

MANUAL

LS682-DA Optical Data Coupler



EtherCAT

ETHERNET
POWERLINK

EtherNet/IP

PROFINET

With regard to the supply of products, the current issue of the following document is applicable: The General Terms of Delivery for Products and Services of the Electrical Industry, published by the Central Association of the Electrical Industry (Zentralverband Elektrotechnik und Elektroindustrie (ZVEI) e.V.) in its most recent version as well as the supplementary clause: "Expanded reservation of proprietorship"

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1 Introduction

Congratulations

You have chosen a device manufactured by Pepperl+Fuchs. Pepperl+Fuchs develops, produces and distributes electronic sensors and interface modules for the market of automation technology on a worldwide scale.

Before you install this device and put it into operation, please read the operating instructions thoroughly. The instructions and notes contained in this operating manual will guide you step-by-step through the installation and commissioning to ensure the trouble-free usage of this product. This is useful to you, because with this you:

- support the safe operation of the device
- can utilize the device's entire range of functions
- reduce faulty operation and the associated errors
- reduce costs from downtime and incidental repairs
- increase the effectiveness and operating efficiency of your plant.

Store this operating manual somewhere safe in order to have it available for future work on the device.

After opening the packaging, please ensure that the device is intact and that the package is complete.

Symbols used

The following symbols are used in this manual:



Handling instructions

You will find handling instructions beside this symbol



Note!

This symbol brings important information to your attention.

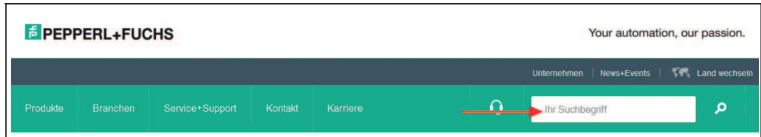
Contact

If you have any questions about the device, its functions, or accessories, please contact us at:

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68307 Mannheim
Telephone: +49 621 776-4411
Fax: +49 621 776-274411
E-Mail: fa-info@pepperl-fuchs.com

1.1 Product Documentation on the Internet

You can view all the relevant documentation and additional information on your product at <http://www.pepperl-fuchs.com>. Simply enter the product name or model number in the **Product/Key word search** box and click **Search**.



Select your product from the list of search results. Click on the information you require in the product information list, e.g., **Technical documents**.



A list of all available documents is displayed.

2 Declaration of Conformity

This product was developed and manufactured under observance of the applicable European standards and guidelines.



Note!

A Declaration of Conformity can be requested from the manufacturer.

The product manufacturer, Pepperl+Fuchs GmbH, D-68307 Mannheim, has a certified quality assurance system that conforms to ISO 9001.



3 Safety

3.1 Symbols Relevant to Safety



Danger!

This symbol indicates an imminent danger.

Non-observance will result in personal injury or death.



Warning!

This symbol indicates a possible fault or danger.

Non-observance may cause personal injury or serious property damage.



Caution!

This symbol indicates a possible fault.

Non-observance could interrupt the device and any connected systems and plants, or result in their complete failure.

3.2 Intended Use

The optical data coupler serves as an optical link between two Ethernet devices; typically one is mobile.

Always operate the device as described in these instructions to ensure that the device and connected systems function correctly. The protection of operating personnel and plant is only guaranteed if the device is operated in accordance with its intended use.

Only use recommended original accessories.

The operating company bears responsibility for observing locally applicable safety regulations.

Installation and commissioning of all devices must be performed by a trained professional only.

User modification and or repair are dangerous and will void the warranty and exclude the manufacturer from any liability. If serious faults occur, stop using the device. Secure the device against inadvertent operation. In the event of repairs, return the device to your local Pepperl+Fuchs representative or sales office.

Compatibility with the LS680 Optical Data Coupler

The LS680 and LS682 optical data couplers operate according to the same functional principle. Due to technical modifications, mixed operation of both device models is not possible. In mixed operation, the alignment LED shows a receiving level; however, valid Ethernet data cannot be received.

3.3

General Safety Information

Class 1M laser product

This device is a class 1M laser product:



Standards

IEC 60825-1:2007 certified. Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007.

Certifié cei 60825-1:2007. Conforme aux normes 21 CFR 1040.10 ET 1040.11 à l'exception des écarts conformément à la notice du laser N° 50, Datée du 24 JUIN 2007.

LS68*-DA-F2:



Warning!

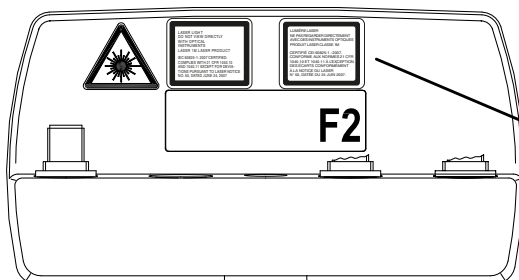
Visible red class 1M laser light

The laser light can be a nuisance especially in a dark environment. Do not point at people!

Do not observe with optical instruments such as magnifying glasses, microscopes, telescopes or binoculars!

Install the device so that the warning is clearly visible and readable.

Maintenance and repairs should only be carried out by authorized service personnel!



LASER LIGHT
DO NOT VIEW DIRECTLY
WITH OPTICAL
INSTRUMENTS
LASER 1M LASER PRODUCT
IEC 60825-1:2007 CERTIFIED
COMPLIES WITH 21 CFR 1040.10
AND 1040.11 EXCEPT FOR DEVI-
ATIONS PURSUANT TO LASER NOTICE
NO. 50, DATED JUNE 24, 2007

LUMIÈRE LASER
NE PAS REGARDER DIRECTEMENT
AVEC DES INSTRUMENTS OPTIQUES
PRODUIT LASER CLASSE 1M
CERTIFIÉ CEI 60825-1:2007
CONFORME AUX NORMES 21 CFR
1040.10 ET 1040.11 À L'EXCEPTION
DES ÉCARTS CONFORMÉMENT
À LA NOTICE DU LASER
N° 50, DATÉE DU 24 JUIN 2007.

LS68*-DA-F1:



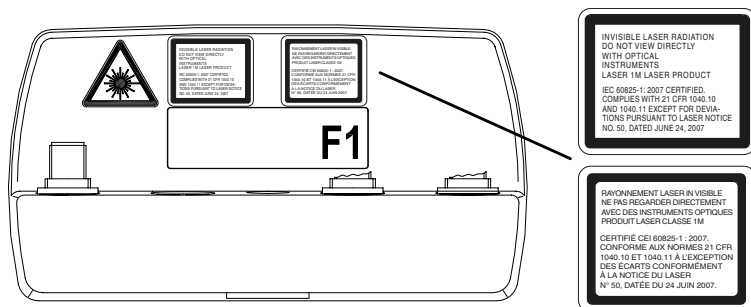
Warning!

Infrared class 1M laser light

Do not observe with optical instruments such as magnifying glasses, microscopes, telescopes or binoculars!

Install the device so that the warning is clearly visible and readable.

Maintenance and repairs should only be carried out by authorized service personnel!



Only use recommended original accessories.

The operating company bears responsibility for observing locally applicable safety regulations.

Installation and commissioning of all devices must be performed by a trained professional only.

User modification and or repair are dangerous and will void the warranty and exclude the manufacturer from any liability. If serious faults occur, stop using the device. Secure the device against inadvertent operation. In the event of repairs, return the device to your local Pepperl+Fuchs representative or sales office.



Caution!

Controls or adjustments

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure

4 Product Description

4.1 Use and Application

The optical data coupler serves as an optical link between two Ethernet devices; ideally, one of these devices is mobile. The opening angle is optimized for operations in high-rack storage.

Devices in industrial Ethernet networks (e.g., with PROFINET, EtherNet/IP, and other Ethernet protocol designs) can be connected to the optical data coupler. The physical transfer takes place with 100 MBit/s full duplex. The connection to multiple devices must be implemented using switches that have been certified for use with the bus system in question. All layer 2 telegrams (IEEE 802.3 Clause 25) are physically transported. There is no saving of telegrams, so the transfer is not delayed at all.

Devices with a transfer rate of 10 MBit/s can be connected via a switch. The optical data coupler uses a semiconductor laser as an optical emitter. The dilation of the light beam and the use of return map blocks guarantee that the devices are harmless in accordance with laser class 1 M. The emitted beam must not be viewed with telescopes or binoculars from distances of less than 20 m. At longer distances, the limit values for laser class 1 are not exceeded, even when viewed through a telescope with a 50 mm aperture.

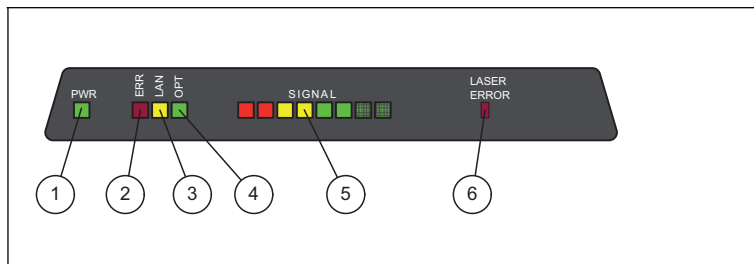


4.2 Model Variants

The optical data coupler is available in different versions:

Number	Model Number	Description
265350	LS682-DA-EN/F1	Standard version, 150 m detection range, frequency 1
265351	LS682-DA-EN/F2	Standard version, 150 m detection range, frequency 2
260312	LS682-DA-EN/F1/35	Version with increased detection range of 300 m, frequency 1
260313	LS682-DA-EN/F2/35	Version with increased detection range of 300 m, frequency 2
265352	LS682-DA-EN/F1/146	Version for deep-freeze applications, 150 m detection range, frequency 1
265353	LS682-DA-EN/F2/146	Version for deep-freeze applications, 150 m detection range, frequency 2
265354	LS682-DA-EN/F1/35/146	Version with increased detection range of 300 m, for deep-freeze applications, frequency 1
265355	LS682-DA-EN/F2/35/146	Version with increased detection range of 300 m, for deep-freeze applications, frequency 2

4.3 Indicators and Operating Controls



- 1 PWR**
Lights up as soon as the optical data coupler receives operating voltage in the correct manner.
- 2 ERR**
Status of the overall connection. Lights up in the event of faults (insufficient signal strength to establish the connection, e.g., misalignment, light beam obstructions, extraneous light in the optical channel). The LED does not light up during normal operation.
- 3 LAN**
Status of the cable connection. The LAN LED (yellow) indicates a physical connection to the next device on the cable. If this LED is not on, this indicates a connection problem. The LAN LED lights up steadily when no data is being transported. Flashing of the LAN LED indicates the presence of data packets on the LAN.

- ④ **OPT**
Status of the optical connection. The OPT LED flashes when the optical connection is stabilized through correct alignment.
- ⑤ **SIGNAL**
The optical signal strength is displayed as an alignment aid during adjustment of the optical data couplers. Additional information see chapter 6.1.
- ⑥ **LASER ERROR**
If the permissible internal temperature is exceeded, this LED flashes. The transmission power is not reduced. If an internal activation error such as overcurrent is detected, the laser is switched off, and an attempt is then made every second to resume normal operation. Meanwhile, the LASER ERROR LED lights for 30 s ... 60 s, even if the process was a one-off, e.g., as the result of an EMC event.

4.4 Interfaces and Connections

The device includes the following connections:

Power Supply

A 4-pin M12 plug (A coded) is located on the rear of the housing to connect the power supply and the alarm output. The following diagram shows the pin assignment:



Figure 4.1 Power supply and alarm output connection layout

- 1 24 V power supply:
- 2 n.c.
- 3 Ground (GND)
- 4 Alarm

Service

An 8-pin M12 plug for service is located on the rear of the housing (for Pepperl+Fuchs-internal use only).



Network

A 4-pin M12 D-coded socket is located on the rear of the housing for connecting to the Ethernet network. The following diagram shows the pin assignment:



Figure 4.2 Network connection layout

- 1 Transmit Data (+)
- 2 Receive Data (+)
- 3 Transmit Data (-)
- 4 Receive Data (-)

4.5 Scope of Delivery

- LS682-DA
- Instruction leaflet

4.6 Accessories

4.6.1 Mounting Accessories

The following mounting accessories are available:

Designation	Description
OMH-LS610-01	Adjustment unit
OMH-LS610-02	Direct mounting set (4 M4 threaded inserts)
Protective cap LS610 accessories	Additional fastening for transport and storage. A protective cap has already been placed onto the service connector.
OMH-LS610-03	Deviation mirror

4.6.2 Connecting Cables

The following female single-ended cordsets are available for selection:

Designation	Description
V1-G-2M-PVC	Female single-ended cordset, straight, M12, 4-pin, PVC cable, length: 2 m
V1-G-2M-PUR	Female single-ended cordset, straight, M12, 4-pin, PUR cable, length: 2 m
V1-M-5M-PVC	Female single-ended cordset, straight, M12, 4-pin, PVC cable, length: 5 m

Designation	Description
V1-M-5M-PUR	Female single-ended cordset, straight, M12, 4-pin, PUR cable, length: 5 m
V1-G-PG9	Female single-ended cordset, straight, M12, 4-pin, field attachable
V1-W-PG9	Female single-ended cordset, angled, M12, 4-pin, field attachable
V1-W-2M-PVC	Female single-ended cordset, angled, M12, 4-pin, PVC cable, length: 2 m
V1-W-2M-PUR	Female single-ended cordset, angled, M12, 4-pin, PUR cable, length: 2 m
V1-W-5M-PVC	Female single-ended cordset, angled, M12, 4-pin, PVC cable, length: 5 m
V1-W-5M-PUR	Female single-ended cordset, angled, M12, 4-pin, PUR cable, length: 5 m

4.6.3

Network connecting cable

The sensor is connected to the network using an M12 connector.

Designation	Description
V1SD-G-2M-PUR-ABG-V45-G	Patch cable M12 to RJ45, length: 2 m
V1SD-G-5M-PUR-ABG-V45-G	Patch cable M12 to RJ45, length: 5 m
V1SD-G-ABG-PG9	male connector, M12 D-coded, 4-pin for bus cable, field attachable

5 Installation

5.1 Preparation



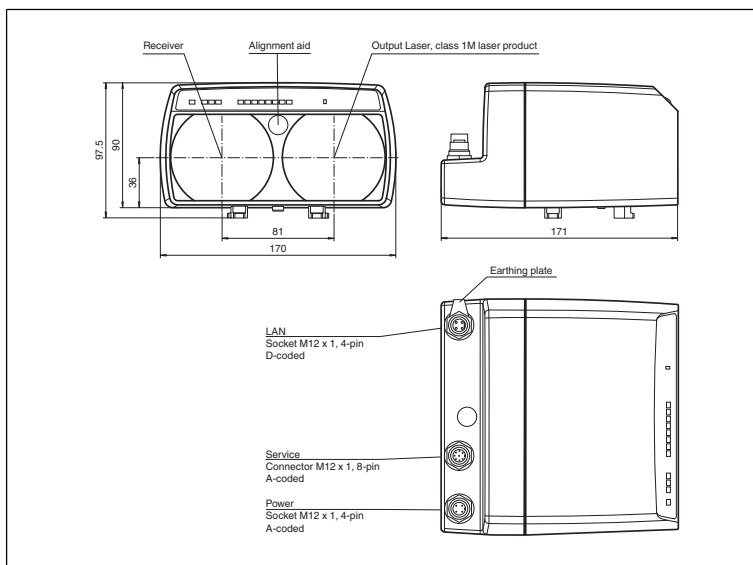
Unpacking the Unit

1. Check that all package contents are present and undamaged.
↳ If anything is damaged, inform the shipper and contact the supplier.
2. Check that all items are present and correct based on your order and the shipping documents.
↳ If you have any questions, please contact Pepperl+Fuchs.
3. Keep the original packing material in case you need to store or ship the unit at a later time.

5.2 Mounting

The device has two mounting holes as well as four retaining feet for easy installation. M4 inserts can also be pressed into these four feet. This allows existing adjustment and mounting options to be used. We also offer other mounting accessories to facilitate fast mounting and adjustment. See chapter 4.6.1

The following illustration shows all the relevant device dimensions in mm:



Mounting on a P+F Adjustment Device

The mounting accessories (OMH-LS610-01) consist of a mounting bracket and an integral alignment device (in x and y axes). The required beam direction ($\pm 90^\circ$ rotation) can be set using the mounting accessories, which are fastened to the mounting bracket using two M4 screws and the central M6 screw. The central screw is for securing the unit in place following adjustment and should not be tightened until the adjustment is finalized. To mount the optical data coupler, squeeze the two front levers together and place feet into the four openings in the adjustment device. The feet have to lock into place so that the levers can be released outwards as far as the stop; if necessary the optical data coupler has to be pressed down applying some force from the top to the center.



5.3

Connection

Connecting the Supply Voltage

The device conforms to protection class III. This means that the power has to be supplied as a low protective voltage (PELV) and limited according to UL Class 2 (100 W). The optical data coupler is supplied with a direct voltage of 18 VDC ... 30 VDC. The insulation test voltage (shield against power/GND) is 50 V maximum.

To supply voltage to the device, proceed as follows:

1. Plug the prepared connecting cable with the 4-pin M12 socket into the plug provided on the rear of the housing.
2. Screw the cap nut onto the connector as far as it will go. This ensures that the power cable cannot be inadvertently pulled out.
3. Now connect the supply voltage to the cable provided.

↳ The device is now ready for operation.

Grounding/Shielding

This type of grounding is not protective grounding, it acts solely as a down conductor for cable-related faults and is not subject to any safety guidelines (e.g., personnel protection). Functional grounding of the cable shields is required to provide immunity to interference.

To ground the device, proceed as follows:

1. Make up a ground cable using a 6 mm flat connector with an adequate cross-section ($\geq 1.5 \text{ mm}^2$).
2. Plug the flat connector onto the pre-mounted insertion prong on the device.

3. Connect the other end of the ground cable to adjacent metal components (e.g., mounting base, frame, etc.).

↳ The device is now grounded.



Establishing the Network

The M12 plug (D coded) on both devices features the standard assignment for Ethernet. The optical data coupler automatically locates transmitting and receiving lines (Auto-MDIX), meaning there is no need to use a crossover cable. To connect the device to a network, proceed as follows:

1. Plug the prepared network cable with the 4-pin M12 plug into the socket provided on the rear of the housing.
2. Screw the cap nut onto the connector as far as it will go. This ensures that the power cable cannot be inadvertently pulled out.
3. Now connect the network cable to the network connection provided for this purpose.

↳ The device is now ready for operation.



Note!

The Ethernet cable must be of CAT5 quality as a minimum. Unshielded cables (UTP) are not suitable for maintaining immunity.

5.4

Storage and Transport

For storage and transport purposes, package the unit using shockproof packaging material and protect it against moisture. The best method of protection is to package the unit using the original packaging. Furthermore, ensure that the ambient conditions are within allowable range.

6 Commissioning

6.1 Alignment and Adjustment

Aligning two devices over long distances is difficult and is almost impossible to achieve if working alone. However, optimal alignment of the devices and the highest possible reception level are crucial for faultless data transfer. The new "bidirectional" display mode of the LS682 optical data coupler helps with this process.

There are two display modes to help you with adjustment:

- Unidirectional: suitable for short distances up to approx. 150 m
- Bidirectional: suitable for long distances from 150 m to 300 m



Tip

The optical data coupler is designed to ensure that an adequate reception level is obtained over the entire emitter spot. However, for technical reasons, the maximum reception level is often not in the center of the spot. To ensure that the range is as symmetrical as possible, Pepperl+Fuchs recommends using the adjustment aid to "trace" the edges of the spot horizontally and vertically, and then setting the center position. The drop-off in intensity at the edge of the spot is very pronounced, which makes the edges easy to locate.

Alignment Aids in "Unidirectional" Display Mode

To make alignment easier, an alignment LED that is visible from far away is located on the front of the device. As soon as a receiver detects the emitted light of the device opposite it, the flashing frequency of the alignment LED decreases. When the alignment LED goes out, the devices are optimally aligned. Sufficient excess gain is available.

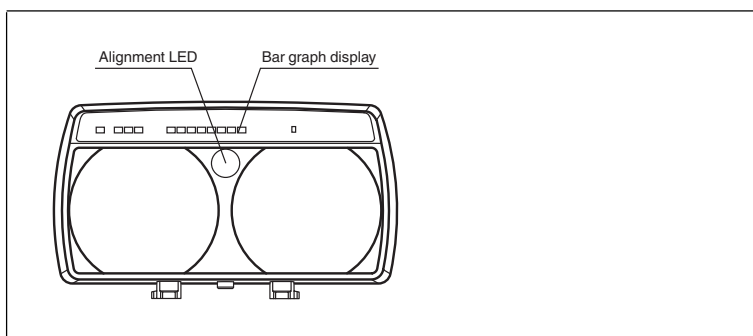


Figure 6.1 Position of the alignment LED and the bar graph display on the device

The bar graph indicator shows the reception level of the device on which it is located.

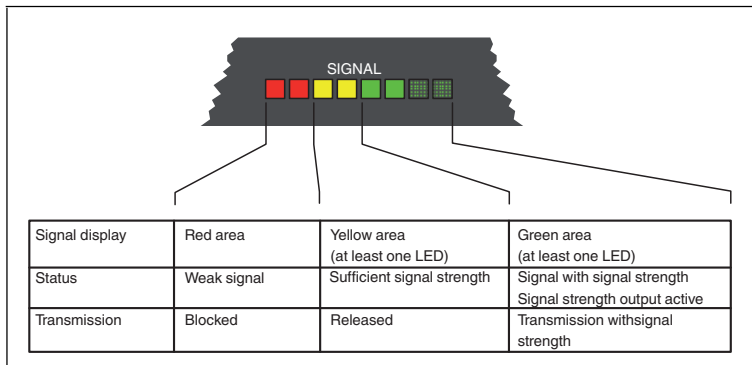


Figure 6.2 Explanation of relationship between bar graph display and operating state

Excess Gain

In "Excess gain" mode (green zone), the signal strength of the optical data coupler is sufficient for operational purposes. The optical data coupler should operate in the green zone within the nominal range (at least one green LED); if the signal strength drops below this limit level, the weak signal indication (alarm output) is switched off. Telegrams continue to be sent until the signal strength drops below the level required for operational purposes (red LED only).

Alignment Aid in "Bidirectional" Display Mode

The reception level of both sides is shown at the same time on one device.

This means that the effect on the reception of both devices when aligning can be read directly on the device. It is no longer necessary to have someone helping on the opposite side.

The "bidirectional" display mode starts automatically when the LS682 optical data coupler has not received any signal for more than three seconds (e.g., due to interruption of the light beam with opaque material or deliberate covering of the receiving lens).

In the "bidirectional" display mode, the highest reception level value is displayed:

- Steady LED: reception level of the local device.
- Flashing LED: reception level of the opposite device.

The "bidirectional" display mode is ended if the signal level on both sides is stable and greater than the minimum reception strength for more than eight seconds.



Example 1

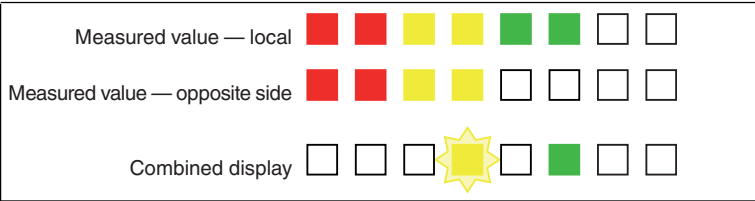


Figure 6.3 The reception level of the local device is greater than the reception level of the opposite side: green LED lights up (local device), yellow LED flashes (opposite side)

Example 2



Figure 6.4 The reception level of both devices is equally good: green LED flashes (local measured value/opposite side measured value identical)

Example 3



Figure 6.5 The reception level of the opposite side is greater than the reception level of the local device: green LED lights up (local device), green LED flashes (opposite side)

Example 4

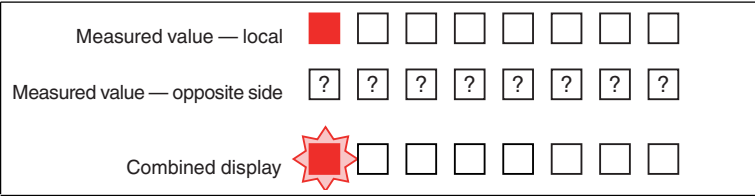
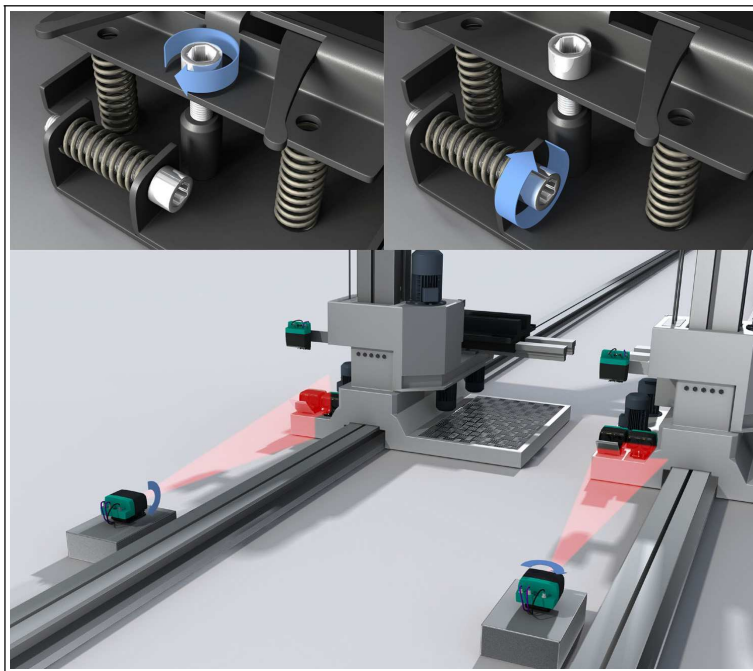


Figure 6.6 The reception level of the opposite side is unknown (interruption of the light beam, misaligned, etc.). The reception level of the local device is low: red LED flashes

Aligning Using the Adjustment Aid

The beam axis is aligned in the x and y direction using the two adjustment screws (hollow, 5 mm). This position is then fixed by tightening the central screw. Ethernet data communication is not needed for the alignment.



Alignment Sequence

1. Place the adjustment aid on the bracket in the required direction and tighten the two M4 nuts. Screw in the M6 central screw, but do not tighten it yet.
2. Place the optical data coupler in the adjustment aid. Connect the power supply.
3. Roughly align the device at a distance of around 3 – 5 m until both signal indicators lie in the green zone. Ensure that the optical data couplers are at the same height and are not offset.
4. Move both optical data couplers about 20 m apart and turn the adjustment screws Y until the alignment LED starts to flash slowly. Now turn the same screw in the opposite direction, counting the number of turns that the alignment LED remains off before it starts flashing again. Finally, turn the adjustment screw back by half the number of turns (the middle of the range). Perform the same procedure in the x direction.
5. Increase the distance to maximum. Adjust the device further if necessary.

6. We recommend making the height adjustment before the lateral adjustment, since the height adjustment can mechanically modify the lateral position, but this does not apply the other way around.

↳ Once you have made the adjustments, tighten the central M6 screw to fix the position in the horizontal direction.

Parallel light paths

If two light paths are installed next to each other without any optical separation, the optical data couplers must be installed opposite each other in pairs to avoid cross-talk. A minimum distance 'a' between the beam axes is not required, provided that the adjacent pairs have the identical overall distance 'd'.

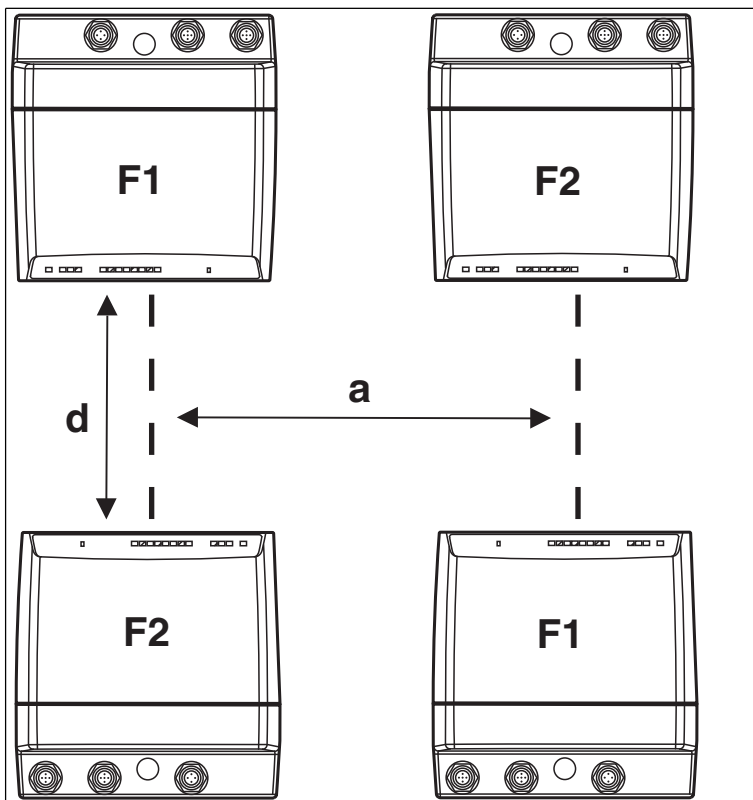
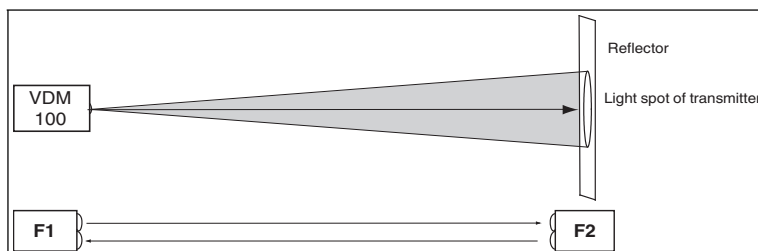


Figure 6.7 Parallel light paths

In such arrangements, disconnecting one side of an optical data coupler is not permitted. Similarly, the light beam must not be obstructed.

Parallel Arrangement with VDM100 Distance Measurement Devices

The optical data coupler and distance measurement devices of type VDM100 can be arranged in parallel. A minimum distance between the devices is not required.



6.2

Topology

The optical data coupler does not contain any address routing logic (switch). This means that the distribution of the information must always be controlled by an external switch. The internal Ethernet adapter is permanently set to 100 MBit full duplex, as this is the only format that is converted for the optical transmission. Any adjustments required to connection modes must be made using the external switch. The pair of optical data couplers effectively replace a cable, the maximum cable lengths always relate to the distance from the ODC to the appropriate switch. The signal propagation time, on the other hand, depends on the physical distance between the two ODCs; it amounts to 3.3 ns for each meter of light path.

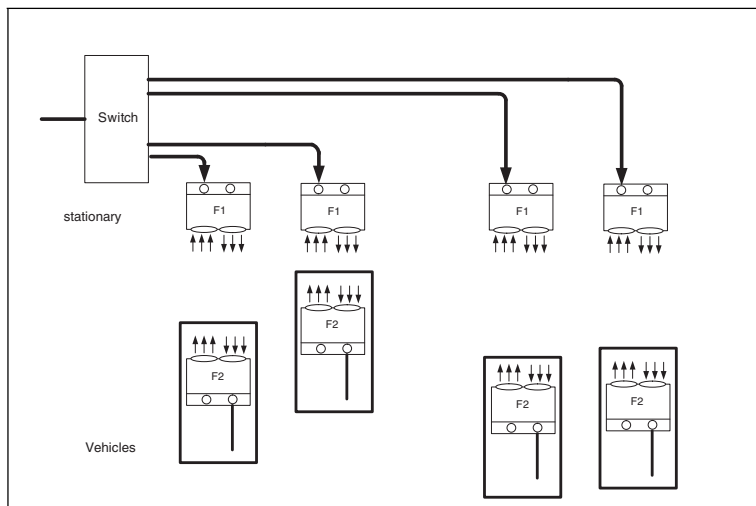


Figure 6.8 Topology

7 Maintenance and Repair

7.1 Maintenance

To get the best possible performance out of your device, keep the optical unit on the device clean and clean it when necessary.

Observe the following instructions when cleaning:

- Do not touch the optical unit with your fingers.
- Do not immerse the device in water. Do not spray the device with water or other fluids.
- Do not use a scouring agent to clean the surface of the device.
- Use a cotton or paper cloth moistened with water or isopropyl alcohol (not soaked).
- Remove any residual alcohol using a cotton or paper cloth moistened with distilled water (not soaked).
- Wipe the surface of the device dry using a lint-free cloth.

7.2 Repair

The devices must not be repaired, changed or manipulated. If there is a defect, the product must always be replaced with an original device.

8 Troubleshooting

8.1 What to Do in the Event of an Error

Please check that the following actions have been taken:

- The customer has tested the system according to the checklist below.
- Telephone assistance has been sought from the Service Center to isolate the problem.

Checklist

Fault	Indicators				Cause	Remedy
	PWR	ERR	LAN	OPT		
No display	Off	Off	Off	Off	The power supply is switched off or there is a wiring fault in the distributor or switch cabinet.	Check whether there is a reason why the power supply is switched off (installation or maintenance work, etc.). Switch on the power supply if appropriate. Check the wiring carefully and repair any wiring faults.
No network connection	On		Off		Network cable not connected or incorrectly connected Port on the switch is deactivated	Check the connection to the next participant: LAN LED Activate the port on the switch
No optical communication	On	On		Off	Receiving level too low, transfer blocked	Improve alignment or incorrect pairing; F1+F2 required
Bar graph display does not reflect full value despite precise alignment	On	Off	On	On	Not an error; individual scaling deviation in the highest signal strength range	None

- If none of the above solves the problem, contact the Service Center. Have the exact model number of the sensor ready if possible.

9

Appendix

9.1

Technical Data: LS682-DA-EN/F*

General Data

	LS682-DA-EN/F1	LS682-DA-EN/F2
Effective operating distance	0 m ... 150 m	
Range limit	180 m	
Light source	Laser diode	
Light type	Modulated infrared light	Modulated red light
Laser nominal ratings		
Note	INVISIBLE LASER BEAM, DO NOT LOOK DIRECTLY AT THE LASER BEAM USING OPTICAL INSTRUMENTS	VISIBLE LASER BEAM, DO NOT LOOK DIRECTLY AT THE LASER BEAM USING OPTICAL INSTRUMENTS
Laser class	1M	
Wavelength	785 nm	660 nm
Beam divergence	15 mrad	
Pulse duration	8 ns	
Repeat rate	62.5 MHz	
Maximum optical power output	60 mW	
Diameter of the light spot	1.5 m at a distance of 100 m	
Opening angle	1°	
Extraneous light limit	> 10,000 Lux	

Functional Safety Data

	LS682-DA-EN/F1	LS682-DA-EN/F2
MTTF _d	58.6 a	
Life time (T _M)	10 a	
Diagnostic coverage (DC)	0%	

Indicators/Operating Controls

	LS682-DA-EN/F1	LS682-DA-EN/F2
Data flow display	Green LED: OPTO link Yellow LED: LAN link Red LED: ERROR	
Function indicator	Signal strength (8 LEDs: red, yellow, green)	

Electrical Data

	LS682-DA-EN/F1	LS682-DA-EN/F2
Operating voltage	18 VDC ... 30 VDC	
No-load current	200 mA	
Data rate	100 MBit/s (Fast Ethernet)	

Interface

	LS682-DA-EN/F1	LS682-DA-EN/F2
Interface type	100 BASE-TX	

Output

	LS682-DA-EN/F1	LS682-DA-EN/F2
Pre-fault output	1 PNP, inactive when below the signal strength, short-circuit proof, max. 200 mA	

Ambient Conditions

	LS682-DA-EN/F1	LS682-DA-EN/F2
Ambient temperature	-10 °C ... 50 °C (14 °F ... 122 °F)	
Storage temperature	-20 °C ... 70 °C (-4 °F ... 158 °F)	

Mechanical Data

	LS682-DA-EN/F1	LS682-DA-EN/F2
Degree of protection	IP65	
Connection	M12x1 plug, 4-pin, standard (power supply), M12x1 plug, 8-pin, service, M12x1 socket, 4-pin, D-coded (LAN)	
Material		
Housing	ABS/PC	
Optical face	Plastic	
Weight	700 g	

Conformity with Standards and Directives

	LS682-DA-EN/F1	LS682-DA-EN/F2
Directive conformity		
EMC Directive 2004/108/EC	EN 61000-6-2:2005; EN 60947-5-2:2007	
Conformity with standards		
Laser class	IEC 60825-1:2007 EN 60825-1:2007	

Approvals and Certificates

	LS682-DA-EN/F1	LS682-DA-EN/F2
UL approval		cULus-listed

9.2

Technical Data: LS682-DA-EN/F*/35

General Data

	LS682-DA-EN/F1/35	LS682-DA-EN/F2/35
Effective operating distance	0 m ... 300 m	
Range limit	350 m	
Light source	Laser diode	
Light type	Modulated infrared light	Modulated red light
Laser nominal ratings		
Note	INVISIBLE LASER BEAM, DO NOT LOOK DIRECTLY AT THE LASER BEAM USING OPTICAL INSTRUMENTS	VISIBLE LASER BEAM, DO NOT LOOK DIRECTLY AT THE LASER BEAM USING OPTICAL INSTRUMENTS
Laser class	1M	
Wavelength	785 nm	660 nm
Beam divergence	15 mrad	
Pulse duration	8 ns	
Repeat rate	62.5 MHz	
Maximum optical power output	60 mW	
Diameter of the light spot	1.5 m at a distance of 100 m	
Opening angle	1°	
Extraneous light limit	> 10,000 Lux	

Functional Safety Data

	LS682-DA-EN/F1/35	LS682-DA-EN/F2/35
MTTF _d		58.6 a
Life time (T _M)		10 a
Diagnostic coverage (DC)		0%

Indicators/Operating Controls

	LS682-DA-EN/F1/35	LS682-DA-EN/F2/35
Data flow display		Green LED: OPTO link Yellow LED: LAN link Red LED: ERROR
Function indicator		Signal strength (8 LEDs: red, yellow, green)

Electrical Data

	LS682-DA-EN/F1/35	LS682-DA-EN/F2/35
Operating voltage		18 VDC ... 30 VDC
No-load current		200 mA
Data rate		100 MBit/s (Fast Ethernet)

Interface

	LS682-DA-EN/F1/35	LS682-DA-EN/F2/35
Interface type		100 BASE-TX

Output

	LS682-DA-EN/F1/35	LS682-DA-EN/F2/35
Pre-fault output		1 PNP, inactive when below the signal strength, short-circuit proof, max. 200 mA

Ambient Conditions

	LS682-DA-EN/F1/35	LS682-DA-EN/F2/35
Ambient temperature		-10 °C ... 50 °C (14 °F ... 122 °F)
Storage temperature		-20 °C ... 70 °C (-4 °F ... 158 °F)

Mechanical Data

	LS682-DA-EN/F1/35	LS682-DA-EN/F2/35
Degree of protection	IP65	
Connection	M12x1 plug, 4-pin, standard (power supply), M12x1 plug, 8-pin, service, M12x1 socket, 4-pin, D-coded (LAN)	
Material		
Housing	ABS/PC	
Optical face	Plastic	
Weight	700 g	

Conformity with Standards and Directives

	LS682-DA-EN/F1/35	LS682-DA-EN/F2/35
Directive conformity		
EMC Directive 2004/108/EC	EN 61000-6-2:2005; EN 60947-5-2:2007	
Conformity with standards		
Laser class	IEC 60825-1:2007 EN 60825-1:2007	

Approvals and Certificates

	LS682-DA-EN/F1/35	LS682-DA-EN/F2/35
UL approval	cULus-listed	

9.3

Technical Data: LS682-DA-EN/F*/146

General Data

	LS682-DA-EN/F1/146	LS682-DA-EN/F2/146
Effective operating distance	0 m ... 150 m	
Range limit	180 m	
Light source	Laser diode	
Light type	Modulated infrared light	Modulated red light
Laser nominal ratings		
Note	INVISIBLE LASER BEAM, DO NOT LOOK DIRECTLY AT THE LASER BEAM USING OPTICAL INSTRUMENTS	VISIBLE LASER BEAM, DO NOT LOOK DIRECTLY AT THE LASER BEAM USING OPTICAL INSTRUMENTS
Laser class	1M	
Wavelength	785 nm	660 nm
Beam divergence	15 mrad	
Pulse duration	8 ns	
Repeat rate	62.5 MHz	
Maximum optical power output	60 mW	
Diameter of the light spot	1.5 m at a distance of 100 m	
Opening angle	1°	
Extraneous light limit	> 10,000 Lux	

Functional Safety Data

	LS682-DA-EN/F1/146	LS682-DA-EN/F2/146
MTTF _d	58.6 a	
Life time (T _M)	10 a	
Diagnostic coverage (DC)	0%	

Indicators/Operating Controls

	LS682-DA-EN/F1/146	LS682-DA-EN/F2/146
Data flow display	Green LED: OPTO link Yellow LED: LAN link Red LED: ERROR	
Function indicator	Signal strength (8 LEDs: red, yellow, green)	

Electrical Data

	LS682-DA-EN/F1/146	LS682-DA-EN/F2/146
Operating voltage	18 VDC ... 30 VDC	
No-load current	200 mA	
Data rate	100 MBit/s (Fast Ethernet)	

Interface

	LS682-DA-EN/F1/146	LS682-DA-EN/F2/146
Interface type	100 BASE-TX	

Output

	LS682-DA-EN/F1/146	LS682-DA-EN/F2/146
Pre-fault output	1 PNP, inactive when below the signal strength, short-circuit proof, max. 200 mA	

Ambient Conditions

	LS682-DA-EN/F1/146	LS682-DA-EN/F2/146
Ambient temperature	-30 °C ... 50 °C (-22 °F ... 122 °F)	
Storage temperature	-40 °C ... 70 °C (-40 °F ... 158 °F)	

Mechanical Data

	LS682-DA-EN/F1/146	LS682-DA-EN/F2/146
Degree of protection	IP65	
Connection	M12x1 plug, 4-pin, standard (power supply), M12x1 plug, 8-pin, service, M12x1 socket, 4-pin, D-coded (LAN)	
Material		
Housing	ABS/PC	
Optical face	Plastic	
Weight	700 g	

Conformity with Standards and Directives

LS682-DA-EN/F1/146		LS682-DA-EN/F2/146
Directive conformity		
EMC Directive 2004/108/EC	EN 61000-6-2:2005; EN 60947-5-2:2007	
Conformity with standards		
Laser class	IEC 60825-1:2007 EN 60825-1:2007	

Approvals and Certificates

	LS682-DA-EN/F1/146	LS682-DA-EN/F2/146
UL approval		cULus-listed

9.4

Technical Data: LS682-DA-EN/F*/35/146

General Data

	LS682-DA-EN/F1/35/146	LS682-DA-EN/F2/35/146
Effective operating distance	0 m ... 300 m	
Range limit	350 m	
Light source	Laser diode	
Light type	Modulated infrared light	Modulated red light
Laser nominal ratings		
Note	INVISIBLE LASER BEAM, DO NOT LOOK DIRECTLY AT THE LASER BEAM USING OPTICAL INSTRUMENTS	VISIBLE LASER BEAM, DO NOT LOOK DIRECTLY AT THE LASER BEAM USING OPTICAL INSTRUMENTS
Laser class	1M	
Wavelength	785 nm	660 nm
Beam divergence	15 mrad	
Pulse duration	8 ns	
Repeat rate	62.5 MHz	
Maximum optical power output	60 mW	
Diameter of the light spot	1.5 m at a distance of 100 m	
Opening angle	1°	
Extraneous light limit	> 10,000 Lux	

Functional Safety Data

	LS682-DA-EN/F1/35/146	LS682-DA-EN/F2/35/146
MTTF _d	58.6 a	
Life time (T _M)	10 a	
Diagnostic coverage (DC)	0%	

Indicators/Operating Controls

	LS682-DA-EN/F1/35/146	LS682-DA-EN/F2/35/146
Data flow display	Green LED: OPTO link Yellow LED: LAN link Red LED: ERROR	
Function indicator	Signal strength (8 LEDs: red, yellow, green)	

Electrical Data

	LS682-DA-EN/F1/35/146	LS682-DA-EN/F2/35/146
Operating voltage	18 VDC ... 30 VDC	
No-load current	200 mA	
Data rate	100 MBit/s (Fast Ethernet)	

Interface

	LS682-DA-EN/F1/35/146	LS682-DA-EN/F2/35/146
Interface type	100 BASE-TX	

Output

	LS682-DA-EN/F1/35/146	LS682-DA-EN/F2/35/146
Pre-fault output	1 PNP, inactive when below the signal strength, short-circuit proof, max. 200 mA	

Ambient Conditions

	LS682-DA-EN/F1/35/146	LS682-DA-EN/F2/35/146
Ambient temperature	-30 °C ... 50 °C (-22 °F ... 122 °F)	
Storage temperature	-40 °C ... 70 °C (-40 °F ... 158 °F)	

Mechanical Data

	LS682-DA-EN/F1/35/146	LS682-DA-EN/F2/35/146
Degree of protection	IP65	
Connection	M12x1 plug, 4-pin, standard (power supply), M12x1 plug, 8-pin, service, M12x1 socket, 4-pin, D-coded (LAN)	
Material		



Housing	ABS/PC
Optical face	Plastic
Weight	700 g

Conformity with Standards and Directives

LS682-DA-EN/F1/35/146	LS682-DA-EN/F2/35/146
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Directive conformity

EMC Directive 2004/108/EC	EN 61000-6-2:2005; EN 60947-5-2:2007
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Conformity with standards

Laser class	IEC 60825-1:2007 EN 60825-1:2007
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Approvals and Certificates

LS682-DA-EN/F1/35/146	LS682-DA-EN/F2/35/146
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UL approval	cULus-listed
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FACTORY AUTOMATION – SENSING YOUR NEEDS



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