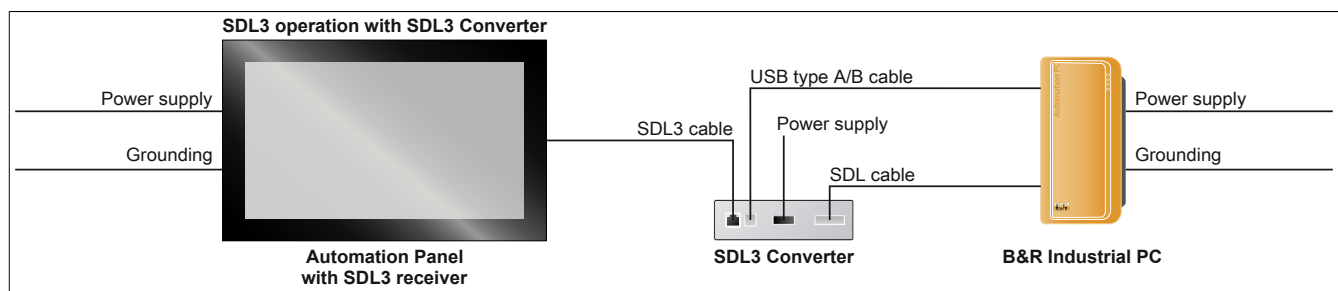
It is used to transfer not just display data, but touch screen, matrix key, LED, service and diagnostic data as well.

If the B&R Industrial PC is equipped with an SDL3 transmitter, then an additional SDL graphics line can also be implemented.

The display's brightness can be configured using the ADI Control Center.

Operation with a USB type A/B cable

The maximum distance for transmitting data between the B&R Industrial PC and the SDL3 Converter (5COSD3.1000-00) is 5 m. Completely integrated in SDL3 technology, USB 2.0 is used to transfer data over this distance.



Availability of interfaces on Automation Panels with an SDL3 receiver:

SDL3 interface	✓	USB1, USB2	✓	USB 2.0		Power supply	✓	Grounding	✓
----------------	---	------------	---	---------	--	--------------	---	-----------	---

Maximum cable length of SDL3: 100 m

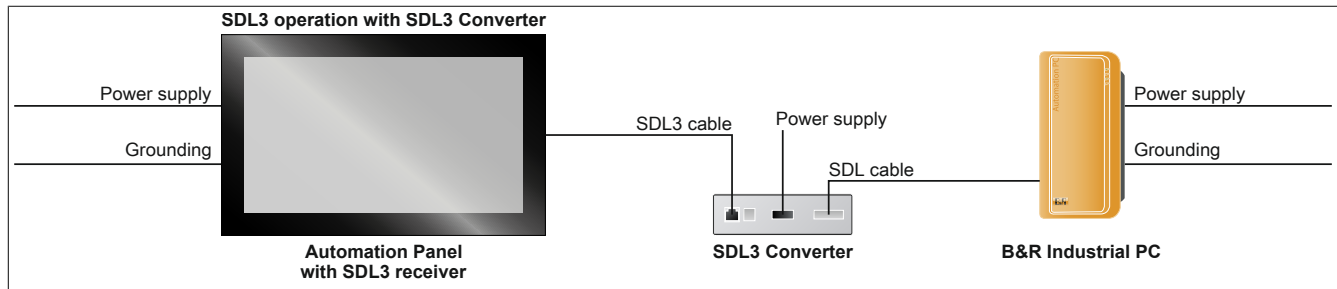
Maximum cable length of SDL and USB: 5 m

Prerequisites and requirements

- Automation Panel with SDL3 receiver
- B&R Industrial PC with SDL interface
- SDL3 Converter
- SDL cable, USB type A/B cable, SDL3 cable

Operation without a USB type A/B cable

The maximum distance for transmitting data between the B&R Industrial PC and the SDL3 Converter (5COSD3.1000-00) is 10 m. Completely integrated in SDL3 technology, USB 1.1 is used to transfer data over this distance.



Availability of interfaces on the Automation Panel with SDL3 receiver:

SDL3 interface ✓ USB1, USB2 ✓ USB 1.1 ✓ Power supply ✓ Grounding ✓

Maximum cable length of SDL3: 100 m

Maximum cable length of SDL: 10 m

Prerequisites and requirements

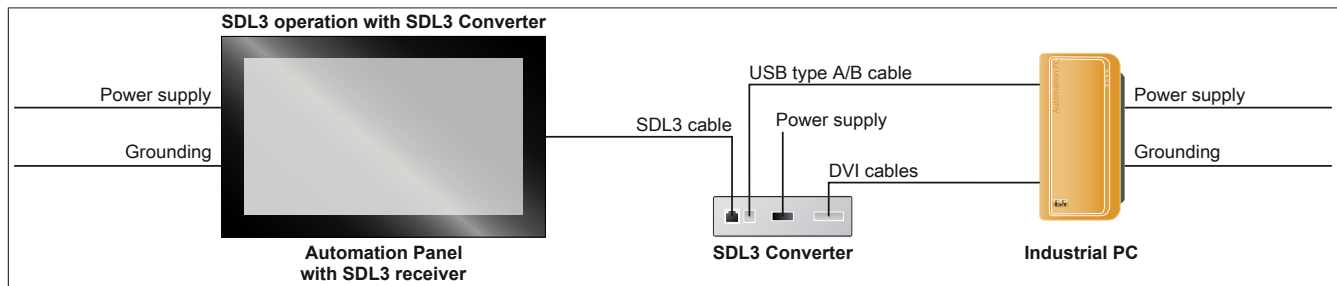
- Automation Panel with SDL3 receiver
- B&R Industrial PC with SDL interface
- SDL3 Converter
- SDL cable, SDL3 cable

2.1.1.2 Operating SDL3 with an SDL3 Converter via DVI

When operating SDL3 with an SDL3 Converter (5COSD3.1000-00) via DVI, communication between an industrial PC and the SDL3 Converter is handled using a DVI cable and a USB type A/B cable. The Automation Panel is connected to the SDL3 Converter using an SDL3 cable. Data from multi-touch touch screens is transferred over the USB type A/B cable.

The Automation Panel can be installed up to 100 m from the SDL3 Converter.

The maximum distance for transmitting data between the industrial PC and the SDL3 Converter (5COSD3.1000-00) is 5 m. Completely integrated in SDL3 technology, USB 2.0 is used to transfer data over this distance.



Availability of interfaces on the Automation Panel with SDL3 receiver:

SDL3 interface ✓ USB1, USB2 ✓ USB 2.0 ✓ Power supply ✓ Grounding ✓

Maximum cable length of SDL3: 100 m

Maximum cable length of DVI and USB: 5 m

Prerequisites and requirements

- Automation Panel with SDL3 receiver
- Industrial PC with DVI interface
- SDL3 Converter
- DVI cable, USB type A/B cable, SDL3 cable

Limitations

- Resistive touch screens (single-touch) not supported
- No brightness control on display
- No transmission of service and diagnostic data

- Firmware update not possible

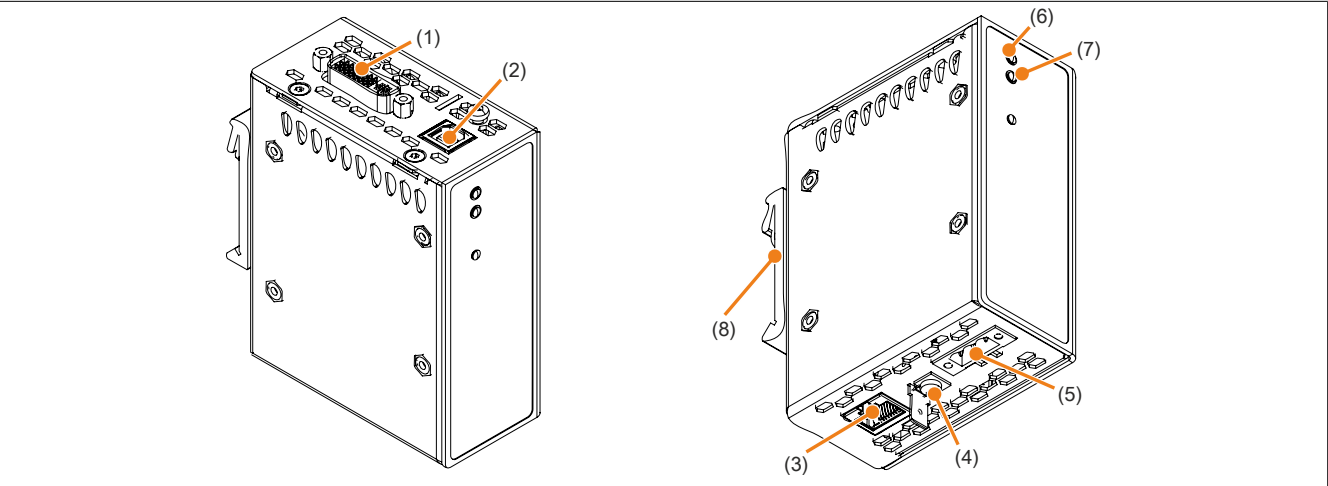
2.1.2 General limitations

- The USB 2.0 transfer rate is limited to 30 Mbit/s with SDL3.
- The SDL3 transmitter continuously emulates a display using EDID data and hot plugging code, which allows DVI-compatible operation. This can lead to improperly displayed images during operation with multiple displays. In Windows, a connected panel is detected by the graphics driver even in the following situation:
 - No cable is connected.
 - A connection has not yet been established between the SDL3 link module and the SDL3 Converter.

It is possible to correct these improperly displayed images by making suitable settings in BIOS or via the graphics driver.

2.2 Device interfaces

2.2.1 Device interfaces - Overview



No.	Type of interface		No.	Type of interface	
1	SDL/DVI In	"SDL/DVI In interface"	5	24 VDC	"+24 VDC voltage supply"
2	USB In	"USB In interface"	6	Status LED	"LED status indicators"
3	SDL3 Out	"SDL3 Out interface"	7	SDL3 LED	"LED status indicators"
4	Functional ground connection	"Grounding"	8		Top-hat rail installation

2.2.2 +24 VDC voltage supply

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

The pinout is listed in the following table. The supply voltage is protected internally by a soldered fuse (15 A, fast-acting) to prevent damage to the device in the event of an overload (fuse replacement necessary) or if the voltage supply is connected incorrectly (reverse polarity protection -> fuse replacement not necessary). The device must be returned to B&R for repairs if the fuse is blown in the event of an error.

+24 VDC power supply	
Protected against reverse polarity	
Pin	Description
1	+
2	Functional ground
3	-
Model number	Short description
Terminal blocks	
0TB103.9	Male connector 24 V 5.08 3-pin screw clamps
0TB103.91	Male connector 24 V 5.08 3-pin cage clamps

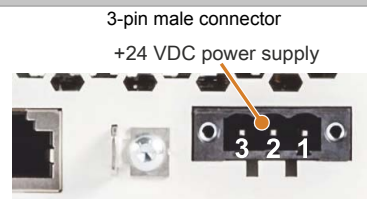


Table 5: +24 VDC voltage supply connection

Electrical characteristics	
Nominal voltage	24 VDC $\pm 25\%$
Nominal current	Max. 3 A
Electrical isolation	Yes
Uninterruptible power supply	No

2.2.2.1 Grounding

Caution!

Functional ground (pin 2 of power supply and ground connection) must be kept as short as possible and connected to the largest possible wire cross section at the central grounding point (e.g. the control cabinet or system).

A ground connection is located next to the power supply on the SDL3 Converter.



The ground connection must be used, for example, to fasten a copper strip to a central grounding point in the control cabinet or system where the device is installed. The largest possible conductor cross section should be used (at least 2.5 mm²).

2.2.3 SDL/DVI In interface

The SDL/DVI In interface can be used to transfer either SDL or DVI data. For more information, see the section "Connection options" on page 13.

SDL/DVI In interface - SDL (Smart Display Link) / DVI	
The following overview lists the video signals available on the panel input. For additional details, see the technical data for the link module or display unit being used.	
	Video signals
	SDL, DVI



Table 6: SDL/DVI In interface

Information:

Hot plugging of output devices on the SDL/DVI In interface for service purposes is supported by both the hardware as well as the graphics drivers for approved operating systems. The male panel connector is specified for 100 connection cycles.

2.2.3.1 USB communication in SDL and DVI mode

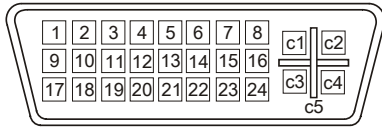
Information:

The USB transfer rate is limited to USB 1.1 in SDL mode.

In DVI mode, the maximum USB transfer rate is determined by the USB interface and USB hub on the display device.

2.2.3.2 Pinout

Pin	Assignment	Description	Pin	Assignment	Description
1	TMDS data 2-	DVI lane 2 (negative)	16	HPD	Hot plug detect
2	TMDS data 2+	DVI lane 2 (positive)	17	TMDS data 0-	DVI lane 0 (negative)
3	TMDS data 2/4 SHIELD	Shield for data pair 2 and 4	18	TMDS data 0+	DVI lane 0 (positive)
4	SDL-	SDL lane (negative)	19	TMDS Data 0/ XUSB1 SHIELD	Shield for data pair 0 and USB1
5	SDL+	SDL lane (positive)	20	XUSB1-	USB lane 1 (negative)
6	DDC clock	DDC-based control signal (clock)	21	XUSB1+	USB lane 1 (positive)
7	DDC data	DDC-based control signal (data)	22	TMDS clock shield	Shield for clock pair
8	N/C	Not connected	23	TMDS clock+	DVI clock (positive)
9	TMDS data 1-	DVI lane 1 (negative)	24	TMDS clock -	DVI clock (negative)
10	TMDS DATA 1+	DVI lane 1 (negative) HDMI clock (positive)	C1	N/C	Not connected
11	TMDS DATA 1/ XUSB0 SHIELD	Shield for data pair 1 and USB0	C2	N/C	Not connected
12	XUSB0-	USB lane 0 (negative)	C3	N/C	Not connected
13	XUSB0+	USB lane 0 (positive)	C4	N/C	Not connected
14	+5 V power ¹⁾	+5 V power supply	C5	N/C	Not connected
15	Ground (return for +5 V, HSync and VSync)	Ground			



24-pin female DVI connector

Table 7: DVI interface - Pinout

1) Protected internally by a multifuse.

2.2.3.3 Cable lengths and resolutions for SDL transmission

The following table lists the relationship between segment lengths and maximum resolution depending on the SDL cable being used:

SDL cable Segment length [m]	Resolution						
	VGA 640 x 480	SVGA 800 x 600	XGA 1024 x 768	HD 1366 x 768	SXGA 1280 x 1024	UXGA 1600 x 1200	FHD 1920 x 1080
1.8	5CASDL.0018-00	5CASDL.0018-00	5CASDL.0018-00	5CASDL.0018-00	5CASDL.0018-00	5CASDL.0018-00	5CASDL.0018-00
	5CASDL.0018-01	5CASDL.0018-01	5CASDL.0018-01	5CASDL.0018-01	5CASDL.0018-01	5CASDL.0018-01	5CASDL.0018-01
	5CASDL.0018-03	5CASDL.0018-03	5CASDL.0018-03	5CASDL.0018-03	5CASDL.0018-03	5CASDL.0018-03	5CASDL.0018-03
5	5CASDL.0050-00	5CASDL.0050-00	5CASDL.0050-00	5CASDL.0050-00	5CASDL.0050-00	5CASDL.0050-00	5CASDL.0050-00
	5CASDL.0050-01	5CASDL.0050-01	5CASDL.0050-01	5CASDL.0050-01	5CASDL.0050-01	5CASDL.0050-01	5CASDL.0050-01
	5CASDL.0050-03	5CASDL.0050-03	5CASDL.0050-03	5CASDL.0050-03	5CASDL.0050-03	5CASDL.0050-03	5CASDL.0050-03
10	5CASDL.0100-00	5CASDL.0100-00	5CASDL.0100-00	5CASDL.0100-00	5CASDL.0100-00	5CASDL.0100-00	5CASDL.0100-00
	5CASDL.0100-01	5CASDL.0100-01	5CASDL.0100-01	5CASDL.0100-01	5CASDL.0100-01	5CASDL.0100-01	5CASDL.0100-01
	5CASDL.0100-03	5CASDL.0100-03	5CASDL.0100-03	5CASDL.0100-03	5CASDL.0100-03	5CASDL.0100-03	5CASDL.0100-03

Table 8: Cable lengths and resolutions for SDL transmission

2.2.3.4 Cable lengths and resolutions for DVI transmission

The following table lists the relationship between segment lengths and maximum resolution depending on the SDL cable being used:

DVI cables Segment length [m]	Resolution						
	VGA 640 x 480	SVGA 800 x 600	XGA 1024 x 768	HD 1366 x 768	SXGA 1280 x 1024	UXGA 1600 x 1200	FHD 1920 x 1080
1.8	5CADVI.0018-00	5CADVI.0018-00	5CADVI.0018-00	5CADVI.0018-00	5CADVI.0018-00	5CADVI.0018-00	5CADVI.0018-00
5	5CADVI.0050-00	5CADVI.0050-00	5CADVI.0050-00	5CADVI.0050-00	5CADVI.0050-00	5CADVI.0050-00	5CADVI.0050-00

Table 9: Cable lengths and resolutions for DVI transmission

The maximum cable length for DVI transfer is limited to 5 m due to the USB specification.

2.2.4 USB In interface

The USB In interface is a USB 2.0 type B interface that is used to transfer USB data. It must be connected to a USB interface on the output device (e.g. B&R Industrial PC) when using DVI or SDL with a USB cable as the transfer method. Possible transfer methods are listed in the section "Connection options" on page 13.

If the interface is connected to an output device (B&R Industrial PC), then the USB interface is capable of USB 2.0 transfer rates.

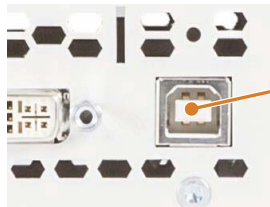
USB In interface ¹⁾		
Type	USB 2.0	1x USB type B, female 
Design	Type B	
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)	
Cable length	Max. 5 m (without hub)	

Table 10: USB In interface

1) The interfaces, etc. available on the device or module have been numbered as such for easy identification. This numbering may differ from that used by the particular operating system.

2.2.5 SDL3 Out interface

The SDL3 Out interface is a female RJ45 connector that is operated with SDL3 technology.

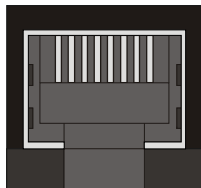
SDL3 Out interface		
The following overview lists the video signals available on the SDL3 output.		Female RJ45 connector 1 
	Video signals	
	SDL3	

Table 11: SDL3 Out interface

Information:

Hot plugging of display devices on the SDL3 Out interface for service purposes is supported by both the hardware as well as the graphics drivers for approved operating systems. The female RJ45 connector is specified for 500 connection cycles.

Information:

If a display device with touch screen is connected to the SDL3 Out interface and then disconnected again during operation (hot plugging), it may be necessary to recalibrate the touch screen.

2.2.6 LED status indicators

LED status indicators are located on the front of the SDL3 Converter.

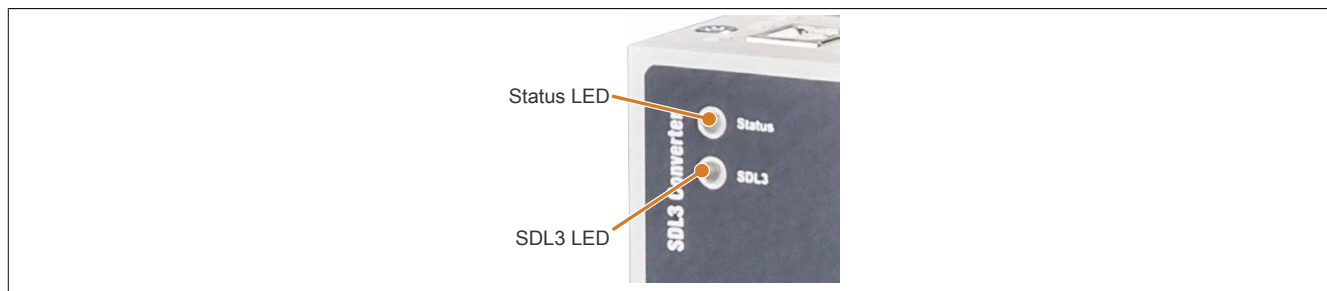


Figure 3: LED status indicators

LED status indicators				
LED	Color	Status	Function	LED status indicator
Status	Yellow	On	Indicates active SDL connection	On 50% Off
		Blinking On - 50% luminance	Indicates active SDL communication and a faulty or incomplete firmware upgrade	On 50% Off
		Blinking On - Off	No active SDL communication	On 50% Off
		Blinking On - 50% luminance - Off	No active SDL communication and a faulty or incomplete firmware upgrade	On 50% Off
SDL3	Yellow	On	SDL3 connection established and OK	On 50% Off
		Off	No active SDL3 connection	On 50% Off

Table 12: LED status indicators

3 Individual components

3.1 SDL3 Converter

3.1.1 5COSD3.1000-00

3.1.1.1 General information

The SDL3 Converter makes it possible to operate SDL3 on B&R Industrial PCs and Automation Panels that do not have an SDL3 interface or SDL3 insert card. Upgrading systems to SDL3 in the course of retrofitting or modifications is extremely easy. The SDL3 interface integrated on a B&R Industrial PC makes it possible to connect two Automation Panels in dual independent display mode.

3.1.1.2 Order data

Model number	Short description	Figure
	Converter	
5COSD3.1000-00	SDL/SDL3 Converter	
	Required accessories	
	SDL3 cable	
5CASD3.0100-00	SDL3 cable, 10 m	
5CASD3.0150-00	SDL3 cable, 15 m	
5CASD3.0200-00	SDL3 cable, 20 m	
5CASD3.0300-00	SDL3 cable, 30 m	
5CASD3.0500-00	SDL3 cable, 50 m	
5CASD3.1000-00	SDL3 cable, 100 m	
	Terminal blocks	
0TB103.9	Connector 24 VDC - 3-pin female - Screw clamps 3.31 mm ²	
0TB103.91	Connector 24 VDC - 3-pin female - Cage clamps 3.31 mm ²	

Table 13: 5COSD3.1000-00 - Order data

3.1.1.3 Technical data

Product ID	5COSD3.1000-00
General information	
LEDs	Status, SDL3
B&R ID code	0xE3C4
Certification cULus	Yes
Interfaces	
USB	1
Quantity	1
Type	USB 2.0
Design	Type B
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)
Monitor/Panel interface	
Design	Female DVI-D connector
Type	SDL/DVI
SDL3 Out	
Design	RJ45 (female connector)
Type	SDL3
Electrical characteristics	
Nominal voltage	24 VDC ±25%
Nominal current	0.2 A
Environmental conditions	
Temperature	
Operation	0 to 55°C
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Mechanical characteristics	
Housing	
Material	Aluminum
Paint	White

Table 14: 5COSD3.1000-00 - Technical data

Product ID	5COSD3.1000-00
Dimensions	
Width	40 mm
Height	100 mm
Depth	80 mm
Weight	500 g

Table 14: 5COSD3.1000-00 - Technical data

3.1.1.4 Dimensions

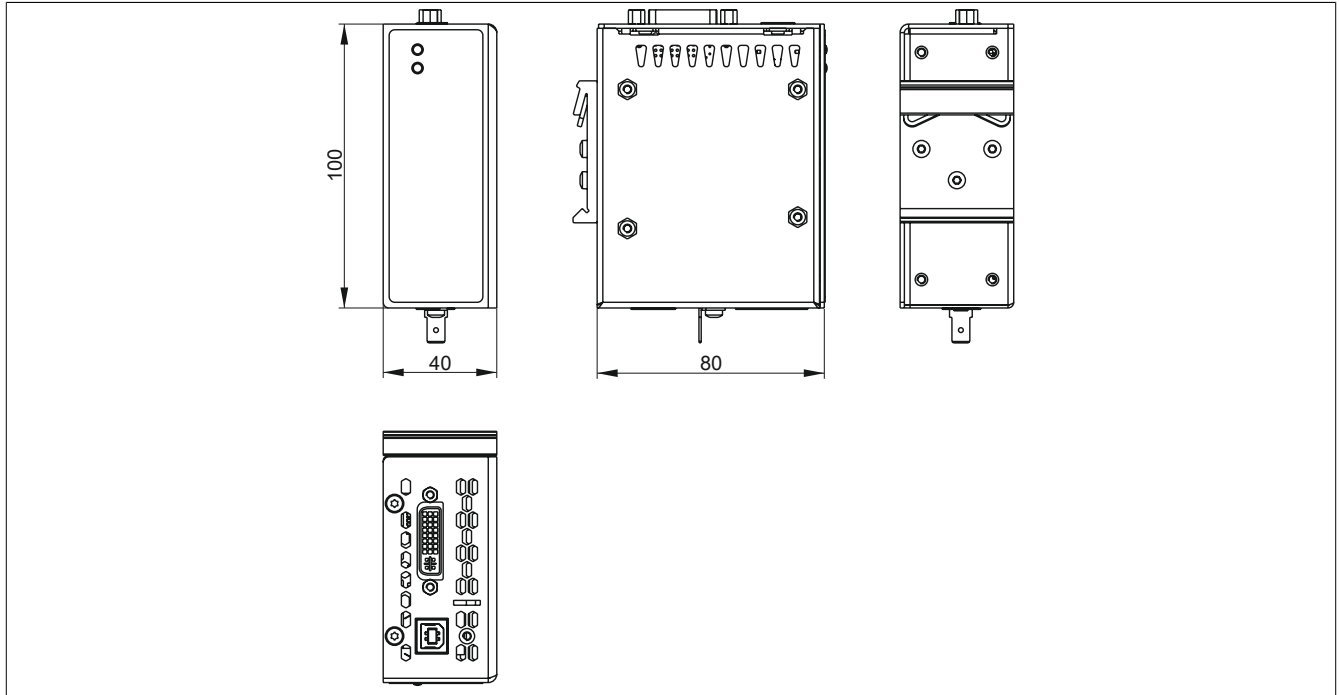


Figure 4: 5COSD3.1000-00 - Dimensions

Chapter 3 • Installation

1 Installation

Danger!

- All supplied power must be disconnected before removing device covers or components or installing/removing accessories, hardware or cables.
- The power cable must be disconnected from the device and from the voltage supply.
- All covers, components, accessories, hardware and cables must be installed or connected before the device can be connected to the power supply and turned on.

1.1 Installing the SDL3 Converter

The frame on the back of the device allows the system to be installed on a top-hat rail (TS35) that corresponds to the EN 50022 standard.

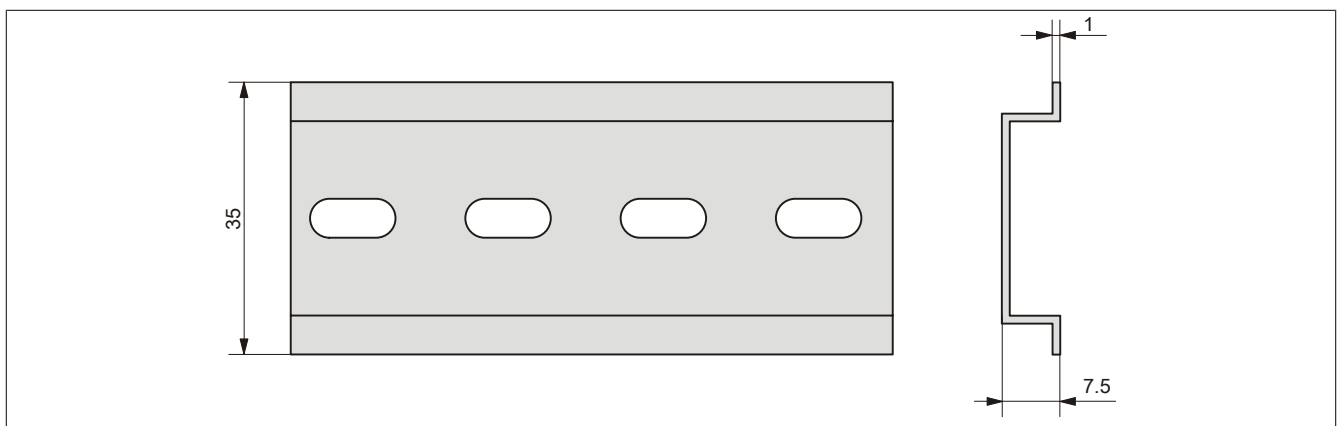


Figure 5: Top-hat rail

Installation notes

- Environmental conditions must be taken into consideration.
- When installed in an enclosure, enough space must be available for air to circulate sufficiently.
- This device is only certified for operation in enclosed rooms.
- This device must not be subjected to direct sunlight.
- Ventilation holes must not be covered.
- This device must be installed using one of the approved mounting orientations.
- The top-hat rail must be able to hold four times the total weight of the device.
- The maximum flex radius of connected cables (SDL3, SDL, DVI, USB, etc.) must not be exceeded.

Procedure

1. Mount the SDL3 Converter in the desired position on the top-hat rail and press down on the SDL3 Converter to snap the locking mechanism into place.

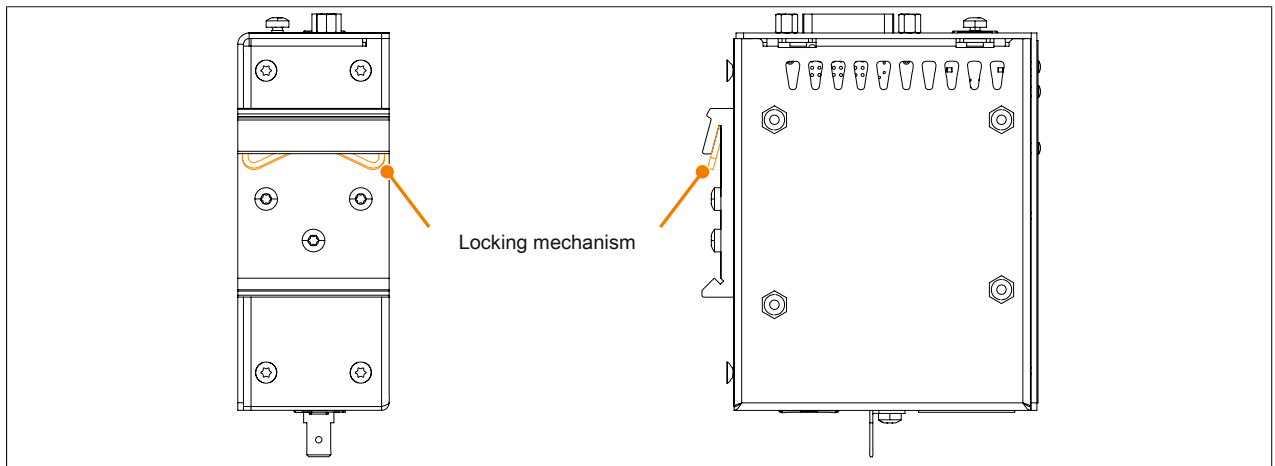


Figure 6: Locking mechanism

2 Removing the SDL3 Converter

2.1 Procedure

1. Press down on the SDL3 Converter and slide it forward to loosen the locking mechanism from the top-hat rail.

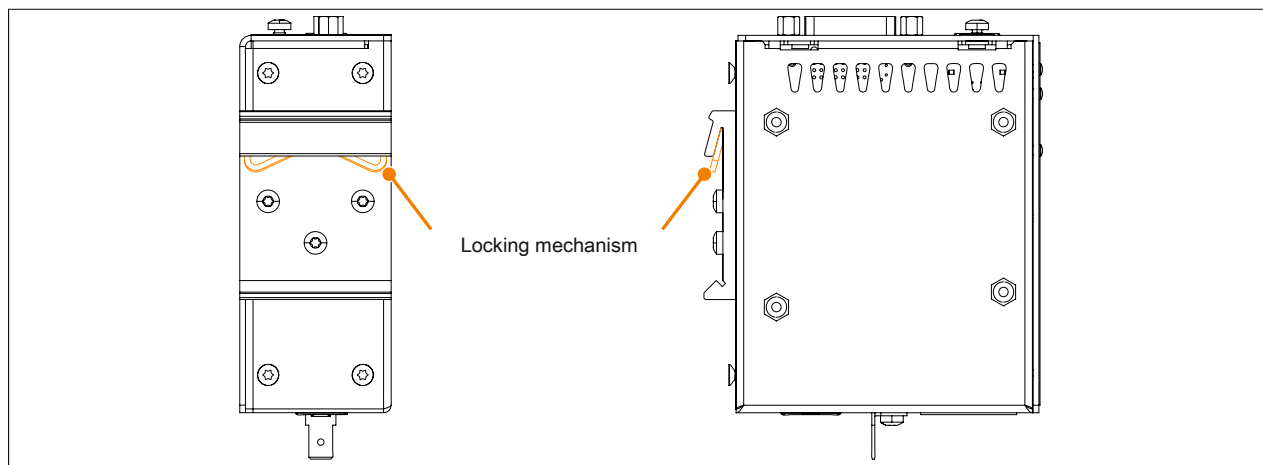


Figure 7: Locking mechanism

3 Connecting to the power mains

Danger!

- All supplied power must be disconnected before removing device covers or components or installing/removing accessories, hardware or cables.
- The power cable must be disconnected from the device and from the voltage supply.
- All covers, components, accessories, hardware and cables must be installed or connected before the device can be connected to the power supply and turned on.

3.1 Installing the DC power cable

Danger!

All supplied power to the B&R Industrial PC must be completely disconnected. Before connecting the DC power cable, it is important to make absolutely sure that it has been disconnected from the power source (e.g. power supply).

3.1.1 Wiring

The DC power cable must be secured in the terminal block (power connector) as shown in the image. Wires with a cross section of 0.75 mm² to 1.5 mm² and wire end sleeves must be used.

Installing the 0TB103.9 screw clamp terminal block

Insert the wires with the wire end sleeves into the terminal contacts ② as shown in the image and tighten the screw clamps ① with a screwdriver (max. torque of 0.4 Nm).

Please note the pinout of the power supply connector on the device!

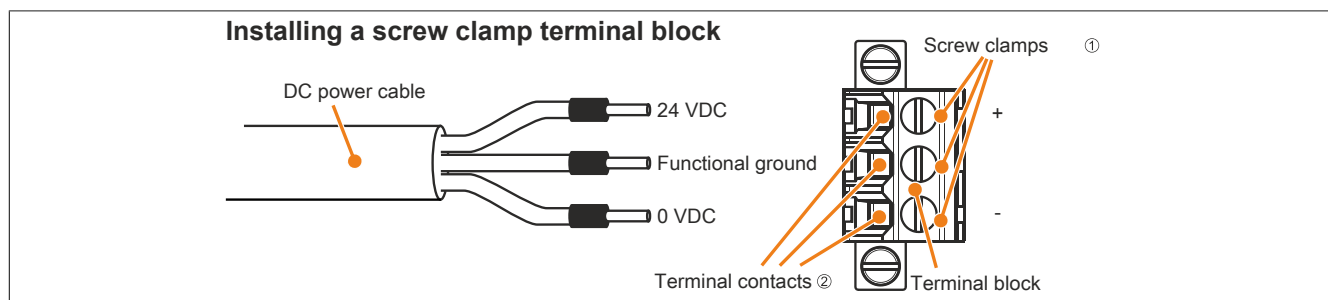


Figure 8: Installing a screw clamp terminal block

Installing the 0TB103.91 cage clamp terminal block

Insert a screwdriver into the cage clamp terminal ① and fasten the wires with wire end sleeves in the terminal contacts ② as shown in the image below. Close the terminal contact by removing the screwdriver.

Please note the pinout of the power supply connector on the device!

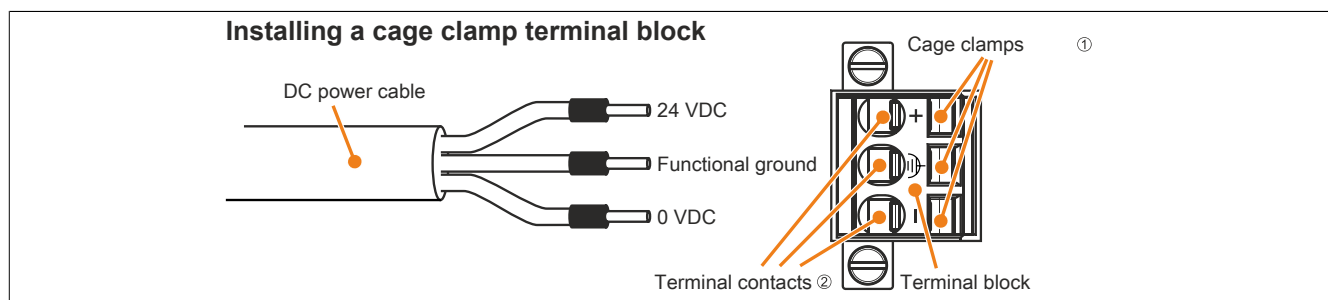


Figure 9: Installing a cage clamp terminal block

3.2 Connecting the power supply to a B&R device

Danger!

The voltage supply to the B&R device must be completely disconnected. Before connecting the power cable, it is important to make absolutely sure that it has been disconnected from the power source (e.g. power supply).

1. Touch the housing or ground connection in order to discharge any electrostatic charge from your body.
2. Connect the power supply connector to the B&R device and tighten the fastening screws (max. tightening torque 0.5 Nm).

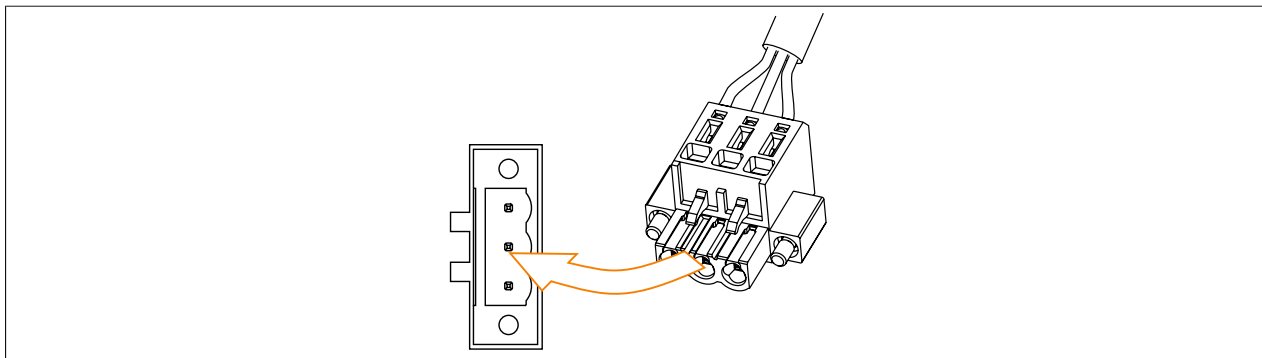


Figure 10: Connecting the power supply connector to a B&R device

3.3 Functional ground - Grounding concept

Functional ground is a current path of low impedance between electrical circuits and ground. It is used, for example, to improve immunity to disturbances and not necessarily as a protective measure. It therefore serves only to deflect disturbances, not to provide any kind of protection against electric shock.

This device comes equipped with two functional ground connections:

- Power supply
- Ground connection

To guarantee safe conductance of electric disturbances, the following points must be observed:

- The device must be connected to the central grounding point in the control cabinet using the shortest route possible.
- A cable with a minimum cross section of 2.5 mm² per connection should be used. If a cable with wire end sleeves is connected to the 0TB103.9 or 0TB103.91 terminal block, then a cable with maximum 1.5 mm² per connection is possible.
- Note the line shielding concept. All data cables connected to the device must be shielded.

Symbol indicating functional ground on the B&R device: 

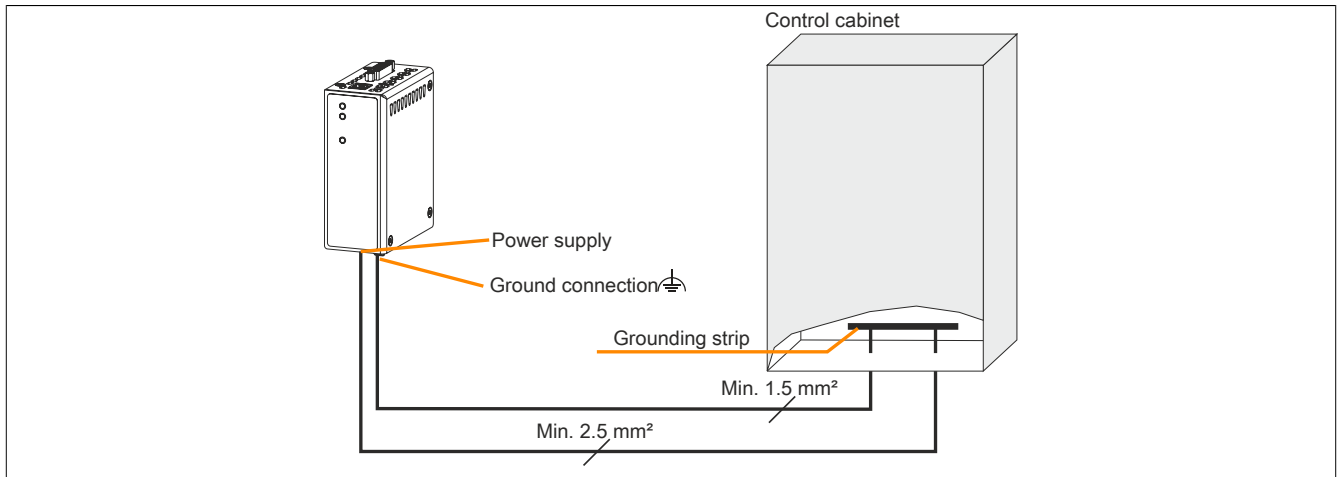


Figure 11: SDL3 Converter - Grounding concept

4 Cable connections

Flex radius specifications must be taken into account when installing or connecting cables.

Information:

The maximum torque for the locating screws is 0.5 Nm.

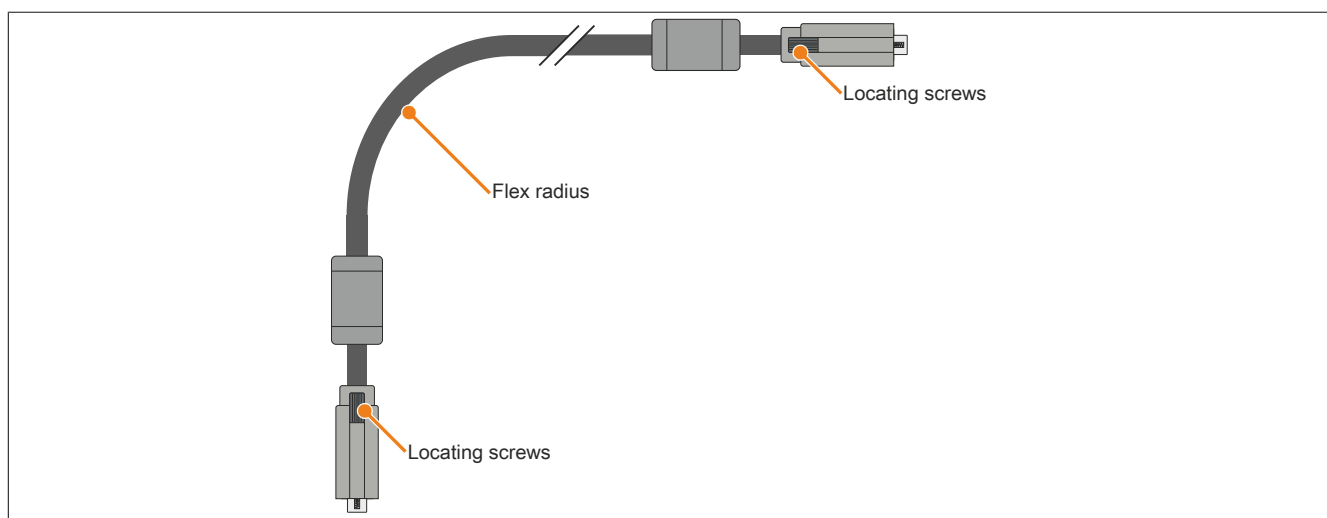


Figure 12: Flex radius - Cable connection

Information:

The specified flex radius is listed in the technical data for the respective cable.

5 Switching on the device for the first time

5.1 General information before switching on the device

Checklist

The following items must be checked before the device is put into operation for the first time:

- Have the installation notes as specified in "Installation" on page 24 been observed?
- Have the permitted environmental conditions been taken into consideration for the device?
- Is the power supply connected correctly, and have the associated values been checked?
- Is the ground cable connected correctly to the ground connection?
- The device must be put into operation first before additional hardware is installed.

Caution!

Before the device is put into operation, it must first be acclimated to room temperature! It should not be immediately subjected to thermal radiation.

If transported at low temperatures or if there are large temperature fluctuations, the device must not be subjected to any type of moisture.

Prerequisites and requirements

The following requirements must be fulfilled before the device is switched on for the first time:

- The functional ground connections must be kept as short as possible and connected to the central grounding point using the largest possible wire cross section.
- All connection cables must be connected correctly.
- An Automation PC or Panel PC and Automation Panel must be connected.

5.2 Switching on the SDL3 Converter

Procedure

1. Connect and switch on the voltage supply (e.g. power supply).
2. The device is operational.

Chapter 4 • Software

1 Upgrade information

Warning!

The BIOS and firmware on B&R devices must be kept current. New versions can be downloaded from the B&R website (www.br-automation.com).

1.1 Firmware upgrade

To upgrade the firmware, an APC2100, APC910 or PPC900 with compatible MTCX firmware must be connected in addition to an Automation Panel with an SDL3 link module.

The latest firmware upgrade is available in the Downloads section of the B&R website (www.br-automation.com).

More detailed information regarding this procedure can be found in the Readme file included with the firmware upgrade.

Chapter 5 • Standards and certifications

1 Standards and guidelines

1.1 CE mark



Product complies with all applicable directives and their harmonized EN standards.

1.2 EMC directive

These devices meet the requirements of EC directive "2004/108/EC Electromagnetic compatibility" and are designed for the following areas:

EN 61131-2:2007	Programmable logic 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

1.3 Low voltage directive

These devices satisfy the requirements of EC directive "2006/95/EC Low voltage directive" and are designed for the following areas:

EN 61131-2:2007	Programmable logic controllers - Part 2: Equipment requirements and tests
EN 60204-1:2006 + A1:2009	Safety of machinery - Electrical equipment of machines - Part 1: General requirements

Chapter 6 • Accessories

The following accessories have successfully completed functional testing at B&R and are approved for use with this device. Nevertheless, it is important to observe any limitations that may apply to the complete system when operated with other individual components. When operating the complete system, the specifications for the individual components must be observed.

All components listed in this manual have been subjected to extensive system and compatibility testing and are approved for use. B&R can make no guarantee regarding the functionality of non-approved accessories.

1 Power connectors

1.1 0TB103.9x

1.1.1 General information

The single-row, 3-pin 0TB103 terminal block is used to connect the voltage supply.

1.1.2 Order data

Model number	Short description	Figure
	Terminal blocks	
0TB103.9	Connector 24 VDC - 3-pin female - Screw clamps 3.31 mm ²	
0TB103.91	Connector 24 VDC - 3-pin female - Cage clamps 3.31 mm ²	

Table 15: 0TB103.9, 0TB103.91 - Order data

1.1.3 Technical data

Information:

The following characteristics, features and limit values only apply to this accessory and can deviate from those specified for the complete system. The data specifications for the complete system take precedence over those of individual components.

Product ID	0TB103.9		0TB103.91	
General information				
Certification				
CE			Yes	
cULus			Yes	
GL			Yes ¹⁾	
Terminal block				
Note	Protected against vibration by the screw flange Nominal values according to UL			
Number of pins	3 (female)			
Type of terminal clamp	Screw clamps		Cage clamps ²⁾	
Cable type	Only copper wires (no aluminum wires!)			
Distance between contacts	5.08 mm			
Connection cross section				
AWG wire	26 to 14 AWG		26 to 12 AWG	
Wire end sleeves with plastic covering			0.20 to 1.50 mm²	
Solid wires			0.20 to 2.50 mm²	
Fine strand wires	0.20 to 1.50 mm²		0.20 to 2.50 mm²	
With wire end sleeves			0.20 to 1.50 mm²	
Tightening torque	0.4 Nm		-	

Table 16: 0TB103.9, 0TB103.91 - Technical data

Product ID	0TB103.9	0TB103.91
Electrical characteristics		
Nominal voltage	300 V	
Nominal current ³⁾	10 A / contact	
Contact resistance	≤5 mΩ	

Table 16: 0TB103.9, 0TB103.91 - Technical data

- 1) Yes, although applies only if all components installed within the complete system have this certification.
- 2) Cage clamp terminal blocks cannot be used side-by-side.
- 3) The limit data for each I/O module must be taken into consideration.

2 Cables

2.1 SDL3 cables

2.1.1 5CASD3.xxxx-00

2.1.1.1 General information

5CASD3.xxxx-00 SDL3 cables are designed to transfer SDL3 data and very easy to install. An RJ45 connector allows these cables to be connected in very narrow spaces, for example in swing arm shafts.

Caution!

Power must be disconnected before connecting or disconnecting cables.

2.1.1.2 Order data

Model number	Short description	Figure
5CASD3.0100-00	SDL3 cable, 10 m	
5CASD3.0150-00	SDL3 cable, 15 m	
5CASD3.0200-00	SDL3 cable, 20 m	
5CASD3.0300-00	SDL3 cable, 30 m	
5CASD3.0500-00	SDL3 cable, 50 m	
5CASD3.1000-00	SDL3 cable, 100 m	

Table 17: 5CASD3.0100-00, 5CASD3.0150-00, 5CASD3.0200-00, 5CASD3.0300-00, 5CASD3.0500-00, 5CASD3.1000-00 - Order data

2.1.1.3 Technical data

Product ID	5CASD3.0100-00	5CASD3.0150-00	5CASD3.0200-00	5CASD3.0300-00	5CASD3.0500-00	5CASD3.1000-00
General information						
Certification	Yes					
CE						
cULus	Yes					
Cable construction						
Wire cross section	4x 2x 26/7 AWG			4x 2x 23/1 AWG		
Features	Flame-resistant, halogen-free, lead-free					
Outer sheathing	Polyurethane (PUR) Yellow, RAL 1021					
Material						
Color						
Labeling						
	HARTING INDUSTRIAL CABLE S/ FTP CAT 6A PUR 4x 2x 26/7 AWG			HARTING INDUSTRIAL INSTALLATION CA- BLE S/FTP CAT 7 PUR 4x 2x 23/1 AWG		
Lines	Polyethylene (PE) Green/white-green, orange/white-orange, blue/white-blue, brown/white-brown Aluminum foil and braided wire shield made of tinned copper wires					
Wire insulation						
Wire colors						
Shield						
Type	Unprotected copper wire, 4x 2x 26/7 AWG			Unprotected copper wire, 4x 2x 23/1 AWG		
Connector						
Type	2x RJ45, male					
Connection cycles	Min. 750					
Contacts	8					
Electrical characteristics ¹⁾						
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 in accordance with ISO/IEC 11801 (EN 50173-1), ISO/IEC 24702 (EN 50173-3)			Category 7 / Class F up to 600 MHz in accordance with ISO/IEC 11801 (EN 50173-1), ISO/IEC 24702 (EN 50173-3)		
Insulation resistance	≥ 500 MΩ/km			≥5 GΩ/km		
Operating conditions						
Flame-retardant	IEC 60332-1-2					
Oil and hydrolysis resistance	EN 60811-2-1 (90°C / 7x24 h)					
EN 60529 protection	IP20 IP20, only when connected properly					
Cables						
RJ45 connector						

Table 18: 5CASD3.0100-00, 5CASD3.0150-00, 5CASD3.0200-00, 5CASD3.0300-00, 5CASD3.0500-00, 5CASD3.1000-00 - Technical data

Product ID	5CASD3.0100-00	5CASD3.0150-00	5CASD3.0200-00	5CASD3.0300-00	5CASD3.0500-00	5CASD3.1000-00
Environmental conditions						
Temperature						
Storage						
Fixed installation						
Flexible installation						
	-40 to 70°C			-10 to 50°C		
Mechanical characteristics						
Dimensions						
Length						
Diameter						
	10 m	15 m	20 m	30 m	50 m	100 m
	6.7 mm			8.3 mm		
Flex radius						
Fixed installation						
Flexible installation						
	≥5x diameter			≥4x diameter		
	≥10x diameter			≥8x diameter		
Weight	500 g	700 g	950 g	2150 g	3500 g	6950 g
Tension						
During operation						
During installation						
	≤70 N			≤110 N		
	≤70 N			≤110 N		

Table 18: 5CASD3.0100-00, 5CASD3.0150-00, 5CASD3.0200-00, 5CASD3.0300-00, 5CASD3.0500-00, 5CASD3.1000-00 - Technical data

1) At an ambient temperature of 20°C.

2.1.1.4 Flex radius specifications

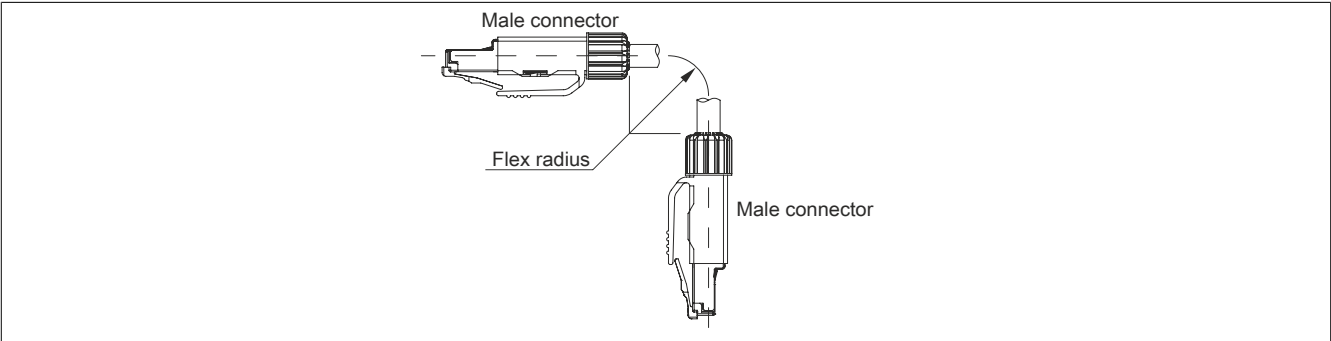


Figure 13: SDL3 - Flex radius specifications

2.1.1.5 Dimensions

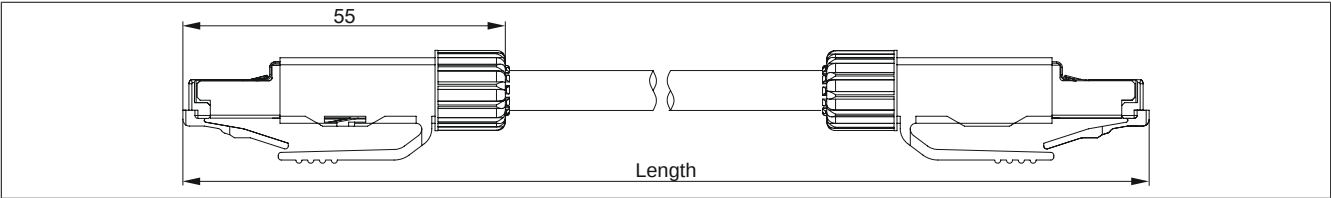


Figure 14: 5CASD3.xxxx-00 - Dimensions

2.1.1.6 Cable pinout

Warning!

Field-assembled cables must be wired according to these specifications.

If a field-assembled cable is used, B&R cannot guarantee that it will function properly. All cables provided by B&R are guaranteed to function properly, however.

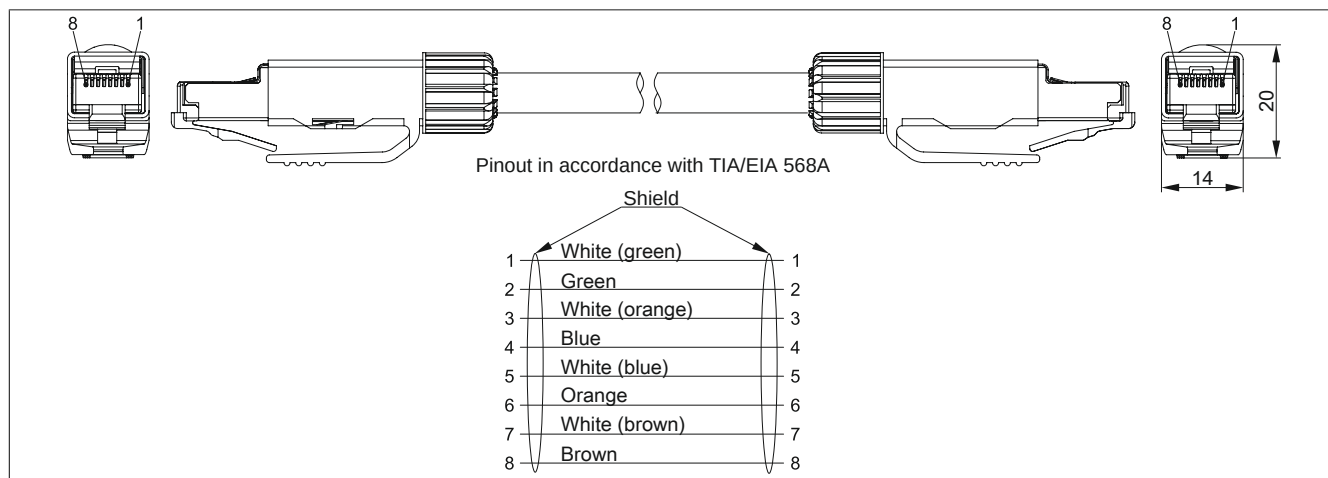


Figure 15: 5CASD3.xxxx-00 - Pinout

2.1.1.7 Cabling

The following information and figure apply when using a field-assembled cable that is not directly connected to a B&R device, but to an RJ45 network interface (e.g. patch panel).

Cables must meet category 6a (Cat6a) or category 7 (Cat7) requirements. Exceeding the maximum total length of 100 m is not permitted.

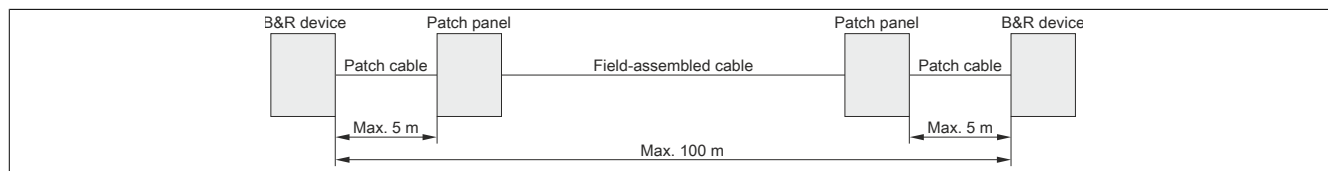


Figure 16: Cabling with a field-assembled cable

2.2 SDL cables

2.2.1 5CASDL.0xxx-00

2.2.1.1 General information

5CASDL.0xxx-00 SDL cables are designed for use in inflexible applications. 5CASDL.0xxx-03 SDL flex cables are required for flexible applications (e.g. swing arm systems).

Caution!

Power must be disconnected before connecting or disconnecting cables.

2.2.1.2 Order data

Model number	Short description	Figure
	SDL cables	
5CASDL.0018-00	SDL cable - 1.8 m	
5CASDL.0050-00	SDL cable - 5 m	
5CASDL.0100-00	SDL cable, 10 m	

Table 19: 5CASDL.0018-00, 5CASDL.0050-00, 5CASDL.0100-00 - Order data

2.2.1.3 Technical data

Product ID	5CASDL.0018-00	5CASDL.0050-00	5CASDL.0100-00
General information			
Certification			
CE	Yes		
cULus	Yes		
GOST-R	Yes		
GL	Yes ¹⁾		
Cable construction			
Wire cross section	AWG 28		AWG 24
Shield	Individual cable pairs and entire cable		
Complete shielding	Tinned copper braiding, optical coverage >85%		
Outer sheathing			
Material	PVC		
Color	Black		
Labeling	E74020-C (UL) AWM STYLE 20176 80°C 30V VW-1 DVI DIGITAL LINK		
Connector			
Type	2x DVI-D (24+1), male		
Connection cycles	100		
Contacts	Gold-plated		
Mechanical protection	Metal cover with crimped stress relief		
Locating screw tightening torque	Max. 0.5 Nm		
Electrical characteristics			
Conductor resistance			
AWG 24	-		≤93 Ω/km
AWG 28	≤237 Ω/km		-
Insulation resistance	Min. 10 MΩ/km		
Mechanical characteristics			
Dimensions			
Length	1.8 m ±30 mm	5 m ±30 mm	10 m ±50 mm
Diameter	Typ. 8.6 ±0.2 mm Max. 9 mm		Typ. 11 ±0.2 mm Max. 11.5 mm
Flex radius	≥5x cable diameter (male connector - ferrite bead and ferrite bead - ferrite bead)		
Flexibility	Limited flexibility, valid for ferrite bead - ferrite bead (tested 100 cycles with 5x cable diameter, 20 cycles/minute)		
Weight	Approx. 300 g	Approx. 580 g	Approx. 1500 g

Table 20: 5CASDL.0018-00, 5CASDL.0050-00, 5CASDL.0100-00 - Technical data

1) Yes, although applies only if all components installed within the complete system have this certification.

2.2.1.4 Flex radius specifications

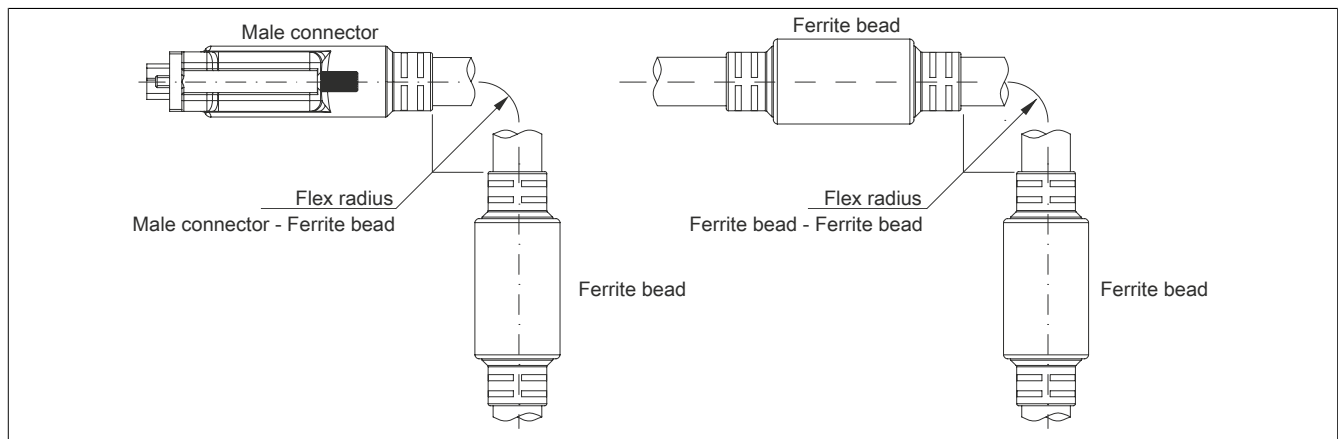


Figure 17: Flex radius specifications

2.2.1.5 Dimensions

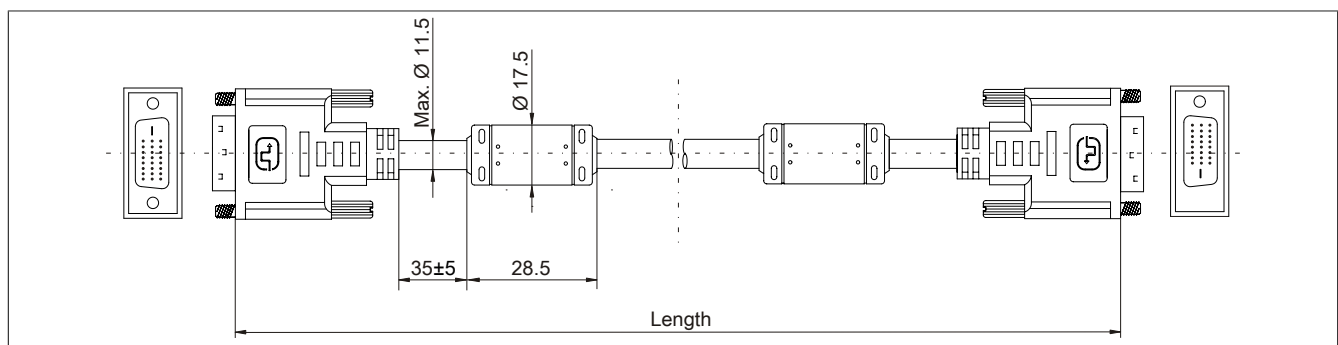


Figure 18: 5CASDL.0xxx-00- Dimensions

2.2.1.6 Cable pinout

Warning!

Field-assembled cables must be wired according to these specifications.

If a field-assembled cable is used, B&R cannot guarantee that it will function properly. All cables provided by B&R are guaranteed to function properly, however.

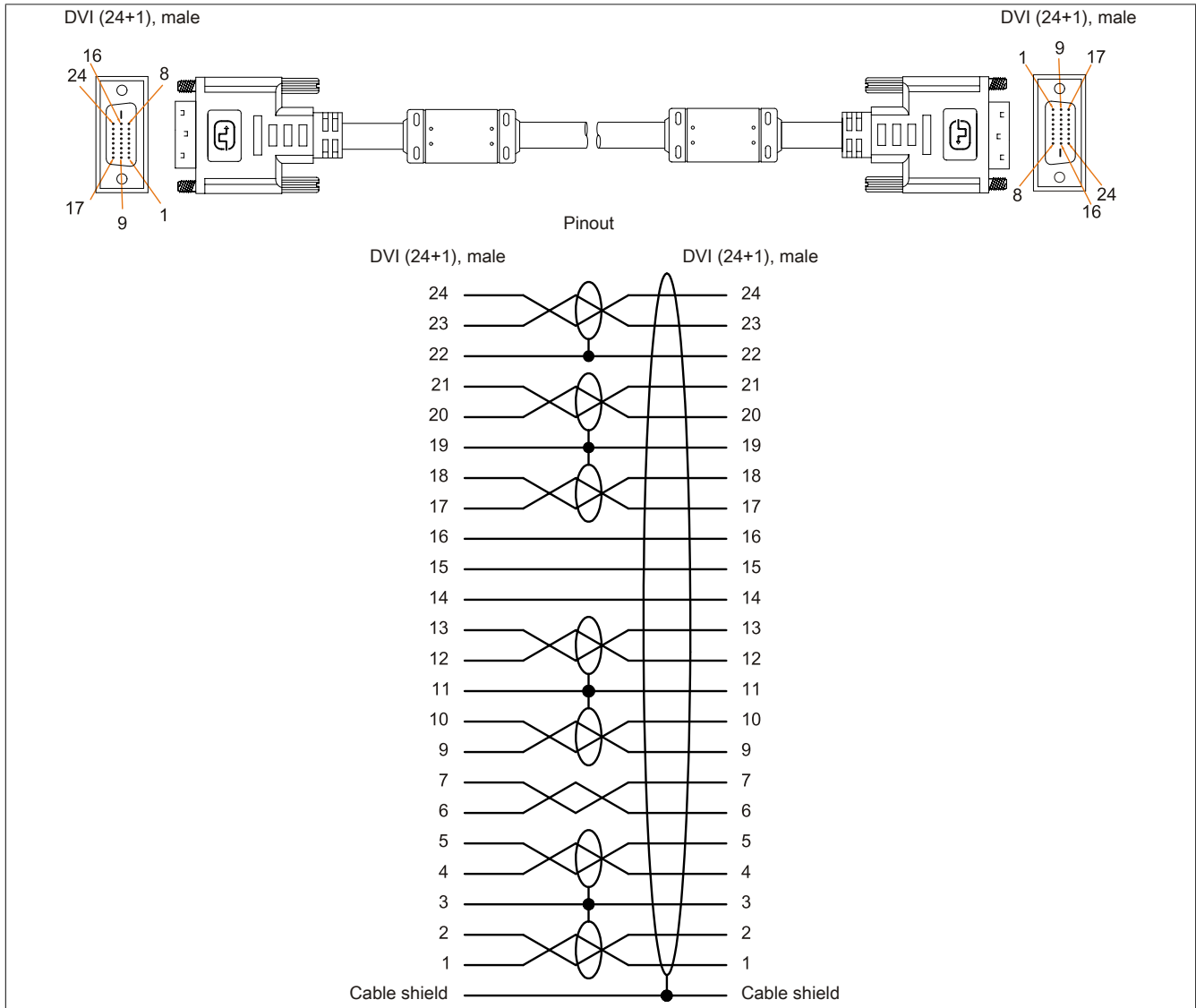


Figure 19: 5CASDL.0xxx-00 - Pinout

2.3 SDL cables with 45° male connector

2.3.1 5CASDL.0xxx-01

2.3.1.1 General information

5CASDL.0xxx-01 SDL cables with a 45° connector are designed for use in inflexible applications.

Caution!

Power must be disconnected before connecting or disconnecting cables.

2.3.1.2 Order data

Model number	Short description	Figure
	SDL cables with 45° connectors	
5CASDL.0018-01	SDL cable - 45° connector - 1.8 m	
5CASDL.0050-01	SDL cable with 45° male connector, 5 m	
5CASDL.0100-01	SDL cable with 45° male connector, 10 m	

Table 21: 5CASDL.0018-01, 5CASDL.0050-01, 5CASDL.0100-01 - Order data

2.3.1.3 Technical data

Product ID	5CASDL.0018-01	5CASDL.0050-01	5CASDL.0100-01
General information			
Certification			
CE	Yes		
cULus	Yes		
GOST-R	Yes		
GL	Yes ¹⁾		
Cable construction			
Wire cross section	AWG 28		AWG 24
Shield	Individual cable pairs and entire cable		
Complete shielding	Tinned copper braiding, optical coverage >85%		
Outer sheathing			
Material	PVC		
Color	Black		
Connector			
Type	2x DVI-D (24+1), male		
Connection cycles	100		
Contacts	Gold-plated		
Mechanical protection	Metal cover with crimped stress relief		
Locating screw tightening torque	Max. 0.5 Nm		
Electrical characteristics			
Conductor resistance			
AWG 24	-		≤93 Ω/km
AWG 28	≤237 Ω/km		-
Insulation resistance	Min. 10 MΩ/km		
Mechanical characteristics			
Dimensions			
Length	1.8 m ±30 mm	5 m ±50 mm	10 m ±100 mm
Diameter	Max. 9 mm		Max. 11.5 mm
Flex radius			
Fixed installation	≥5x cable diameter (male connector - ferrite bead and ferrite bead - ferrite bead)		
Flexibility	Limited flexibility, valid for ferrite bead - ferrite bead (tested 100 cycles with 5x cable diameter, 20 cycles/minute)		
Weight	Approx. 300 g	Approx. 590 g	Approx. 2800 g

Table 22: 5CASDL.0018-01, 5CASDL.0050-01, 5CASDL.0100-01 - Technical data

1) Yes, although applies only if all components installed within the complete system have this certification.

2.3.1.4 Flex radius specifications

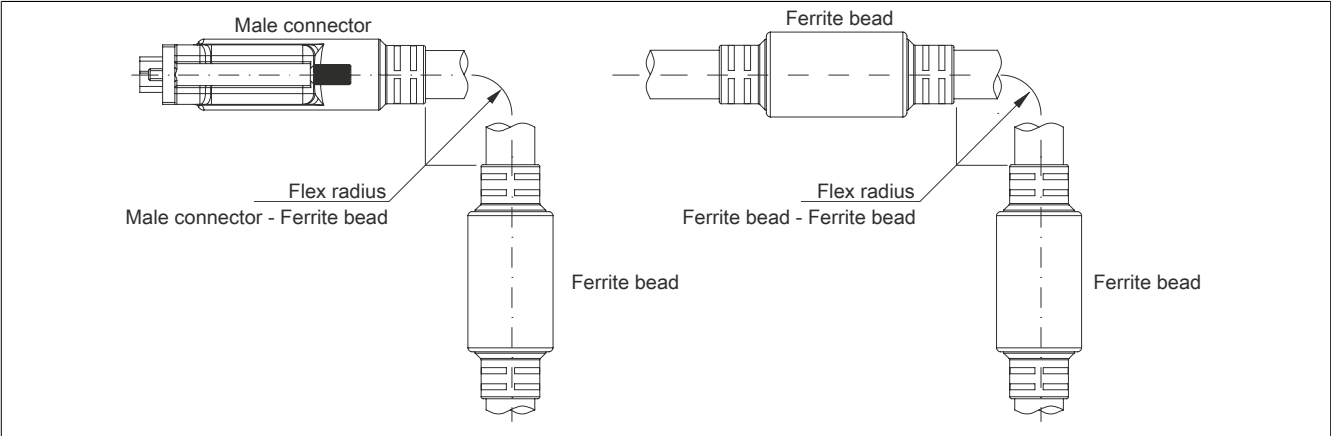


Figure 20: Flex radius specifications

2.3.1.5 Dimensions

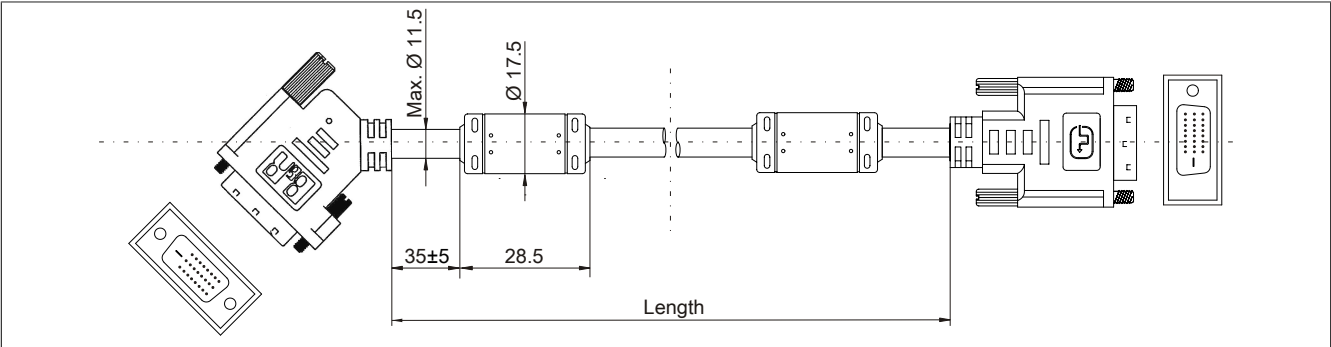


Figure 21: 5CASDL.0xxx-01 - Dimensions

2.3.1.6 Cable pinout

Warning!

Field-assembled cables must be wired according to these specifications.

If a field-assembled cable is used, B&R cannot guarantee that it will function properly. All cables provided by B&R are guaranteed to function properly, however.

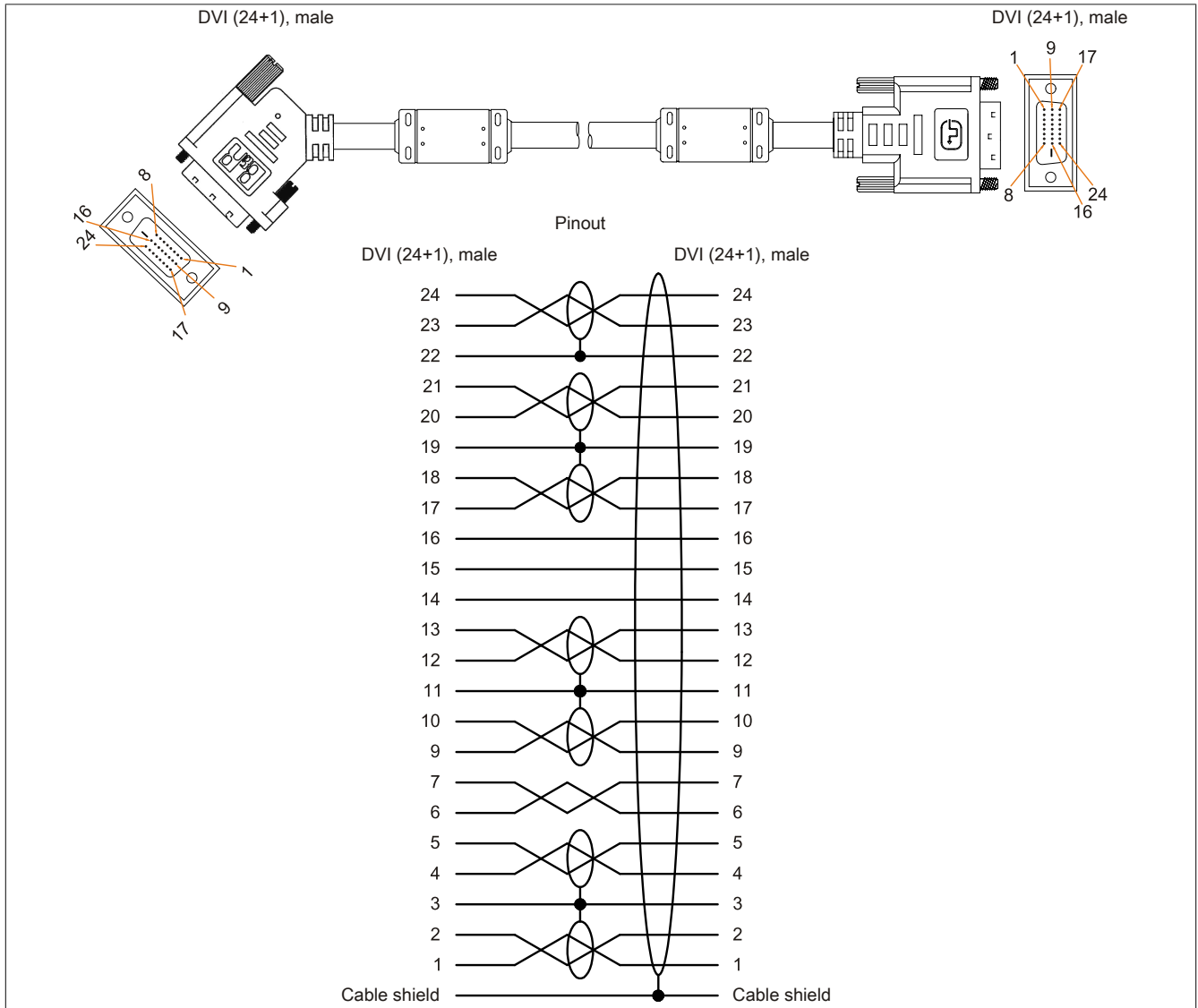


Figure 22: 5CASDL.0xxx-01 - Pinout

2.4 SDL flex cables

2.4.1 5CASDL.0xxx-03

2.4.1.1 General information

5CASDL.0xxx-03 SDL flex cables are designed for use in both inflexible and flexible applications (e.g. swing arm systems).

Caution!

Power must be disconnected before connecting or disconnecting cables.

2.4.1.2 Order data

Model 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	

Table 23: 5CASDL.0018-03, 5CASDL.0050-03, 5CASDL.0100-03 - Order data

2.4.1.3 Technical data

Product ID	5CASDL.0018-03		5CASDL.0050-03		5CASDL.0100-03	
General information						
Certification	Yes Yes Yes Yes ¹⁾					
CE						
cULus						
GOST-R						
GL						
Cable construction						
Wire cross section	AWG 24 (control wires) AWG 26 (DVI, USB, data)					
Features	Silicone- and halogen-free					
Shield	Individual cable pairs and entire cable					
Complete shielding	Aluminum-clad foil + tinned copper braiding					
Outer sheathing	Special semi-glossy TMPU Black (B&R) SDL Cable (UL) AWM 20236 80°C 30V E 63216					
Material						
Color						
Labeling						
Connector						
Type	2x DVI-D (24+1), male					
Connection cycles	Min. 200					
Contacts	Gold-plated					
Mechanical protection	Metal cover with crimped stress relief					
Locating screw tightening torque	Max. 0.5 Nm					
Electrical characteristics						
Operating voltage	≤30 V					
Test voltage	1 kV 0.5 kV					
Wire/Wire						
Wire/Shield						
Wave impedance	100 ±10 Ω					
Conductor resistance	≤95 Ω/km ≤145 Ω/km					
AWG 24						
AWG 26						
Insulation resistance	>200 MΩ/km					
Operating conditions						
Approbation	UL AWM 20236 80°C 30 V					
Flame-retardant	In accordance with UL758 (cable vertical flame test)					
Oil and hydrolysis resistance	In accordance with VDE 0282-10					
Environmental conditions						
Temperature	-20 to 80°C -20 to 80°C -5 to 60°C					
Storage						
Fixed installation						
Flexible installation						
Mechanical characteristics						
Dimensions	1.8 m ±20 mm 5 m ±45 mm 10 m ±90 mm Max. 12 mm					
Length						
Diameter						

Table 24: 5CASDL.0018-03, 5CASDL.0050-03, 5CASDL.0100-03 - Technical data

Product ID	5CASDL.0018-03	5CASDL.0050-03	5CASDL.0100-03
Flex radius	$\geq 6 \times$ cable diameter (from male connector - ferrite bead) $\geq 10 \times$ cable diameter (from ferrite bead - ferrite bead) $\geq 15 \times$ cable diameter (from ferrite bead - ferrite bead)		
Flexibility	Flexible, valid for ferrite bead - ferrite bead (tested 300,000 cycles with 15x cable diameter, 4800 cycles/hour)		
Drag chain data	Flex cycles: 300,000 Speed: 4800 cycles/hour Flex radius: 180 mm, 15x cable diameter Hub: 460 mm		
Weight	Approx. 460 g	Approx. 1020 g	Approx. 1940 g
Tension			
During operation	≤ 50 N		
During installation	≤ 400 N		

Table 24: 5CASDL.0018-03, 5CASDL.0050-03, 5CASDL.0100-03 - Technical data

1) Yes, although applies only if all components installed within the complete system have this certification.

2.4.1.4 Flex radius specifications

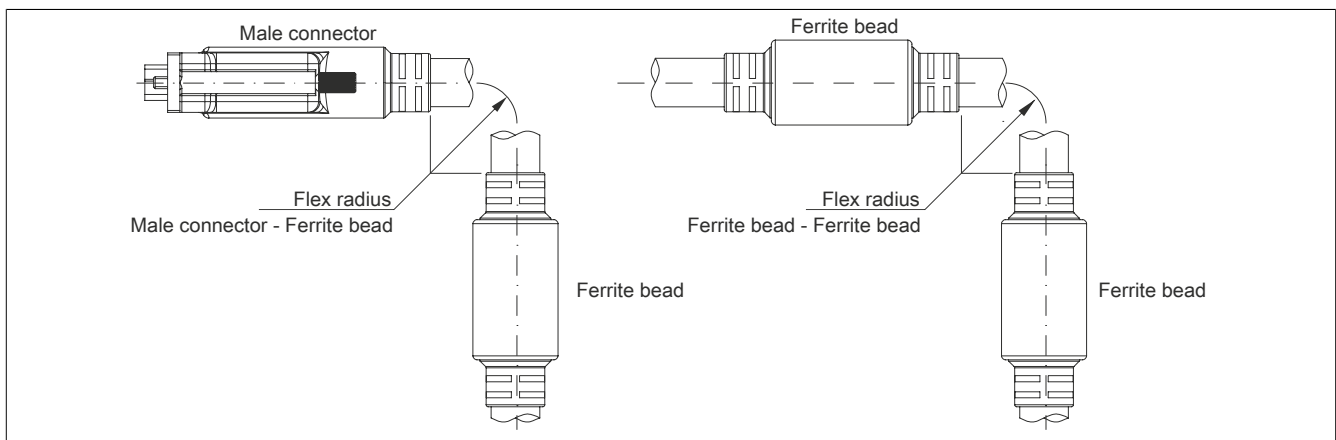


Figure 23: Flex radius specifications

2.4.1.5 Dimensions

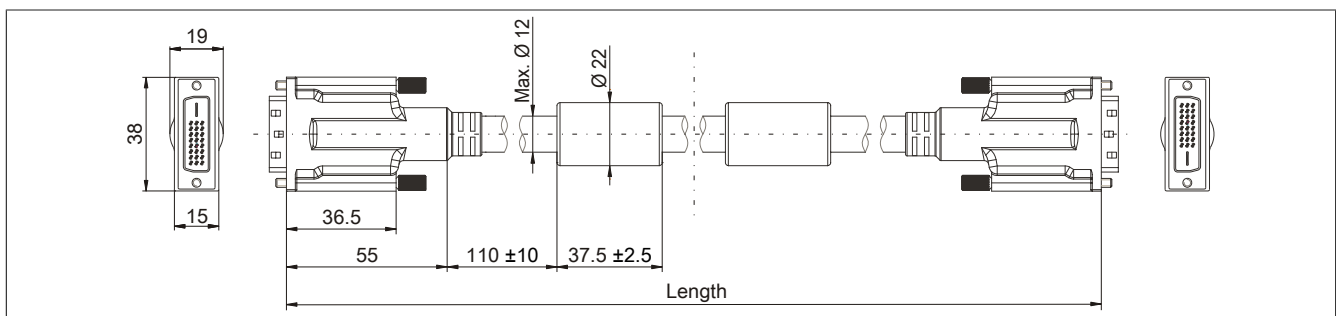


Figure 24: 5CASDL.0xxx-03 - Dimensions

2.4.1.6 Design

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

Table 25: 5CASDL.0xxx-03 SDL flex cables - Structure

2.4.1.7 Cable pinout

Warning!

Field-assembled cables must be wired according to these specifications.

If a field-assembled cable is used, B&R cannot guarantee that it will function properly. All cables provided by B&R are guaranteed to function properly, however.

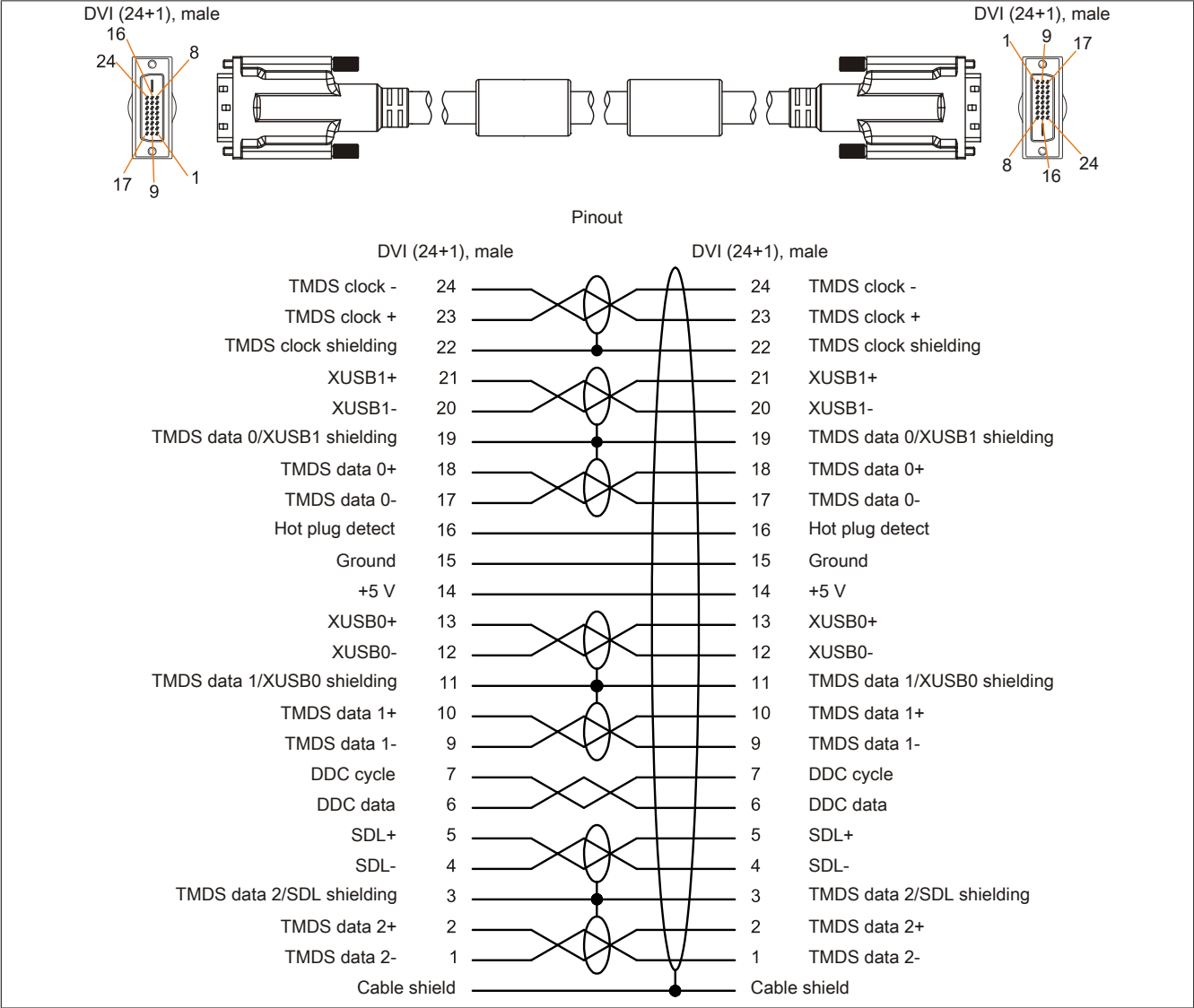


Figure 25: 5CASDL.0xxx-03 - Pinout

2.5 DVI cables

2.5.1 5CADVI.0xxx-00

2.5.1.1 General information

5CADVI.0xxx-00 DVI cables are designed for use in inflexible applications.

Caution!

Power must be disconnected before connecting or disconnecting cables.

2.5.1.2 Order data

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

Table 26: 5CADVI.0018-00, 5CADVI.0050-00 - Order data

2.5.1.3 Technical data

Product ID	5CADVI.0018-00	5CADVI.0050-00
General information		
Certification		
CE	Yes	
cULus	Yes	
GOST-R	Yes	
GL	Yes ¹⁾	
Cable construction		
Wire cross section	AWG 28	
Shield	Individual cable pairs and entire cable	
Complete shielding	Tinned copper braiding, optical coverage >86%	
Outer sheathing		
Material	PVC	
Color	Beige	
Labeling	AWM STYLE 20276 80°C 30V VW1 DVI DIGITAL SINGLE LINK DER AN	
Connector		
Type	2x DVI-D (18+1), male	
Connection cycles	100	
Locating screw tightening torque	Max. 0.5 Nm	
Electrical characteristics		
Conductor resistance	Max. 237 Ω/km	
Insulation resistance	Min. 100 MΩ/km	
Mechanical characteristics		
Dimensions		
Length	1.8 m ±50 mm	5 m ±80 mm
Diameter	Max. 8.5 mm	
Flex radius	≥5x cable diameter (male connector - ferrite bead and ferrite bead - ferrite bead)	
Weight	Approx. 260 g	Approx. 460 g

Table 27: 5CADVI.0018-00, 5CADVI.0050-00 - Technical data

1) Yes, although applies only if all components installed within the complete system have this certification.

2.5.1.4 Flex radius specifications

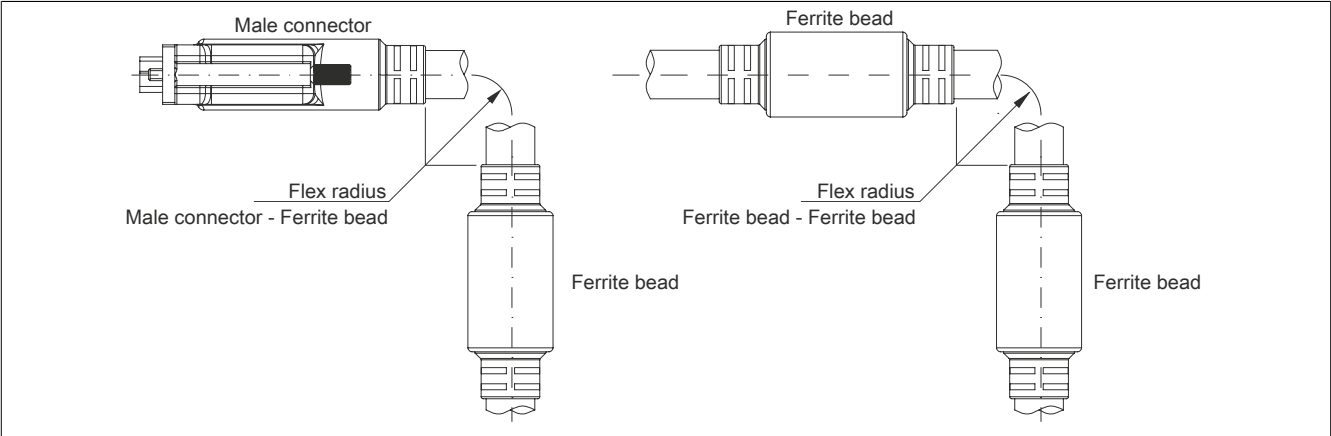


Figure 26: Flex radius specifications

2.5.1.5 Dimensions

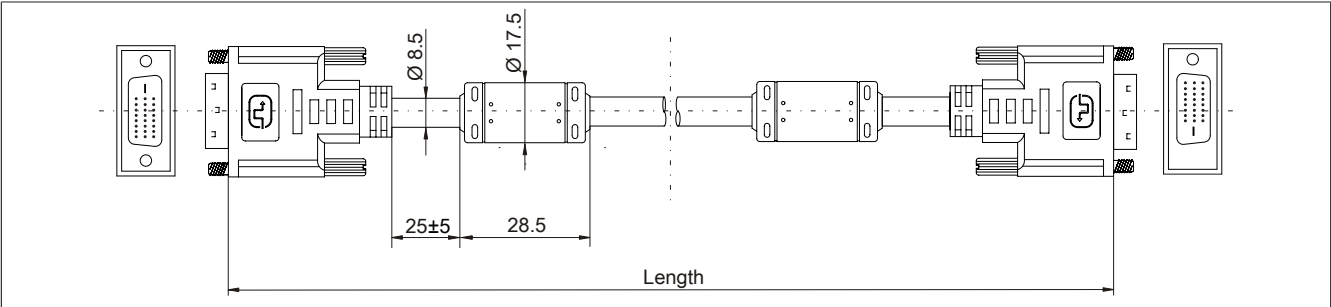


Figure 27: 5CADVI.0xxx-00 - Dimensions

2.5.1.6 Cable pinout

Warning!

Field-assembled cables must be wired according to these specifications.

If a field-assembled cable is used, B&R cannot guarantee that it will function properly. All cables provided by B&R are guaranteed to function properly, however.

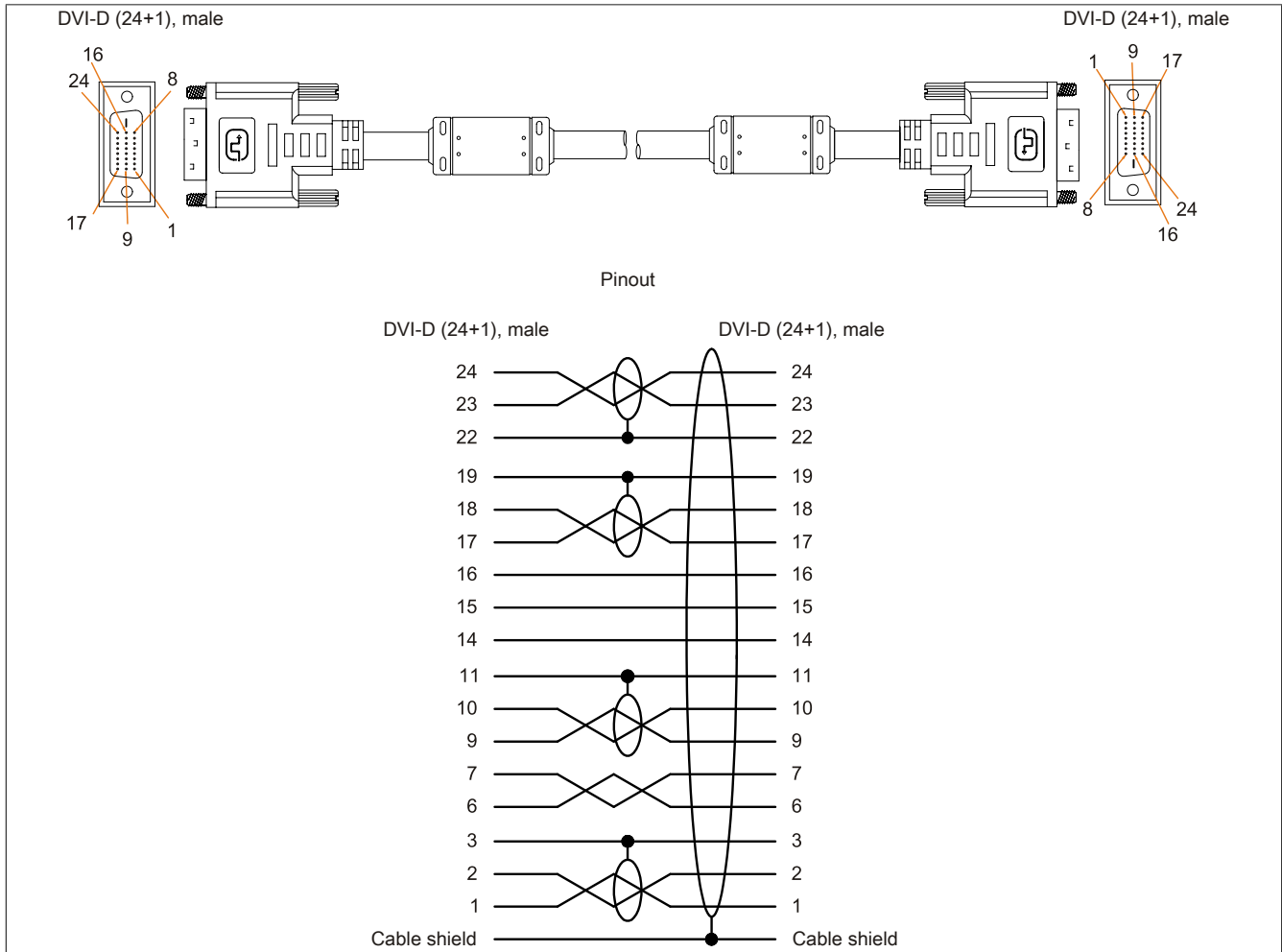


Figure 28: 5CADVI.0xxx-00 - Pinout

2.6 USB cables

2.6.1 5CAUSB.00xx-00

2.6.1.1 General information

USB cables are designed to achieve USB 2.0 transfer speeds.

2.6.1.2 Order data

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

Table 28: 5CAUSB.0018-00, 5CAUSB.0050-00 - Order data

2.6.1.3 Technical data

Product ID	5CAUSB.0018-00	5CAUSB.0050-00
General information		
Certification		
CE	Yes	
cULus	Yes	
GOST-R	Yes	
Cable construction		
Wire cross section	AWG 24, 28	
Shield	Entire cable	
Outer sheathing		
Color	Beige	
Connector		
Type	USB type A male and USB type B male	
Mechanical characteristics		
Dimensions		
Length	1.8 m ±30 mm	5 m ±50 mm
Diameter	Max. 5 mm	
Flex radius	Min. 100 mm	

Table 29: 5CAUSB.0018-00, 5CAUSB.0050-00 - Technical data

2.6.1.4 Cable pinout

Warning!

Field-assembled cables must be wired according to these specifications.

If a field-assembled cable is used, B&R cannot guarantee that it will function properly. All cables provided by B&R are guaranteed to function properly, however.

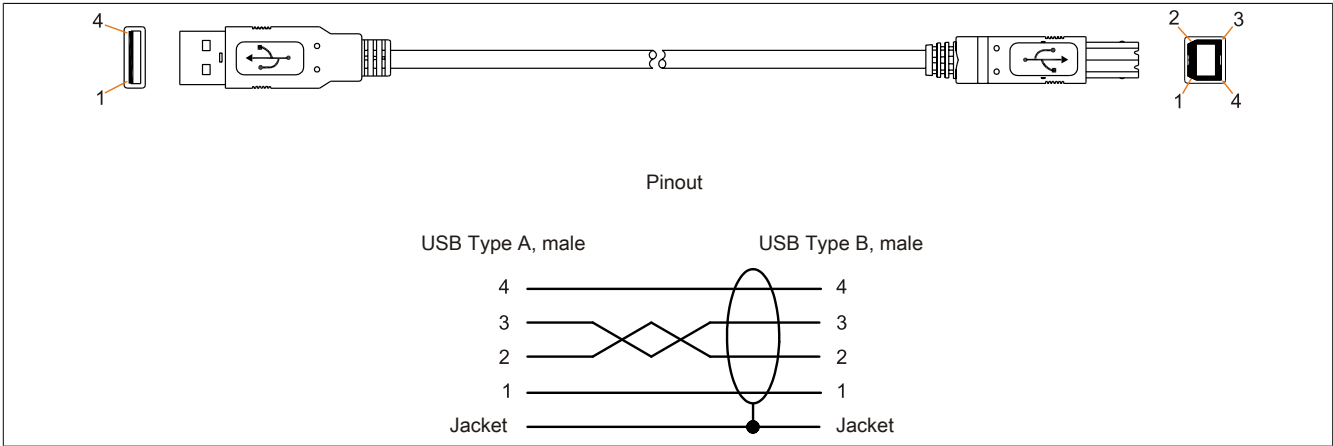


Figure 29: 5CAUSB.00xx-00 USB cables - Pinout

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