TECHNICAL INFORMATION

JEF300/JEF500
Laser Measurement Sensors

Mounting, electrical installation and data output formats

SICK
Sensor Intelligence.

1 About this document

1.1 Information overview

Additional information on the **mounting** and **electrical installation** as well on the **data output formats** of measured values (JEF500 and JEF300) and of the Level Control result (JEF300) is summarized in this document. It is intended for suitably qualified installation and commissioning personnel, and can be applied to configuration, commissioning and further data processing.

Notes on commissioning, configuration with SOPAS-ET and maintenance is included in the operating instructions for JEF300 respectively for JEF500.

Information on the JEF300/500 can also be referred to in the Internet on the product page for the JEF300/500 under **www.mysick.com/en/jef300** respectively .../**jef500**:

- Technical data in the online data sheet (PDF)
- Dimensional drawing and 3D CAD dimension models in various electronic formats
- Operating range diagrams
- EC Declaration of Conformity (PDF)
- Overview and description of the command strings
- SOPAS-ET configuration software
- JEF300/500 product information with an overview of the accessories (PDF)
- JEF300 operating instructions and JEF500 operating instructions (PDF)
- This JEF300/500 technical information (PDF)

Support is also available from your sales partner to be found under **www.sick.com/worldwide**.

Symbols used

Some information in this document is highlighted as follows to facilitate quick access to this information.

NOTICE

Note!

A notice refers to a potential risk of damage or loss of function of the JEF300/500 or the devices connected up to it.

⚠ WARNING

Warning!

A warning refers to specific or potential dangers to the physical safety of the user. It is there to protect the user against accidents.

The safety mark next to the warning, on the left, refers to the type of accident risk, e.g. electricity-related. The ascending warning levels (CAUTION, WARNING, DANGER) refer to the severity of the possible danger.

➢ Always read the warnings carefully and make sure you comply with them.

Important This important note is there to advise you on special aspects.

This symbol refers to supplementary technical documentation.

1.2 Safety information

- Read the notes on mounting and electrical installation prior to carrying out the work.
- Read additionally the operating instructions of the JEF300 respectively JEF500 to familiarize yourself with the device and its functions.
- The JEF300/500 corresponds to laser class 2. For more on this, see *Section "Laser warning", Page 5.*
- The JEF300/500 is an active sensor. It does not require any illumination for the objects, any reflectors or position markers.
- The JEF300/500 can only safely detect parts of objects, e.g. edges, surrounds or protruding parts, when the area visible for the JEF300/500 is at least three times the angular resolution resulting from the distance to the zero point. If the area is smaller, distance measurements outside the tolerance of the JEF300/500 may be produced.
- **Function of the JEF300:**
  The JEF300 works as a triggered detection sensor in the Level Control application (e.g. check for complete presence or absence of objects in a matrix). The detection process can be started and ended via max. two physical switching inputs among other things. The JEF300 outputs the results after the detection process is complete switching via max. two physical switching outputs. The results are displayed based on selectable elements from the matrix (matrix complete, row, column or element)

  The additional use of a CDB620 connection module with the optional CMC600 parameter memory module provides software-controlled expansion by 2 additional switching inputs and outputs. They are not suitable for time critical applications such as connecting an incremental encoder.

  After completing the detection process, the JEF300 also outputs the results as data via the requesting data interface. After switching on the JEF300, the data is subscribed to once by command. The results include element-related height values and the status of the switching threshold evaluation via all rows, columns and elements of the entire matrix.

  Function of the JEF500:
  As a triggered measurement sensor, the JEF500 outputs the measured values (scan angle-related radial distance, remission, etc.) via the requesting data interface. After switching on the JEF500, the data is subscribed to once by command. The data is only output in realtime via a port of the Ethernet interface.
- Only use the device under permitted ambient conditions (e.g. designated region, temperature, ground potential). Where necessary, official and statutory regulations governing the operation must be complied with.
- Opening the screws of the JEF300/500 housing will invalidate any warranty claims against SICK AG.
- Repair work on the JEF300/500 may only be performed by qualified and authorized service personnel from SICK AG.
- **The JEF300/500 laser measurement sensors are not devices for protecting persons as defined by current machine safety standards.**

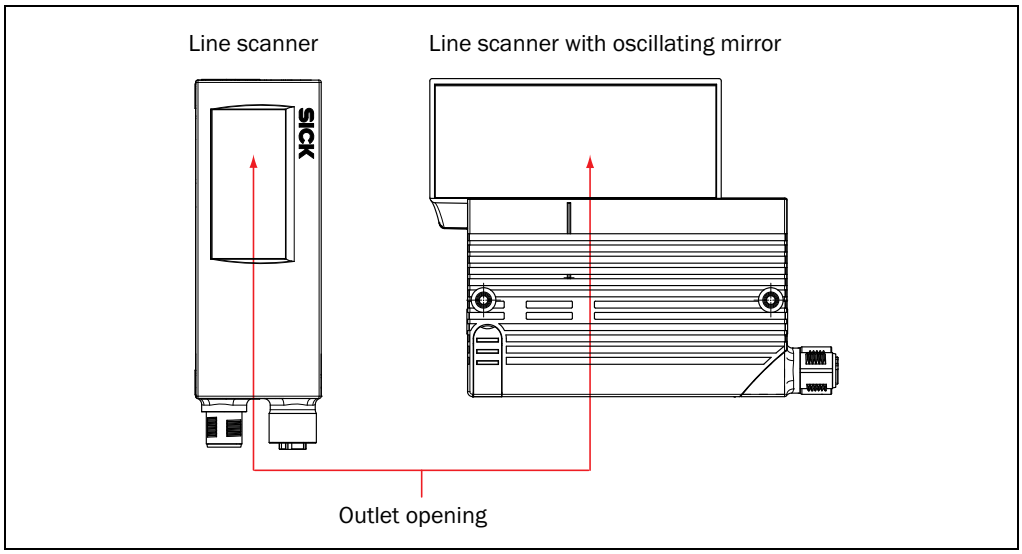
Laser warning

CAUTION

Laser radiation!

The JEF300/500 uses a red light laser diode and corresponds to laser class 2.

The entire measurement window is a an outlet opening for the visible laser radiation.



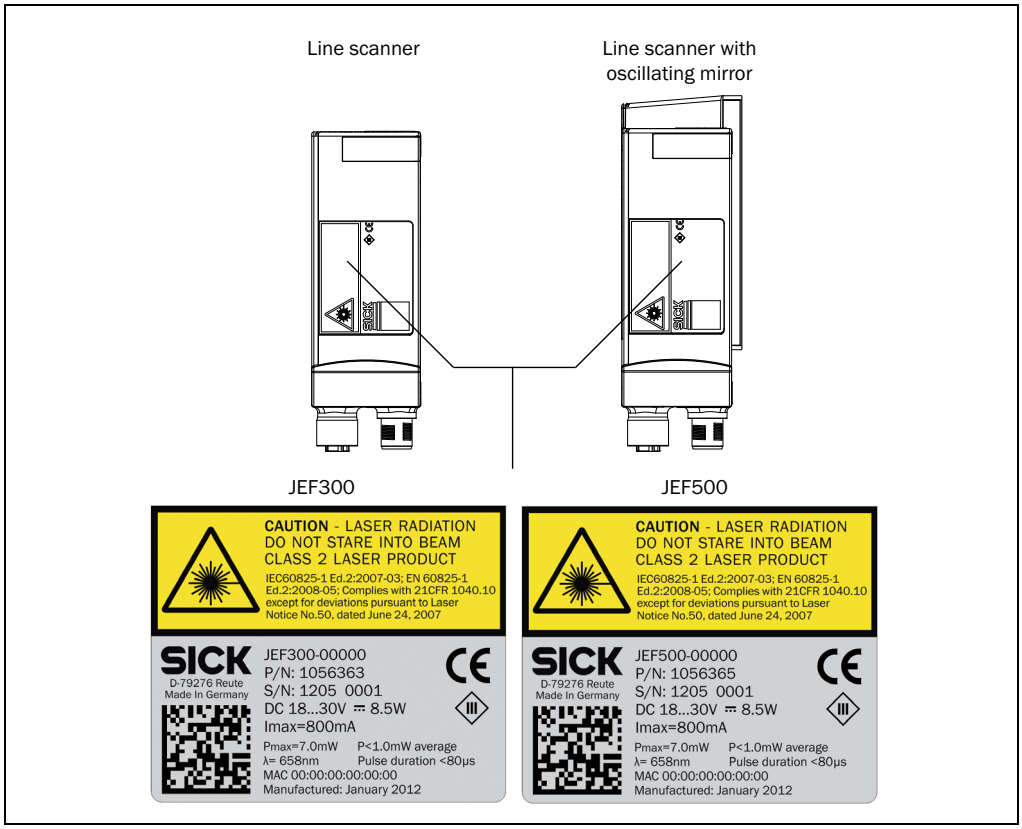
The human eye is not at risk when accidentally exposed to the laser radiation for short periods of time (up to 0.25 s). When intentionally exposed to the laser beam for longer periods of time, the retina of the eye may be damaged. The emitted radiation is harmless to human skin.

Caution – incorrect use can lead to the user beeing exposed to dangerous radiation.

- ➢ Never look directly into the beam path (similar to sunlight)
- ➢ Never point the laser beam at the eyes of people.
- ➢ When mounting and aligning the JEF300/500, avoid reflections of the laser beam off reflective surfaces.
- ➢ Do not open the closed JEF300/500 housing because this operation does not interrupt possible activation of the laser diode.
- ➢ Comply with the latest version of the applicable provisions on laser protection.

Important Maintenance is not necessary to ensure compliance with laser class 2.

Laser warning/laser specifications labels



The JEF300/500 includes two self-adhesive laser warning labels in German or French for replacement as required.

Controlling the laser diode

In real detection mode (JEF300) or measurement mode (JEF500), the JEF300/500 turns the laser diode on and off for moving objects with the trigger signal of the conveyor system (object in field of view). Triggering occurs via the switching inputs of the JEF300/500 or by two commands via one of the data interfaces.

A laser timeout that can be adjusted using SOPAS ET can automatically turn off the laser diode in this type of object trigger control, e.g. cycle stopped too long (conveyor system stopped). If the function is activated, the laser timeout is 10 min (default).

In the "Free running" or "Auto cycle" cycle types, the laser diode is turned on continuously or cyclically and a set laser timeout has no effect.

The "Laser" LED on the JEF300/500 illuminates while the laser diode is on. The JEF300/500 independently monitors beam generation and automatically shuts down the laser diode in the event of irregularities. In such case, the "Ready" LED illuminates red. The JEF300/500 no longer sends any detection result (JEF300) or measured values (JEF500).

Table of contents

2 Mounting

2.1 Notes on mounting

General:

- Use optional mounting kits 1, 2 or 3 depending on the application for a required fine adjustment in 2 or 3 axe.
  See *Chapter 2.2 Optional accessories, Page 9*.
- Mount the JEF300/500, so that:
  - The measurement can be taken free of shock and vibration.
  - It has a clear view of the object to be measured.
  - For the line scanner, the scan line is at a right angle to the direction of transport.
  - The line scanner with oscillating mirror is plane-parallel to the level ground.
  - It is minimum 400 mm above the highest object.
  - The position of the 90° beam (vertically downwards) is centered over the conveyor system width to minimize measurement shadowing by the radial scanning.
  - Its laser beam does not shine on glossy or reflective objects (e.g. stainless steel, window). This can produce measured value jumps in the measurement results.
  - Illumination by ambient light does not exceed 2,000 lx.
  - It is not exposed to direct sunlight (window, skylight) or other sources of heat. This causes the temperature in the device to increase improperly.
- The objects can be moved on a conveyor system with a flat transporting surface. Rotation, vibration, swaying and slipping of the objects on the conveyor system and uneven transporting surfaces can reduce the measurement accuracy and degrade the evaluation of detecting respectively distance measuring.
- Line scanner: The conveyor system must have a constant conveyor velocity or an incremental encoder must be installed and connected.

JEF300:

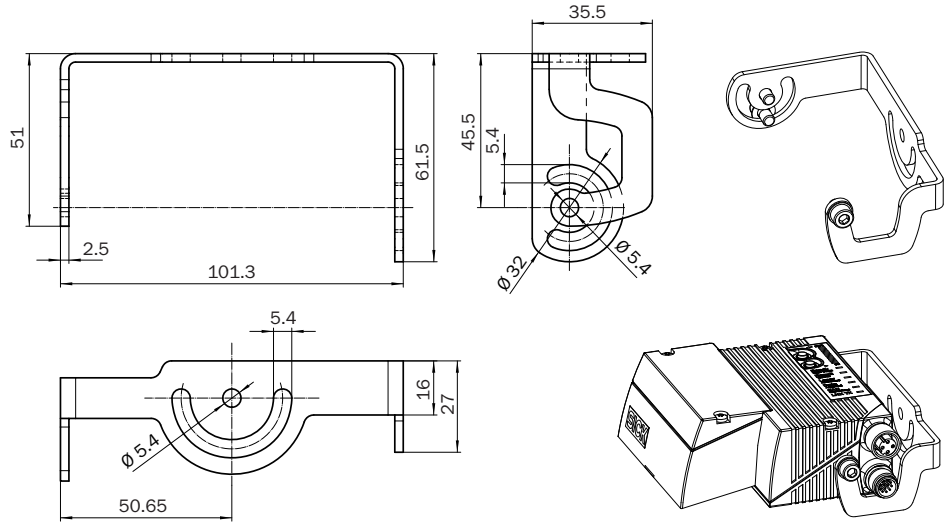
- Mount the JEF300 as high as possible within its operating range and with the laser beam vertically downwards above the guided objects.

JEF500:

- The JEF500 can be mounted in any position depending on the purpose. If the measurement is taken from above, mount the JEF500 as high as possible within its operating range and with the laser beam vertically downwards above the guided objects.

2.2 Optional accessories

2.2.1 Installing mounting set 1 (part no. 2042800)

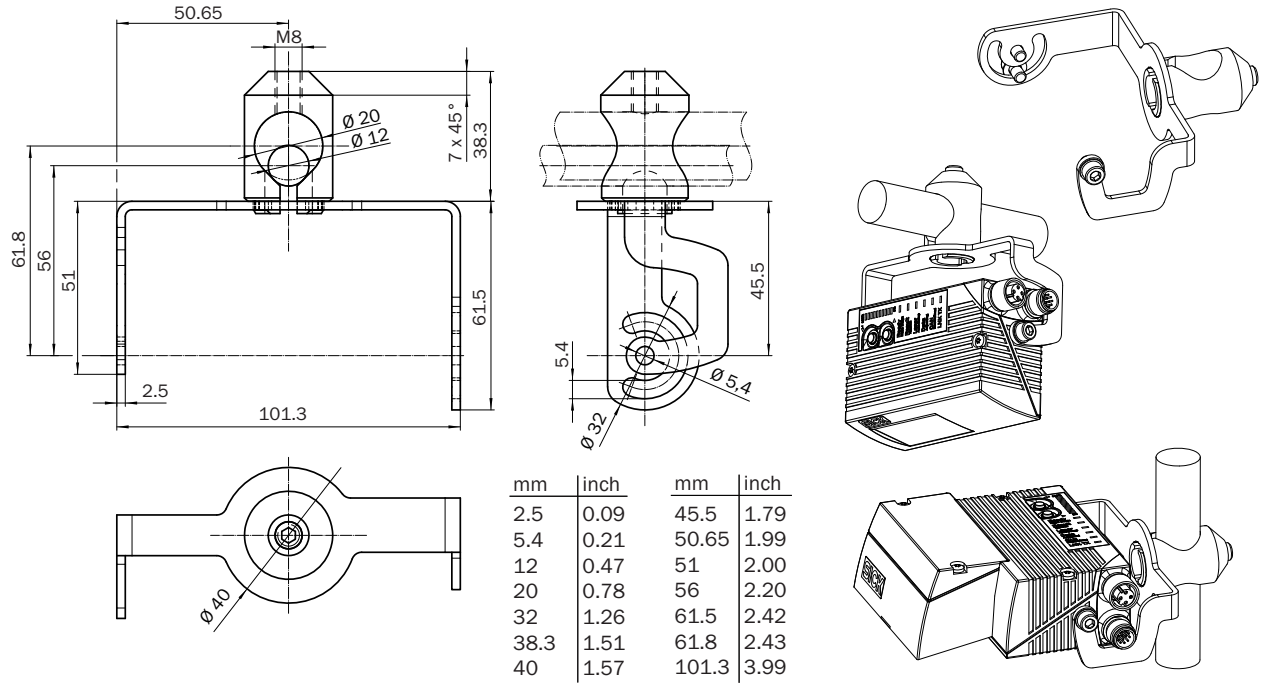


mm	inch	mm	inch
2.5	0.09	45.5	1.79
5.4	0.21	50.65	1.99
16	0.63	51	2.00
27	1.06	61.5	2.42
32	1.26	101.3	3.99
35.5	1.39		

Included to fix the JEF300/500 to the bracket:
- 3 x cylinder head screws M5 x 8 mm, with hexagon socket, self-locking
- 3 x spring washer A5

All dimensions in mm

2.2.2 Installing mounting set 2 (part no. 2042801)

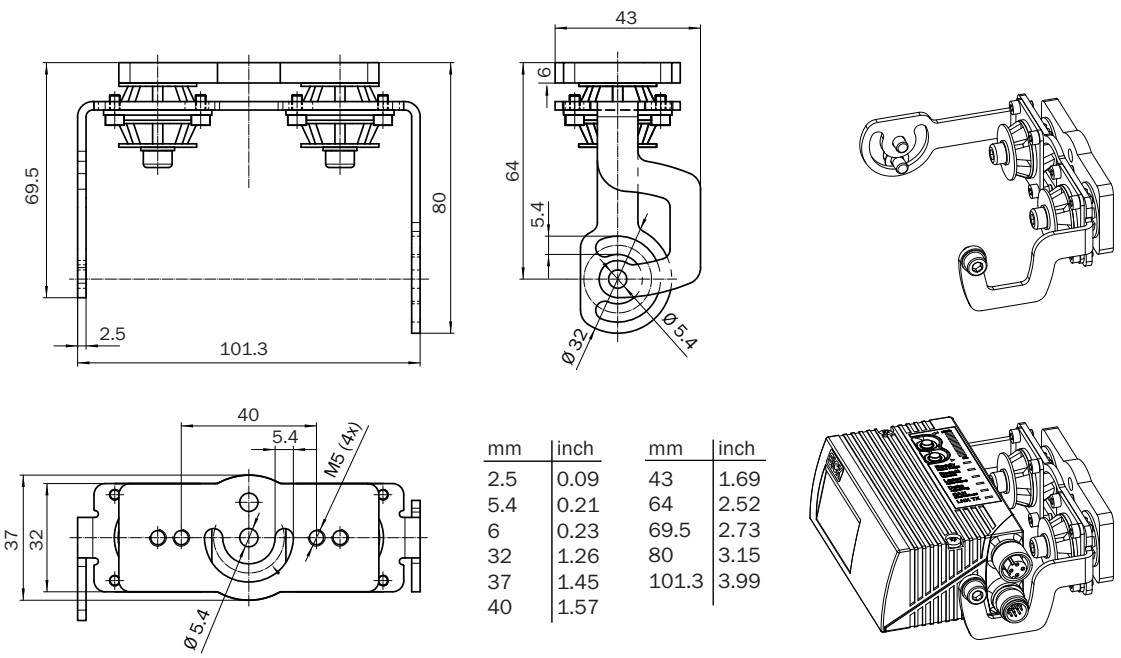


mm	inch	mm	inch
2.5	0.09	45.5	1.79
5.4	0.21	50.65	1.99
12	0.47	51	2.00
20	0.78	56	2.20
32	1.26	61.5	2.42
38.3	1.51	61.8	2.43
40	1.57	101.3	3.99

Included to fix the JEF300/500 to the bracket:
- 3 x cylinder head screws M5 x 8 mm, with hexagon socket, self-locking
- 3 x spring washer A5

All dimensions in mm

2.2.3 Installing mounting set 3 (part no. 2042799) with shock absorber



mm	inch	mm	inch
2.5	0.09	43	1.69
5.4	0.21	64	2.52
6	0.23	69.5	2.73
32	1.26	80	3.15
37	1.45	101.3	3.99
40	1.57		

Included to fix the JEF300/500 to the bracket:
- 3 x cylinder head screws M5 x 8 mm, with hexagon socket, self-locking
- 3 x spring washer A5

All dimensions in mm

2.3 Mounting the CDB620-001 connection module

The mounting location for the connection module (distance to JEF300/500) depends on the physical design of the serial data interface (configuration/data output) used.

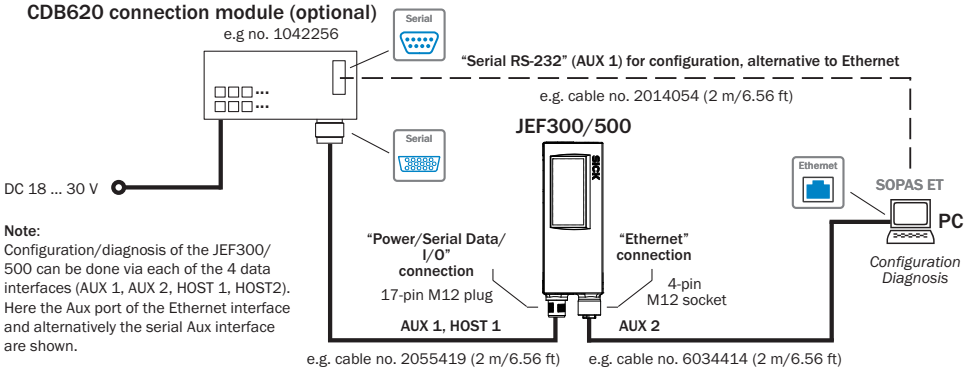
The permissible cable lengths are listed in Section *"Wiring serial data interfaces:", Page 23*.

For detailed information on mounting and the electrical installation, see "CDB620 connection module" operating instructions (part no. 8012119, Ger./Engl. version) supplied in printed form.

3 Electrical installation

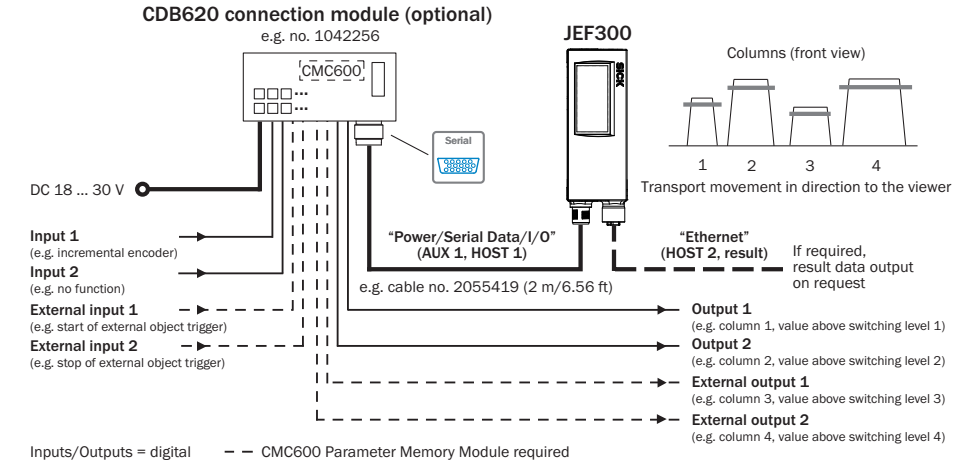
3.1 Overview of all interfaces and connection options

JEF300/JEF500: Configuration/Diagnosis



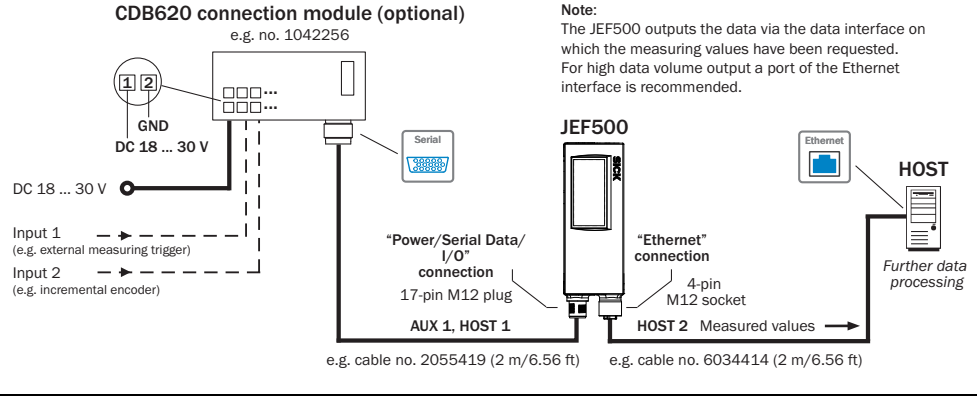
Note:
Configuration/diagnosis of the JEF300/500 can be done via each of the 4 data interfaces (AUX 1, AUX 2, HOST 1, HOST2). Here the Aux port of the Ethernet interface and alternatively the serial Aux interface are shown.

JEF300: Detection mode



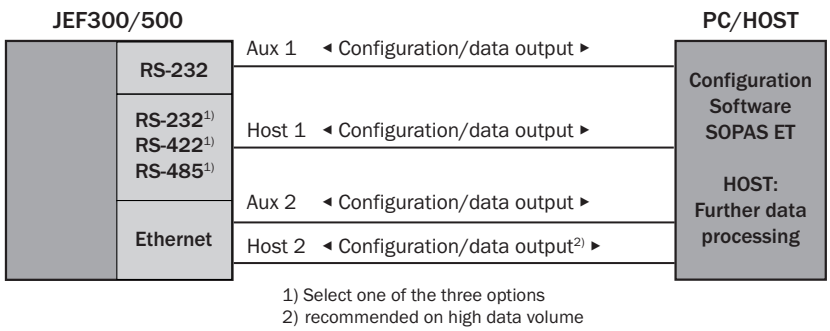
Note:
The JEF300 outputs the result via the data interface on which the result has been requested. Here the Host port of the Ethernet interface is shown. For high data volume a port of the Ethernet interface is recommended.

JEF500: Measurement mode



Note:
The JEF500 outputs the data via the data interface on which the measuring values have been requested. For high data volume output a port of the Ethernet interface is recommended.

3.1.1 Using the data interfaces



Possible interface → Assignable function ↓	HOST 1 serial RS-232/ 422/485	AUX 1 serial RS-232	HOST 2 Ethernet 10/100 Mbit/s	AUX 2 Ethernet 10/100 Mbit/s
Complete application result output (JEF300)	●	●	●	●
Mesasured value output (JEF500)	●	●	●	●
Heartbeat output (JEF300/500)	●	●	●	
Configuration (SOPAS, commands)	○	○	○	○

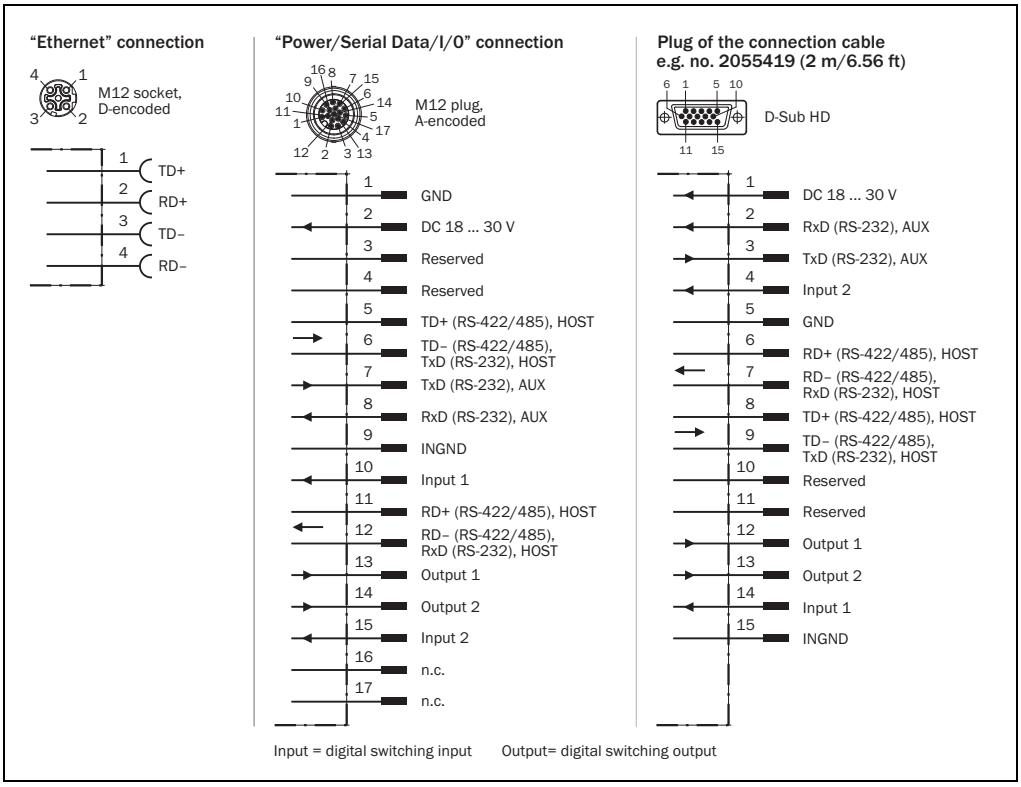
● = The JEF300/500 only outputs the date via the requesting data interface by subscription
● = not recommended
○ = Access only makes practical sense via one of the interfaces (risk of collision)

The logical Aux interface of the JEF300/500 can operate the serial data interface and Aux port of the Ethernet interface in parallel.

In a similar manner, the logical Host interface can operate the serial data interface and the Host port of the Ethernet interface in parallel.

However, the data released by means of a command string is only output on the interface on which the request was received. For output in real time, one of the two ports of the Ethernet interface must be selected. The physical RS-232 and RS-422/485 Host interfaces cannot be used simultaneously.

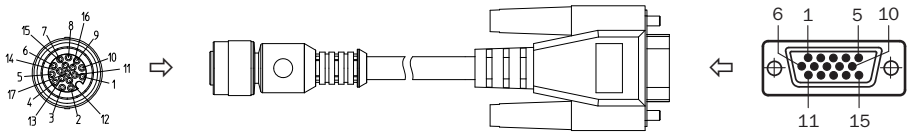
3.2 Pin assignments



3.3 Pin assignments and lead color assignments of cables

3.3.1 JEF300/500 ("Power/SerialData/I/0" connection) to CDB620-001

Cable no. 2049764 (0.9 m/2.95 ft), no. 2055419 (2 m/6.56 ft), no. 2055420 (3 m/9.84 ft)



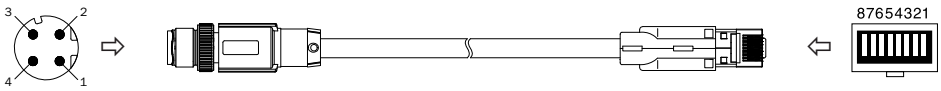
17-pin M12 socket, A-type encoded (Front view)

15-pin D Sub HD plug (Front view)

Pin	Signal	Function	Pin
2	DC 18 ... 30 V	Supply voltage	1
8	RxD (RS-232), AUX	Aux interface (receiver)	2
7	TxD (RS-232), AUX	Aux interface (sender)	3
15	Input 2	Switching input 2	4
1	GND	Ground	5
11	RD+ (RS-422/485), Host	Host interface (receiver+)	6
12	RD– (RS-422/485)/RxD (RS-232), Host	Host interface (receiver–)	7
5	TD+ (RS-422/485), Host	Host interface (sender+)	8
6	TD– (RS-422/485)/TxD (RS-232), Host	Host interface (sender–)	9
4	Reserved	–	10
3	Reserved	–	11
13	Output 1	Switching output 1	12
14	Output 2	Switching output 2	13
10	Input 1	Switching input 1	14
9	INGND	Common ground for all inputs	15
16	n.c.	–	–
17	n.c.	–	–

3.3.2 JEF300/500 ("Ethernet" connection) to PC

Cable no. 6034414 (2 m/6.56 ft), no. 6034415 (5 m/16.4 ft)



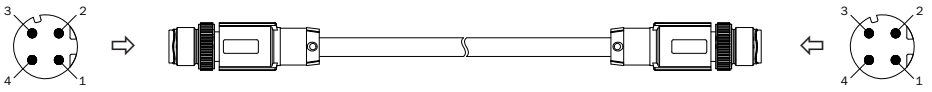
4-pin M12 plug, D-type encoded (Front view)

8-pin RJ-45 plug (Front view)

Pin	Signal	Function	Pin
1	TD+ (Ethernet)	Sender+	1
3	TD– (Ethernet)	Sender–	2
2	RD+ (Ethernet)	Receiver+	3
4	RD– (Ethernet)	Receiver–	6

3.3.3 JEF300/500 ("Ethernet" connection) to Ethernet (M12)

Cable no. 6034420 (2 m/6.56 ft), no. 6034421 (3 m/9.84 ft), 6034422 (5 m/16.4 ft)



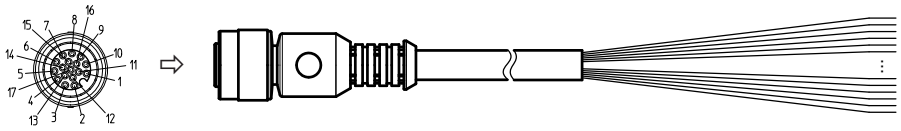
4-pin M12 plug, D-type encoded (Front View)

4-pin M12 plug, D-type encoded (Front View)

Pin	Signal	Function	Pin
1	TD+ (Ethernet)	Sender+	1
3	TD– (Ethernet)	Sender–	2
2	RD+ (Ethernet)	Receiver+	3
–	–	–	4
–	–	–	5
4	RD– (Ethernet)	Receiver–	6

3.3.4 JEF300/500 ("Power/SerialData/I/0" connection) to customer specific connection box (power supply)

No. 6042772 (3 m/9.84 ft), no. 6042773 (5 m/16.4 ft)

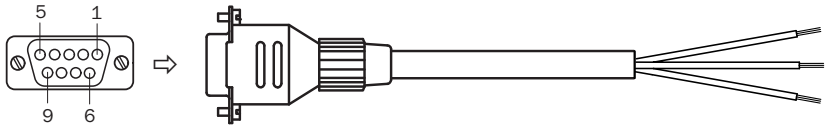


17-pin M12 socket, A-type encoded (Front view)

Pin	Signal	Function	Color of lead
1	GND	Ground	brown
2	DC 18 ... 30 V	Supply voltage	blue
3	Reserved	–	white
4	Reserved	–	green
5	TD+ (RS-422/485), Host	Host interface (receiver+)	pink
6	TD– (RS-422/485)/TxD (RS-232), Host	Host interface (receiver–)	yellow
7	TxD (RS-232), Aux	Aux interface (sender)	black
8	RxD (RS-232), Aux	Aux interface (receiver)	gray
9	INGND	Common ground for all inputs	red
10	Input 1	Switching input 1	purple
11	RD+ (RS-422/485), Host	Host interface (receiver+)	gray-pink
12	RD– (RS-422/485)/RxD (RS-232), Host	Host interface (receiver–)	red-blue
13	Output 1	Switching output 1	white-green
14	Output 2	Switching output 2	brown-green
15	Input 2	Switching input 2	white-yellow
16	n.c.	–	yellow-brown
17	n.c.	–	white-gray

3.3.5 CDB620-001 connection module to PC (serial data: Host interface)

No. 2020319 (3 m/9.84 ft)



9-pin D Sub socket
(Front view)

Pin	Signal	Function	Color of lead	CDB620-001 terminal
1	–	–	–	–
2	RxD (RS-232)	Host interface (receiver)	brown	43 (TxD Host)
3	TxD (RS-232)	Host interface (sender)	blue	44 (RxD Host)
4	–	–	–	–
5	GND	Ground	black	42 (GND)
6	–	–	–	–
7	–	–	–	–
8	–	–	–	–
9	–	–	–	–

3.4 Notes on the electrical installation

- Electrical connections between the JEF300/500 and other devices may only be connected or disconnected when the system is not live, otherwise the devices may be damaged.
- Turn the swivel connector unit with the electrical connections max. 180° from end position to end position.
- The electrical circuits connected to the JEF300/500 (e.g. switching inputs with external powered sensors) must be implemented as SELV or PELV electrical circuits.
  (SELV = **S**afety-**E**xtra-**L**ow-**V**oltage, PELV = **P**rotective-**E**xtra-**L**ow-**V**oltage).
- Do not switch on the supply voltage for the JEF300/500/the CDB620-001 connection module until the connection work has been completed and the wiring work has been tested thoroughly.

Prerequisites for enclosure rating IP 65

- During normal operation, the cover for the Micro SD card slot (black rubber cover) must be flush mounted on the housing.
  Protect the JEF300/500 from moisture and dust when the cover is temporarily open.
- If the Ethernet interface is not used, fit the electrical connection (4-pin M12 socket) with the yellow protective plug as in delivery state.
- The same also applies for the EMC requirements (ESD) according to CE.

Cable lengths for data interfaces

The possible length of cable between JEF300/500 and the host computer depends on the selected physical design of the host interface and the set data transmission rate. For the serial interfaces, see *Section “Wiring serial data interfaces:“, Page 23*.

3.5 Prerequisites for the safe operation of the JEF300/500 in a system

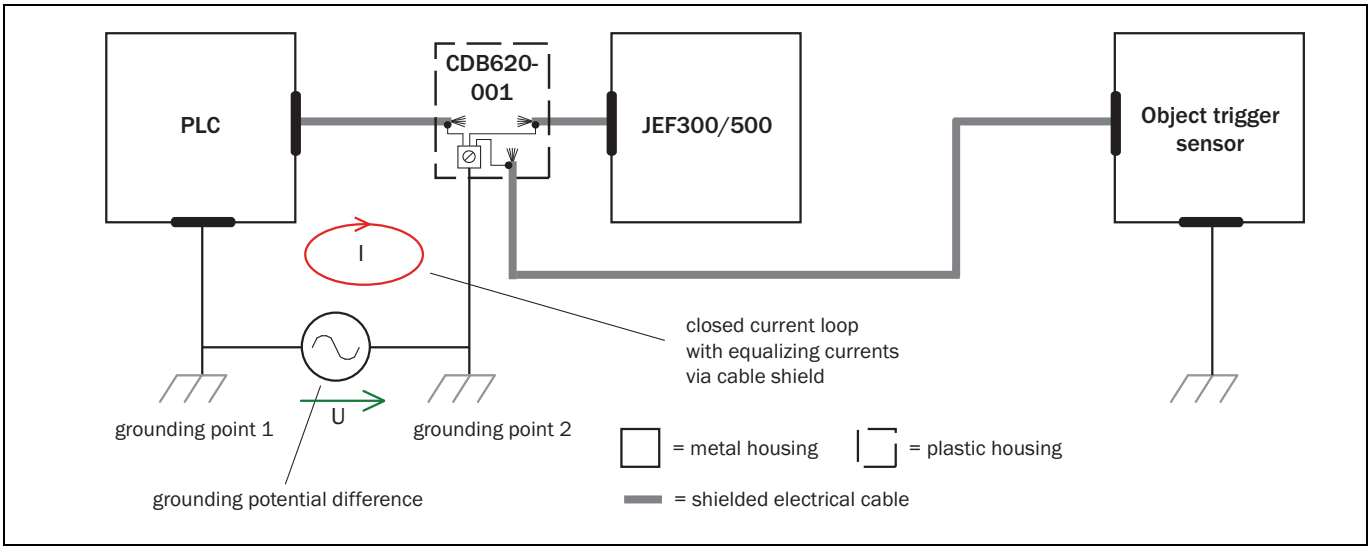
The JEF300/500 is designed and tested for electrical safety according to EN 60950-1 (2006-04)/A11 (2009-03). It is connected to the peripheral devices (power supply, object trigger sensor(s), PLC, Host etc.) via shielded cables. The cable shield, for example, for the data cable rests against the metal housing of the JEF300/500. The device can either be grounded through the cable shield or through the CDB620 connection module.

If the peripheral devices have metal housings and if the cable shields also lie on their housings, it is assumed that all devices involved in the installation have the **same ground potential**.

This is achieved for instance by complying with the following conditions:

- Mounting the devices on conductive metal surfaces
- Correctly grounding the devices/metal surfaces in the system
- If necessary, low-impedance and current carrying equipotential bonding between areas with different ground potentials.

If these conditions are not met, e.g. on devices in a widely distributed system over several buildings, potential equalization currents may, due to different ground potentials, flow along the cable shields between the devices, which can lead to hazards.



DANGER

Risk of injury/risk of damage via electrical current!

Potential equalization currents between the JEF300/500 and other grounded devices in the system can have the following effects:

- Dangerous voltages on the metal housing of the JEF300/500, for instance
- Incorrect function or irreparable damage to the devices
- Damage/irreparable damage of the cable shield due to heating and cable fires

➢ Where local conditions are unfavorable and thus do not meet conditions for a safe earthing method (same ground potential at all grounding points), take measures in accordance with the following formats.

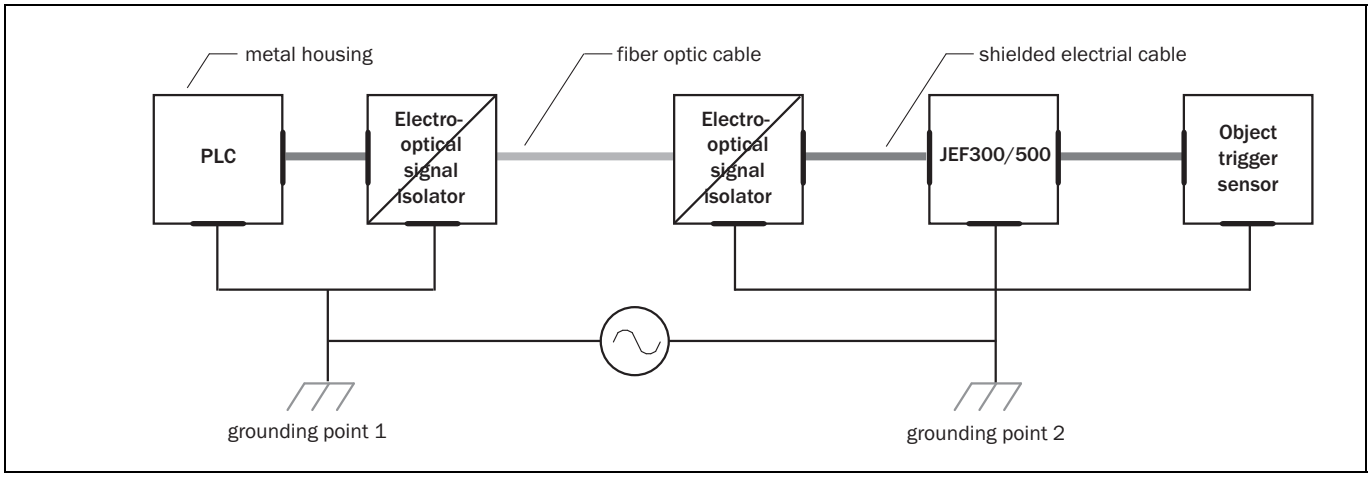
Remedial measures

The most common solution to prevent potential equalization currents on cable shields is to ensure low-impedance and current carrying equipotential bonding. If this is not possible, the following solution approaches serve as a suggestion.

Important We expressly advise against opening up the cable shields. Doing this means that the EMC limit values can no longer be complied with and that the safe operation of the device data interfaces can no longer be guaranteed.

a) Measures for widely distributed system installations

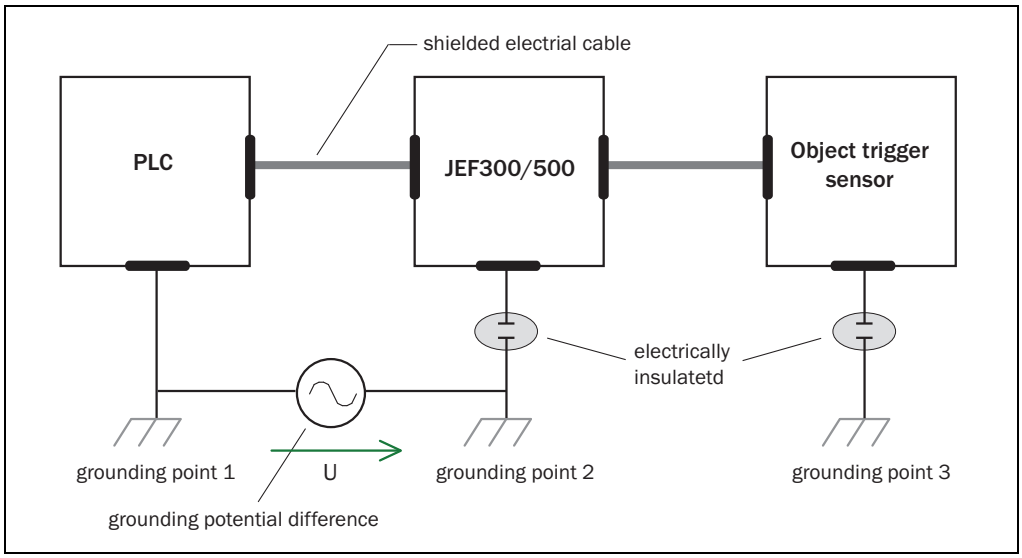
On widely distributed system installations with correspondingly large potential differences, we recommend setting up local islands and connecting them using commercially available **electro-optical signal isolators**. This measure achieves a high degree of resistance to electromagnetic interference while at the same time complying with all the requirements of EN 60950-1.



The ground loop is isolated by using the electro-optical signal isolator between the islands. Within the islands, a stable equipotential bonding prevents equalizing currents at the cable shields.

b) Measures for small system installations

For smaller installations with only slight potential differences, insulated installation of the JEF300/500 and of peripheral devices may be a sufficient solution.



Even in the event of large differences in the ground potential, ground loops are effectively prevented, meaning that equalizing currents can no longer flow via the cable shields and metal housing.

Important The power supply for the JEF300/500 and the connected peripheral devices must also guarantee the required level of insulation.

Under certain circumstances, a tangible potential can develop between the insulated metal housings and the local ground potential.

Special national regulations for Sweden and Norway

Varning och atjarder

Utrustning som ar kopplad till skyddsjord via jordat vagguttag och/eller via annan utrustning och samtidigt ar kopplad till kabel-TV nat kan i vissa fall medfora risk for brand.

➢ For att undvika detta skall vid anslutning av utrustningen till kabel-TV nat galvanisk isolator finnas mellan utrustningen och kabel-TV natet.

Advarsel og tiltaker

Utstyr som er koplet til beskyttelsesjord via nettplugg og/eller via annet jordtilkoplet utstyr - og er tilkoplet et kabel - TV nett, kan forarsake brannfare.

➢ For a unnga dette skal det ved tilkopling av utstyret til kabel-TV nettet installeres en galvanisk isolator mellom utstyret og kabel-TV nettet.

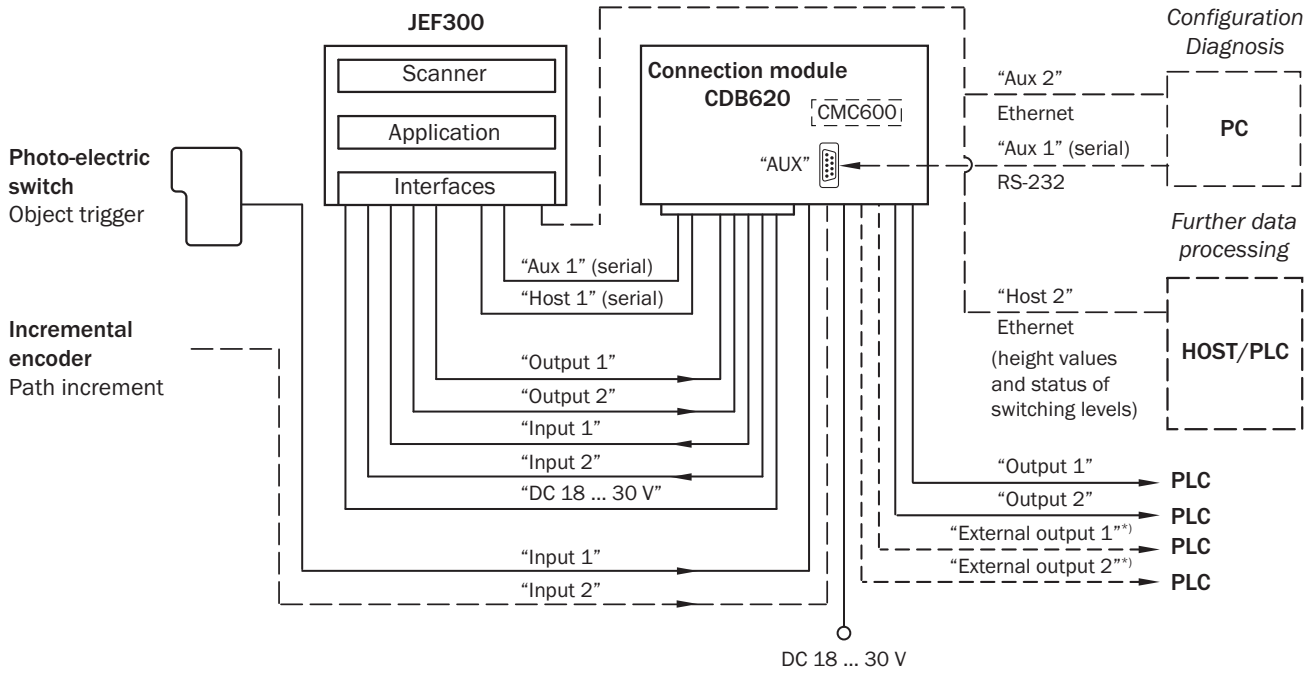
Corresponding English translation

Devices which are connected to the electrical system PE of the building via a mains connection or other devices with a connection to the PE, and which are connected to a cable distribution system with coaxial cables, can under certain circumstances cause a risk of fire.

➢ Connections to a cable distribution system must therefore be made such that electrical insulation is offered below a certain frequency range (galvanic separating link).

3.6 Installation steps

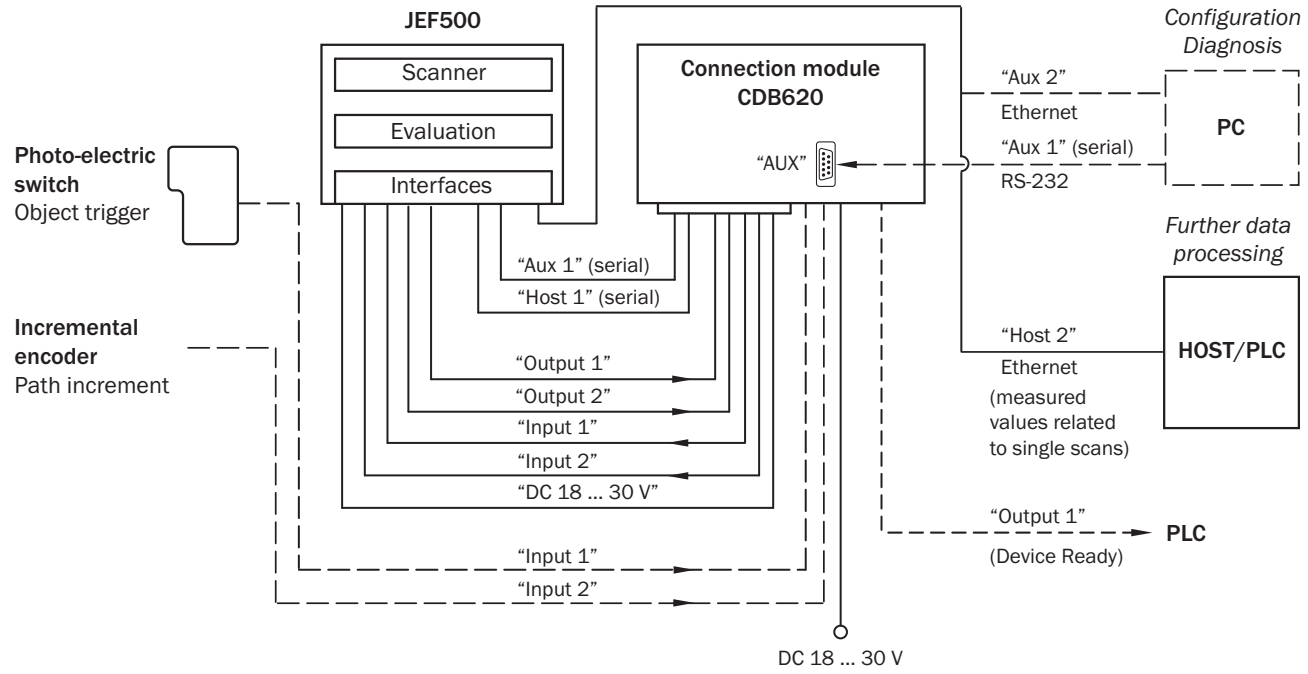
3.6.1 Block diagram: wiring the CDB620-001 connection module for JEF300



*) for external output 1 and 2 the CMC600 parameter cloning module is additionally required

Here the data output via the Host port of the Ethernet interface is shown.
The JEF300 only outputs the data via the data interface on which the data have been requested.

3.6.2 Block diagram: wiring the CDB620-001 connection module for JEF500



Here the data output via the Host port of the Ethernet interface is shown. The JEF500 only outputs the data via the data interface on which the data have been requested. For high data volume output a port of the Ethernet interface is recommended.

The commissioning/configuration of the connection module as well as the technical data are described in the "CDB620 connection module" operating instructions (part no. 8012119, Ger./Engl. version).

3.6.3 Connecting up the supply voltage

The JEF300/500 requires a power supply unit with the following characteristics:

- Supply voltage DC 18 ... 30 V (stabilized protective extra-low voltage [SELV or PELV] acc. to the IEC 60364-4-41 standard).
- The power source must be able to provide at least 10 W output.
- Additional 0.5 W output power when using the optional CMC600 parameter memory module in the CDB620-001 connection module

DANGER

Risk of injury via electrical current!

If the supply voltage is produced by the removal and conversion of electricity from the AC mains power supply with the aid of a power supply unit, then insufficient electrical separation between the input and output circuit may lead to an electric shock.

➢ Only use one power supply unit whose output circuit has safe electrical separation from the input circuit by means of double insulation and a safety transformer in accordance with IEC 742.

Protection of supply cables

To ensure protection against short-circuits/overload in the supply cables from the customer's power system, the conductor cross sections used have to be selected and protected according to the national standards.

The supply voltage is fed via the connection module (see *Chapter 3.7.2 JEF300/500: Wiring the supply voltage in the CDB620-001 connection module, Page 28*).
The CDB620-001 connection module already has one fuse (0.8 A slow blow) in the electrical circuit downstream of the S1 switch.

Using the JEF300/500 without connection module

The connecting cable e.g. no. 6042772 (3 m/9.84 ft, 17-pin D-Sub HD socket and open cable end) can be used for wiring without the CDB620-001 connection module.
The JEF300/500 must then be protected using a separate, fuse (max. 0.8 A slow blow) in the supplying circuit at the start of the supply cable.

3.6.4 Wiring the data interfaces

Wiring the Ethernet interface:

1. Connect the JEF300/500 to the PC via an Ethernet cable (patch, 1:1).
2. Set up communication via SOPAS configuration software.

Important The Ethernet interface for the JEF300/500 has an Auto-MDIX function. This automatically adjusts the transmission speed as well as any necessary crossover connections.

Wiring serial data interfaces:

The maximum data transmission rate for the serial interface depends on the cable length and on the type of interface. The following recommendations apply:

Type of interface	Data transmission rate	Distance to the target computer (Host)
RS-232	Up to 19.2 kBd 38.4 ... 57.6 kBd 115.2 ... 500 kBd	Max. 10 m (32.8 ft) Max. 3 m (9.84 ft) Max. 2 m (6.56 ft)
RS-422/485[1)]	Up to 38.4 kBd 38.4 ... 57.6 kBd 57.6 .. 115.2 kBd	Max. 1,200 m (3,927 ft) Max. 500 m (1,640 ft) Max. 200 m (656.16 ft)
1) with RS-422 suitable cable and the according cable termination as per specification		

NOTICE

Damage to the internal interface module

If the serial data interfaces are wired incorrectly, then electronic components of the JEF300/500 could get damaged.

- ➢ Observe the information on wiring.
- ➢ Carefully check the wiring prior to switching on the JEF300/500.

The wiring is done using the connection module, for more on this, see

- *Chapter 3.7.3 JEF300/500: Wiring the RS-232 serial host data interface in the CDB620-001 connection module, Page 29*
- *Chapter 3.7.4 JEF300/500: Wiring the RS-422 serial host data interface in the CDB620-001 connection module, Page 30*
- *Chapter 3.7.5 JEF300/500: Wiring the RS-485 serial host data interface in the CDB620-001 connection module, Page 31*

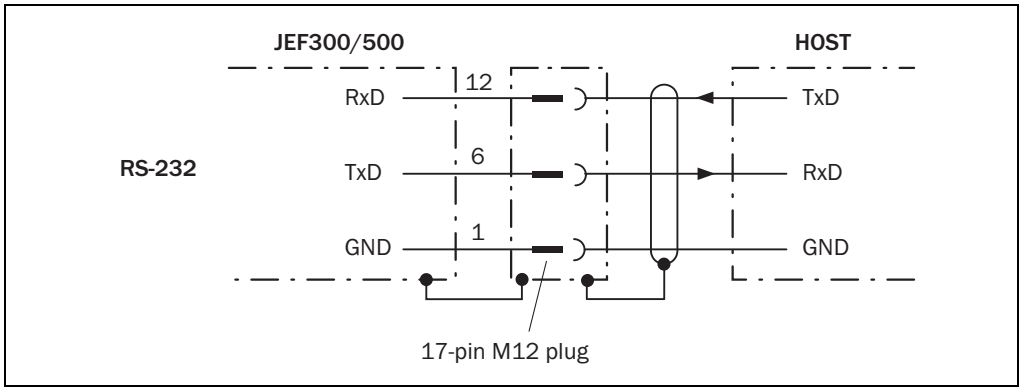
Recommendation

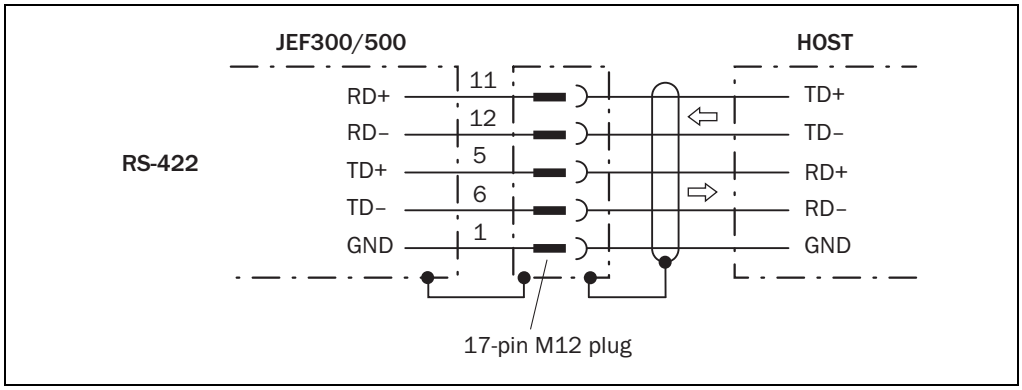
- Use shielded data cables (twisted pair leads).
- To prevent interference factors, do not lay data cables over a longer route in parallel with power supply cables and motor cables, in cable channels, for example.

Termination of the RS-422 data interface

Termination can be implemented in the CDB620-001 connection module. See "CDB620 connection module" operating instructions (part no. 8012119, Ger./Engl. version).

Wiring the data interfaces without connection module





3.6.5 Wiring the switching inputs

JEF300

The two switching inputs "Input 1" and "Input 2" can be used for starting and/or ending the detection process and/or for connecting an incremental signal.

Important Thanks to the CMC600 parameter memory module in combination with the CDB620-001 connection module, the two additional switching inputs "External input 1" and "External input 2" on the terminals in the connection module are available as an expansion (not suitable for time critical applications such as connecting an incremental encoder).

The inputs are wired using the connection module; for more on this, see:

- *Chapter 3.7.6 JEF300/500: Wiring the "Input 1" switching input in the CDB620-001 connection module ("Sens 1"), Page 32*
- *Chapter 3.7.7 JEF300/500: Wiring the "Input 2" switching input in the CDB620-001 connection module ("Sens 2"), Page 33*
- *Chapter 3.7.8 JEF300: Wiring the "External input 1" switching input in the CDB620-001 connection module ("In 1"), Page 34*
- *Chapter 3.7.9 JEF300: Wiring the "External input 2" switching input in the CDB620-001 connection module ("In 2"), Page 35*

JEF500

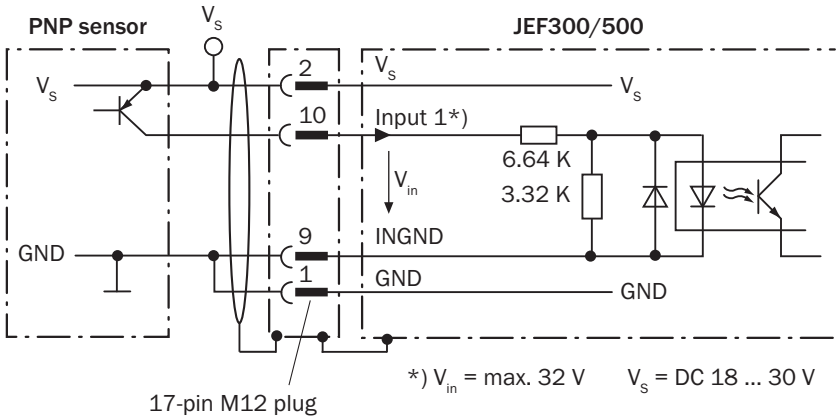
The two switching inputs "Input 1" and "Input 2" can be used for starting and/or ending the measurement operation or for connecting an incremental signal.

The inputs are wired using the connection module; for more on this, see:

- *Chapter 3.7.6 JEF300/500: Wiring the "Input 1" switching input in the CDB620-001 connection module ("Sens 1"), Page 32*
- *Chapter 3.7.7 JEF300/500: Wiring the "Input 2" switching input in the CDB620-001 connection module ("Sens 2"), Page 33*

General

Wiring the switching inputs without connection module



Design and wiring pinciple of input 2 (pin 15) same as input 1.

The ratings for the switching inputs are identical.

Switching behavior	Power fed to the input starts the assigned function in the JEF300/500. (Default settings: Logic: Active High; Sensitivity: Edge, debouncing: 10 ms)
Features	– Opto-decoupled, reverse polarity protected – Can be wired with the PNP output of a sensor
Electrical values	Low: $V_{in} \leq 2$ V; $I_{in} \leq 0.3$ mA High: 6 V $\leq V_{in} \leq$ 32 V; 0.7 mA $\leq I_{in} \leq$ 5 mA

3.6.6 Wiring the switching outputs

JEF300

The two switching outputs "Output 1" and "Output 2" can be allocated independently of each other with various functions for the output of the result status or with the static function "Device Ready". The result status refers to the detected matrix (entire matrix, column, row or individual element). If the allocated event (switching level undercutted or overshooted) occurs in the detection process, then the corresponding switching output is live after the end of the object trigger pulse for the selected pulse duration.

Important Thanks to the CMC600 parameter memory module in combination with the CDB620-001 connection module, the two additional switching outputs "External output 1" and "External output 2" on the terminals in the connection module are available as an expansion (not suitable for time critical applications).

The outputs are wired using the connection module; for more on this, see:

- *Chapter 3.7.10 JEF300/500: Wiring the "Output 1" switching output in the CDB620-001 connection module ("Res 1"), Page 36*

- *Chapter 3.7.11 JEF300/500: Wiring the "Output 2" switching output in the CDB620-001 connection module ("Res 2"), Page 37*
- *Chapter 3.7.12 JEF300: Wiring the "External output 1" switching output in the CDB620-001 connection module ("Out 1"), Page 38*
- *Chapter 3.7.13 JEF300: Wiring the "External output 2" switching output in the CDB620-001 connection module ("Out 2"), Page 39*

JEF500

The two switching outputs "Output 1" and "Output 2" can be allocated independently of each other with the static function "Device Ready".

The outputs are wired using the connection module; for more on this, see:

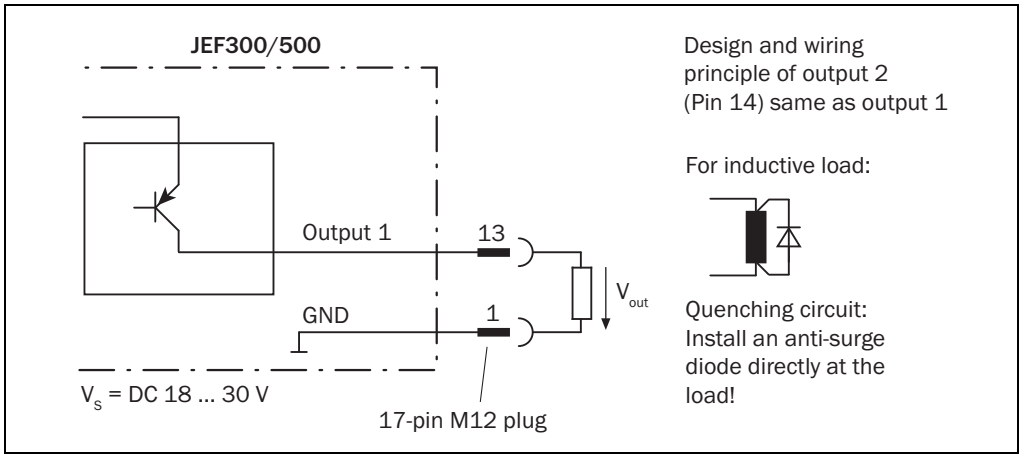
- *Chapter 3.7.10 JEF300/500: Wiring the "Output 1" switching output in the CDB620-001 connection module ("Res 1"), Page 36*
- *Chapter 3.7.11 JEF300/500: Wiring the "Output 2" switching output in the CDB620-001 connection module ("Res 2"), Page 37*

General

All outputs can also be activated by command via the data interfaces to signal, for example, user-defined situations.

Important Capacitive loads on the switching outputs have an effect on the switch-on and switch-off behavior. The maximum capacity of 100 nF is a limit value. Exceeding this value can lead to unwanted pulsing behavior of the output.

Wirng the switching outputs without connection module

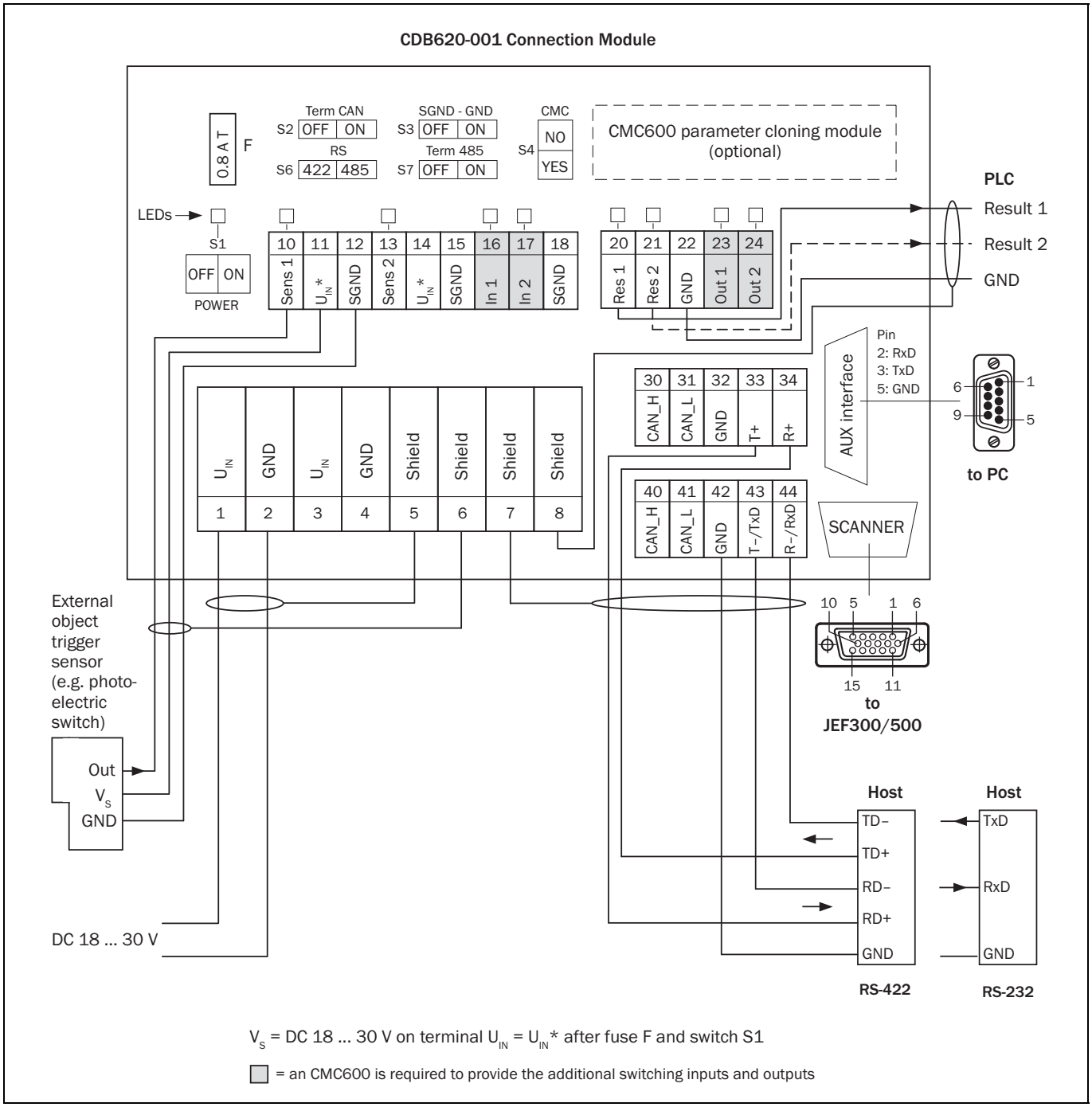


The ratings for the switching outputs are identical.

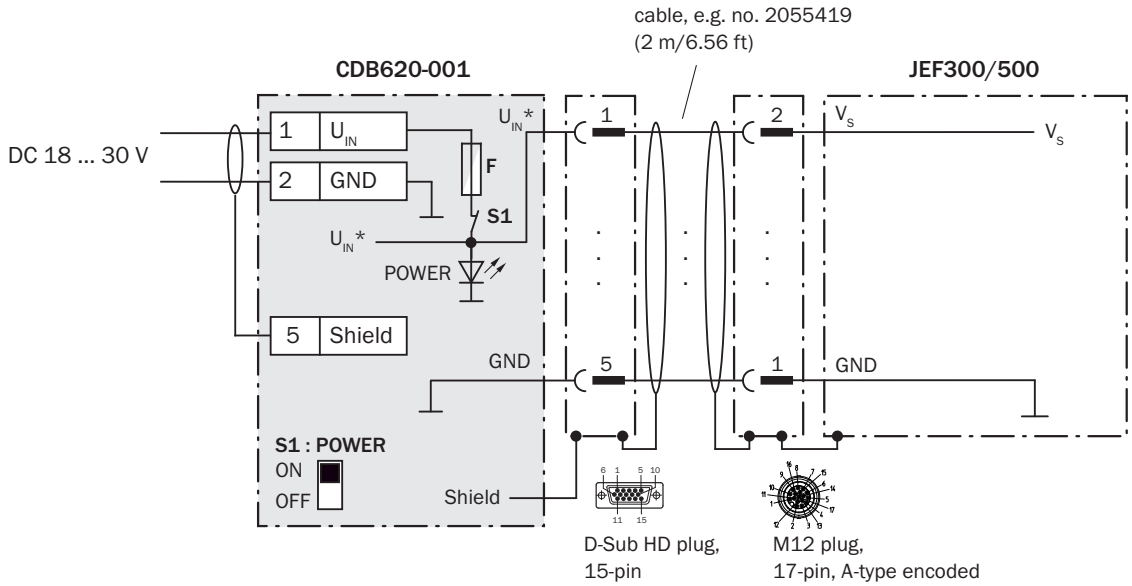
Switching behavior	PNP switching against the supply voltage V_S. (Default settings: ON event: "Application" (JEF300)/"No function" (JEF500) Logic: Active High, OFF event: Timer, Duration: 100 ms)
Features	– Short-circuit-proof and temperature-protected – Galvanically not separated from supply voltage V_S
Electrical values	$0\ V \leq V_{out} \leq V_S$ Guaranteed: $(V_S - 1.5\ V) \leq V_{out} \leq V_S$ with $I_{out} \leq 100\ mA$

3.7 Using the CDB620-001 connection module

3.7.1 Wiring overview (one switching input/one switching output used)



3.7.2 JEF300/500: Wiring the supply voltage in the CDB620-001 connection module



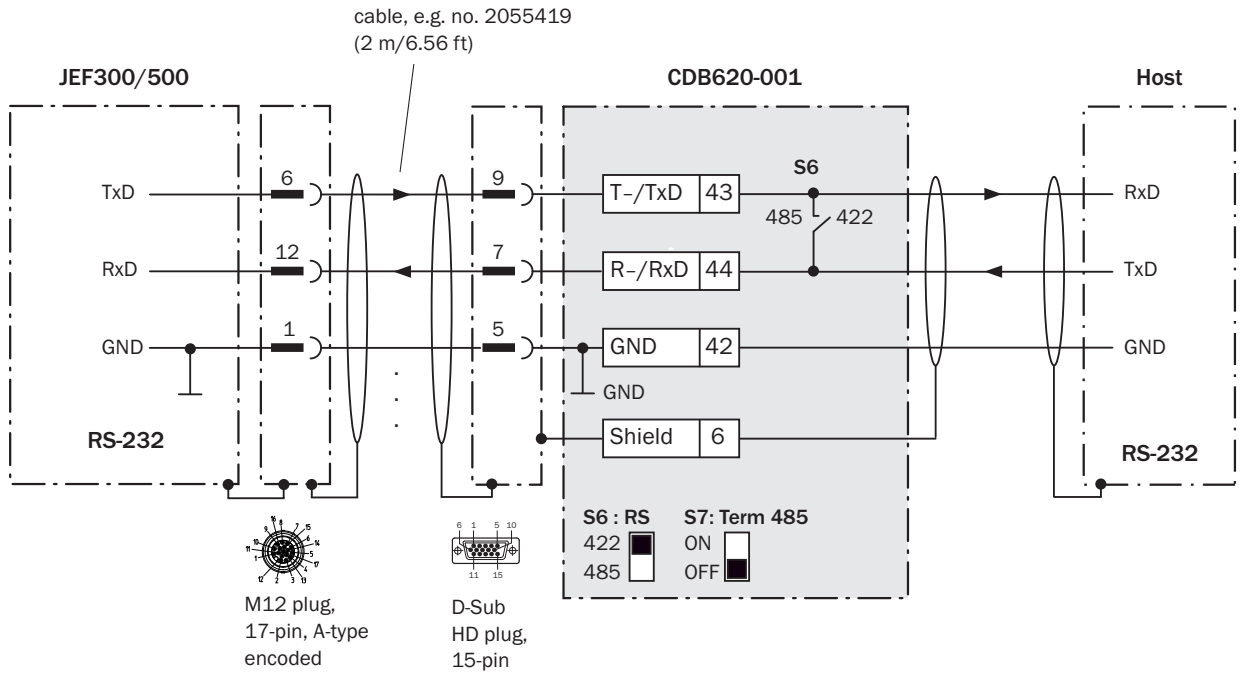
V_S = DC 18 ... 30 V on terminal U_{IN} = U_{IN}* after fuse F and switch S1

Switch S1:

ON:
Power supply voltage U_{IN} switched to U_{IN}* via fuse to CDB620-001 and JEF300/500.
Power supply voltage U_{IN}* additionally available on terminals 11 and 14.

OFF:
CDB620-001 and JEF300/500 disconnected from power supply voltage.
Recommended position during all electrical installation work.

3.7.3 JEF300/500: Wiring the RS-232 serial host data interface in the CDB620-001 connection module

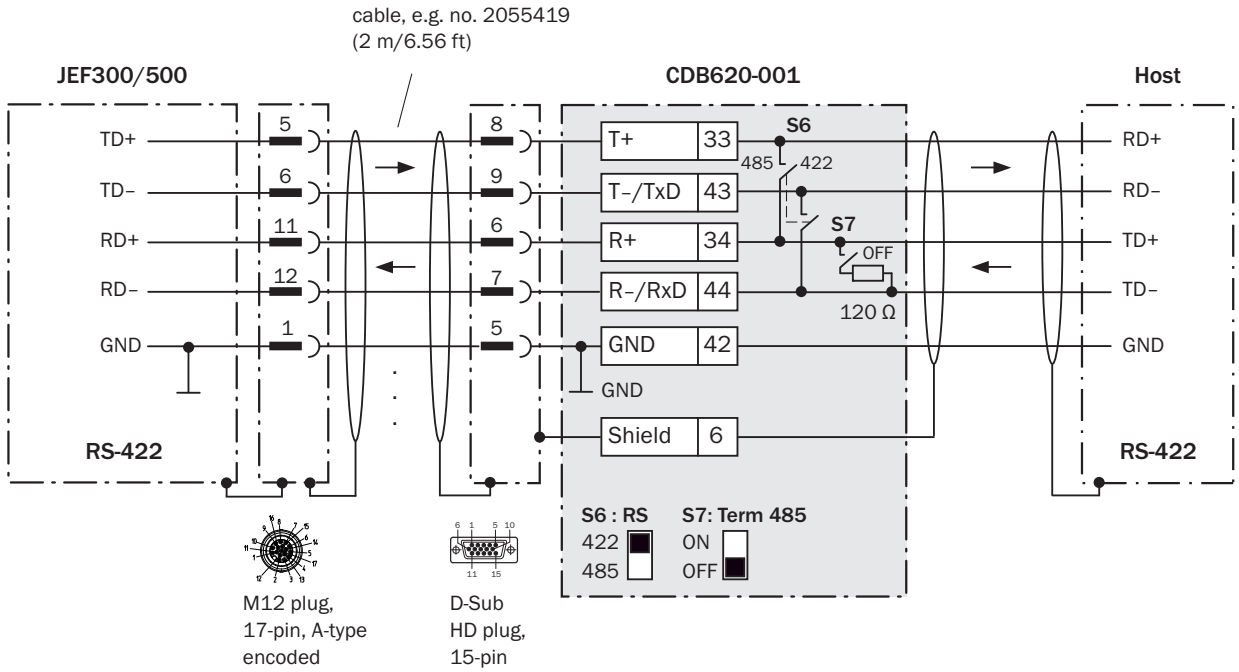


Pin and wire color assignment of prefabricated cables

Signal	Cable[1]		Cable[2]	
	M12 socket, 17-pin	D-Sub HD plug, 15-pin	M12 socket, 17-pin	Open end, 17 core
TxD	6	9	6	yellow
RxD	12	7	12	red-blue
GND	1	5	1	brown

1) cables no. 2049764 (0.9 m/2.95 ft), no. 2055419 (2 m/6.56 ft), no. 2055420 (3 m/9.84 ft)
2) cables no. 6042772 (3 m/9.84 ft), no. 6042773 (5 m/16.4 ft)

3.7.4 JEF300/500: Wiring the RS-422 serial host data interface in the CDB620-001 connection module



S7: Term 422

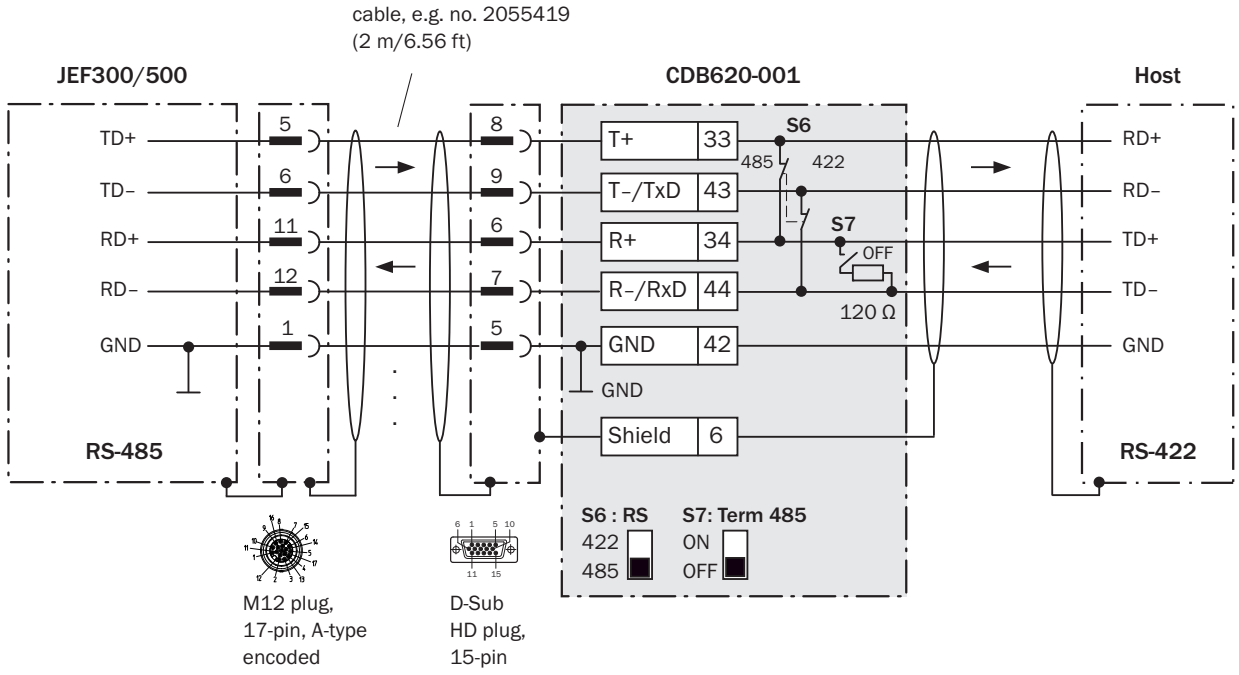
Switch to ON if the RS-422 receiver in the JEF300/500 has to be terminated to improve the noise ratio of the on the cable.

Pin and wire color assignment of prefabricated cables

Signal	Cable[1]		Cable[2]	
	M12 socket, 17-pin	D-Sub HD plug, 15-pin	M12 socket, 17-pin	Open end, 17 core
TD+	5	8	5	pink
TD–	6	9	6	yellow
RD+	11	6	11	gray-pink
RD–	12	7	12	red-blue
GND	1	5	1	brown

1) cables no. 2049764 (0.9 m/2.95 ft), no. 2055419 (2 m/6.56 ft), no. 2055420 (3 m/9.84 ft)
2) cables no. 6042772 (3 m/9.84 ft), no. 6042773 (5 m/16.4 ft)

3.7.5 JEF300/500: Wiring the RS-485 serial host data interface in the CDB620-001 connection module



S7: Term 485
Switch to ON if the JEF300/500 is on the end of RS-485 bus cable.

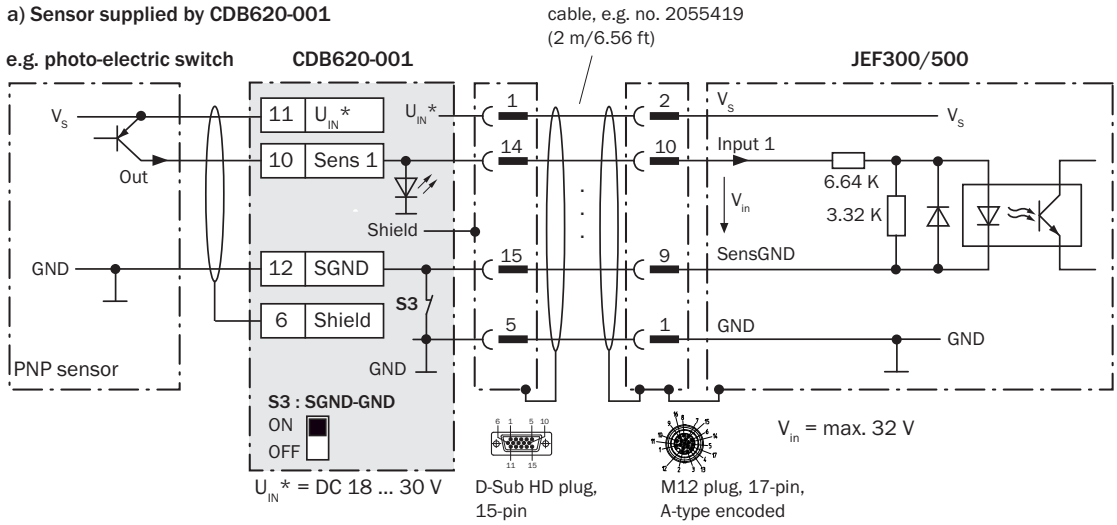
Pin and wire color assignment of prefabricated cables

Signal	Cable[1]		Cable[2]	
	M12 socket, 17-pin	D-Sub HD plug, 15-pin	M12 socket, 17-pin	Open end, 17 core
TD+	5	8	5	pink
TD–	6	9	6	yellow
RD+	11	6	11	gray-pink
RD–	12	7	12	red-blue
GND	1	5	1	brown

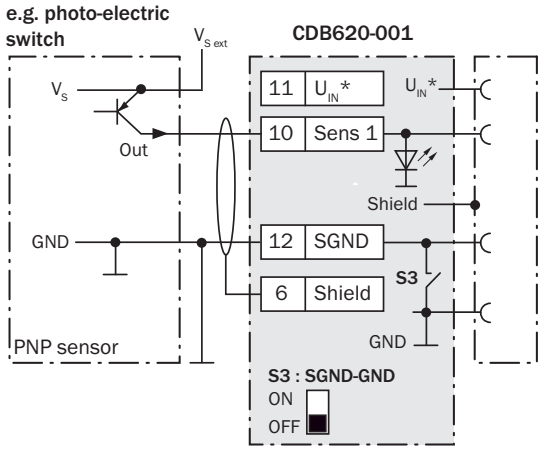
1) cables no. 2049764 (0.9 m/2.95 ft), no. 2055419 (2 m/6.56 ft), no. 2055420 (3 m/9.84 ft)
2) cables no. 6042772 (3 m/9.84 ft), no. 6042773 (5 m/16.4 ft)

3.7.6 JEF300/500: Wiring the "Input 1" switching input in the CDB620-001 connection module ("Sens 1")

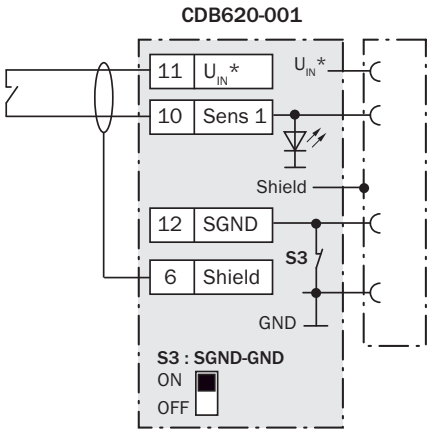
a) Sensor supplied by CDB620-001



b) Sensor connected electrically isolated/externally supplied



c) Switch supplied by CDB620-001



d) Switch connected electrically isolated/externally supplied

Connect the switch as shown in b)

Pin and wire color assignment of prefabricated cables

Signal	Cable[1]		Cable[2]	
	M12 socket, 17-pin	D-Sub HD plug, 15-pin	M12 socket, 17-pin	Open end, 17 core
V_S	2	1	2	blue
Sensor 1	10	14	10	violet
SensGND	9	15	9	red
GND	1	5	1	brown

1) cables no. 2049764 (0.9 m/2.95 ft), no. 2055419 (2 m/6.56 ft), no. 2055420 (3 m/9.84 ft)
2) cables no. 6042772 (3 m/9.84 ft), no. 6042773 (5 m/16.4 ft)

Ratings for "Input 1" switching input

Switching behavior	Power fed to the input starts the assigned function, e.g. start of detecting/measuring. (Default setting: Logic: Active high, Sensitivity: Edge, Debouncing 10 ms)
Features	– Optodecoupled, reverse polarity protected – Can be wired with the PNP output of a sensor
Electrical values	Low: $V_{in} \leq 2$ V; $I_{in} \leq 0.3$ mA High: $6 V \leq V_{in} \leq 32$ V; $0.7 mA \leq I_{in} \leq 5$ mA

Function assignment to "Input 1" switching input via SOPAS ET:
- Start of detecting (JEF300)/measuring (JEF500)
- Stop of detecting (JEF300)/measuring (JEF500)
- Increment input
- if required further functions in the future

Switch S3: SGND-GND

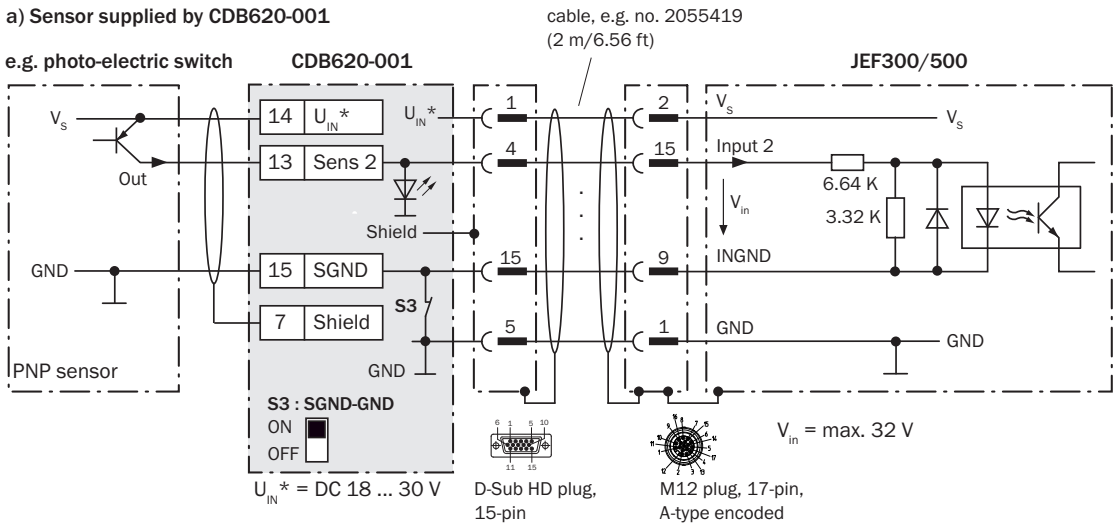
ON: GND of the sensor connected to GND of CDB620-001/JEF300/500.

OFF: Sensor connected electrically isolated to the CDB620-001/JEF300/500.

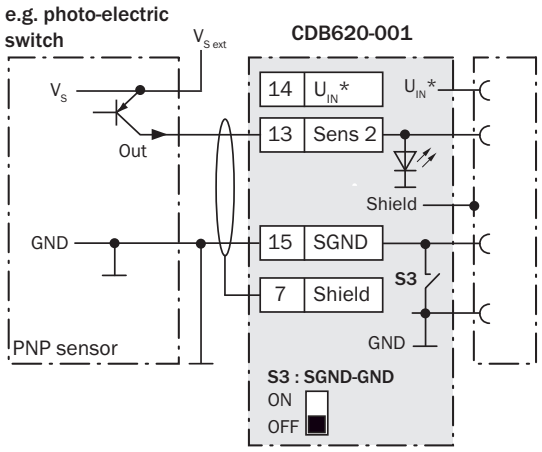
Reference potential valid for all switching inputs ("Sensor 1/2" and "In 1/2")

3.7.7 JEF300/500: Wiring the "Input 2" switching input in the CDB620-001 connection module ("Sens 2")

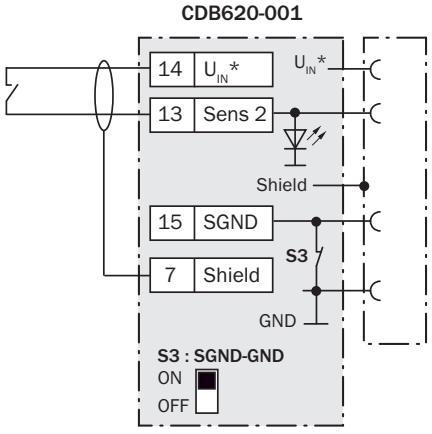
a) Sensor supplied by CDB620-001



b) Sensor connected electrically isolated/externally supplied



c) Switch supplied by CDB620-001



d) Switch connected electrically isolated/externally supplied

Connect the switch as shown in b)

Pin and wire color assignment of prefabricated cables

Signal	Cable[1]		Cable[2]	
	M12 socket, 17-pin	D-Sub HD plug, 15-pin	M12 socket, 17-pin	Open end, 17 core
V_S	2	1	2	blue
Sensor 2	15	4	15	white-yellow
SensGND	9	15	9	red
GND	1	5	1	brown

1) cables no. 2049764 (0.9 m/2.95 ft), no. 2055419 (2 m/6.56 ft), no. 2055420 (3 m/9.84 ft)
2) cables no. 6042772 (3 m/9.84 ft), no. 6042773 (5 m/16.4 ft)

Ratings for "Input 2" switching input

Switching behavior	Power fed to the input starts the assigned function, e.g. stop of detecting/measuring. (Default setting: Logic: Active high, Sensitivity: Edge, Debouncing 10 ms)
Features	– Optodecoupled, reverse polarity protected – Can be wired with the PNP output of a sensor
Electrical values	Low: $V_{in} \le 2$ V; $I_{in} \le 0.3$ mA High: 6 V ≤ V_{in} ≤ 32 V; 0.7 mA ≤ I_{in} ≤ 5 mA

Function assignment to "Input 2" switching input via SOPAS ET:
- Start of detecting (JEF300)/measuring (JEF500)
- Stop of detecting (JEF300)/measuring (JEF500)
- Increment input
- if required further functions in the future

Switch S3: SGND-GND

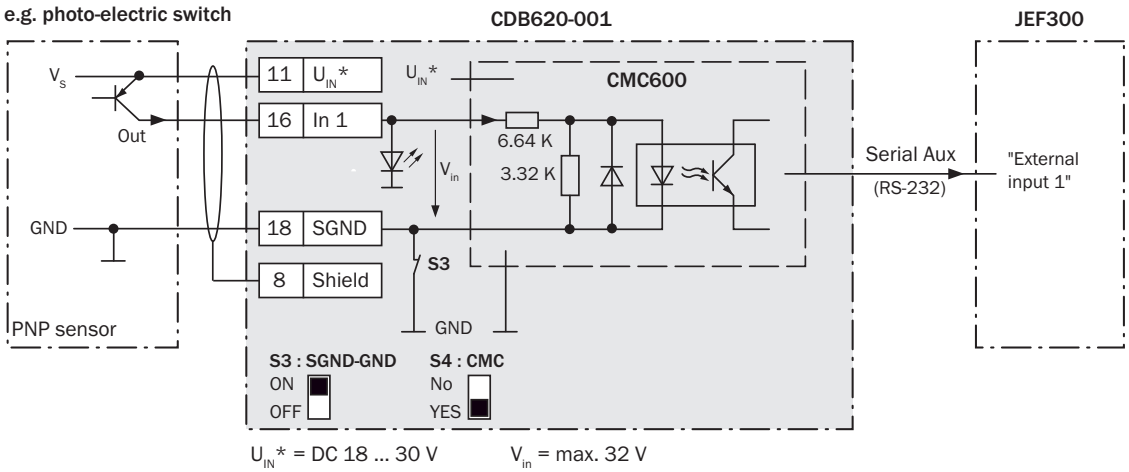
ON: GND of the sensor connected to GND of CDB620-001/JEF300/500.

OFF: Sensor connected electrically isolated to the CDB620-001/JEF300/500.

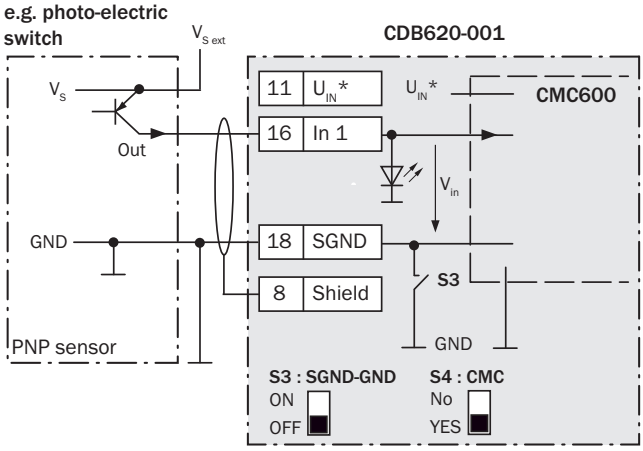
Reference potential valid for all switching inputs ("Sensor 1/2" and "In 1/2")

3.7.8 JEF300: Wiring the "External input 1" switching input in the CDB620-001 connection module ("In 1")

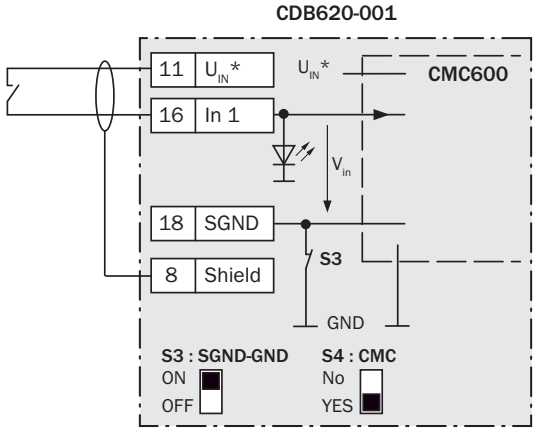
a) Sensor supplied by CDB620-001



b) Sensor connected electrically isolated and externally supplied



c) Switch supplied by CDB620-001



d) Switch connected electrically isolated and externally supplied

Connect the switch as shown in b)

Software-controlled, the CMC600 transfers the switching status of its physical "In 1" input automatically via the cable to the serial Aux data interface of the JEF300.
The JEF300 converts the status internally to its logical "External input 1".

Ratings for "External input 1" ("In 1" switching input)

Switching behavior	Power fed to the input starts the assigned function, e.g. start of detecting. (Default setting: Logic: Active high, Sensitivity: Edge, Debouncing 10 ms)
Features	– Optodecoupled, reverse polarity protected – Can be wired with the PNP output of a sensor
Electrical values	Low: $V_{in} \le 2$ V; $I_{in} \le 0.3$ mA High: 6 V ≤ $V_{in} \le 32$ V; 0.7 mA ≤ $I_{in} \le 5$ mA

Function assignment to "External input 1" via SOPAS ET:
- Start of detecting (JEF300)
- Stop of detecting (JEF300)
- if required further functions in the future

Switch S3: SGND-GND

ON: GND of the sensor connected to GND of CDB620-001/CMC600.

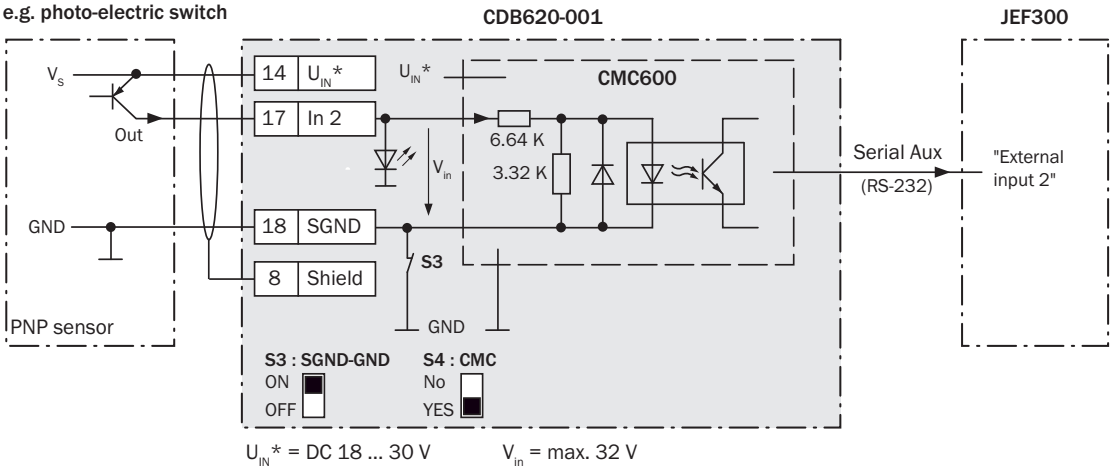
OFF: Sensor connected electrically isolated to the CDB620-001/CMC600.

Reference potential valid for all switching inputs ("Sensor 1/2" and "In 1/2")

3.7.9 JEF300: Wiring the "External input 2" switching input in the CDB620-001 connection module ("In 2")

a) Sensor supplied by CDB620-001

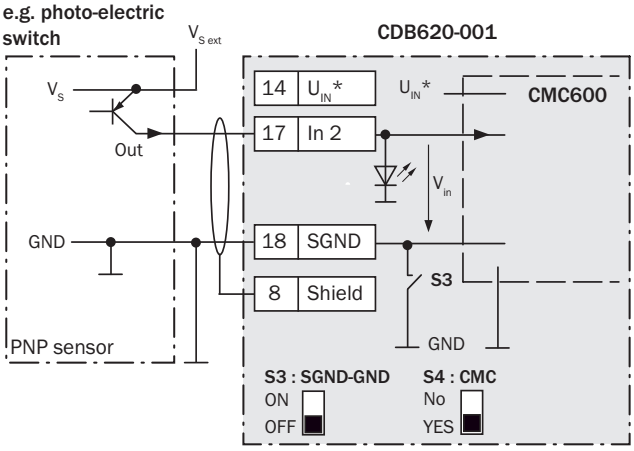
e.g. photo-electric switch



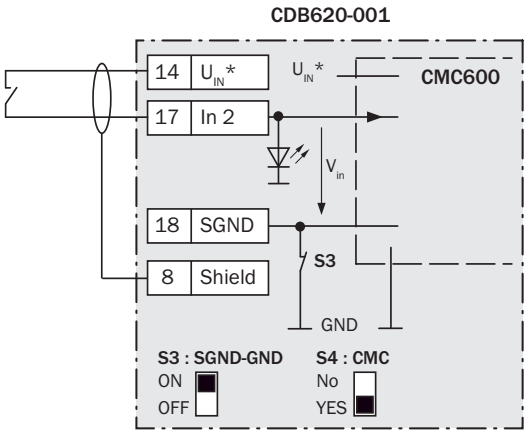
U_{IN}* = DC 18 ... 30 V V_{in} = max. 32 V

b) Sensor connected electrically isolated and externally supplied

e.g. photo-electric switch



c) Switch supplied by CDB620-001



d) Switch connected electrically isolated and externally supplied

Connect the switch as shown in b)

Software-controlled, the CMC600 transfers the switching status of its physical "In 2" input automatically via the cable to the serial Aux data interface of the JEF300.
The JEF300 converts the status internally to its logical "External input 2".

Ratings for "External input 2" ("In 2" switching input)

Switching behavior	Power fed to the input starts the assigned function, e.g. stop of detecting. (Default setting: Logic: Active high, Sensitivity: Edge, Debouncing 10 ms)
Features	– Optodecoupled, reverse polarity protected – Can be wired with the PNP output of a sensor
Electrical values	Low: $V_{in} \leq 2$ V; $I_{in} \leq 0.3$ mA High: 6 V ≤ $V_{in} \leq 32$ V; 0.7 mA ≤ $I_{in} \leq 5$ mA

Function assignment to "External input 2" via SOPAS ET:
- Start of detecting (JEF300)
- Stop of detecting (JEF300)
- if required further functions in the future

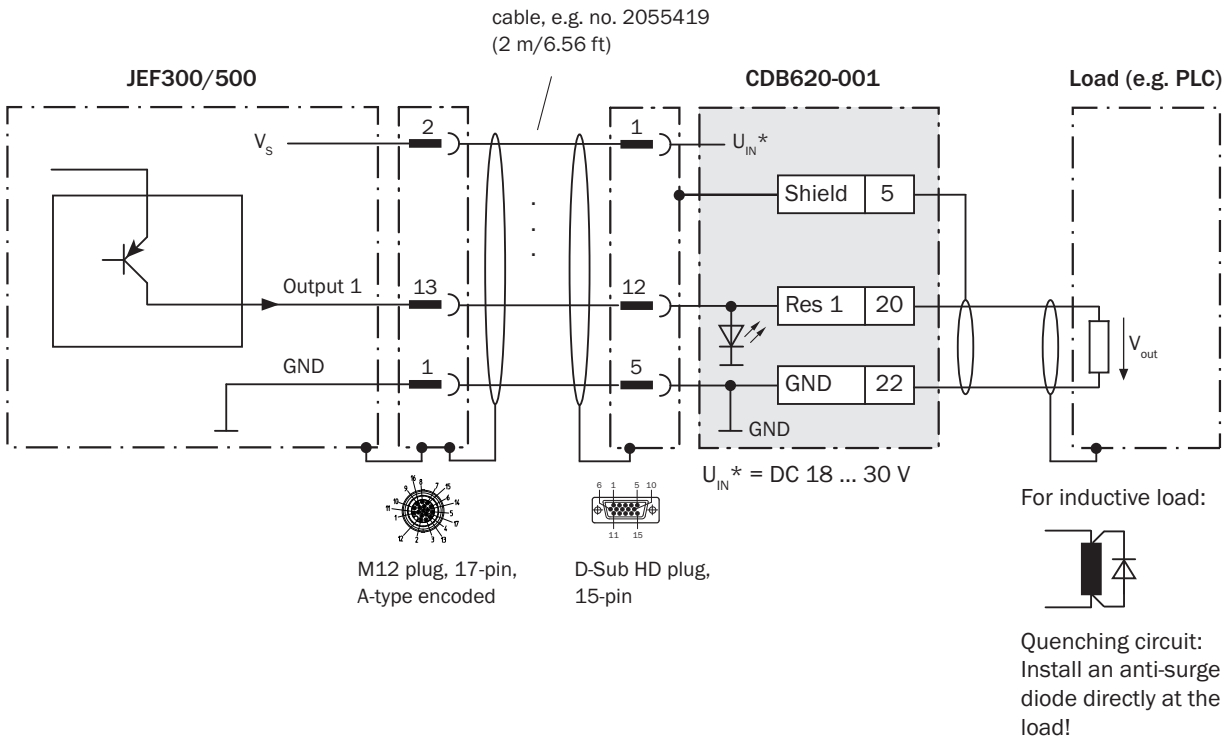
Switch S3: SGND-GND

ON: GND of the sensor connected to GND of CDB620-001/CMC600.

OFF: Sensor connected electrically isolated to the CDB620-001/CMC600.

Reference potential valid for all switching inputs ("Sensor 1/2" and "In 1/2")

3.7.10 JEF300/500: Wiring the "Output 1" switching output in the CDB620-001 connection module ("Res 1")



Ratings for "Output 1" switching output

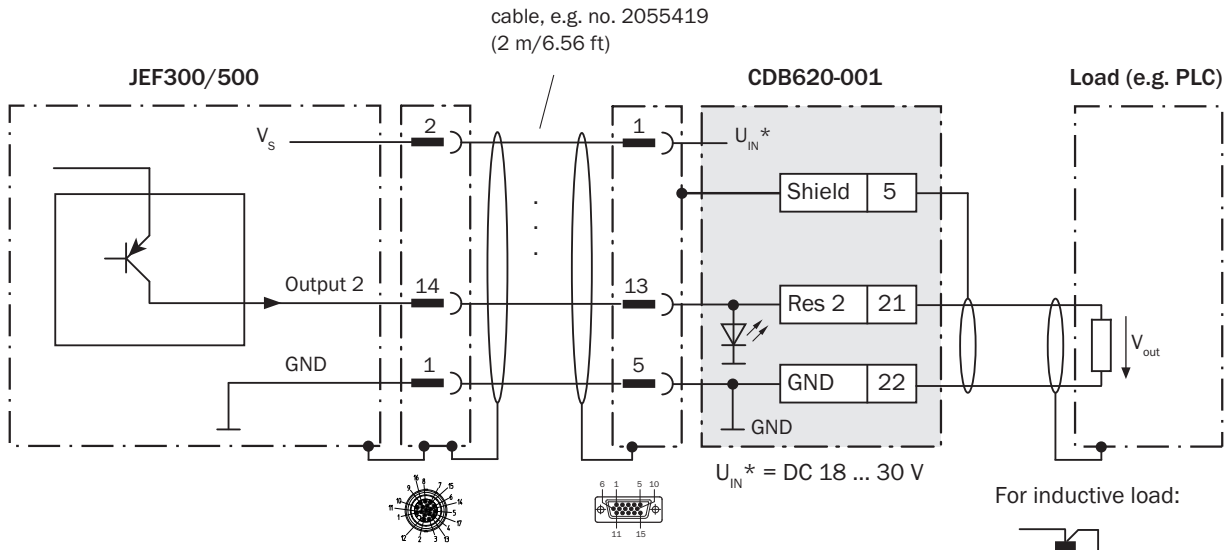
Switching behavior	PNP switching against the supply voltage V_S (Default setting: ON event: Application (JEF300), No function (JEF500), OFF event: Timer, Logic: Active High, Duration: 100 ms)
Features	– Short-circuit proof + temperature protected – Galvanically not separate from V_S
Electrical values	$0\ V \le V_{out} \le V_S$ Guaranteed: $(V_S - 1.5\ V) \le V_{out} \le V_S$ with $I_{out} \le 100\ mA$

Pin and wire color assignment of prefabricated cables

Signal	**Cable**[1]		**Cable**[2]	
	M12 socket, 17-pin	**D-Sub HD plug, 15-pin**	**M12 socket, 17-pin**	**Open end, 17 core**
V_S	2	1	2	blue
Result 1	13	12	13	white-green
GND	1	5	1	brown

1) cables no. 2049764 (0.9 m/2.95 ft), no. 2055419 (2 m/6.56 ft), no. 2055420 (3 m/9.84 ft)
2) cables no. 6042772 (3 m/9.84 ft), no. 6042773 (5 m/16.4 ft)

3.7.11 JEF300/500: Wiring the "Output 2" switching output in the CDB620-001 connection module ("Res 2")



For inductive load:

Quenching circuit:
Install an anti-surge diode directly at the load!

Ratings for "Output 2" switching output

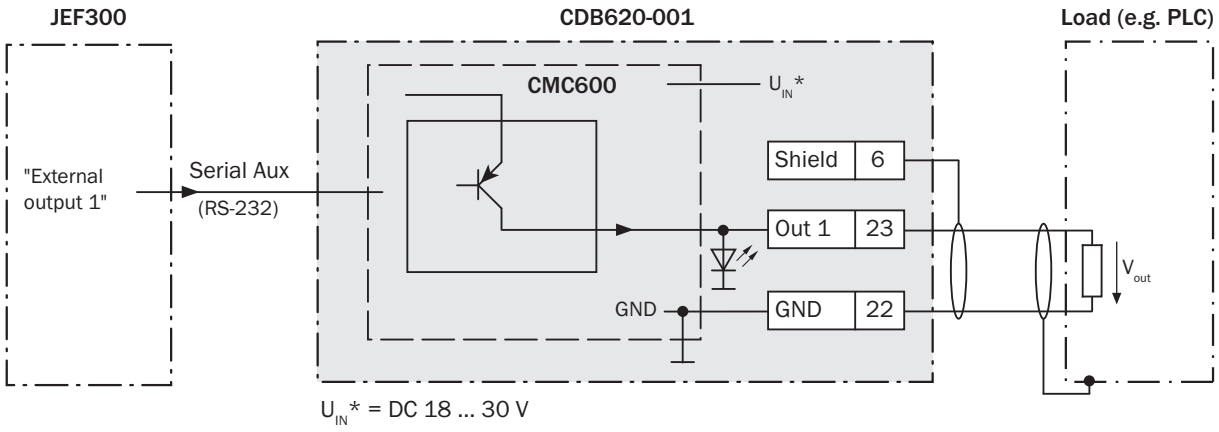
Switching behavior	PNP switching against the supply voltage V_S (Default setting: ON event: No function, OFF event: Timer, Logic: Active high, Duration 100 ms)
Features	– Short-circuit proof + temperature protected – Galvanically not separate from V_S
Electrical values	$0\ V \le V_{out} \le V_S$ Guaranteed: $(V_S - 1.5\ V) \le V_{out} \le V_S$ with $I_{out} \le 100\ mA$

Pin and wire color assignment of prefabricated cables

Signal	**Cable**[1]		**Cable**[2]	
	M12 socket, 17-pin	**D-Sub HD plug, 15-pin**	**M12 socket, 17-pin**	**Open end, 17 core**
V_S	2	1	2	blue
Result 2	14	13	14	brown-green
GND	1	5	1	brown

1) cables no. 2049764 (0.9 m/2.95 ft), no. 2055419 (2 m/6.56 ft), no. 2055420 (3 m/9.84 ft)
2) cables no. 6042772 (3 m/9.84 ft), no. 6042773 (5 m/16.4 ft)

3.7.12 JEF300: Wiring the "External output 1" switching output in the CDB620-001 connection module ("Out 1")



For inductive load:

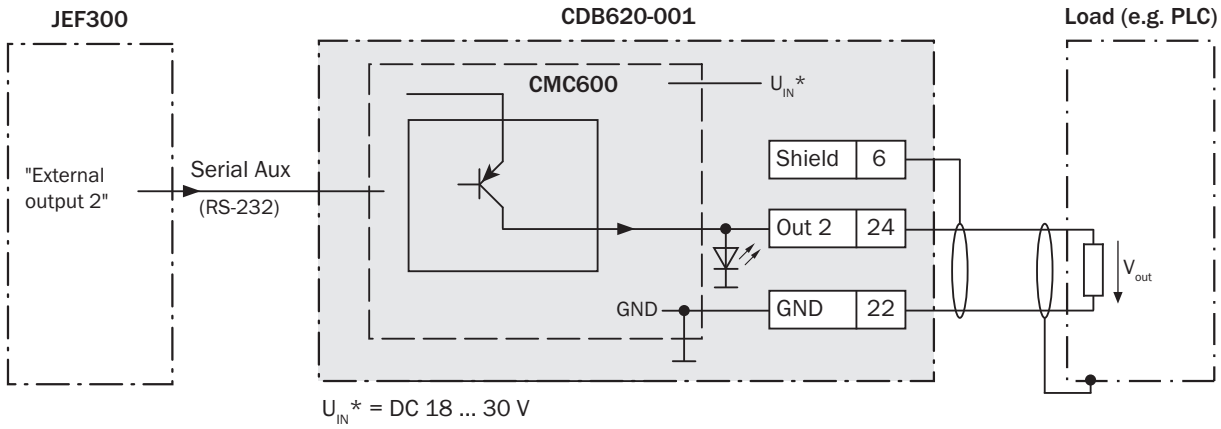
Quenching circuit: Install an anti-surge diode directly at the load!

Ratings for "External output 1" ("Out 1" switching output)

Switching behavior	PNP switching against the supply voltage U_{IN}* (Default setting: ON event: No function, OFF event: Timer, logic: Active high, Duration: 100 ms)
Features	– Short-circuit proof + temperature protected – Galvanically not separate from U_{IN}*
Electrical values	0 V ≤ V_{out} ≤ U_{IN}* Guaranteed: (U_{IN}* – 1.5 V) ≤ V_{out} ≤ U_{IN}* with I_{out} ≤ 100 mA

The JEF300 indicates the switching status of its logical "external output 1" via the serial Aux data interface.
Software-controlled, the status is automatically taken over by the CMC600 via the cable and converted to the physical "Out 1" output in the CDB620-001.

3.7.13 JEF300: Wiring the "External output 2" switching output in the CDB620-001 connection module ("Out 2")



For inductive load:

Quenching circuit: Install an anti-surge diode directly at the load!

Ratings for "External output 2" ("Out 2“ switching output)

Switching behavior	PNP switching against the supply voltage U_{IN}* ((Default setting: ON event: No function, OFF event: Timer, logic: Active high, Duration: 100 ms)
Features	–Short-circuit proof + temperature protected – Galvanically not separate from U_{IN}*
Electrical values	0 V ≤ V_{out} ≤ U_{IN}* Guaranteed: (U_{IN}* − 1.5 V) ≤ V_{out} ≤ U_{IN}* with I_{out} ≤ 100 mA

The JEF300 indicates the switching status of its logical "external output 2" via the serial Aux data interface.
Software-controlled, the status is automatically taken over by the CMC600 via the cable and converted to the physical "Out 2" output in the CDB620-001.

4 Measured value output

4.1 Telegrams

Notation

The individual parts in the telegram syntax of JEF300/500 are each to be separated by a space (ASCII code 32, 20h). This has to be done also in the request to the JEF300/500.

The JEF300/500 sends measured values prepaired as follows:

- Values with a leading “+” or “–” as a decimal value (ASCII notation)
- Values without a leading “+” or “–” as a hexadecimal value (ASCII notation)
- Different notations can be mixed within a telegram
- All the telegram examples refer to the Cola-A protocol

Variable types

The variable types are given in the description of the measured value output telegram, the following variable types are possible:

Variable type	Length (byte)	Value range	Sign
uint_8	1	0 ... 255	No
uint_16	2	0 ... 65,535	No
uint_32	4	0 ... 4.294.967.295	No
int_32	4	–2,147,483,648 ... +2,147,483,647	Yes
float_32	4	$-10^{-44,85}$ ... $+10^{38,53}$	Yes
string	Context-dependent	Note: strings are terminated with nonzero characters	

Important

- The information in the “Length” column of the table refers to the binary transfer of the numeric parameters.
- The information in the “Value range” column in the table refers to the value range mathematically possible for the variable type. The actual value ranges for the parameters may be different, see also *Chapter 4.3 Measured value output format, Page 43*.

4.2 Request of measured values (subscription)

The JEF300/500 initializes after switching on the supply voltage. The "Ready" LED then illuminates green, indicating that the JEF300/500 is ready for operation.

Important The JEF300/500 is now ready to measure automatically, but does not yet output any data. To obtain measured values in principle, the user must request (subscribe to) the measured values once after switching on the JEF300/500 by command via a data interface. Event subscription then applies until the device is switched off again.

When the object trigger is started, the internal reading interval opens in the JEF300/500. The device begins to measure and outputs the data as follows depending on the device type:

JEF300:

When the object trigger starts, the JEF300 continuously scans the existing matrix with its objects from above. Its records the height values of the individual volume elements obtained in rows. It checks these values against the configured switching threshold(s) of the columns. When the object trigger stops, the internal reading interval closes and stops the measurement process in the matrix. The JEF300 completes the assessment of the entire matrix based on undercutting or overshooting switching thresholds. It outputs the Level Control result as configured via the switching output(s). The JEF300 outputs the processed measured values and the Level Control result parallel via the requesting data interface (recommendation: Ethernet). The data output format is not configurable.

JEF500:

When the object trigger starts, the JEF500 continuously scans the surrounding contour in its field of view, generally centered from above. It saves the values determined per measurement process (scan) cyclically to its measured value memory. The values are output continuously via the requesting data interface. When the object trigger stops, the internal reading interval closes and stops the measurement process and thus, data output. Some parts of the data output format can be configured via SOPAS ET.

4.2.1 JEF300: Output of Level Control result

1. Subscribe to measured values (event)

Request to JEF300:

<STX>sEN APPLCres 1<ETX>

Answer of JEF300 (confirmation of request):

<STX>sEA APPLCres 1<ETX>

2. After end of object trigger

Answer of JEF300:

<STX>sSN APPLCres (for data content see *Chapter 4.3.1 JEF300: Level Control (Height values, result refers to all elements of application), Page 43*) <ETX>

Telegram structure of request: **sEN APPLCres**

Telegram part	Description	Variable type	Length (byte)	Value range
Command type	Request (SOPAS event by name)	string	3	**sEN**
Command	Data request	string	8	**APPLCres**
MeasurementStartStopp		Enum8	1	**0** Stop output **1** Start output

4.2.2 JEF500: Continuous measured value output

1. Subscribe to measured values (event)

Request to JEF500:

<STX>sEN LMDscandata 1<ETX>

Answer of JEF500 (confirmation of request):

<STX>sEA LMDscandata 1<ETX>

2. After start of object trigger

Answer of JEF500 (continuous measured value output):
<STX>sSN LMDscandata (for data contents see *Chapter 4.3.2 JEF500: Measured value output (radial distance values, reflectivity), Page 45*) <ETX>

3. After stop of object trigger

Data output is stopped until next start of object trigger.

Telegram structure of request: **sEN LMDscandata** MeasurementStartStopp

Telegram part	Description	Variable type	Length (byte)	Value range
Command type	Request (SOPAS event by name)	string	3	**sEN**
Command	Data request	string	11	**LMDscandata**
MeasurementStartStopp		Enum8	1	**0** Stop measured value output **1** Start measured value output

4.2.3 JEF500: Single measured value output

If required:

When requesting the data from single measurement process, the JEF500 only sends the measured values of the scan last performed determined while the reading interval is open before closing. Therefore, these measured values can also be output on request when the reading interval is closed after object trigger end (laser diode off).

➢ Request the measured values of last measurement

Request to JEF500:

<STX>sRN LMDscandata<ETX>

Answer of JEF500:

<STX>sRA LMDscandata (for data contents see *Chapter 4.3.2 JEF500: Measured value output (radial distance values, reflectivity), Page 45*) <ETX>

Telegram structure of request: **sRN LMDscandata**

Telegram part	Description	Variable type	Length (byte)	Value range
Command type	Request (SOPAS read by name)	string	3	**sRN**
Command	Data request	string	11	**LMDscandata**

4.3 Measured value output format

4.3.1 JEF300: Level Control (Height values, result refers to all elements of application)

Name: LevelControlResult

SOPAS Communication name: APPLCres

Telegram part		Description	Variable type	Length (byte)	Value range
Command type		Request (**S**OPAS **r**ead **a**nswer/**S**OPAS **s**ent **e**vent)	string	3	**sSN**
Command		Request of result data about all elements	string	8	**APPLCres**
Telegram counter		Counter, starting at the first result telegram after switching on or changing parameters. When the upper limit is reached, the counter starts again at 0 (= 1st telegram).	uint_16	2	**0000h** 0 **FFFFFh** 65,535
Time information	Day	Day of the month (1 to 31)	uint_8	1	**01h ... 1Fh**
	Month	Month (1 to 12)	uint_8	1	**01h ... 0Ch**
	Year	Year (4-digit)	uint_16	2	**07B2h ... 270Fh**
	Hour	Hour (0 to 23)	uint_8	1	**00h ... 17h**
	Minute	Minute (0 to 59)	uint_8	1	**00h ... 3Bh**
	Second	Second (0 to 59)	uint_8	1	**00h ... 3Bh**
	Millisecond	Millisecond (0 to 999)	uint_16	2	**0000h ... 03E7h**
	High-resolution time stamp	Time since switching on the JEF300 (in µs)	uint_32	4	**00000000h** 0 **FFFFFFFFh** 4,294,967,295
Encoder position		Information in Ticks at time of result output	uint_16	2	**0000h ... FFFFh**
Status information	Inputs status	The least significant byte reflects the state of the digital inputs by bit. The least significant bit corresponds to input 1.	uint_16	2 x 1	**00 00h ... 03 03h** **00 00h** All switching inputs off **00 01h** Switching input 1 on **00 02h** Switching input 2 on **01 00h** Switching input 3 (external) on **02 00h** Switching input 4 (external) on ... **03 03h** Switching inputs 1 ... 4 on
	Outputs status	The least significant byte reflects the state of the digital outputs by bit. The least significant bit corresponds to output 1.	uint_16	2 x 1	**00 00h ... 03 03h** **00 00h** All switching outputs off **00 01h** Switching output 1 on **00 02h** Switching output 2 on **01 00h** Switching output 3 (external) on **02 00h** Switching output 4 (external) on ... **03 03h** Switching outputs 1 ... 4 on
Reserved byte A		Reserved	uint_32	4	–
Reserved byte B		Reserved	uint_32	4	–

Telegram part		Description	Variable type	Length (byte)	Value range
Combined switching level state		State of all individual switching level results combined (about all elements)	uint_8	1	**00h ... 02h** 0 All elements below switching levels (undercutting) 1 All elements above switching levels (overshooting) 2 Mixed: elements below and above switching levels
Number of columns		Number of configured columns	uint_16	2	**0001h ... 000Fh** (1 ... 15) 0000h caused by wrong parameters
Column 1... n	Switching level state of column 1 ... column n	State of all element switching levels in column x	uint_8	1	**00h ... 02h** 0 All elements below switching levels (undercutting) 1 All elements above switching levels (overshooting) 2 Mixed: elements below and above switching levels
Number of rows		Number of configured rows	uint_16	2	**0001h ... 000Fh** (1 ... 15) 0000h caused by wrong parameters
Row 1 ... n	Switching level state of row 1 ... row n	State of all element switching levels in row x	uint_8	1	**00h ... 02h** 0 All elements below switching levels (undercutting) 1 All elements above switching levels (overshooting) 2 Mixed: elements below and above switching levels
Number of elements		Number of configured element (intersection point of row x and der column x)	uint_16	2	**0001h ... 00E1h** (1 ... 225) 0000h caused by wrong parameters
Element 1 ... n	Switching level state of element 1 ... element n	State of switching level of element x	uint_8	1	**00h ... 01h** 0 Element below switching level (undercutting) 1 Element above switching level (overshooting)
	Height	Evaluated height of this element (in mm)	float_32	4	**No limit**
	Error state	Error state of this element (bit field)	uint_8	1	**00h ... 01h** 0 No error (OK) 1 No scan point within element 2 Too few scan points within element (configured quality not reached) 4 Overflow (too much scan points within element for averaging)

(contd.)

4.3.2 JEF500: Measured value output (radial distance values, reflectivity)

Name: ScanData

SOPAS Communication name: LMDscandata

Important Information that is grayed out in the following table is not output by the JEF500.

Telegram part		Description	Variable type	Length (byte)	Value range
	Command type	Request (**S**OPAS **s**ent **e**vent)	string	3	**sSN**
	Command	Request of data	string	11	**LMDscandata**
	Version number	Version information for the scan data format	uint_16	2	**0001h** 1
Device information	Device number	Device ID as configured with SOPAS ET	uint_16	2	**0000h ... FFFFh**
	Serial number	Factory serial number	uint_32	4	**00000000h ... FFFFFFFFh**
	Device status	Status of the JEF500	uint_16	2 x 1	**00 00h** Device OK (fixed)
Status information	Telegram counter	Counter, starting at the first measured value telegram (cyclic data) after confirmation of the measured value request. When the upper limit is reached, the counter starts again at 0 (= 1st telegram).	uint_16	2	**0000h** 0 **FFFFFh** 65,535
	Scan counter	Counter, starting with the first scan after switching on the laser diode. When the upper limit is reached, the counter starts again at 0 (= 1st scan).	uint_16	2	**0000h** 0 **FFFFFh** 65,535
	Time of scan generation		uint_32	4	**00000000h** 0 **FFFFFFFFh** 4,294,967,295
	Time of data transfer	Time since switching on the JEF500 (in µs)	uint_32	4	**00000000h** 0 **FFFFFFFFh** 4,294,967,295
	Inputs status	The least significant byte reflects the state of the digital inputs by bit. The least significant bit corresponds to input 1.	uint_16	2 x 1	**00 00h ... 03 03h** **00 00h** All switching inputs off **00 01h** Switching input 1 on **00 02h** Switching input 2 on **01 00h** Switching input 3 (external) on **02 00h** Switching input 4 (external) on ... **03 03h** Switching inputs 1 ... 4 on
	Output status	The least significant byte reflects the state of the digital outputs by bit. The least significant bit corresponds to output 1.	uint_16	2 x 1	**00 00h ... 03 03h** **00 00h** All switching outputs off **00 01h** Switching output 1 on **00 02h** Switching output 2 on **01 00h** Switching output 3 (external) on **02 00h** Switching output 4 (external) on ... **03 03h** Switching outputs 1 ... 4 on
	Reserved byte A	Reserved	uint_16	2	–

Telegram part		Description	Variable type	Length (byte)	Value range
Measuerment parameters	Scanning frequency	Information in 1/100 Hz	uint_32	4	**80000** 800 Hz
	Measurement frequency	Frequency between two separate measurements (in 100 Hz)	uint_32	4	**00000000h ... FFFFFFFFh**
Number of encoders		Defines the number of connected encoders as configured with SOPAS ET. When 0, the following values for encoder position and speed drop.	uint_16	2	**0000h ... 0001h** 0 no encoder (***default setting***) 1 1 encoder
Encoder	Encoder position	Information in Ticks	uint_32	4	**00000000h ... FFFFFFFFh**
	Encoder speed	Information in Ticks/mm	int_16	2	**0000h ... FFFFh**
Number of 16-bit channels		Defines the number of 16-bit output channels as configured in SOPAS ET in which the JEF500 outputs measured data.	uint_16	2	**0000h ... 0002h** **0** JEF500 does not output any measured data **1** JEF500 outputs the distance values (DIST1) or the reflectivity values (RSSI1) via channel 1. **2** JEF500 outputs the distance values (DIST1) via channel 1 and the reflectivity values (RSSI1) via channel 2 (***default setting***)
Output channel 1 ... 4 (16 bit)	Measured data content	The telegram part defines the contents in the output channel.	string	5	**DIST1** Radial distance of the first reflected pulse **RSSI1** Reflectivity values of the first reflected pulse
	Scaling factor	Multiplier for the values in the telegram parts "Data_1 ... Data_n"	float_32	4	**00000001h** (fixed)
	Scaling offset	For JEF500 always 0	float_32	4	**00000000h** (fixed)
	Starting angle	Information in 1/10,000°	Int_32	4	≈ +660,000
	Angular step width	Information in 1/10,000°	uint_16	2	1,000 ... 10,000 (≈ +9,690)
	Number of data	Defines the number of items the JEF500 outputs.	uint_16	2	47
	Data_1 ... Data_n	Output of the measured values 1 to n. The contents and the unit depend of the telegram part "Measured data content“. (DIST in mm, RSSI in digits)	uint_16	2	**0000h ... FFFFh**
RSSI = Received Signal Strength Indicator					

(contd.)

Telegram part		Description	Variable type	Length (byte)	Value range
Number of 8-bit channels		Defines the number of 8-bit output channels as configured in SOPAS ET in which the JEF500 outputs measured data.	uint_16	2	**0000h ... 0004h** **0** JEF500 does not output any measured data in 8-bit channels (fixed)
Output channel 1 ... 4 (8 bit)	Measured data content	The telegram part defines the contents in the output channel.	string	5	**RSSI1** Reflectivity values for the first reflected pulse
	Scaling factor	Multiplier for the values in the telegram parts "Data_1 ... Data_n"	float_32	4	**00000001h** (fixed)
	Scaling offset	For JEF500 always 0	float_32	4	**00000000h** (fixed)
	Starting angle	Information in 1/10,000°	Int_32	4	–450,000 ... +2,250,000
	Angular step width	Information in 1/10,000°	uint_16	2	1,000 ... 10,000
	Number of data	Defines the number of items the JEF500 outputs	uint_16	2	0
	Data_1 ... Data_n	Output of the measured values 1 to n. The contents and the unit depend of the telegram part "Measured data content". (DIST in mm, RSSI in digits)	uint_8	1	**00h ... FFh**
Position		Defines whether the JEF500 outputs position data.	uint_16	2	**0000h ... 0001h** 1 JEF500 outputs position data
Position information	X position	XN coordinate of the sensor in a coordinate system	Real	4	**00000000h** (fixed)
	Y position	YN coordinate of the sensor in a coordinate system	Real	4	**00000000h** (fixed)
	Z position	ZN coordinate of the sensor in a coordinate system	Real	4	**00000000h** (fixed)
	X rotation	XN rotation of the sensor in a coordinate system	Real	4	**00000000h** (fixed)
	Y rotation	YN rotation of the sensor in a coordinate system (deflection position of oscillating mirror (in 1/10.000°)	Real	4	–5.0° ... +35°
	Z rotation	ZN rotation of the sensor in a coordinate system	Real	4	**00000000h** (fixed)
	Rotation type	Rotation type	Enum8	1	**0** no rotation information (fixed)
Name		Defines whether the JEF500 outputs the device name configured with SOPAS ET.	uint_16	2	**0000h ... 0001h** **0** no devivce name ***(default setting)*** **1** JEF500 outputs its device name
	Device name	Flexible range from 0 ... 16 characters (20h ... FFh)	string	0 ... 16	.....
Comment		Defines whether the JEF500 outputs the comment	uint_16	2	**0000h ... 0001h** **0** no comment (fixed)
	Comment content	Configured comment. 0 ... 128 characters (20h ... FFh)	string	0 ... 128	.....

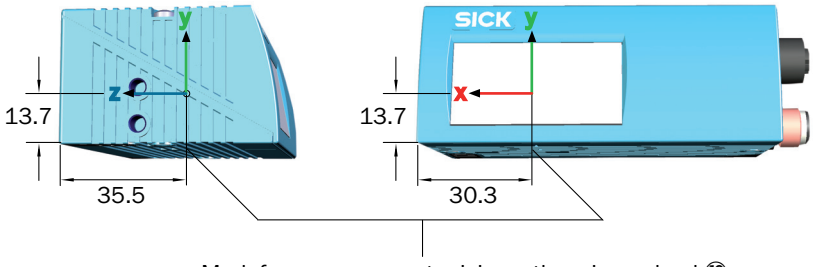
(contd.)

Telegram part		Description	Variable type	Length (byte)	Value range
Time information		Defines whether the JEF500 outputs the time stamp activated with SOPAS ET.	uint_16	2	**0000h ... 0001h** **0** no time information ***(default setting)*** **1** JEF500 outputs time information
Time information	Year	Year (4-digit)	uint_16	2	**02B2h ... 270Fh**
	Month	Month (1 to 12)	uint_8	1	**01h ... 0Ch**
	Day	Day of the month (1 to 31)	uint_8	1	**01h ... 1Fh**
	Hour	Hour (0 to 23)	uint_8	1	**00h ... 17h**
	Minute	Minute (0 to 59)	uint_8	1	**00h ... 3Bh**
	Second	Second (0 to 59)	uint_8	1	**00h ... 3Bh**
	Microsecond	Microsecond (0 to 999)	uint_32	4	**00000000h ... 000003E7h**
Event information		Defines whether the JEF500 outputs event information.	uint_16	2	**0000h ... 0001h** **0** no event information (fixed)
Event information	Event type	Fast digital input event	string	4	FDIN
	Encoder position	Position of the encoder at time of event (in ticks)	uint_32	4	**00000000h ... FFFFFFFFh**
	Time of event	Time since switching on the sensor (in µs)	uint_32	4	**00000000h** 0 **FFFFFFFFh** 68,719,476,735
	Angle position	Scanning angle of the sensor at time of event (in 1/10.000 °)	int_32	4	–450,000 ... +2,250,000

(contd.)

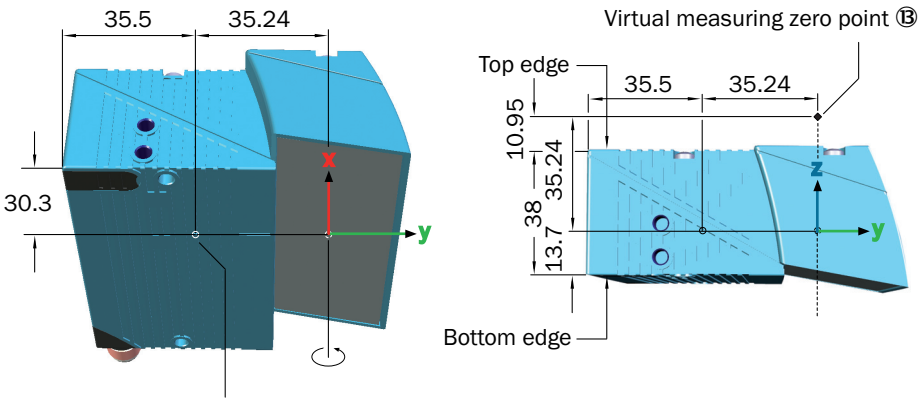
4.3.3 JEF500: Optical origin in the device

Line scanner



All dimensions in mm

Line scanner with oscillating mirror



All dimensions in mm

Important For absolute measurements with the oscillating mirror, the measured values of the JEF500 must be adjusted by the user. This depends on the selected reference point on the JEF500 to the object.

Reference: Bottom edge of device

Corrected result = Measured value – (13.7 mm + 35.24 mm) =
Measured value – 48.94 mm

Reference: Top edge of device

Corrected result = Measured value "Bottom edge" + 38 mm =
Measured value – 10.94 mm

Both calculations are only in effect at deflection angle 0° of the oscillating mirror!

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