

WOLink 4E1/300 N



Communication by light

Gesellschaft für optische Kommunikationssysteme mbH



**Installation and
operating instructions**

Safety instructions

Warning! Avoid to look directly into the front side of a connected WOLink 4E1/300 N-station, because the invisible infrared light (IR-light) may injure your eyes !

The stations are in accordance with the following standards:

EN 60 950 1988 and DIN VDE 0805/05.90 respectively SAFETY OF INFORMATION TECHNOLOGY EQUIPMENT INCLUDING ELECTRIC OFFICE MACHINES

DIN VDE 0100 T410/11.83 INSTALLATION OF HEAVY CURRENT EQUIPMENT WITH NOMINAL VOLTAGES OF UP TO 1000 V. PROTECTION AGAINST CURRENTS HAZARDOUS TO THE HUMAN BODY.

According to this standard the stations belong to protection class 1, which prescribes:

Warning! The protective earth must be connected without fail at the plug sockets supplying the equipment with current.

In addition we recommend:

Fit the electric circuit with a FI circuit breaker (30 mA) to protect persons during direct or indirect contact with the equipment. These switches can only be installed by expert personnel.

Connect the electric circuit to the uninterruptible power supply (UPS) of the existing computer equipment to protect against system failure.

Transport and scope of delivery

Attention: The equipment must not be tilted, thrown or set down hard.

Before transport screw the covering onto the operating panel.

Scope of delivery: 1 station 1 holders
 2 M 6 x 12 - screws 1 power cables (3m long)

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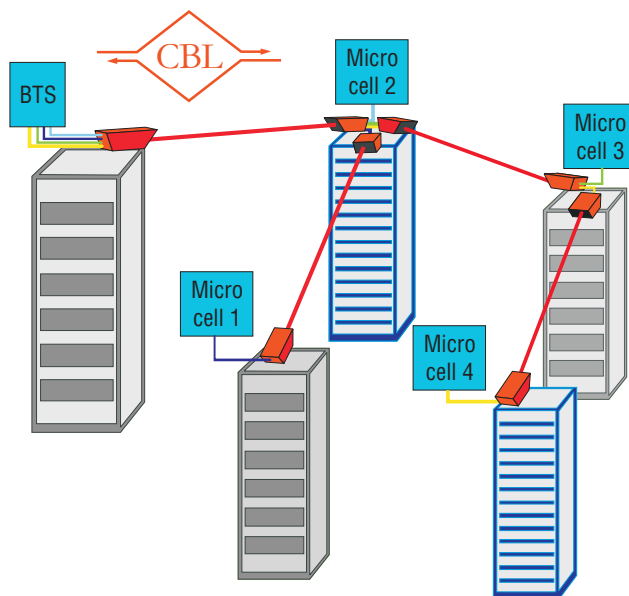
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1. The optical radio relay system

The WOLink 4E1/300 N is a bidirectional optical radio relay system and can bridge a distance of 300 meters. It transmits digital signals with the transmission rate of up to four times 2.048 Mbps through the atmosphere using infrared light (IR-LED).

Application: The WOLink 4E1/300 N is especially developed for connecting systems with E1-interface, standardized as CCITT G.703. It is supposed as a supplement for the high performance optical links where voice/data integration is needed. Another main focus is the usage in carrier networks for creating microcells.

For the network the system is like a connection via fiber optic.



CBLs WOLink 4E1/300 provides capacity and coverage for GSM. It brings multi-standard capability to mobile telephony traffic hot-spots.

Advantages: The system

- bridges obstacles such as roads, rail tracks, rivers, etc.
- needs no additional frequency approval.
- saves high investments and time for the laying of a permanent line.
- can be installed easily and without any problems.
- is excellently suited as an interim solution or as a secondary route.

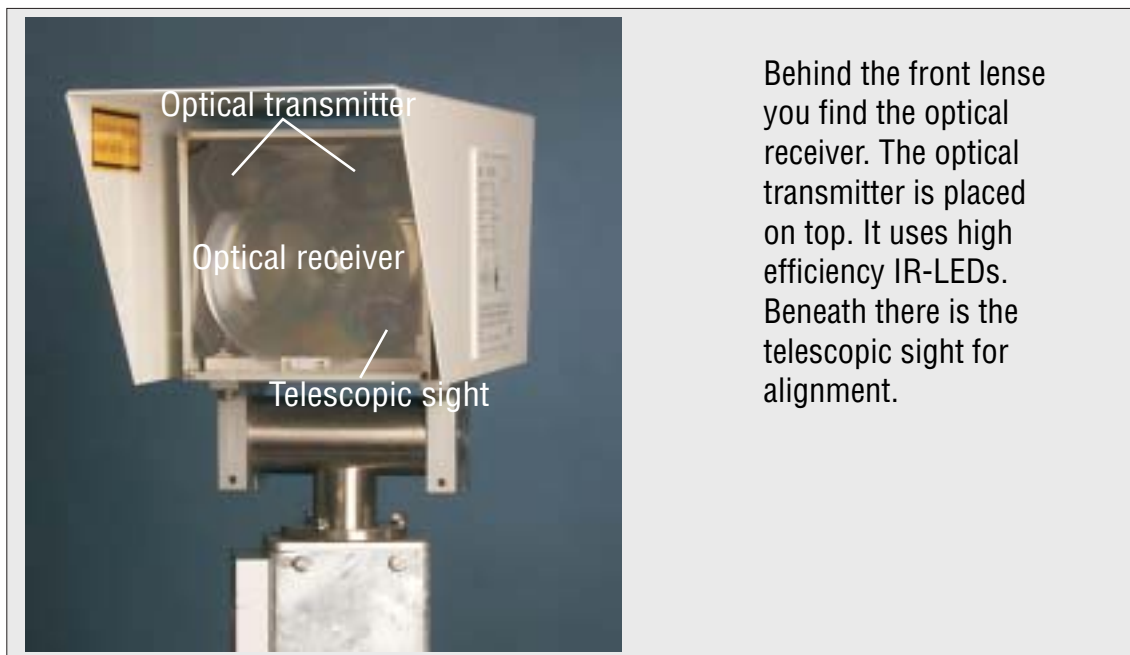
Availability: The attenuation of the IR light over the transmission path depends on the distance and the weather conditions. Only heavier fog and extreme rain or snowfall can absorb the IR waves so severely that the optical transmission path is interrupted for a short time.

2. The WOLink 300 station

Warning! Never look directly into the front side of a station!

Below a protective cover you find in a sealed casing :

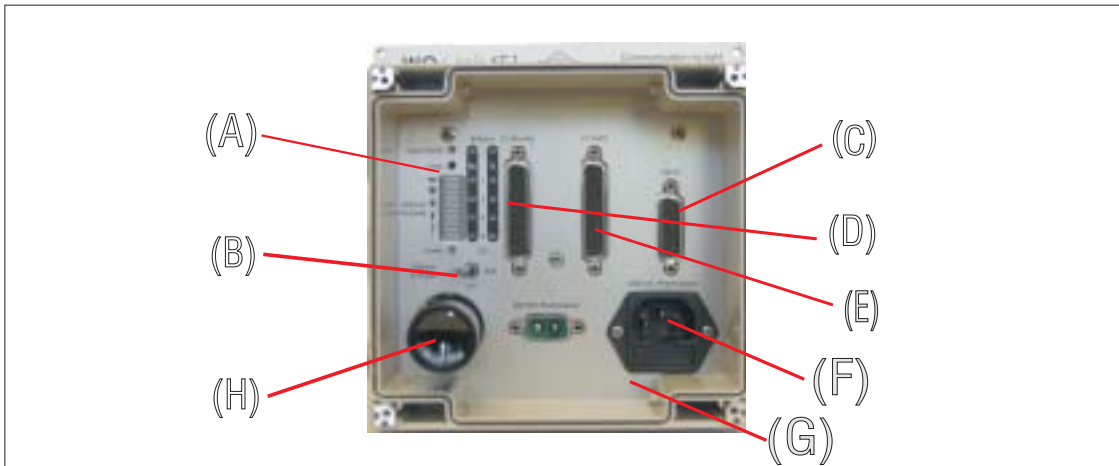
- two optical transmitter with signal processing
- optical receiver with signal processing
- the operating panel with the connections
- a telescopic sight for alignment



On the reverse side you will find the operating panel with user interfaces behind a transparent protective cover (operating panel covering) and the oculars of the telescopic sight.

The telescopic sight: is stable mounted with the casing and its alignment is coupled with the transmitter and receiver. This simplifies the alignment of both stations.

2.1 Back panel



2.2 Switches and connectors

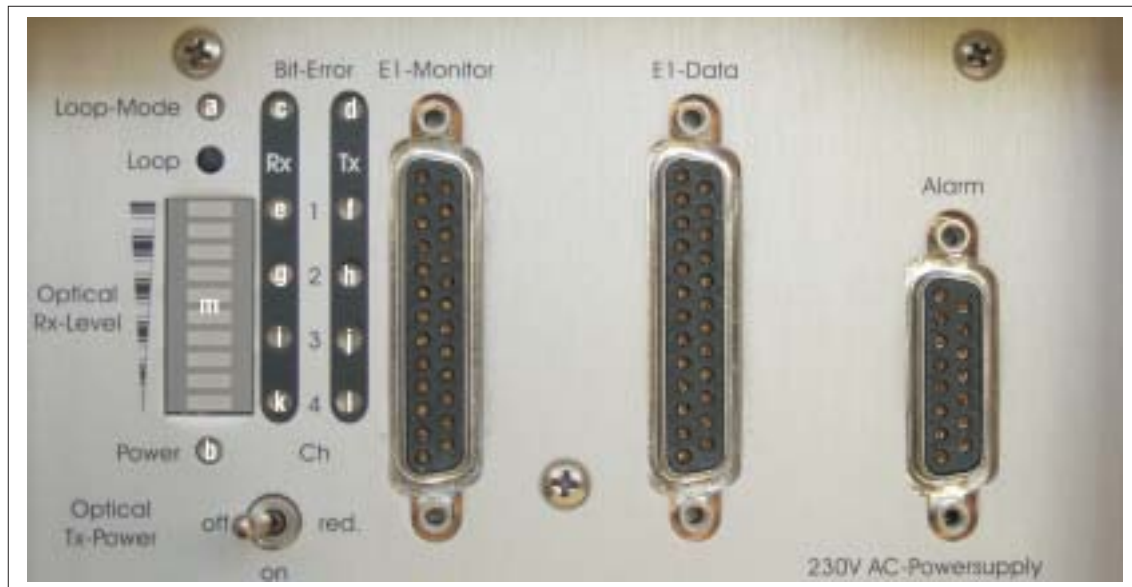
Nr.	Description	Function/LED-Signal
A	Push-button for loop-function	Push button for 5 seconds until LED "Loop" switches to "green". At this time channel 1 is automatically selected, what is indicated by the red blinking TX-LED. In this state you can choose another channel, all channels together or no channel by pressing the button several times. The loop function is still on hold and data still transmitted! 15 seconds after last time pressing the button the selection will be activated (LED "Loop" becomes red). If no channel is selected, the system returns to normal mode (LED "Loop" becomes dark!). To disable the loop mode push the loop-button once.
B	Switch for optical power	Controls the optical power of the station: off, full or reduced power.
C	Alarm	D-sub 15 for connecting external alarm devices with the system. There are separated contacts for local and remote alarms as well as an input port for alarm signals of external devices, which are transponded to additional contacts. (Pin layout: see page 8)
D	Monitoring and additional signals	D-sub 25 connector for realtime monitoring the data during operation. There are additional signals for Receiving Strength Signal Indicators as well as AGC and an optional RX monitor. (Pin layout: see page 14)
E	Connector for data	D-sub 25 connector for connecting the E1-Interfaces to the system. (Pin layout: see page 14)
F	Power connector	Plug for the power supply with 230 V AC
G	Power connector	Plug for the power supply with 48 V DC
H	Telescopic sight	Is needed for roughly bringing the systems in line.

Keep in mind!

Loop means dual-loop:

In the local system the data from the data terminal equipment is looped back **AND** the incoming signal of the remote system is sent back by an optical loop.

2.3 Indicators



The indicators on the back panel:

No.	Description	Design	Colour
a	Loop-Status	LED	Green - Choose loop mode, loop not activated Red - loop activ Off - normal function
b	Power-LED	LED	Green - OK
c	Local Bit-Error	LED	Off - OK, no bit errors on optical path received Red flashing - Bit error on optical path received Red - Receiver does not process incoming signal. For further detail see "Additional functions", page 8.
d	Remote Bit-Error	LED	Off - OK, remote WOLink signals: "No bit errors received on optical path" Red - Remote WOLink receives bit errors on optical path
e, g, i, k	Rx-Data Ch 1..4	LED	Green - Receive data on G.703 Red - No data on G.703
f, h, k, l	Tx-Data Ch 1..4	LED	Off - Remote WOLink receives no data on G.703 port Green - Remote WOLink receives data on G.703 port Red - No incoming optical signal blinking - Loop mode on this channel <i>Loop-LED green:</i> Channel is selected for loop function, but not activated by now <i>Loop-LED red:</i> Channel is switched into loop
m	Optical power in	Bargraph indicator	Shows the received signal strength of the optical input by the position of the lighted bar.

2.4 Additional functions

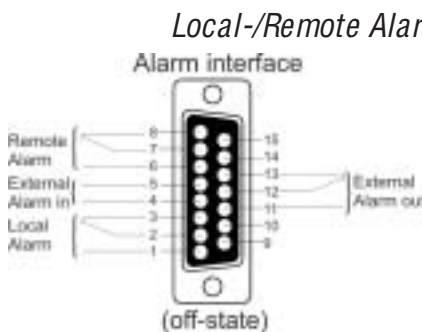
System protection by bit error measurement

As the bit error rate is continuously monitored, WOLink 4E1/300 N interrupts signal processing in case of too many bit errors. If the bit error rate of 10^{-4} is exceeded, sending of the data to the local system makes no longer sense. In this case the WOLink 4E1/300 N does not process the incoming data and the logical link will be interrupted. It sends an AIS signal to the system. But still the bit error rate is observed to secure that the link will be established again, as soon as the bit error rate falls below 10^{-6} .

This function allows a better protection of the user systems. If there are too many bit errors, the signals may be corrupted. This endangers the whole system to hang up. CBL reduces this risk by preventing the throughput of this undefined data.

External alarm contacts

The D-sub 15 connector provides you with alarm signals which indicate a continuous interruption of the incoming optical signal at the local and the opposite station. In addition you may transmit a static alarm signal from a third party device (i. e. UPS) through the optical link.



Local-/Remote Alarm: On pins 1 and 2 you get a contact which is open at power of the local device, 2 and 3 belongs to an optener. If the relay is active, the station operates properly. In case the bit error rate of the received signal exceeds the threshold for this value for more than 1 second, the relay releases. It will change to proper operation after the bit error rate falls below the value mentioned above for more than 30 seconds. The delay should prevent short interruptions like birds crossing the beam from creating an alarm, leading to a frequent switching.

Relay number	Contacts	Function
Local alarm	Opener: 2-3, closer: 1-2	Alarm in case of fault in the local station
Remote alarm	Opener: 7-8, closer: 6-7	Alarm in case of fault in the remote station
External alarm	Opener: 12-13, closer: 11-12	Alarm in external device at the remote station

External alarm signal: You can command the External Alarm out of the opposite device with a connection between pin 4 and 5 of the local alarm connector. The following relationship between input and output is appended:

pin 4 and 5 no contact - pin 12 and 13 short, pin 13 and 14 open
 pin 4 and 5 have contact - pin 12 and 13 open, pin 13 and 14 short.

3. Installation

The WOLink 4E1/300 N system is easy to install in five steps:

- Select locations
- Install stations
- Align stations
- Perform system test
- Connect to the data source

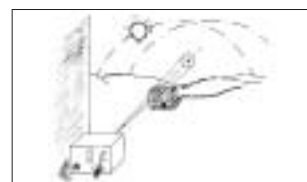
3.1 Selecting locations

Criteria for the selection of the link path and mounting locations:

- line of sight must exist between the two stations and the stations must be installed in a stable and vibrationless position;
- hazards to persons must be excluded. No persons may be able to look into the light beam unintentionally;
- no smoke-emitting sources (e. g. chimneys) may be present below or immediately adjacent to the beam path because smoke absorbs the infrared light;
- No discharges of warm air (e. g. from air conditioning units) may be present below or immediately adjacent to the beam path because warm air causes streaks which divert the infrared light;
- Changing obstacles (e. g. trees) or moving obstacles (e. g. construction cranes) must not interrupt the infrared light beam.
- Free access to the operating panel must be possible and the displays must remain readable.
- The holder must be bolted onto a firm base.
- If possible, you should position the stations at a location protected from wind, rain and sun.

Recommendation:

The continuation of the link path should never point directly to the sun, because the sun would shine directly on the sensitive optical receiver. If this situation cannot be avoided, then short-term interruptions can occur when the sun is at a radius of less than 1 degree behind the opposite station.



3.2 Mount stations

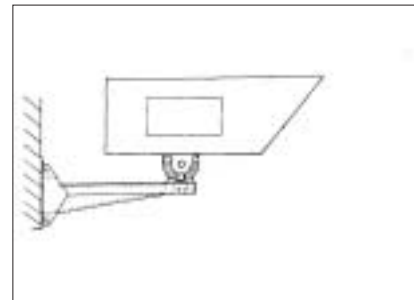
After preparing the installation by laying power cords and data cable to the location of the stations, you may mount the station.

With the help of the supplied holder, the WOLink 4E1/300 N station can be installed in a standing or hanging position in front of a wall and then aligned to the opposite station.

Installation in front of a wall

At the installation in front of a wall you have to bolt together the underside of the casing and the holder. The required screws (two M&x12) are supplied.

- ➔ Bolt the holder to the base using rustproof bolts.
- ➔ Place the WOLink station on the holder and bolt together.



Installation in a standing or hanging position

In order to install the stations in a standing or hanging position, you have to screw together the right side wall of the casing and the holder. You will find the required screws behind the right model plate, which you have to unscrew.

- ➔ Unscrew the right model plate at the protective hood.
 - ⇒ You also remove the connection between the casing and the protective hood.
 - ⇒ Behind the model plate you will find the required screws in the casing.
- ➔ Screw the holder to the base using rustproof bolts.
- ➔ Screw the protective hood tight on the casing.
- ➔ Bolt the right casing wall on the articulated base and keep the model plate safe.



Caution!

Connect the casing with ground by using a bolt to fix the protection earth cable to one of the four outer drillings at the base of the WOLink

3.3 Alignment of stations

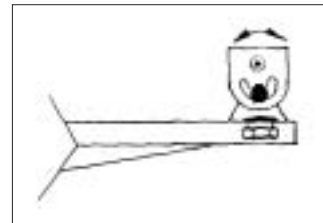
Basically one person can align the stations.

Follow this sequence:

Station A	Station B
Roughly align station	
Connect power supply	
	Roughly align station
	Connect power supply
	Finally align station
Finally align station	
Check system status (see page 13)	
Connect data cable	

Roughly align stations

With the aid of the telescope you may easily align each station to the opposite station, because they are connected with the station and aligned parallel to their IR-beams. If you release slightly the two screws in the holder, you can rotate and tilt the station.



Connecting power supply (230 V AC and/or 48 V DC)

- Release the four knurled bolts at the corners of the operating panel covering and remove it.
- Plug the mains cables into the appliance sockets.
- The Power LED lights up.

KEEP IN MIND

You may use 230 V AC or 48 V DC as power supply for the system. If you connect the system to both voltages simultaneously, the system is mainly fed by the 230 V AC supply. In case of failure, the system changes to 48 V DC automatically. CAUTION! The switching operates NOT without short interruption!

Final alignment

With the aid of the step bar indicators “Optical power in” the station will be aligned finally. You have to move the station at its base until you achieve the highest position of a lit up bar.

Attention: Operation is guaranteed even if only the lowest bar is lit up, but at least the second bar should light up with favourable weather conditions to ensure a sufficient system reserve!

Please note: The position of the illuminated bar should not fall below the maximum reached position, otherwise you must repeat the alignment procedure.

Both stations should have similar reception levels!

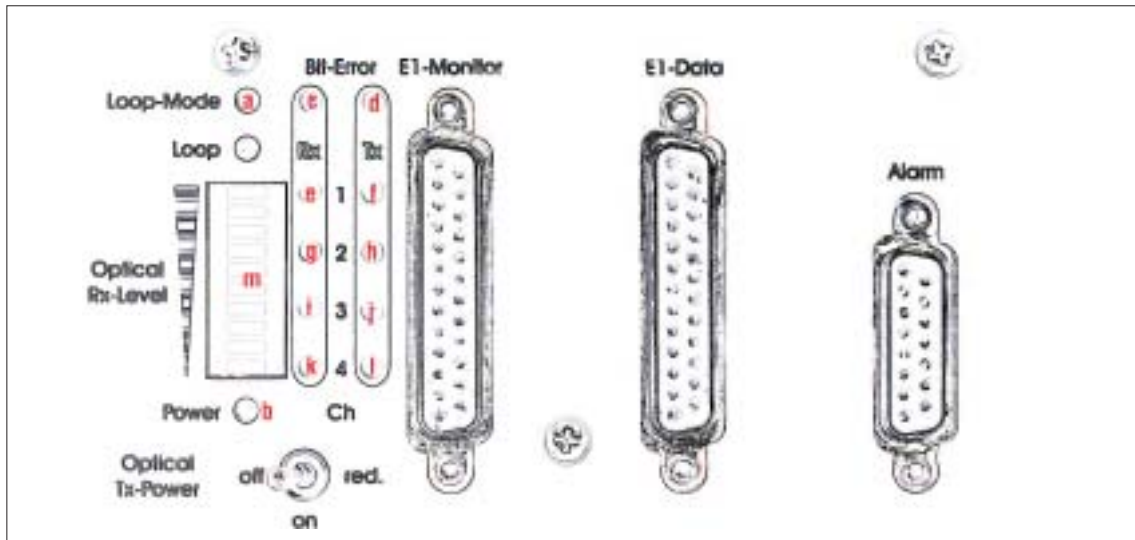
⇒ **This completes the installation procedure!**

Number of lit up bars :

Station		A:					B:				
Date											
Bargraph	10										
	9										
	8										
	7										
	6										
	5										
	4										
	3										
	2										
	1										

3.5 Performing system test

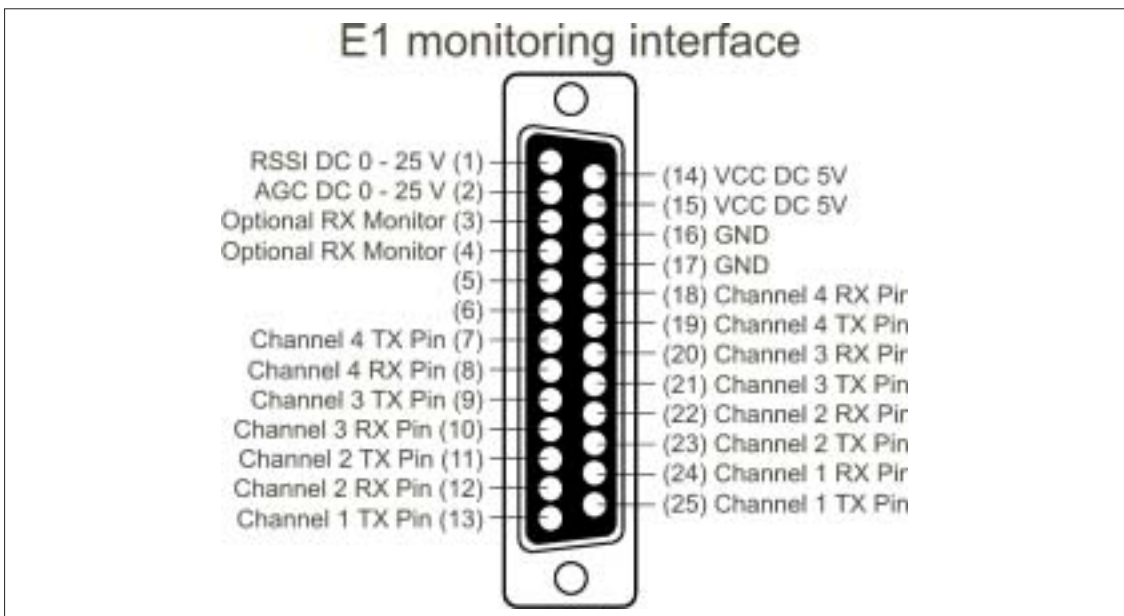
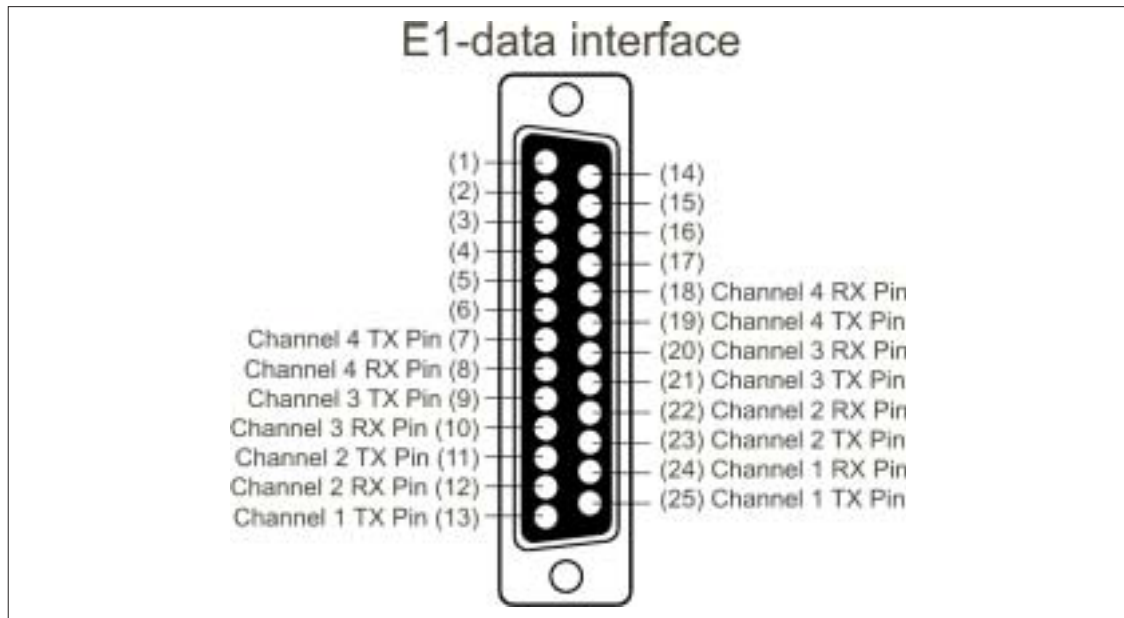
At the time, you turn on the optical transmitter, you can test the link. There is no need for difficult test modes or complicate button combinations, because the system uses continuously transmitted multiplex frames to get the needed information.



No.	Description	Design	Colour
a	Loop-Status	LED	Green - Choose loop mode, loop not activated Red - loop activ Off - normal function
b	Power-LED	LED	Green - OK
c	Local Bit-Error	LED	Off - OK, no bit errors on optical path received Red flashing - Bit error on optical path received Red - Receiver does not process incoming signal. For further detail see "Additional functions", page 8.
d	Remote Bit-Error	LED	Off - OK, remote WOLink signals: "No bit errors received on optical path" Red - Remote WOLink receives bit errors on optical path
e, g, i, k	Rx-Data Ch 1..4	LED	Green - Receive data on G.703 Red - No data on G.703
f, h, k, l	Tx-Data Ch 1..4	LED	Off - Remote WOLink receives no data on G.703 port Green - Remote WOLink receives data on G.703 port Red - No incoming optical signal blinking - Loop mode on this channel <i>Loop-LED green:</i> Channel is selected for loop function, but not activated by now <i>Loop-LED red:</i> Channel is switched into loop
m	Optical power in	Bargraph indicator	Shows the received signal strength of the optical input by the position of the lighted bar.

3.6 Connection to data source

After you finished testing, you may connect the stations to your data source. The WO-Link 4E1/300 N provides you with 2 D-sub 25 connectors. Use the left for monitoring and the left for data connection. The monitoring port give you further functionality, as there are connections for monitoring the data signals, additional alarm tools and an interface for measurement of the signal strength (see second graphic). The pin layout is shown beneath.



Additionally you may connect the alarm connector to an external alarm device. For pin layout see page 8.

Attention!

Never use the monitoring ports as data connectors

⇒ With this the installation is complete!

4. Operation with the data source

No further work is required after the installation has been completed and the system has been switched on.

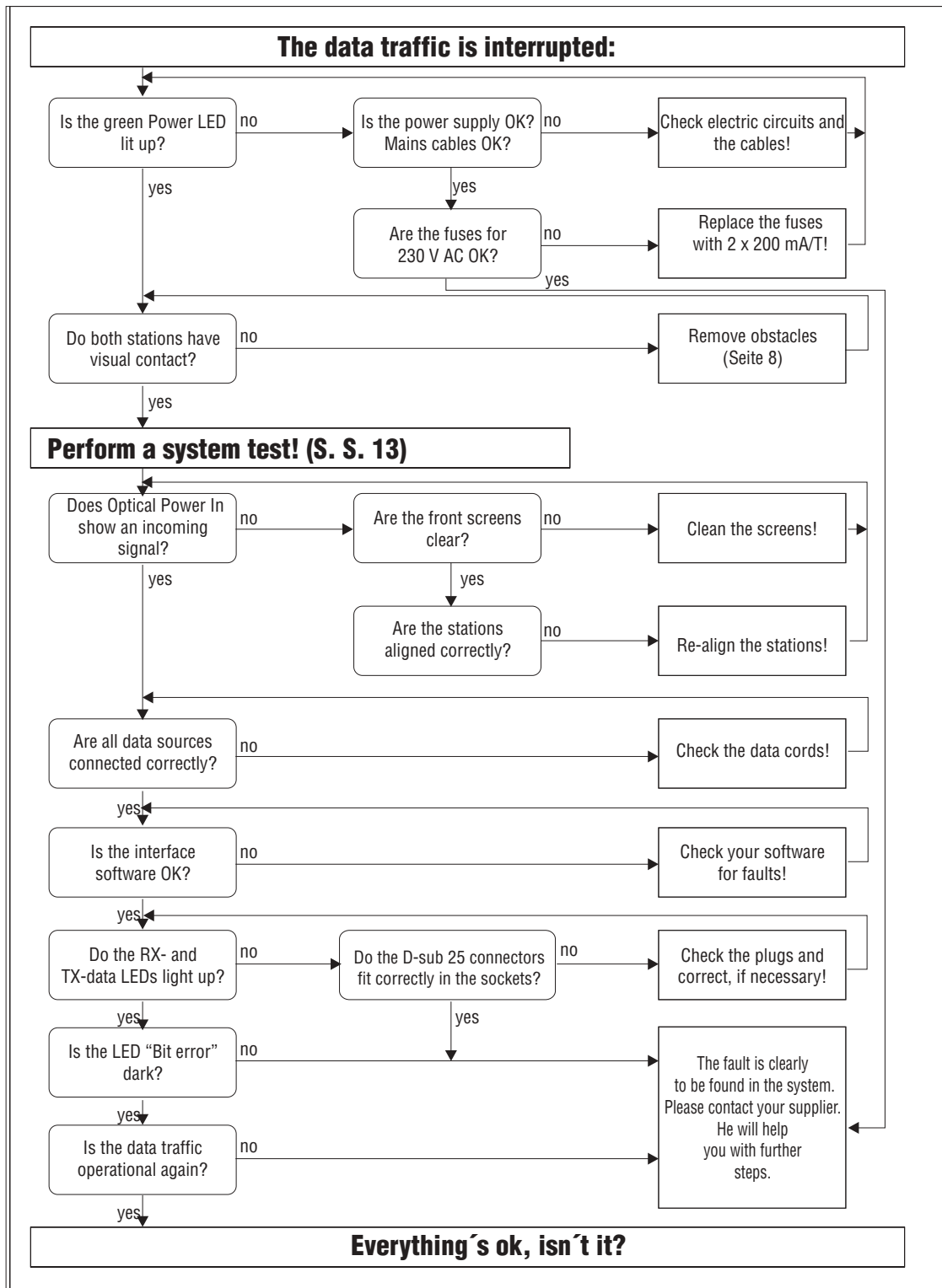
You can check whether the optical link is working properly by using the control lamps.

The control LEDs during operation

No.	Description	Design	Colour
a	Loop-Status	LED	Green - Choose loop mode, loop not activated Red - loop activ Off - normal function
b	Power-LED	LED	Green - OK
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m	Optical power in	Bargraph indicator	Shows the received signal strength of the optical input by the position of the lighted bar.

5. Faults - and how to remedy them

The appliances were tested before delivery and left our factory in perfect condition. Nevertheless the possibility cannot be excluded, that a fault occurs. If the connection is interrupted, check the system, using following pattern:



Checking and replacing the fuses

- Note: The fuses (2 x 400 mA/T) are located in the plug-in unit.
- Remove the mains power plug!
 - Remove the panel cover and remove the power cable.
 - Pull out the plug-in unit with the fuse.
 - Now you can remove and replace the fuses.
 - Reinsert the plug-in unit until it latches into position.
 - Restart the station in operation mode.

6. Maintenance

In principle the WOLink 4E1/300 N-system is maintenance-free.

Recommendation: Depending on the influence of the local environment, you should clean the front screens once or twice a year.

Then check the optical reception level of the stations.

- With normal weather conditions compare the reception level display with the values achieved during installation.

If the reception level is more than two bars lower than the value achieved during installation, then you should check the alignment of the stations.

If desired, you may conclude a service agreement with your supplier!

7. Repair and disposal

Only the manufacturer may repair the system. This is the reason why the stations are sealed.

Please note: Your warranty is void, if you damage the seals or open the stations!

In addition the manufacturer guarantees to take back the systems and to dispose these correctly.

8. Guarantee

In addition to the legal guarantee requirements, the manufacturer guarantees to remedy defects in the stations in accordance with the General Business Conditions of the CBL GmbH company within a period of twelve months following the date of purchase. This guarantee only applies, if the appliances have not been opened, i. e. that the seals are not broken.

Technical data WOLink 4E1/300 N

Features

Maximum range	300 m
Data transmission rate	4 x 2,048 Mbps
Electrical interface	G.703
Bit error rate, typical	10 ⁻⁹

Optical data

Transmitter	Highpower IR-LED
Divergence	< 30 mrad
Wavelength	850 nm
Receiver	Si-PIN
Dynamic, typical	> 50 dB

Additional data

Displays	Power, Loop, Bit-Error, Optical Power in, data channel 1..4: RX, TX
Atmospheric humidity (not condensing)	90 %
Range of temperature	- 20 ... + 50 °C
Power supply	48DC / 230 AC / 50 / 30 V/V/Hz/VA
Weight	ca. 5 kg
Dimensions (LWH)	500 x 200 x 200 mm

Article-no. **03043**

Your distributor:

Developed and manufactured in Germany by

CBL-Communication by light, Gesellschaft für optische Kommunikationssysteme mbH

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