4.2.3 Fields of application

In automation, power and data are mostly transmitted via connectors. Connectors that have to be frequently unplugged and plugged in again have a limited service life. Their contacts become misshapen and worn. This leads to unplanned and unforeseeable production stoppages and regular maintenance intervals. Contactless real-time communication systems can provide a solution.

Robot tool change

In maintenance-intensive applications, such as tool changes on robots, you can easily replace wear-prone and maintenance-intensive connections with NearFi couplers, thus minimizing downtime costs.

Material transport systems

Communicate without contact between workpiece carriers and processing stations with NearFi couplers. Replace slip rings on turntables and rotary tables with wear-free couplers.

Automated guided vehicle systems (AGVS/AGV)

Install NearFi couplers quickly and easily on your automated guided vehicle system (AGVS) and transmit Ethernet data between charging stations and AGVs without contact.

Rotating applications

Use the NearFi couplers as a replacement for slip rings and transmit Ethernet data in real time without the need for contact.

4.2.4 Operating modes

When it comes to supplying external devices, a distinction is made between two voltages:

– US: Communications power and sensor supply
– UA: Actuator supply

To supply other devices, the NearFi couplers forward the voltages.

Power supply US

The power supply US supplies the communications power of the device electronics as well as the sensors.

- Connect this supply voltage to each NearFi base coupler. The device will not work if the voltage is not present.
- Install the power supply for the device electronics independently of the voltage supply for the actuators.
- Protect the power supplies independently. In this way, the network can continue to run, even if some I/O devices are switched off.

Power supply UA

The power supply UA supplies the actuators.

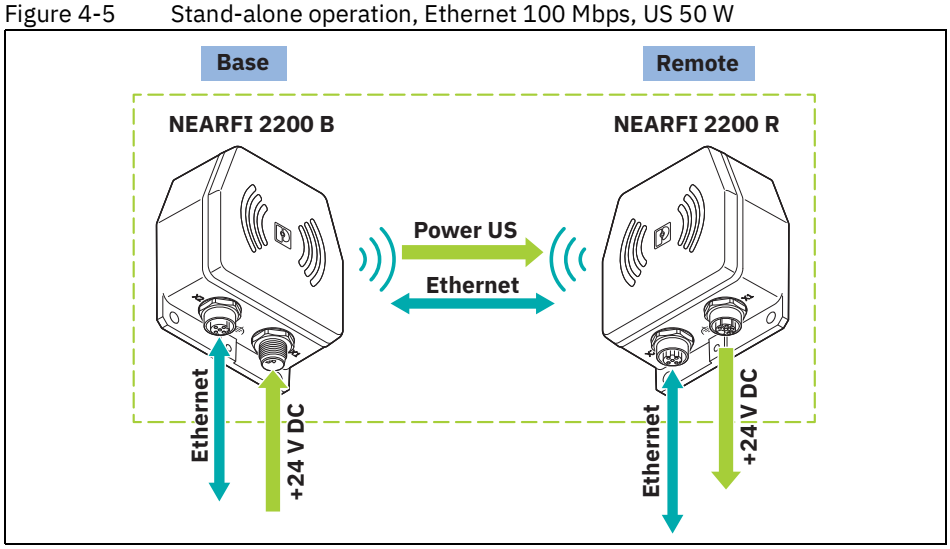
4.2.5 Power and data transmission

Stand-alone operation, Ethernet 100 Mbps, US 50 W

In addition to the real-time Ethernet data, the NEARFI 2200 B base coupler transmits the voltage (US) to the NEARFI 2200 R remote coupler without contact.

50 W (24 V DC/2 A) are available at output X1 (power OUT) of the remote coupler.

Figure 4-5 Stand-alone operation, Ethernet 100 Mbps, US 50 W

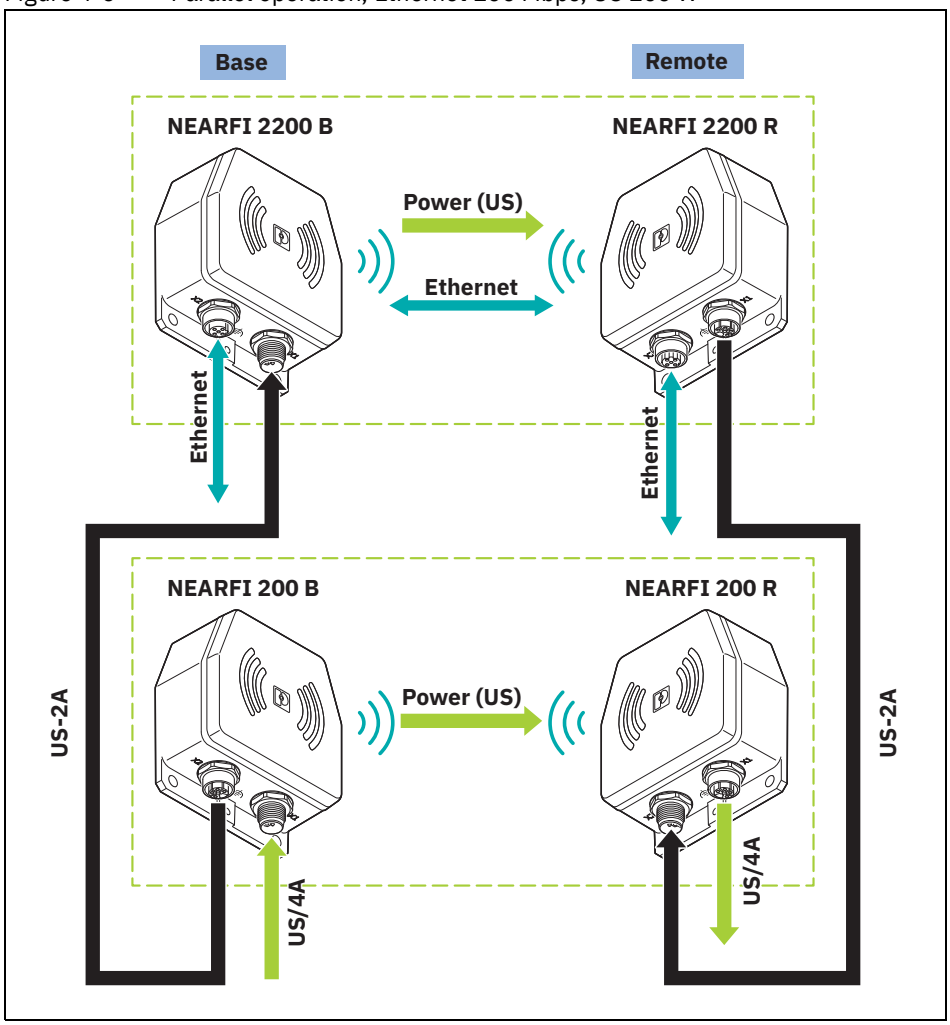


NOTE: Device damage
Never apply voltage to the output X1 (power OUT) of the remote coupler.

Parallel operation, Ethernet 100 Mbps, US 100 W

- In addition to the real-time Ethernet data, the NEARFI 2200 B base coupler transmits voltage 1 (US) to the NEARFI 2200 R remote coupler without contact.
- The NEARFI 200 B base coupler transmits voltage 2 (US) to the NEARFI 200 R remote coupler without contact.
- With parallel connection, the following power is available at the NEARFI 200 R remote coupler, output X1 (power OUT):
  - 100 W (24 V DC/4 A)

Figure 4-6 Parallel operation, Ethernet 100 Mbps, US 100 W

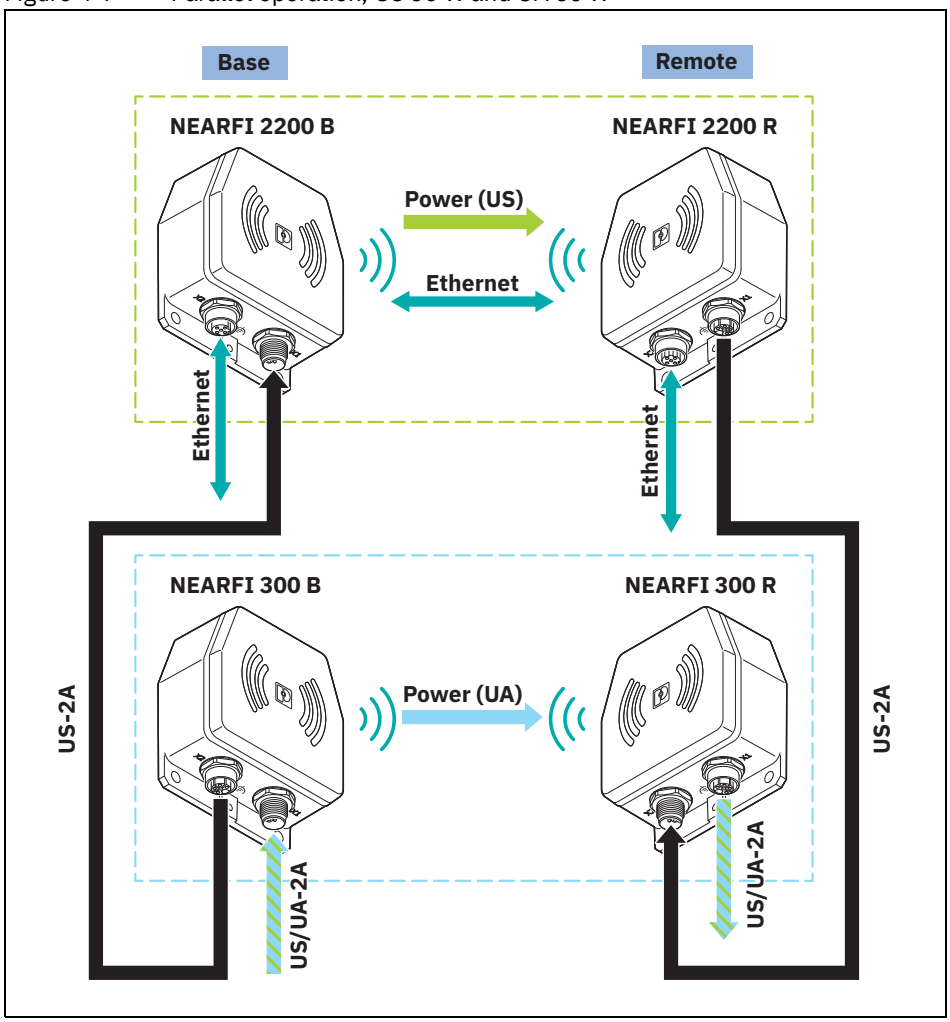


NOTE: Device damage
Never apply voltage to the output X1 (power OUT) of the remote coupler.

Parallel operation, US 50 W and UA 50 W

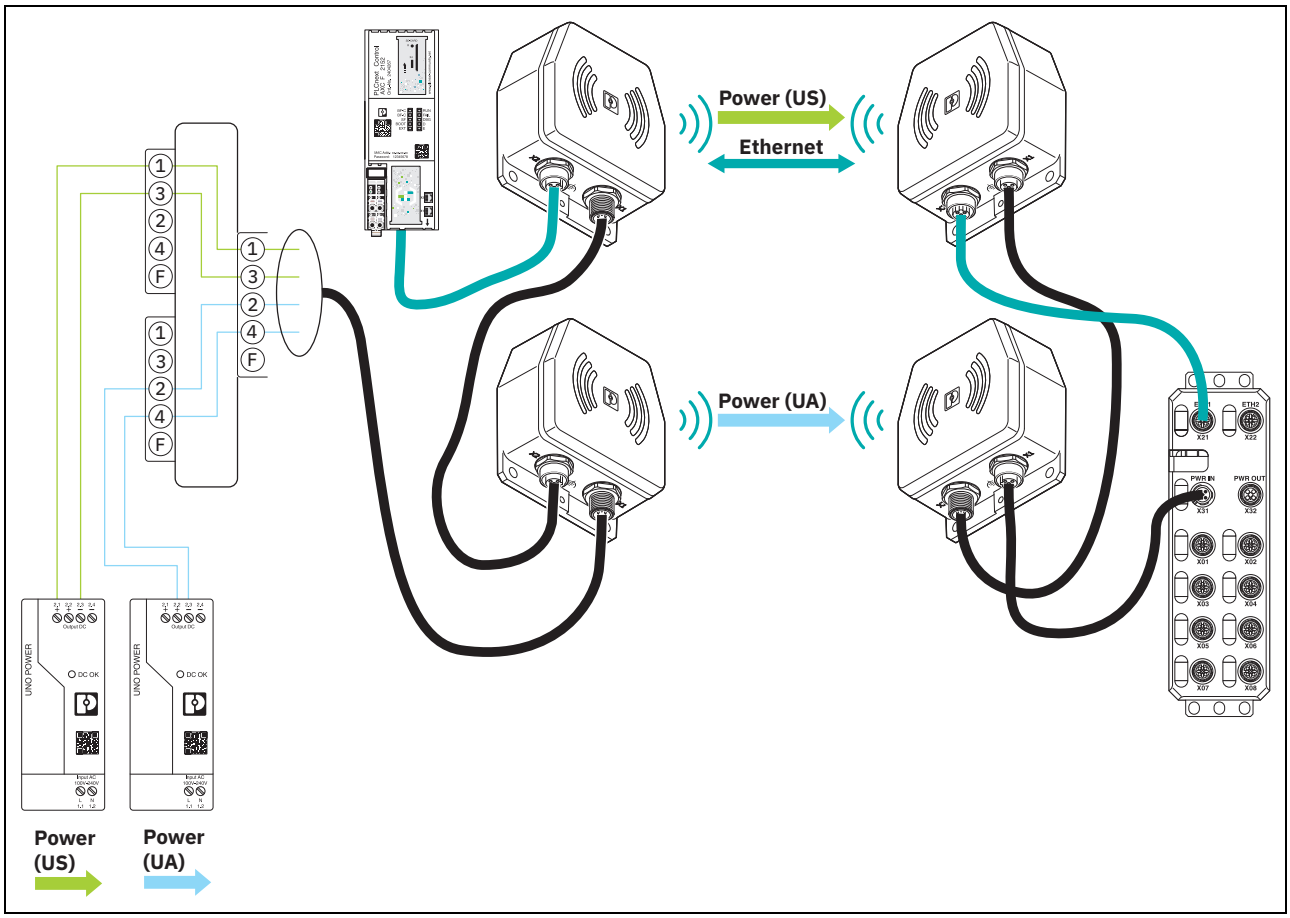
- In addition to the real-time Ethernet data, the NEARFI 2200 B base coupler transmits voltage 1 (US) to the NEARFI 2200 R remote coupler without contact.
- The NEARFI 300 B base coupler transmits voltage 2 (UA) to the NEARFI 300 R remote coupler without contact.
- With parallel connection, two electrically isolated voltages are available at the NEARFI 300 R remote coupler, output X1 (power OUT):
  - Communications voltage US: 50 W (24 V DC/2 A)
  - Actuator voltage UA: 50 W (24 V DC/2 A)

Figure 4-7 Parallel operation, US 50 W and UA 50 W



NOTE: Device damage
Never apply voltage to the output X1 (power OUT) of the remote coupler.

Figure 4-8 Parallel operation, US 50 W and UA 50 W, detailed view with pin assignment



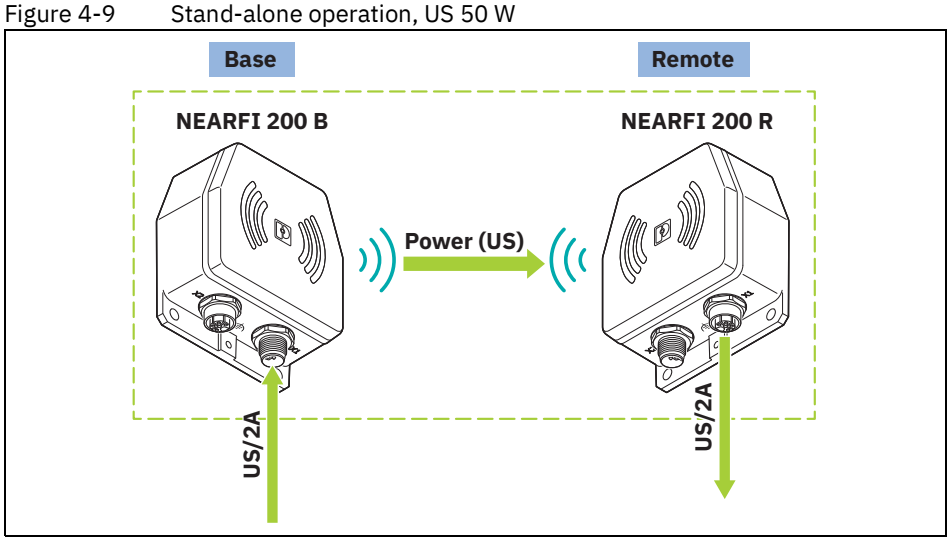
NOTE: Device damage
Never apply voltage to the output X1 (power OUT) of the remote coupler.

4.2.6 Power transmission

Stand-alone operation, US 50 W

- The NEARFI 200 B base coupler transmits the communications and sensor voltage (US) to the NEARFI 200 R remote coupler without contact.
- The following power is available at output X1 (power OUT) of the remote coupler:
  - 50 W (24 V DC/2 A)

Figure 4-9 Stand-alone operation, US 50 W

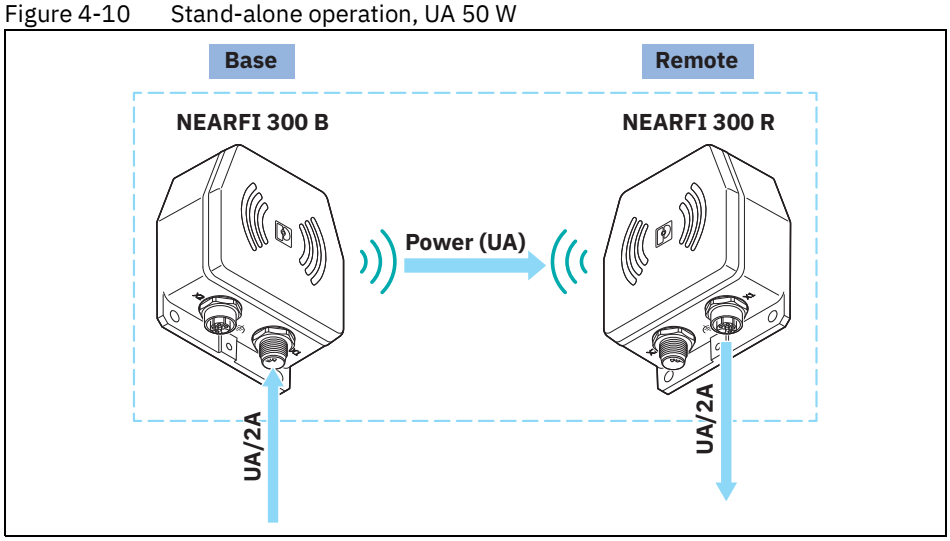


NOTE: Device damage
Never apply voltage to the output X1 (power OUT) of the remote coupler.

Stand-alone operation, UA 50 W

– The NEARFI 300 B base coupler transmits the actuator voltage (UA) to the NEARFI 300 R remote coupler without contact.
– The following power is available at output X1 (power OUT) of the remote coupler:
  – 50 W (24 V DC/2 A)

Figure 4-10 Stand-alone operation, UA 50 W

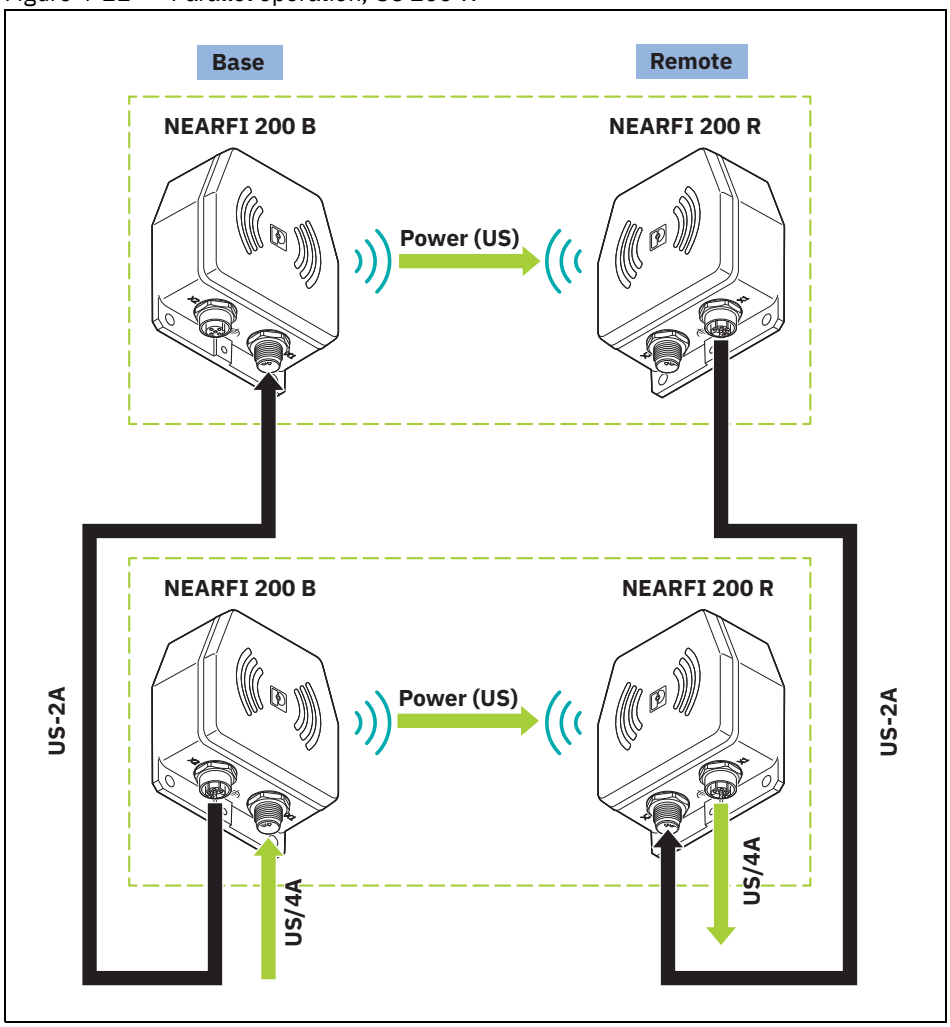


NOTE: Device damage
Never apply voltage to the output X1 (power OUT) of the remote coupler.

Parallel operation, US 100 W

- The NEARFI 200 B base coupler transmits voltage 1 (US) to the NEARFI 200 R remote coupler without contact.
- The NEARFI 200 B base coupler transmits voltage 2 (US) to the NEARFI 200 R remote coupler without contact.
- With parallel connection, the following power is available at the NEARFI 200 R remote coupler, output X1 (power OUT):
  - 100 W (24 V DC/4 A)

Figure 4-11 Parallel operation, US 100 W



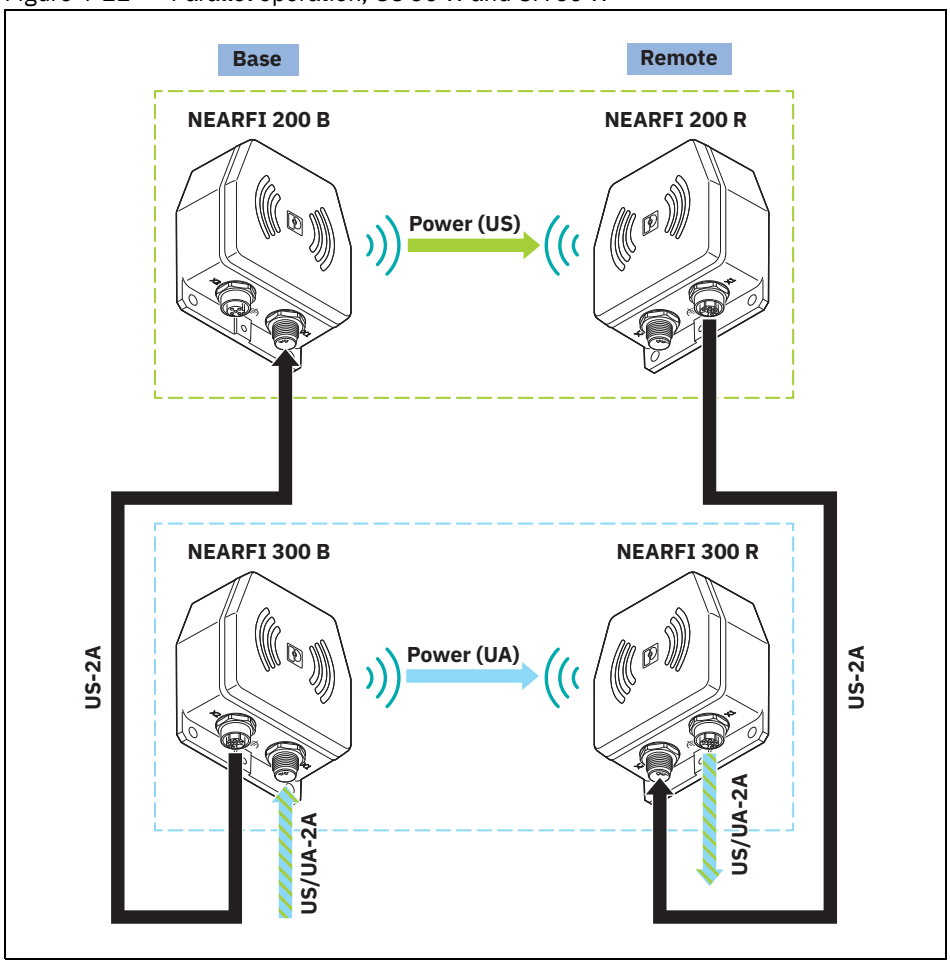
NOTE: Device damage

- Never apply voltage to the output X1 (power OUT) of the remote coupler.
- Further cascading of base couplers is **not** permitted.

Parallel operation, US 50 W and UA 50 W

- The NEARFI 200 B base coupler transmits voltage 1 (US) to the NEARFI 200 R remote coupler without contact.
- The NEARFI 300 B base coupler transmits voltage 2 (UA) to the NEARFI 300 R remote coupler without contact.
- With parallel connection, two electrically isolated voltages are available at the NEARFI 300 R remote coupler, output X1 (power OUT):
  - Communications voltage US: 50 W (24 V DC/2 A)
  - Actuator voltage UA: 50 W (24 V DC/2 A)

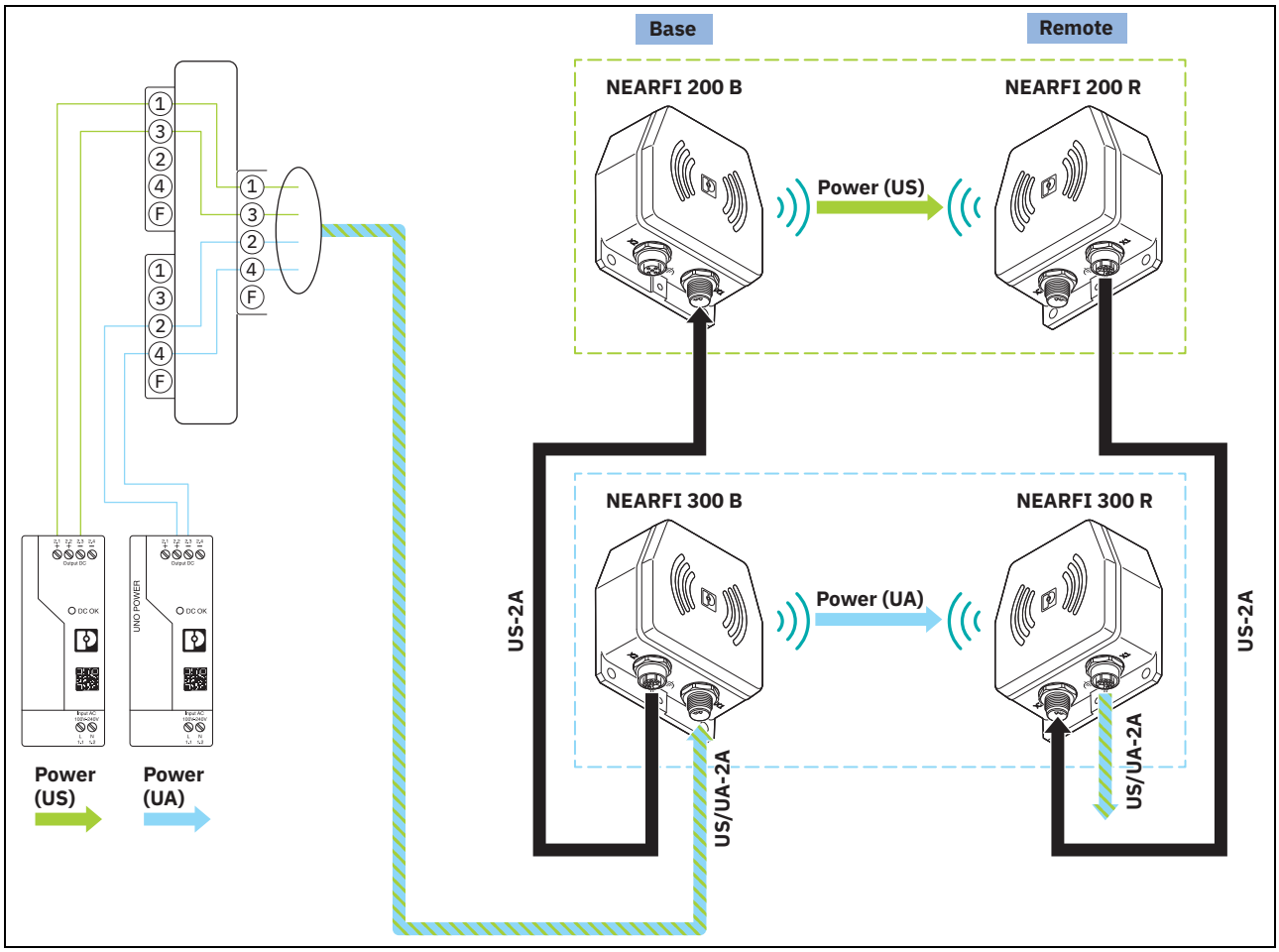
Figure 4-12 Parallel operation, US 50 W and UA 50 W



NOTE: Device damage

- Never apply voltage to the output X1 (power OUT) of the remote coupler.
- Do **not** connect a power source (e.g., power supply unit, battery) to the free input X2 of remote coupler 1.
- You may connect a **maximum of one** additional remote coupler (X2) to output X1 of remote coupler 1. Further cascading to increase performance is not possible.

Figure 4-13 Parallel operation, US 50 W and UA 50 W, detailed view with pin assignment



NOTE: Device damage

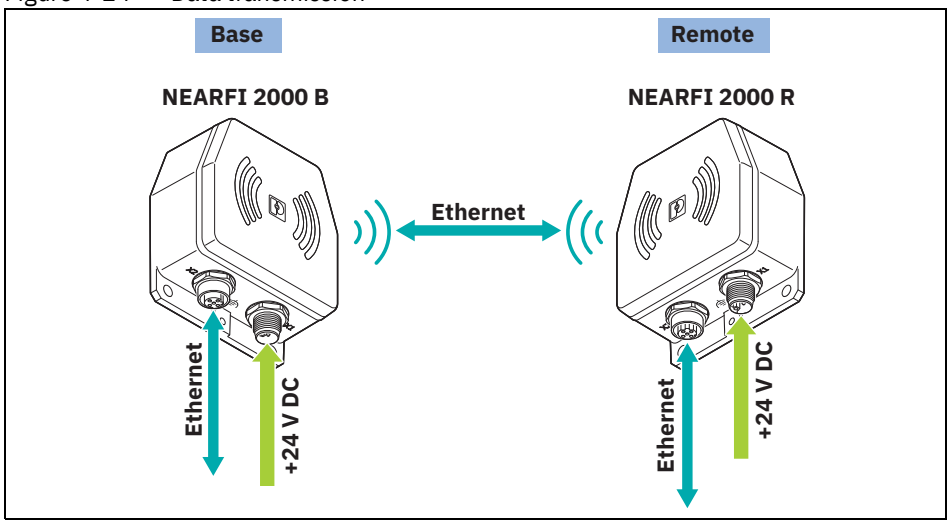
- Never apply voltage to the output X1 (power OUT) of the remote coupler.
- Do **not** connect a power source (e.g., power supply unit, battery) to the free input X2 of remote coupler 1.
- You may connect a **maximum of one** additional remote coupler (X2) to output X1 of remote coupler 1. Further cascading to increase performance is not possible.

4.2.7 Data transmission

The NEARFI 200 data couplers transmit real-time Ethernet data at 100 Mbps between the base and remote coupler without contact.

Supply base and remote couplers with 24 V DC each.

Figure 4-14 Data transmission



4.3 Compatibility

✓ = Yes, compatible ✗ = No, not compatible	L-coded NEARFI...				A-coded NEARFI...		
	2200 R	200 R	300 R	2000 R	PD 2A ETH R	P 2A R	D ETH R
L-coded: NEARFI...							
2200 B	✓	✗	✗	✗	✗	✗	✗
200 B	✗	✓	✗	✗	✗	✗	✗
300 B	✗	✗	✓	✗	✗	✗	✗
2000 B	✗	✗	✗	✓	✗	✗	✗
A-coded: NEARFI...							
PD 2A ETH B	✗	✗	✗	✗	✓	✗	✗
P 2A B	✗	✗	✗	✗	✗	✓	✗
D ETH B	✗	✗	✗	✗	✗	✗	✓

The A-coded versions are **not** described in this manual. You will find the data sheet at phoenixcontact.com/product/1234225.

The A-coded and L-coded versions are **not** compatible with each other.

4.4 Basic circuit diagram

4.4.1 Power and data coupler (NEARFI 2200)

Figure 4-15 Basic circuit diagram of power and data coupler, base

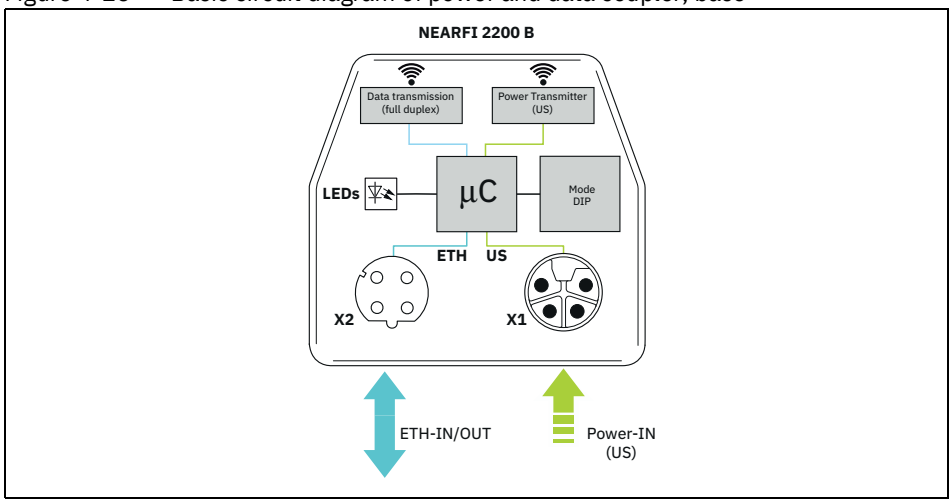
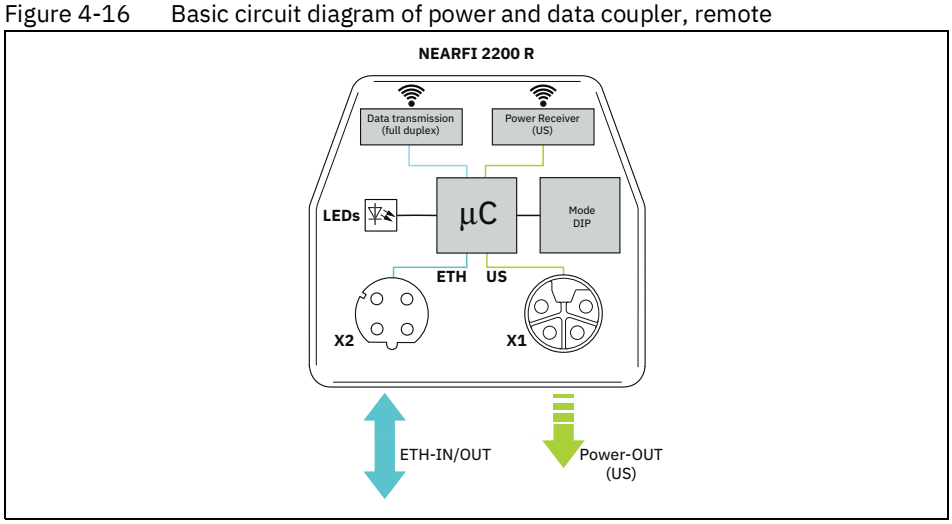


Figure 4-16 Basic circuit diagram of power and data coupler, remote



4.4.2 Power coupler US (NEARFI 200)

Figure 4-17 Basic circuit diagram of power coupler US, base

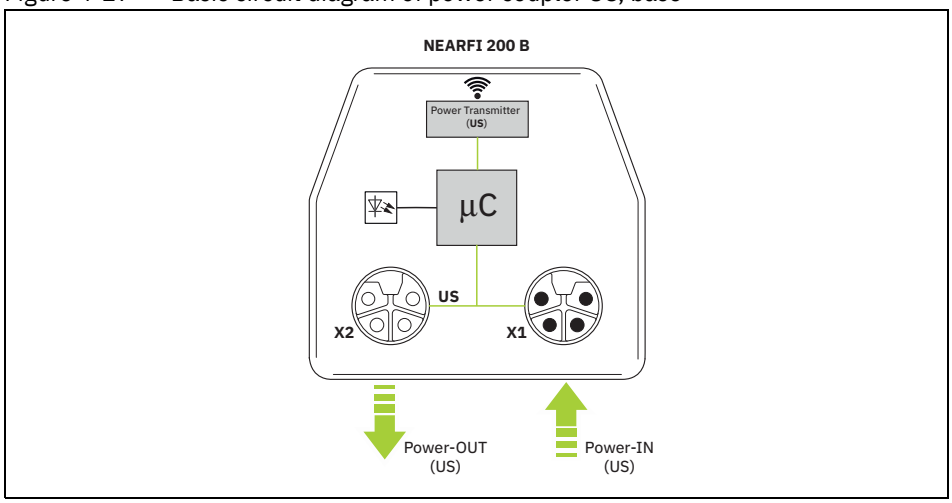
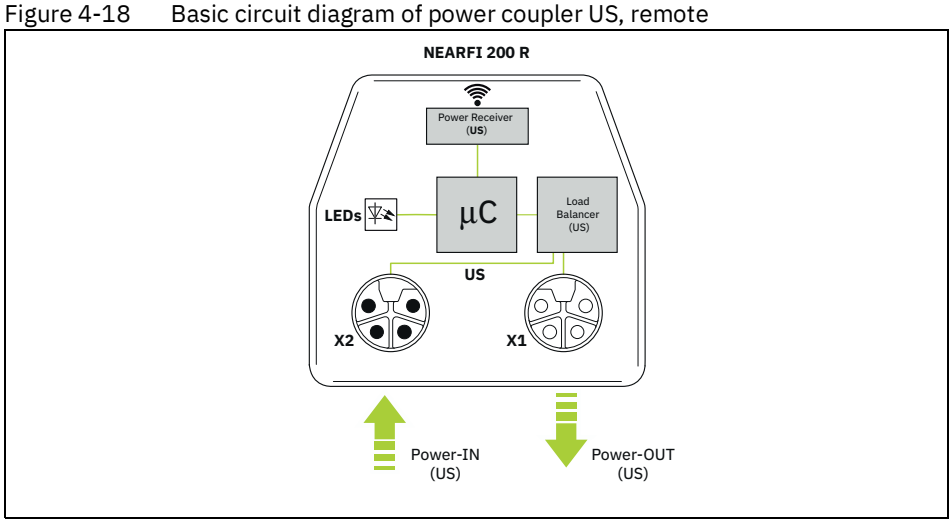


Figure 4-18 Basic circuit diagram of power coupler US, remote



4.4.3 Power coupler UA (NEARFI 300)

Figure 4-19 Basic circuit diagram of power coupler UA, base

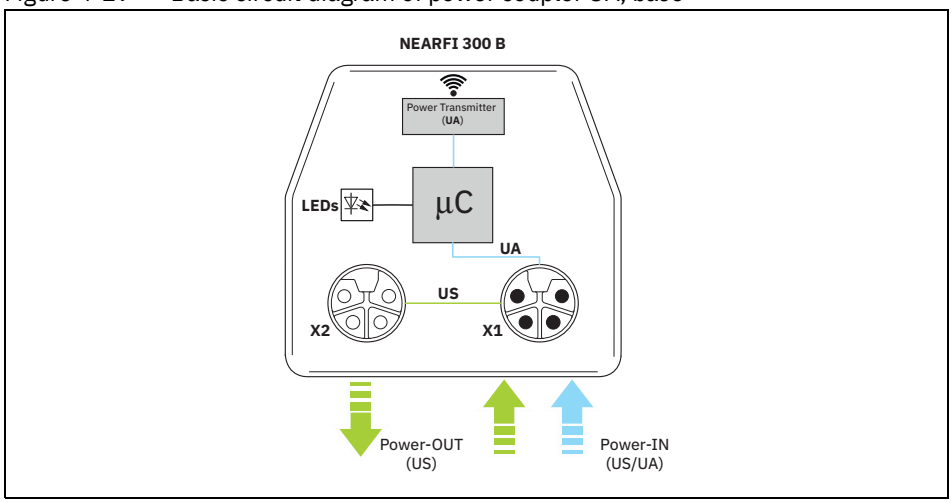
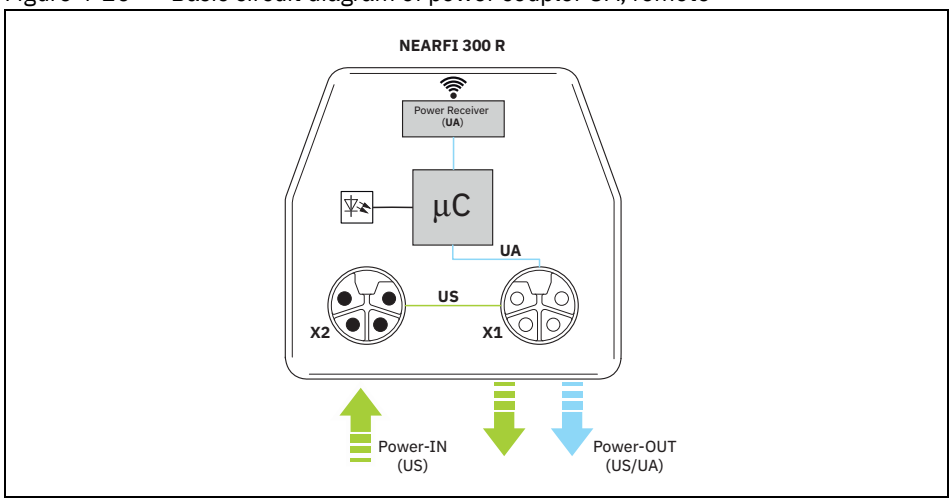
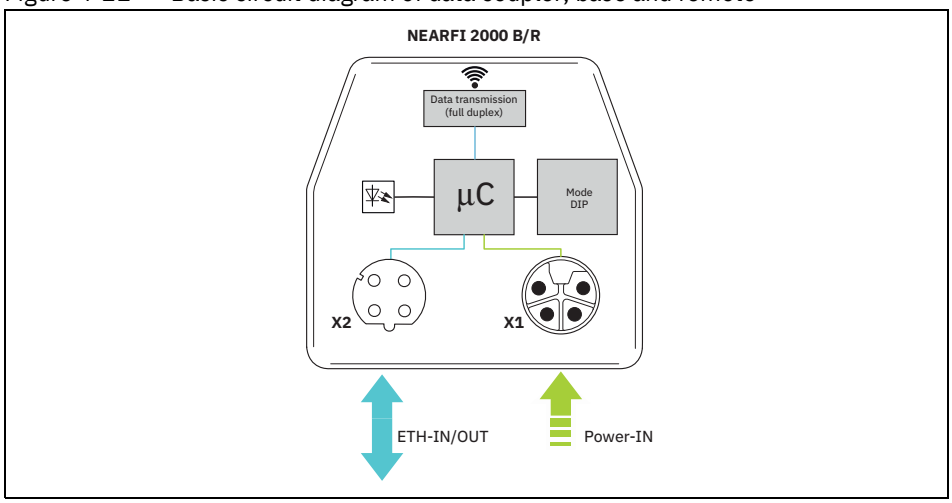


Figure 4-20 Basic circuit diagram of power coupler UA, remote



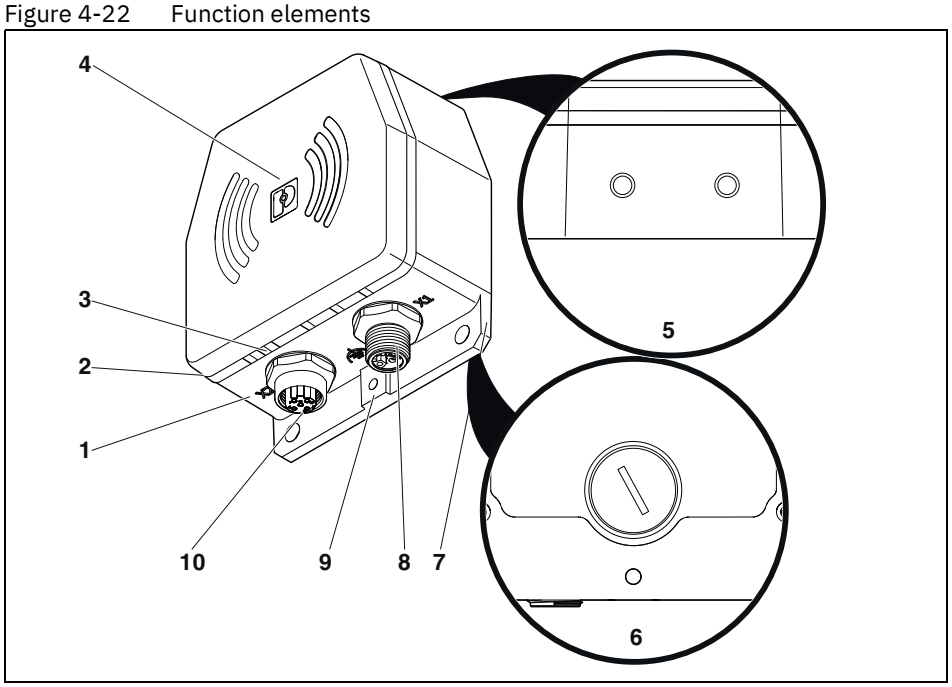
4.4.4 Data coupler (NEARFI 2000)

Figure 4-21 Basic circuit diagram of data coupler, base and remote



4.5 Function elements

Figure 4-22 Function elements



1	Die-cast housing
2	LED ring (green/yellow/red) for device status diagnostics
3	ETH LINK LED (yellow) for Ethernet diagnostics
4	Upper housing part, power coil and antennas centered in the middle behind the logo
5	Mounting option with female thread (2 x M6, depth = 7 mm)
6	Bottom of the housing: DIP switches, QR code, additional mounting options with female thread (4 x M6, depth = 7 mm)
7	Mounting flange with mounting holes (Ø = 5.5 mm)
8	M12 circular connectors for input or output voltage
9	Functional ground connection with female thread (1 x M4, depth = 5 mm)
10	M12 circular connectors for Ethernet

4.5.1 ETH LINK

Table 4-3 LED description: ETH Link

ETH LINK	Status	Description
Yellow	On	Ethernet link present
	Flashing	Ethernet data being transmitted
	Off	No Ethernet link

4.5.2 LED ring

Table 4-4 LED ring for power and data coupler and power coupler

LED ring NEARFI 2200 and NEARFI 200/300		Base	Remote
Green	On	Base and remote coupled, transmission active	
	Flashing	Device ready for operation, no transmission, air gap or offset too large	NEARFI 2200 R only: Remote is supplied with power from base, device is ready to operate, no data transmission, air gap or offset too large, no Ethernet link (if LFPT is activated)
		Remote voltage output overload/short circuit	
	Off	Base not ready for operation	Remote not coupled
Yellow	Flashing	-	For parallel connection of two NearFi paths (NEARFI 200 R only):
			Unfavorable load distribution, distance between base and remote coupler too large
			One of the two paths is not working properly
Red	On	Critical error, internal temperature too high, external supply voltage significantly beyond the nominal range	**NEARFI 200 R only:** For parallel connection of two paths: Critical error, internal temperature too high, NEARFI 200 B does not transmit power to NEARFI 200 R

Table 4-5 LED ring for data coupler

LED ring NEARFI 2000	Status	Base and remote
Green	On	Base and remote coupled, data transmission active
	Flashing	Device ready for operation, no transmission, air gap or offset too large, devices not coupled
	Off	Not ready for operation

4.6 DIP switches

CAUTION: Electrical voltage
Make sure that the device is disconnected from the power supply before opening the screw plug.

- Select the operating mode only when the power is disconnected.
- The change is activated after renewed power up.

NOTE: Electrostatic discharge
Electrostatic discharge can damage or destroy components.

- When handling the device, observe the necessary safety precautions against electrostatic discharge (ESD) in accordance with EN 61340-5-1 and IEC 61340-5-1.

– In the delivery state, all DIP switches are in the “OFF” position.
– For NEARFI 200/300, the DIP switches have no function.

- Ensure that the device is disconnected from the power supply.
- Ensure that the surroundings are clean so that foreign objects cannot penetrate into the device.
- Open the M16 screw plug using a bladed screwdriver.
- Set the operating mode using the DIP switches (see Table 4-6).
- Tighten the screw plug to 1 Nm using a bladed screwdriver.

Figure 4-23 DIP switch

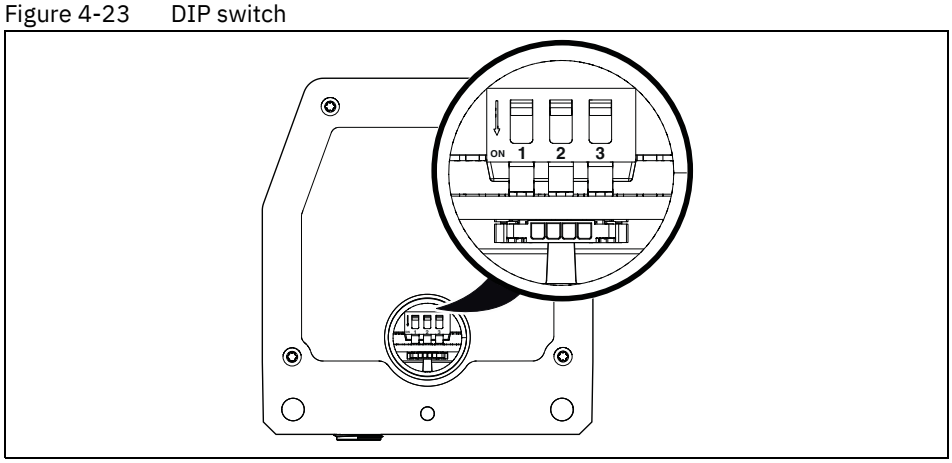


Table 4-6 DIP switch

DIP		NEARFI 2200		NEARFI 2000	
		Base	Remote	Base	Remote
1	ON	n.c.	n.c.	Range 40 mm ... 100 mm	
	OFF	n.c.	n.c.	Range 0 mm ... 40 mm	
2	ON	ETH full duplex		ETH full duplex	
	OFF	ETH auto neg		ETH auto neg	
3	ON	LFPT active (global)		LFPT active (global)	
	OFF	LFPT inactive (local)		LFPT inactive (local)	

4.6.1 DIP 1, range

DIP switch 1 can be used to set two transmission ranges with different ranges. The range option is only available for NEARFI 2000.

40 mm ... 100 mm (DIP 1 = ON)

If you activate DIP 1, you can achieve a greater range and greater offset for data transmission. Please note that the LFPT function is no longer supported.

0 mm ... 40 mm (DIP 1 = OFF)

Default setting, LFPT is supported

4.6.2 DIP 2, ETH

ETH full duplex (DIP 2 = ON)

Fixed configuration of Ethernet interface X2:

– 100 Mbps, full duplex
– No auto negotiation
– No auto crossing
– MDI-X

  The RX and TX cables in the Ethernet port are inverted. You can use standard patch cables with 1-to-1 connection or straight connection.
– Fast startup (FSU)

  This function enables fast startup of the external PROFINET device. The device is ready for operation in less than 500 ms. Note that the “Fast startup/prioritized startup” function must be activated on all Ethernet devices in the network.

Disabling crossover detection changes the pin assignment of the network connection to “Crossover” on the remote coupler.

- Select the connecting cable according to the connected device:
  – Crossover cable with same port assignment
  – Patch cable with different port assignment

ETH auto neg (DIP 2 = OFF)

Settings for Ethernet interface X2:

– Auto negotiation, 100 Mbps, half or full duplex
– Auto crossing (RX/TX crossover)

4.6.3 DIP 3, LFPT

The LFPT function is only available for NEARFI 2200 and NEARFI 2000.

Activate LFPT via DIP switch 3. This allows faults to propagate globally through the system, or stay local to each link segment.

LFPT, global (DIP 3 = ON)

In the event of a link loss between the base and remote coupler, the couplers shut down the copper ports. Connection to the connected Ethernet devices is therefore also interrupted. The connection error is forwarded by the port shutdown.

– LFPT provides information on the status of the entire connection.
– EtherCAT® loopback applications are supported.

Please note that LFPT increases the switch-on time. If you require the “Fast start-up/prioritized startup” function, you need to disable LFPT.

No LFPT, local (DIP 3 = OFF)

The devices **may not** detect an interruption in the wireless connection. Either the connected device does not know that communication is interrupted. Diagnostics are not possible. Or the device is constantly trying to restore the connection. This increases the network load and the application response time.

4.7 Ethernet

Physical interfaces usually provide an auto negotiation function. As soon as the physical connection is established between two Ethernet physical layers, the communication parameters are automatically negotiated. Negotiation can take several seconds.

On the whole, auto negotiation is practical for Ethernet communication. If auto negotiation is active, the fast startup function of industrial protocols, such as PROFINET FSU, is **not** supported.

Fast startup

If you require the “Fast startup/prioritized startup” function, you need to disable auto negotiation on the NearFi couplers. Then use a fixed configuration.

- If required, disable auto negotiation. Set DIP 2 to ON, see page 40.

Link fault pass through (LFPT)

LFPT is required in some applications, e.g., EtherCAT® with loopback function. If the wireless connection between the base and remote coupler is lost, the Ethernet port on the base side is switched off.

- If necessary, enable LFPT. Set DIP 3 to ON, see page 40.

4.8 Switch-on time (operational readiness time)

Connection establishment between the base and remote is dependent on many different parameters, such as:

– Approach speed
– Approach angle
– Connected end devices

Data transmission (NEARFI 2200 and NEARFI 2000)

The interface parameters stored on the Ethernet end device also influence the switch-on time. Auto negotiation and LFPT, for example, delay connection establishment.

General conditions for measurement:

– Fixed setting of 100 Mbps, full duplex, fast startup (DIP 2 = ON)
– LFPT disabled (DIP 3 = OFF)
– PROFINET controller in combination with a PROFINET device
– Spacing of 5 mm, without offset
– Start point of measurement: 24 V is output at the remote coupler
– End point of measurement: Ethernet data is output at the remote coupler

Result:

↪ Maximum switch-on time: < 450 ms

Power coupler (NEARFI 200)

General conditions for measurement:

– Load: 1 A
– Spacing of 5 mm, without offset
– Start point of measurement: Power up of the base coupler
– End point of measurement: 24 V is output at the remote coupler

Result:

↪ Maximum switch-on time: < 80 ms

Power coupler (NEARFI 300)

General conditions for measurement:

– Load: 1 A
– Spacing of 5 mm, without offset
– Start point of measurement: Power up of the base coupler
– End point of measurement: 24 V is output at the remote coupler

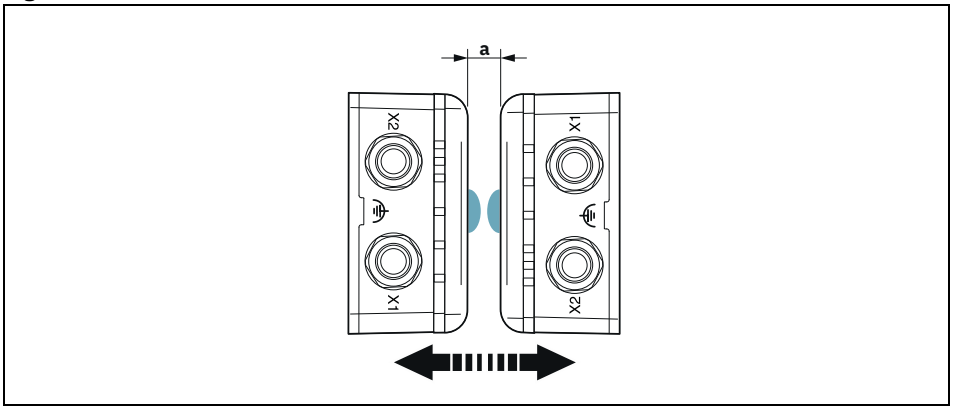
Result:

↪ Maximum switch-on time: < 50 ms

4.9 Positioning of the devices

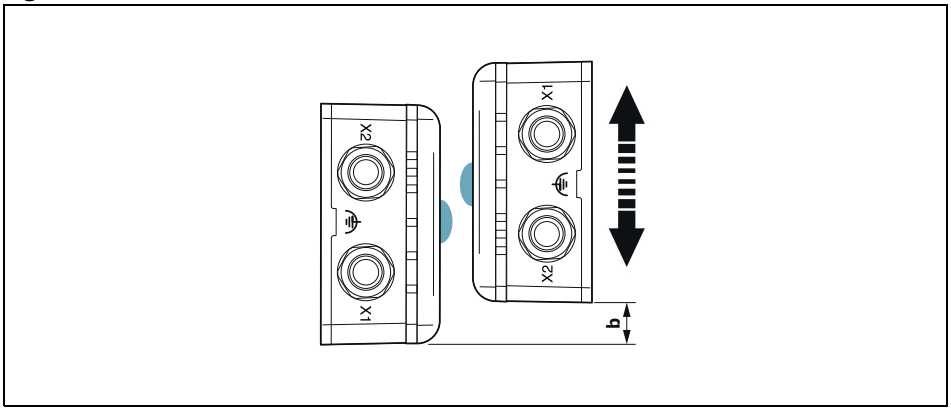
Transmission distance

Figure 4-24 Transmission distance



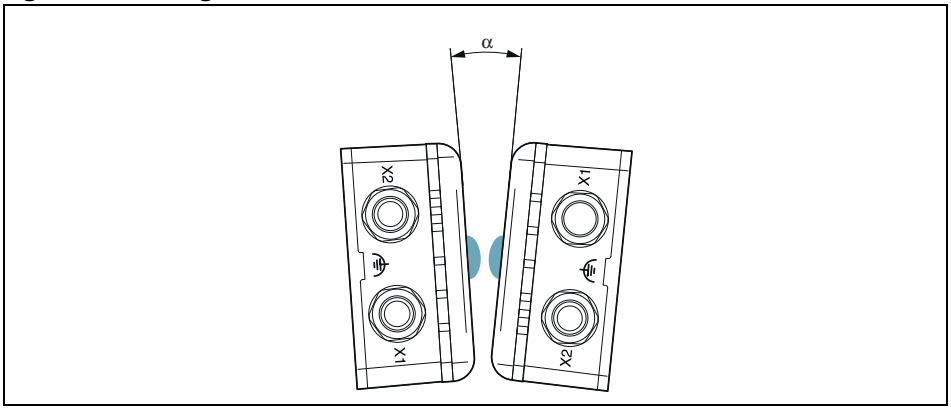
Lateral offset

Figure 4-25 Lateral offset



Angular offset

Figure 4-26 Angular offset



The following diagrams show typical operating ranges with the permissible offset.

- The specified operating range applies in the case of optimal thermal connection.
- Optimum operating range for all versions:
  - Transmission distance: 5 mm
  - Lateral offset: 0 mm
  - Angular offset: 0°
- The specifications for offset apply if the cables of the base and remote coupler exit in the same direction, see 4.9 “Positioning of the devices”.
- If the cables exit in different directions, the operating range is limited, similar to that of rotating applications. In this case, the maximum permissible lateral offset is ±2.5 mm.

NEARFI 2200

Figure 4-27 Transmission distance for lateral offset, NEARFI 2200

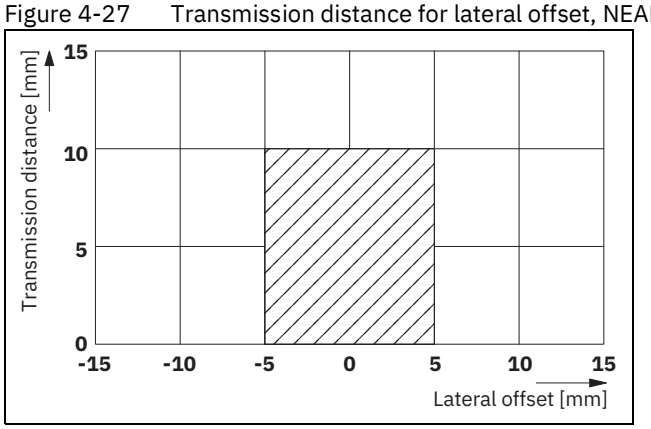
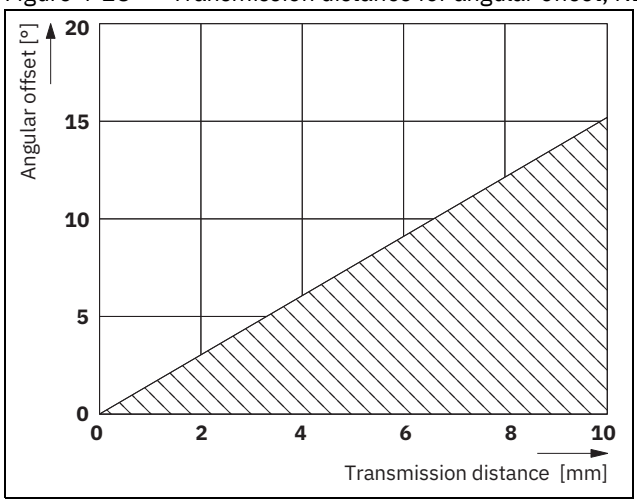


Figure 4-28 Transmission distance for angular offset, NEARFI 2200



NEARFI 200/300

Figure 4-29 Transmission distance for lateral offset, NEARFI 200/300

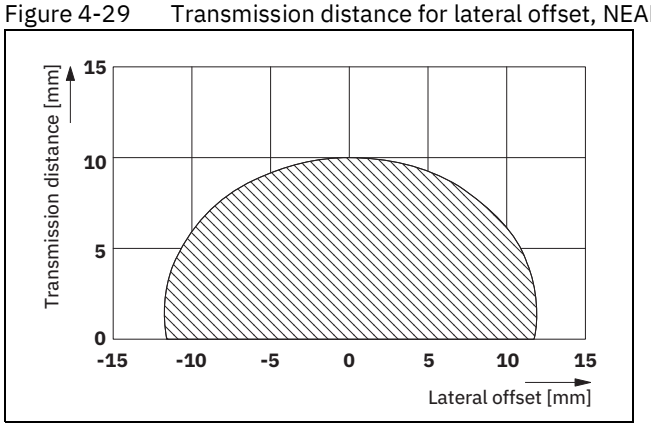
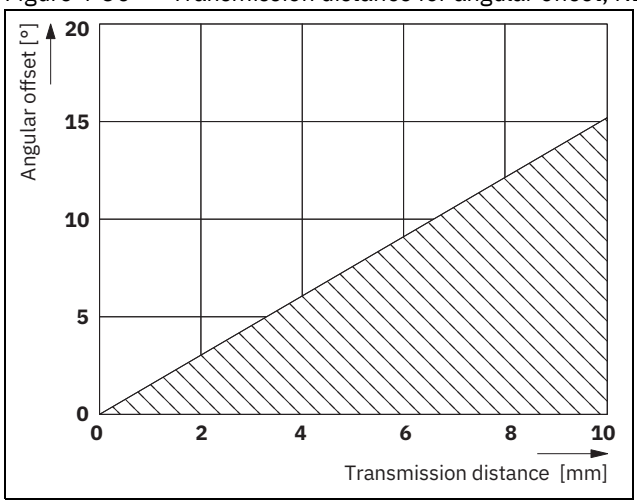
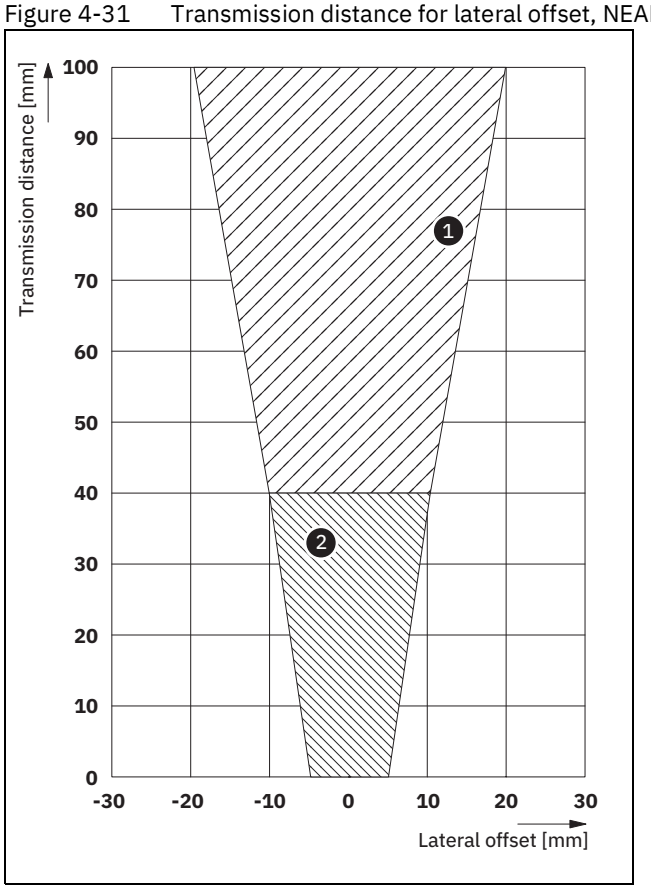


Figure 4-30 Transmission distance for angular offset, NEARFI 200/300



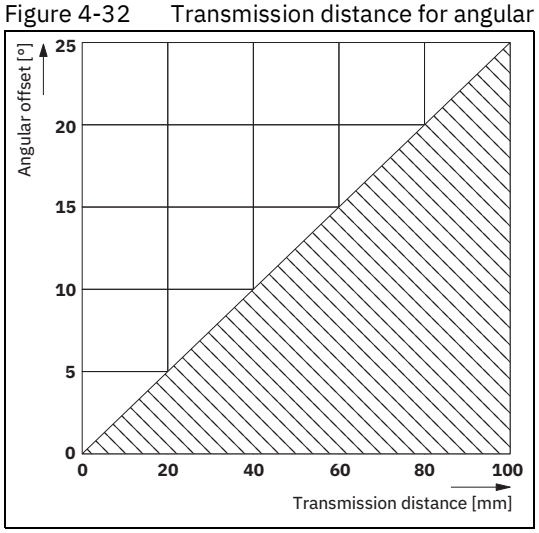
NEARFI 2000

Figure 4-31 Transmission distance for lateral offset, NEARFI 2000



❶ 40 mm ... 100 mm (DIP 1 = ON)
❷ 0 mm ... 40 mm (DIP 1 = OFF)

Figure 4-32 Transmission distance for angular offset, NEARFI 2000



4.10 Obstacles in the air gap

Transmission through non-metallic materials is possible, e.g.,:

- Glass
- Plastic
- Oil, liquids
- Wood

The material thickness influences the attenuation and therefore the transmission distance.

Example, NEARFI 2200:

Actual air gap + material thickness ≤ 10 mm

4.11 Foreign objects in the air gap

The impact of any foreign matter depends on the quantity of the material and the relevant application.

Keep the air gap free of metallic soiling, such as metal shavings.

If metal foreign objects are present in the air gap, power transmission is stopped straight away when there is no immediate response from the remote coupler. The foreign objects remain at a thermally low mean value.

Metal dust

Metal dust that falls off the active surface or only adheres in small quantities has no significant impact. However, if a large amount of ferromagnetic dust permanently adheres to the active surface, e.g., in conjunction with a machine lubricant, transmission will be adversely affected.

Cooling water

A small amount of cooling water that drips off or evaporates after a short time has little effect on transmission. However, persistent wetting or a wall of water will impair data transmission in the 60 GHz band.

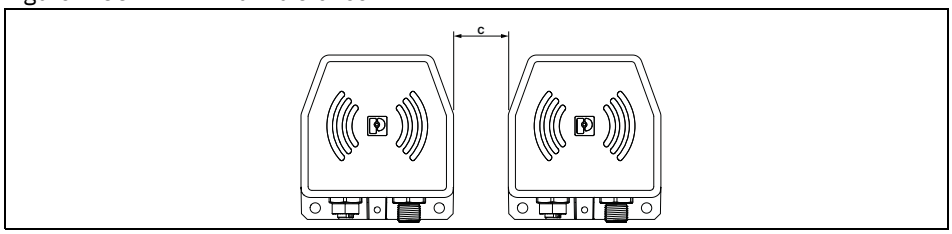
Oil, machine lubricant

Oil or machine lubricant has little effect on transmission. The attenuation is negligible.

4.12 Minimum clearances

Maintain a minimum distance of 5 mm between the two opposing base and remote couplers.

Figure 4-33 Minimum distance



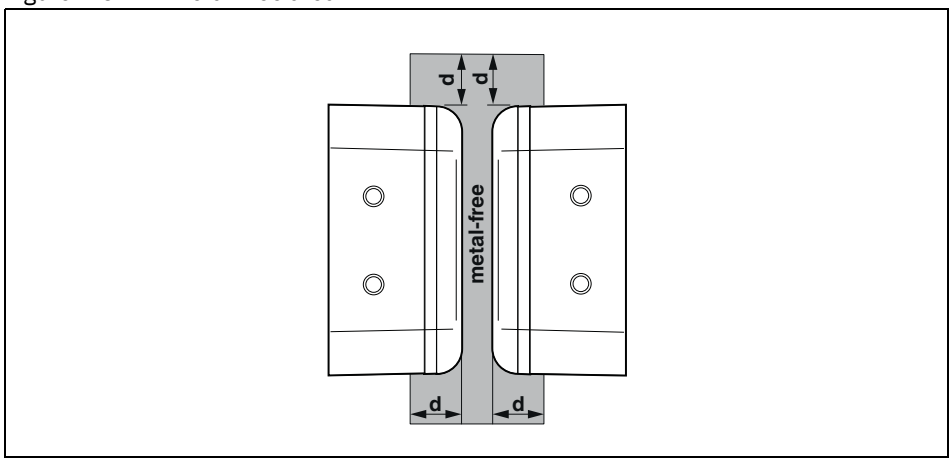
c ≥ 5 mm

4.13 Installation in metal

The black plastic side of the devices is the active surface. The power coils are positioned beneath this surface.

NOTE: Device damage
The device can heat up due to the effects of induction on the power coils.
– Maintain a minimum distance of 5 mm from metal objects.

Figure 4-34 Metal-free area



d ≥ 5 mm

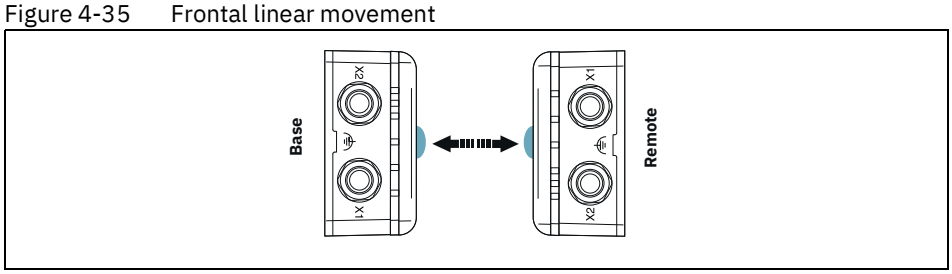
4.14 Coupling the base and remote couplers

Depending on the application, there are various ways of coupling the base and remote couplers.

4.14.1 Individual operation

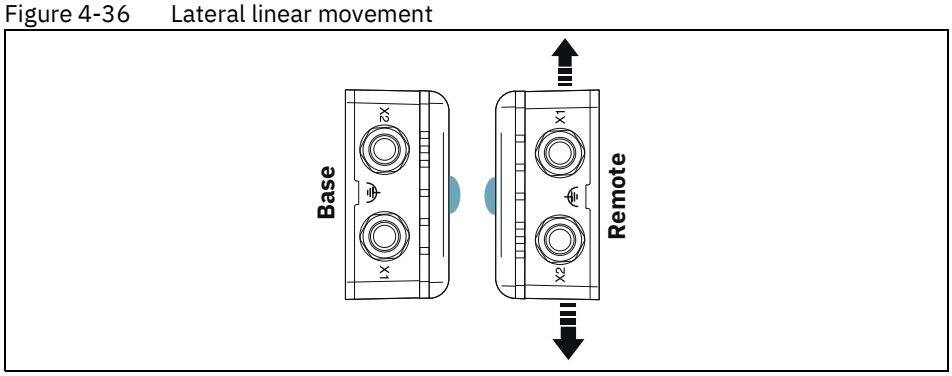
Frontal linear movement

Figure 4-35 Frontal linear movement



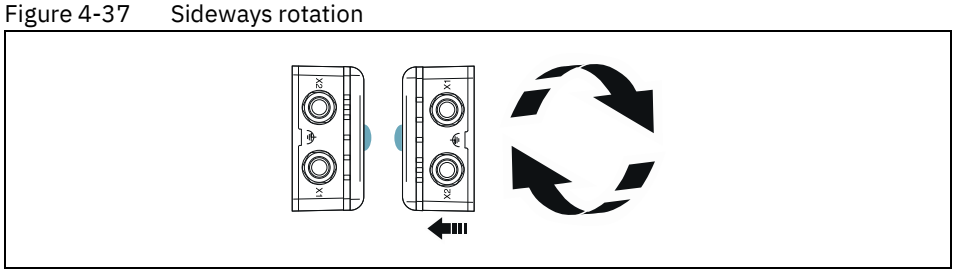
Lateral linear movement

Figure 4-36 Lateral linear movement



Sideways rotation

Figure 4-37 Sideways rotation



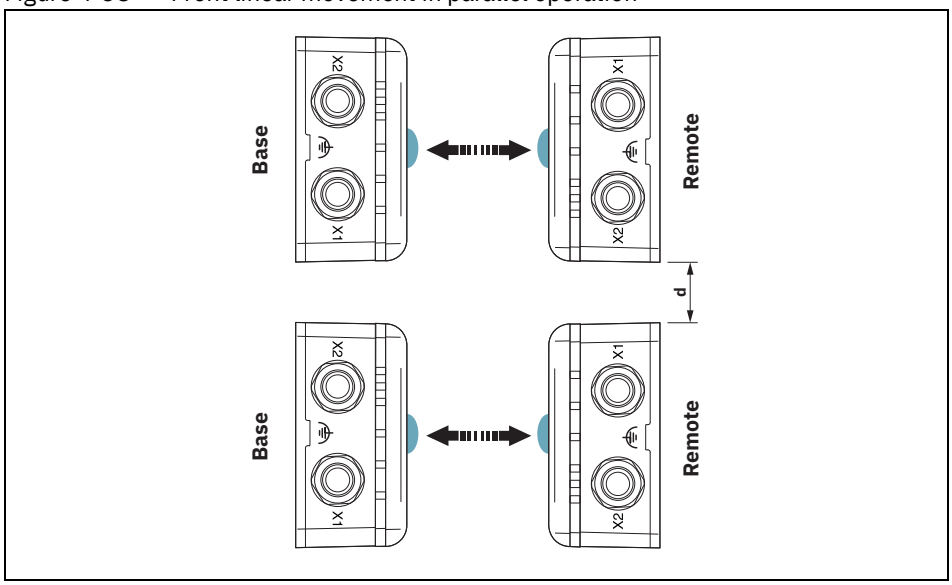
The operating range is limited in rotating applications. The maximum permissible offset is ±2.5 mm. Parallel connection of several NearFi paths is **not** possible.

4.14.2 Parallel operation

Frontal linear movement

The base couplers are each mounted side by side with a clearance of five millimeters. Coupling takes place simultaneously, e.g., for a robot tool change.

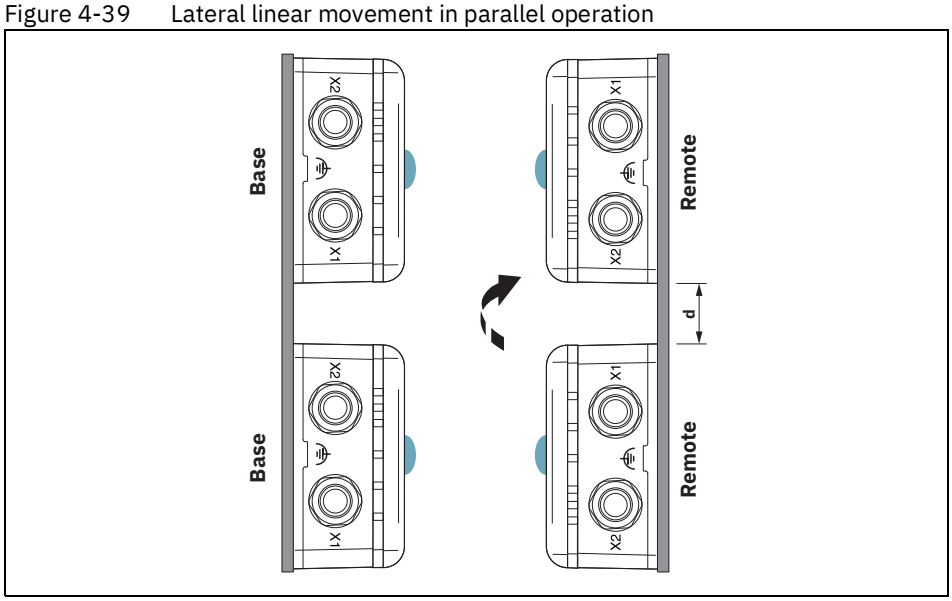
Figure 4-38 Front linear movement in parallel operation



Lateral linear movement

The base couplers are each mounted vertically one above the other with a clearance of five millimeters. Coupling takes place simultaneously, e.g., for a rotary table.

Figure 4-39 Lateral linear movement in parallel operation



4.15 Derating

4.15.1 Derating curve

The derating curve shows the dependence of the maximum permissible ambient temperature on the following factors:

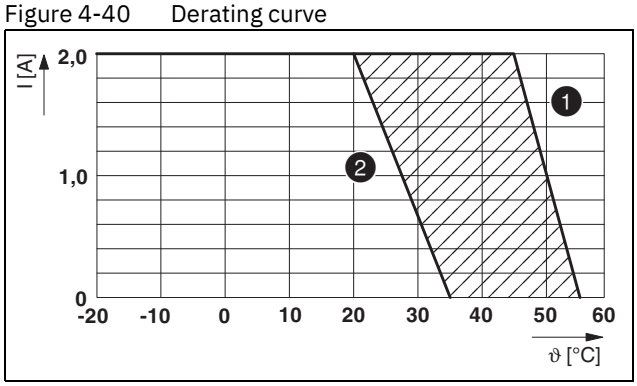
– Thermal connection of the coupler housing
– Current strength or load at the remote output

The current strength is not dependent on the width of the air gap or the offset of the devices.

Please note that the lower derating value of the respective item version applies for parallel operation.

Power and data coupler (NEARFI 2200)

Figure 4-40 Derating curve



1 Optimum thermal connection, see page 54
2 No thermal connection

Power coupler US (NEARFI 200)

Thermal connection	Ambient temperature (operation)
Optimum, see page 54	≤ 55°C
None	≤ 45°C

Power coupler UA (NEARFI 300)

Thermal connection	Ambient temperature (operation)
Optimum, see page 54	≤ 60°C
None	≤ 50°C

Data coupler (NEARFI 2000)

Thermal connection	Ambient temperature (operation)
Optimum, see page 54	≤ 65°C
None	≤ 55°C

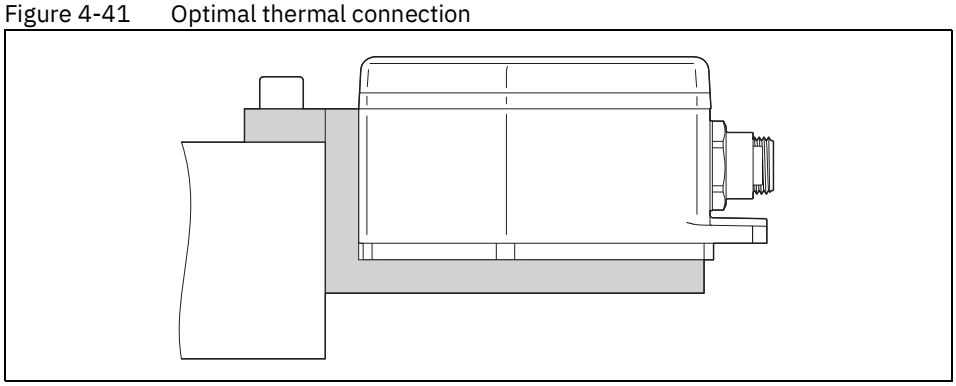
4.15.2 Thermal connection by mounting on metal

- Design the installation location such that the heat loss can be dissipated. Mount the die-cast housing on a metal plate, heatsink, or similar heat-dissipating material.

Optimal thermal connection

Mounting on 10 mm aluminum bracket on the front and bottom, surface bonded to solid metal

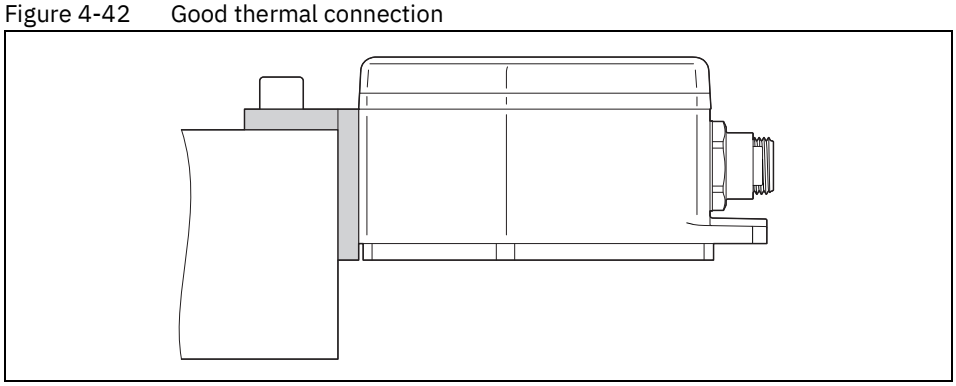
Figure 4-41 Optimal thermal connection



Good thermal connection

Mounting on 5 mm aluminum bracket on the front, surface bonded to solid metal

Figure 4-42 Good thermal connection



No thermal connection

No thermal connection means that the device is mounted on plastic or another non-heat conductive material.

4.15.3 Derating in accordance with UL

Power and data coupler (NEARFI 2200)

Thermal connection	Load/output current	Ambient temperature (operating) in accordance with UL
Optimum, thermal connection via mounting adapter and external heatsink (machine head), see page 56	0 A	≤ 55°C
	2 A	≤ 40°C

Power coupler (NEARFI 200 and NEARFI 300)

Thermal connection	Ambient temperature (operating) in accordance with UL
Optimum, see page 54	≤ 40°C
None	≤ 40°C

Data coupler (NEARFI 2000)

Thermal connection	Ambient temperature (operating) in accordance with UL
Optimum, see page 54	≤ 65°C
None	≤ 55°C

4.15.3.1 Mounting NEARFI 2200 in accordance with UL

UL CONDITIONS OF ACCEPTABILITY for:

– NEARFI 2200 B (base)

– NEARFI 2200 R (remote)

These products were tested with an external thermal connection (adapter) and hard anodized aluminum heatsink (machine head). See figures below for details.

The following tests shall be performed in the end-product evaluation, if a different external thermal connection or heatsink is used:

– TEMPERATURE TEST (10.1-10.4) (UL/CSA 61010-1, UL/CSA 61010-2-201)

Figure 4-43 Installation example with external heatsink (processing head)

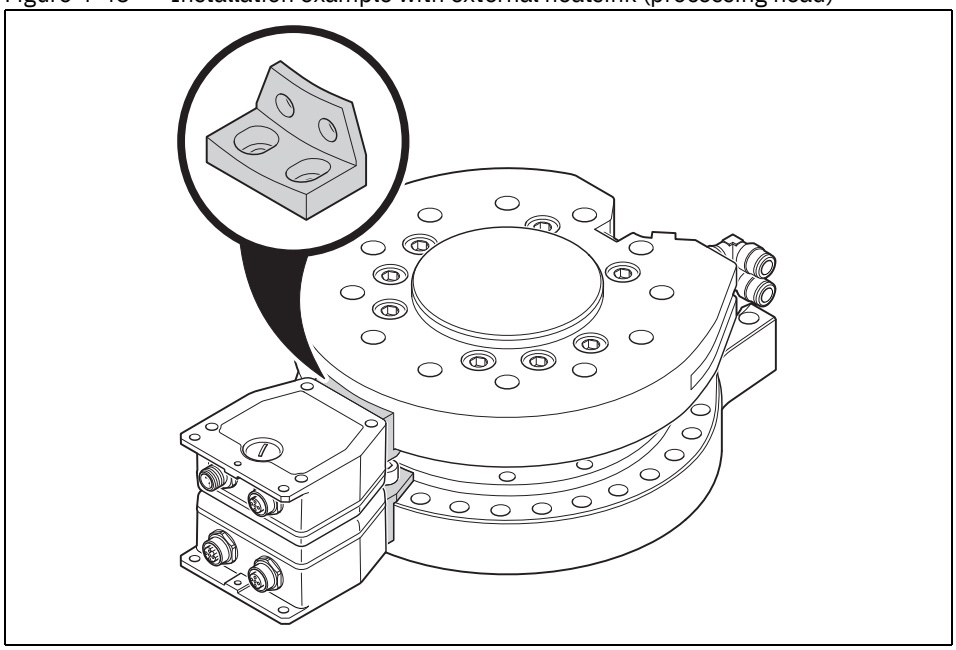
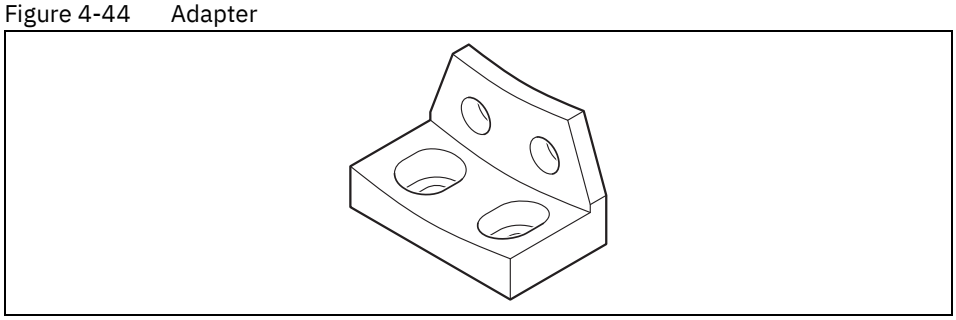
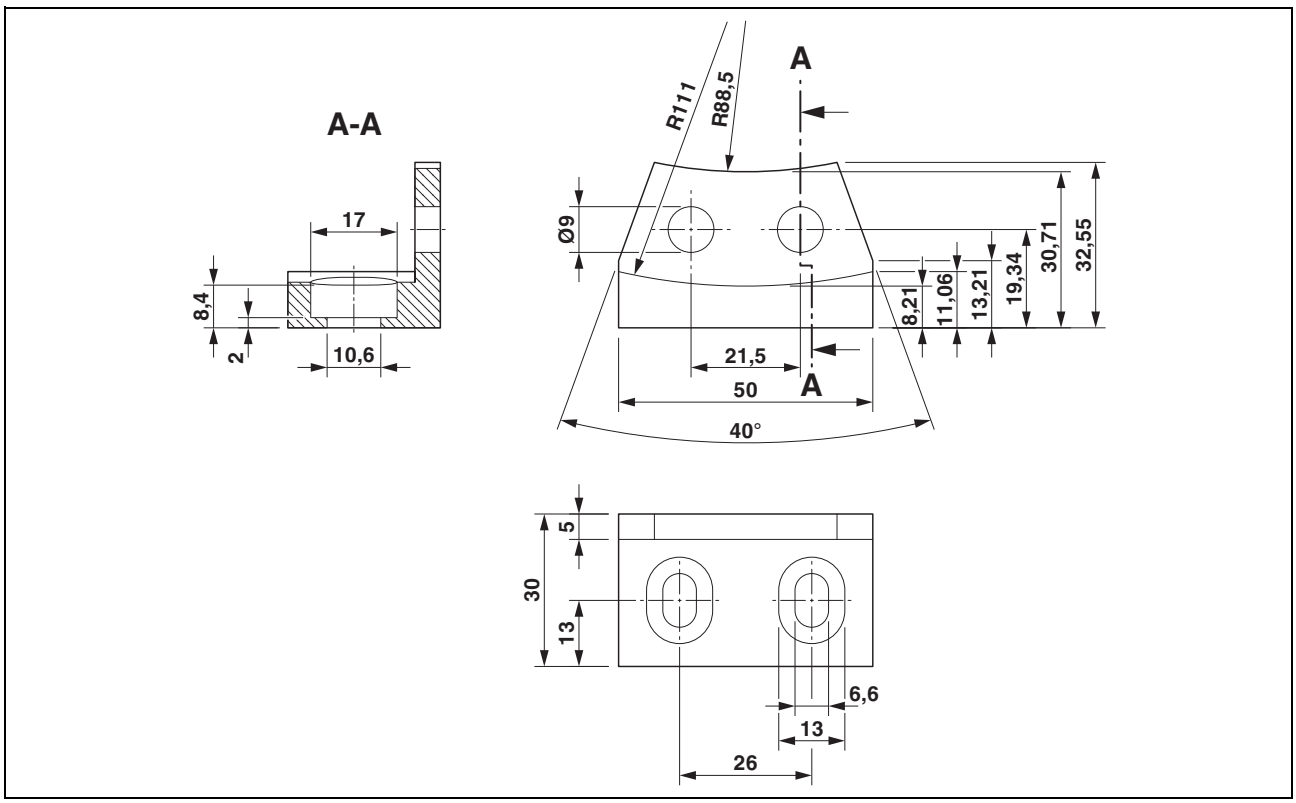


Figure 4-44 Adapter



– 2 x M8 screw, tightening torque: 10 Nm
– 2 x M6 screw, tightening torque: 3 Nm

Figure 4-45 Adapter dimensions



5 Installation

5.1 Mounting and removal

CAUTION:
Observe the safety notes in Section “For your safety” on page 5.

NOTE: Device damage
- Only mount and remove devices when the power supply is disconnected.
- Mount the device on a flat, load-bearing surface or profile.
- Use standard M5 or M6 screws (ISO 4762 or hexalobular internal screws) and spring washers.
- Observe the maximum torque of the screws.
- Select the installation location so that metal objects cannot enter the air gap between the base and the remote.

You can secure the devices in three different ways. This allows the devices to be mounted flexibly, e.g., on a profile or bracket, on a machine, etc.

- 5.1.1 “Mounting with two M5 screws”
- 5.1.2 “Mounting with four M6 screws”
- 5.1.3 “Mounting with two M6 screws”

Rotating applications

- Center the base and remote couplers as accurately as possible. The manufacturer logo “P” marks the center.
- A template for centering the devices can be found here: Figure 9-2 “Centering template”

5.1.1 Mounting with two M5 screws

- Mark the drill holes on the mounting surface and drill the holes.
- Drill the holes with the specified diameter.
- Secure the die-cast housing with two M5 screws and spring washers.
- Check that the die-cast housing is securely mounted.

Figure 5-1 Drilling diagram

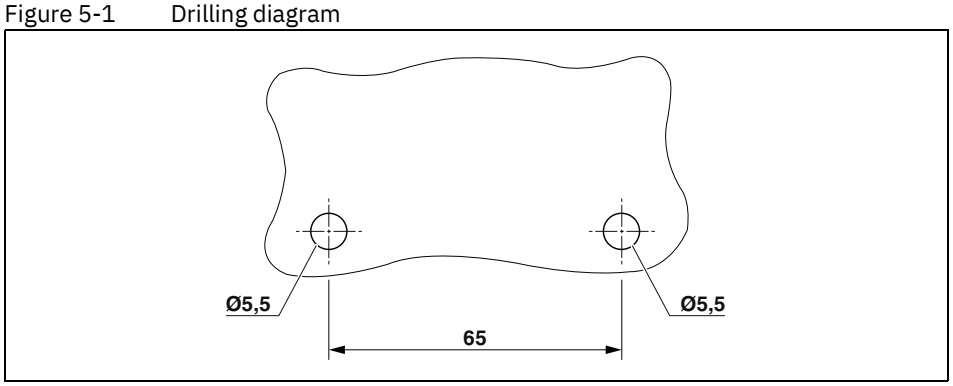
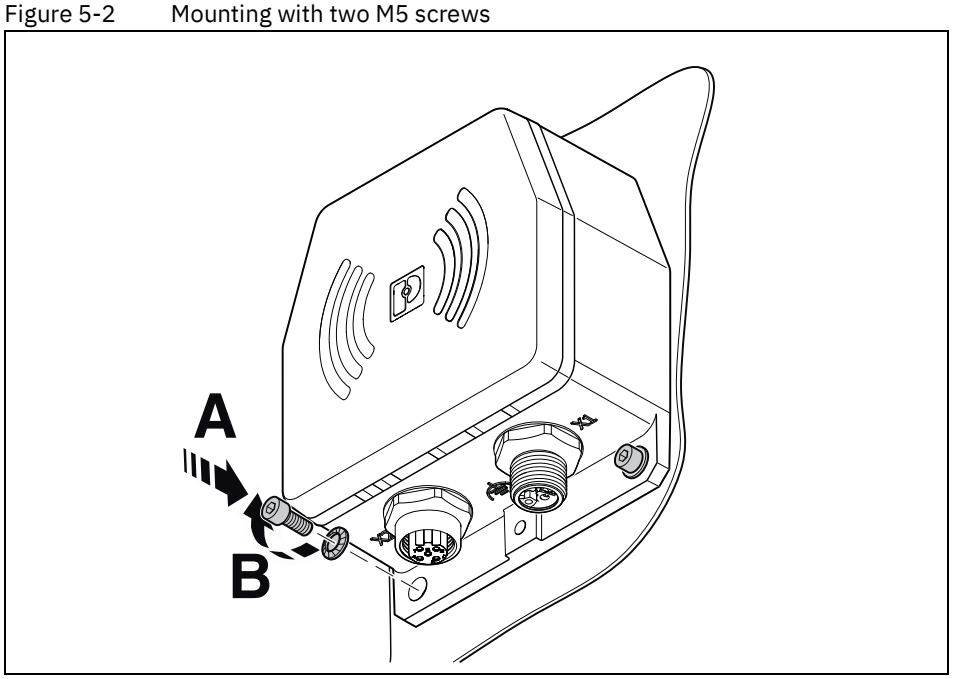


Figure 5-2 Mounting with two M5 screws



5.1.2 Mounting with four M6 screws

If the operating conditions are particularly difficult, e.g., due to vibrations, you can also mount the device with four M6 screws.

- Fix the die-cast housing in place using four screws and four spring washers
  Female thread, thread depth = 7 mm, tightening torque 0.7 Nm
- Check that the die-cast housing is securely mounted.

Figure 5-3 Drilling diagram

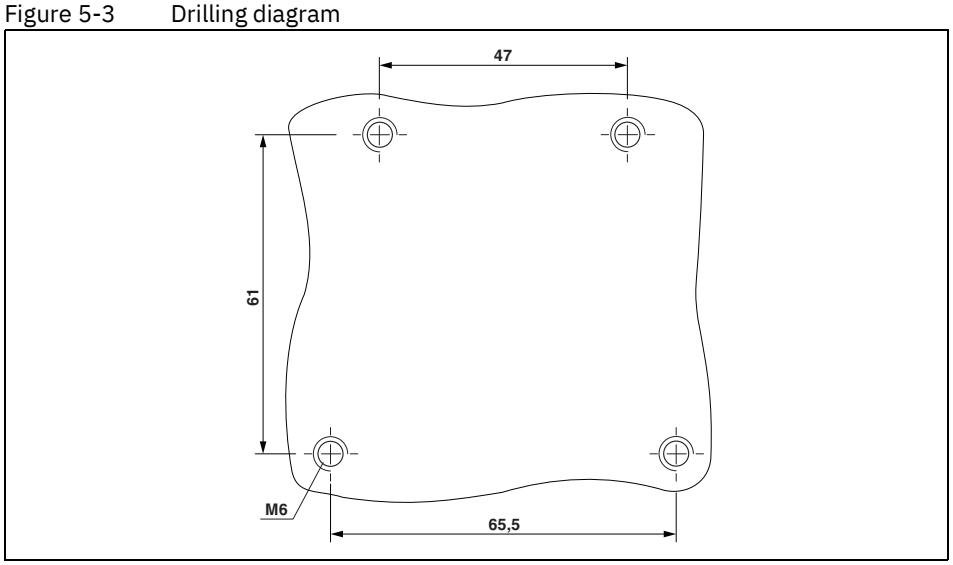
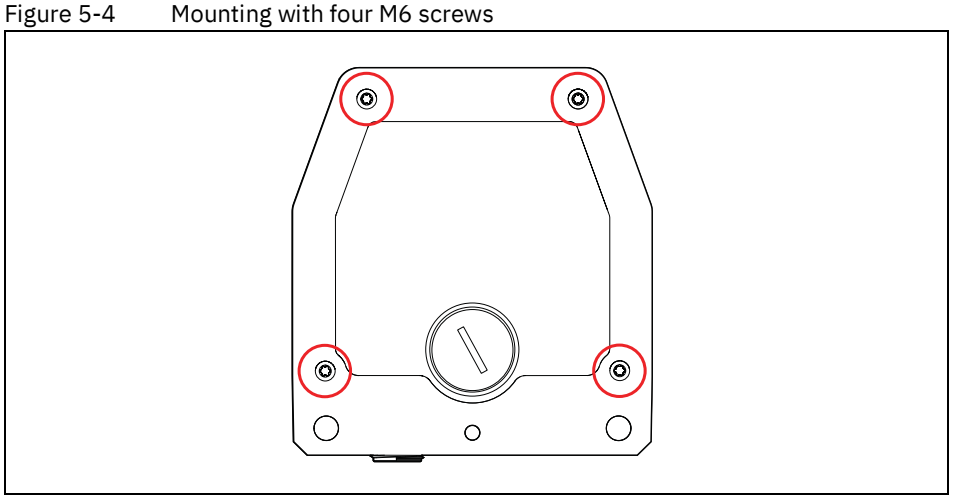


Figure 5-4 Mounting with four M6 screws



5.1.3 Mounting with two M6 screws

You can also mount the device from above with two M6 screws.

- Secure the die-cast housing with two M6 screws.
  Female thread, thread depth = 7 mm, tightening torque 0.7 Nm
- Check that the die-cast housing is securely mounted.

Figure 5-5 Drilling diagram

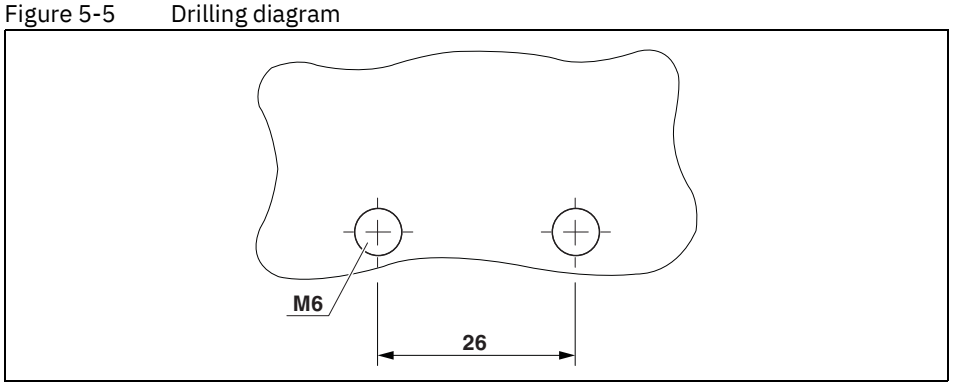
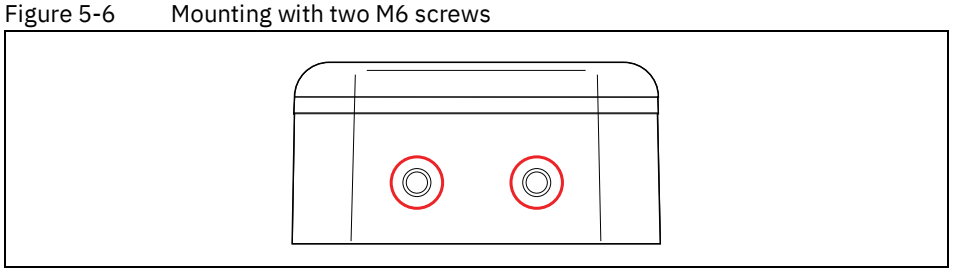


Figure 5-6 Mounting with two M6 screws



5.1.4 Removal

- Disconnect all cables from the device.
- Loosen the mounting screws.

5.2 Connecting cables

- Put protective caps on unused connection sockets to ensure an IP65 degree of protection.
- To prevent untight seals and damage, tighten the M12 connectors to the recommended tightening torque.
  – Recommended tightening torque: 0.4 Nm

5.2.1 Calculating the cable lengths

The voltage drop on the cables is calculated according to the following formula:

$U_A = I \times R \times 2$

Example 1

Line resistance of a 4 x 1.5 mm² power supply cable, cable type 105 (e.g., SAC-4P-...-105/M12FSL) = 12 Ω/km

– At 2 A:
  $U_A = 2\ A \times 12\ \Omega/km \times 2 = 48\ V/km$
  Corresponds to 0.48 V for 10 m

Example 2

Line resistance of a 4 x 2.5 mm² power supply cable, cable type PUR (e.g., SAC-4P-...-PUR/M12FSL) = 7 Ω/km

– At 1.5 A:
  $U_A = 1.5\ A \times 7\ \Omega/km \times 2 = 21\ V/km$
  Corresponds to 0.21 V for 10 m

5.2.2 Pin assignment for NEARFI 2200

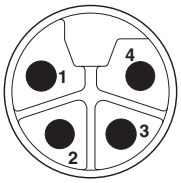
5.2.2.1 Base: Connection X1 (power IN)

The base coupler is supplied via connection X1 (power IN).

– Supply voltage +24 V DC (US)
– Reference potential GND (US)

The NEARFI 2200 B base coupler transmits the voltage US to the NEARFI 2200 R remote coupler without contact.

Table 5-1 Power IN (X1), M12 male, L-coded

	Pin	IN	Wire color
	1	+24 V DC (U_S)	Brown
	2	Not used	White
	3	GND (U_S)	Blue
	4	Not used	Black

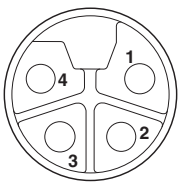
5.2.2.2 Remote: Connection X1 (power OUT)

DC voltage is provided at output X1 (power OUT) of the remote coupler.

The output is protected electronically from overload and short circuit. In case of a fault, the output voltage is limited to < 30 V DC (EN 61131-2).

NOTE: Device damage
Never apply voltage to the output X1 (power OUT) of the remote coupler.

Table 5-2 Power OUT (X1), M12 female, L-coded

	Pin	OUT	Wire color
	1	+24 V DC (U_S)	Brown
	2	Not used	White
	3	GND (U_S)	Blue
	4	Not used	Black

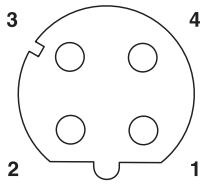
5.2.2.3 Base and remote: Connection X2 (data IN/OUT)

You connect the Ethernet network via the circular connector X2 (data IN/OUT).

The shield is connected to FE in the device. The thread is used for additional shielding.

- Make the FE connection with mounting screws.
- Only use shielded twisted pair cables and corresponding shielded M12 males.

Table 5-3 Data IN/OUT (X2), M12 female, D-coded

	Pin	IN/OUT		Wire color (T568B)
	1	Send	TX+	White-orange
	2	Receive	RX+	White-green
	3	Send	TX-	Orange
	4	Receive	RX-	Green

5.2.3 Pin assignment for NEARFI 200

5.2.3.1 Base: Connection X1 (power IN)

The base coupler is supplied via connection X1 (power IN).

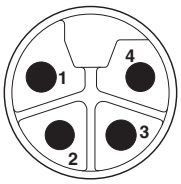
You can connect two supply voltages to the connector:

– Supply voltage 1: +24 V DC (U_S) and reference potential GND (U_S)
– Supply voltage 2: +24 V DC (U_A) and reference potential GND (U_A)

Both supply voltages are electrically isolated from one another and from functional ground. Each pin of connector X1 (power IN) is connected to the same pin of socket X2 (power OUT). This enables the supply to be forwarded to the next device.

– The NEARFI 200 couplers transmit the communications and sensor voltage US via the air.
– The UA actuator voltage is only forwarded via the connectors.

Table 5-4 Power IN (X1), M12 male, L-coded

	Pin	IN	Wire color
	1	+24 V DC (U_S)	Brown
	2	GND (U_A)	White
	3	GND (U_S)	Blue
	4	+24 V DC (U_A)	Black

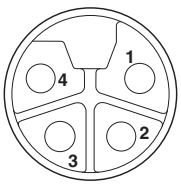
5.2.3.2 Base: Connection X2 (power OUT)

Connection X2 (power OUT) enables the supply voltage to be forwarded to the next device.

The output is protected electronically from overload and short circuit. In case of a fault, the output voltage is limited to < 30 V DC (EN 61131-2).

NOTE: Device damage
Never apply voltage to the output of the base coupler.

Table 5-5 Power OUT (X2), M12 female, L-coded

	Pin	OUT	Wire color
	1	+24 V DC (U_S)	Brown
	2	GND (U_A)	White
	3	GND (U_S)	Blue
	4	+24 V DC (U_A)	Black

5.2.3.3 Remote: Connection X1 (power OUT)

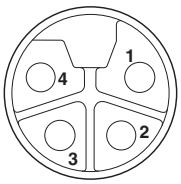
DC voltage is provided at output X1 of the remote coupler:

– Up to 50 W, US in stand-alone operation
– Up to 100 W, US in parallel operation

The output is protected electronically from overload and short circuit. In case of a fault, the output voltage is limited to < 30 V DC (EN 61131-2).

NOTE: Device damage
Never apply voltage to the output of the remote coupler.

Table 5-6 Power OUT (X1), M12 female, L-coded

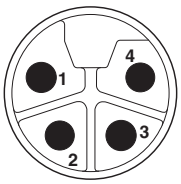
	Pin	OUT	Wire color
	1	+24 V DC (U_S)	Brown
	2	GND (U_A)	White
	3	GND (U_S)	Blue
	4	+24 V DC (U_A)	Black

5.2.3.4 Remote: Connection X2 (power IN)

You can connect the remote coupler to a second remote coupler connected in parallel via connection X2 (power IN).

Each pin of connector X2 (power IN) is connected to the same pin of socket X1 (power OUT). This enables the supply voltage to be forwarded to the remote output X1 (power OUT).

Table 5-7 Power IN (X2), M12 male, L-coded

	Pin	IN	Wire color
	1	+24 V DC (U_S)	Brown
	2	GND (U_A)	White
	3	GND (U_S)	Blue
	4	+24 V DC (U_A)	Black

5.2.4 Pin assignment for NEARFI 300

5.2.4.1 Base: Connection X1 (power IN)

The base coupler is supplied via connection X1 (power IN).

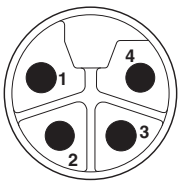
You can connect two supply voltages to the connector:

– Supply voltage 1: +24 V DC (U_S) and reference potential GND (U_S)
– Supply voltage 2: +24 V DC (U_A) and reference potential GND (U_A)

Both supply voltages are electrically isolated from one another and from functional ground. Each pin of connector X1 (power IN) is connected to the same pin of socket X2 (power OUT). This enables the supply to be forwarded to the next device.

– The NEARFI 300 couplers transmit the actuator voltage UA via the air.
– The communications and sensor voltage US is only forwarded via the connectors.

Table 5-8 Power IN (X1), M12 male, L-coded

	Pin	IN	Wire color
	1	+24 V DC (U_S)	Brown
	2	GND (U_A)	White
	3	GND (U_S)	Blue
	4	+24 V DC (U_A)	Black

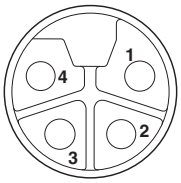
5.2.4.2 Base: Connection X2 (Power-OUT)

Connection X2 (power OUT) enables the supply voltage to be forwarded to the next device.

The output is protected electronically from overload and short circuit. In case of a fault, the output voltage is limited to < 30 V DC (EN 61131-2).

NOTE: Device damage
Never apply voltage to the output of the base coupler.

Table 5-9 Power-OUT (X2), M12 female, L-coded

	Pin	OUT	Wire color
	1	+24 V DC (U_S)	Brown
	2	GND (U_A)	White
	3	GND (U_S)	Blue
	4	+24 V DC (U_A)	Black

5.2.4.3 Remote: Connection X1 (power OUT)

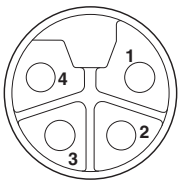
DC voltage is provided at output X1 of the remote coupler:

– Up to 50 W, UA in stand-alone operation
– Two DC voltages, US and UA in parallel operation

The output is protected electronically from overload and short circuit. In case of a fault, the output voltage is limited to < 30 V DC (EN 61131-2).

NOTE: Device damage
Never apply voltage to the output of the remote coupler.

Table 5-10 Power OUT (X1), M12 female, L-coded

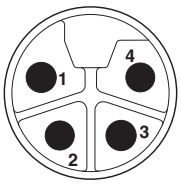
	Pin	OUT	Wire color
	1	+24 V DC (U_S)	Brown
	2	GND (U_A)	White
	3	GND (U_S)	Blue
	4	+24 V DC (U_A)	Black

5.2.4.4 Remote: Connection X2 (power IN)

You can connect the remote coupler to a second remote coupler connected in parallel via connection X2 (power IN).

Each pin of connector X2 (power IN) is connected to the same pin of socket X1 (power OUT). This enables the supply voltage to be forwarded to the remote output X1 (power OUT).

Table 5-11 Power IN (X2), M12 male, L-coded

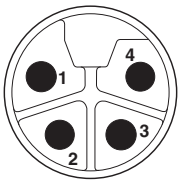
	Pin	IN	Wire color
	1	+24 V DC (U_S)	Brown
	2	GND (U_A)	White
	3	GND (U_S)	Blue
	4	+24 V DC (U_A)	Black

5.2.5 Pin assignment for NEARFI 2000

5.2.5.1 Base and remote: Connection X1 (power IN)

The data couplers are supplied via the X1 circular connector (power IN).

Table 5-12 Power IN (X1), M12 male, L-coded

	Pin	IN	Wire color
	1	+24 V DC (U_S)	Brown
	2	Not used	White
	3	GND (U_S)	Blue
	4	Not used	Black

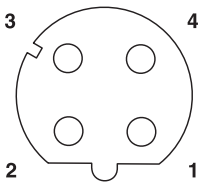
5.2.5.2 Base and remote: Connection X2 (data IN/OUT)

You connect the Ethernet network via the circular connector X2 (data IN/OUT).

The shield is connected to FE in the device. The thread is used for additional shielding.

- Make the FE connection with mounting screws.
- Only use shielded twisted pair cables and corresponding shielded M12 males.

Table 5-13 Data IN/OUT (X2), M12 female, D-coded

	Pin	IN/OUT		Wire color (T568B)
	1	Send	TX+	White-orange
	2	Receive	RX+	White-green
	3	Send	TX-	Orange
	4	Receive	RX-	Green

5.2.6 Circular connectors

Depending on the device and the accessories used, you can plug in or screw the connection via push-pull.

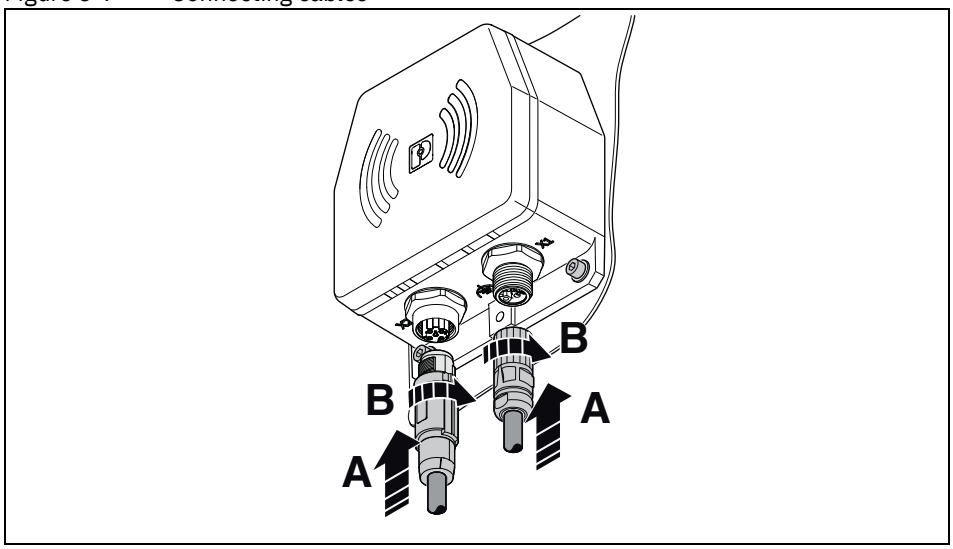
Table 5-14 Circular connectors

NEARFI...	Connection	Meaning	M12	Coding	Connection method
2200 B	X1	Power IN	Male	L	Push-pull fast connection or screw connection
	X2	Ethernet	Female	D	
2200 R	X1	Power OUT (US)	Female	L	Screw connection
	X2	Ethernet	Female	D	Push-pull fast connection or screw connection
200 B	X1	Power IN	Male	L	Push-pull fast connection or screw connection
	X2	Power OUT	Female	L	Screw connection
200 R	X1	Power OUT (US)	Female	L	Screw connection
	X2	Power IN	Male	L	Push-pull fast connection or screw connection
300 B	X1	Power IN	Male	L	Push-pull fast connection or screw connection
	X2	Power OUT	Female	L	Screw connection
300 R	X1	Power OUT (UA)	Female	L	Screw connection
	X2	Power IN	Male	L	Push-pull fast connection or screw connection
2000 B	X1	Power IN	Male	L	Push-pull fast connection or screw connection
	X2	Ethernet	Female	D	
2000 R	X1	Power IN	Male	L	Push-pull fast connection or screw connection
	X2	Ethernet	Female	D	

The device-side circular connectors are coded. It is impossible to accidentally connect power connector X1 and Ethernet connector X2 incorrectly.

- Plug the field-side circular connectors fully onto the connections on the device.
- To affix the plug, tighten the union nut hand-tight.
- Ensure the connection cable has sufficient strain relief in accordance with the conductor cross-section.
- On the NEARFI 200/300, one M12 port is sealed with a filler plug in the delivery state. For stand-alone operation, only one M12 port is required. If you want to operate the devices in parallel, remove the filler plug.

Figure 5-7 Connecting cables

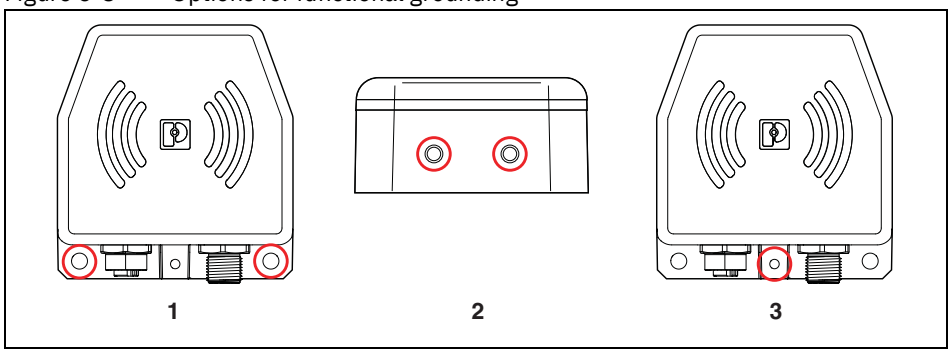


5.2.7 Functional ground

There are three different ways to ground the device:

– Via the mounting screws at the bottom, with toothed lock washer
– Via the mounting screws at the top
– Via the grounding connection with an M4 screw and toothed lock washer
  Female thread, thread depth = 5 mm, tightening torque 0.6 Nm

Figure 5-8 Options for functional grounding



5.3 Startup and maintenance

When you switch on the power supply on the base side, the coupling link is automatically ready for operation.

- Check the area between the base and remote coupler regularly.
- Keep this area free of metallic soiling, such as metal shavings.

6 Troubleshooting

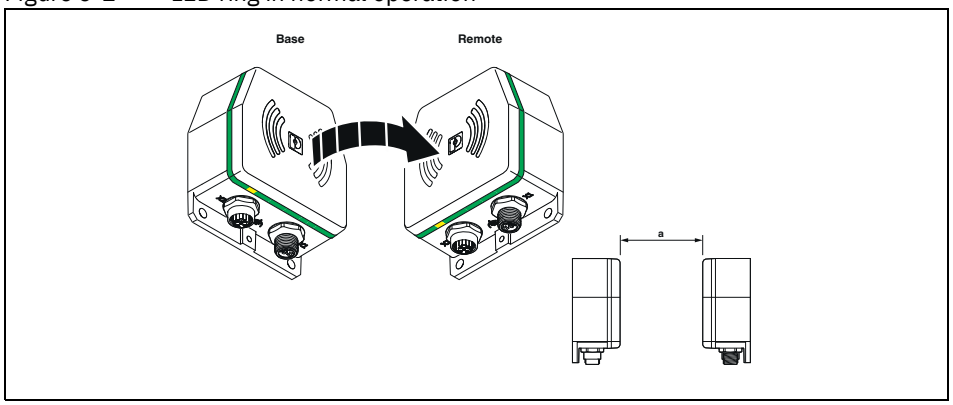
6.1 Diagnostic LEDs

If the devices are not working as expected, check whether there is any interference in the surrounding area.

- Next, check the diagnostics LEDs.

Normal mode

Figure 6-1 LED ring in normal operation

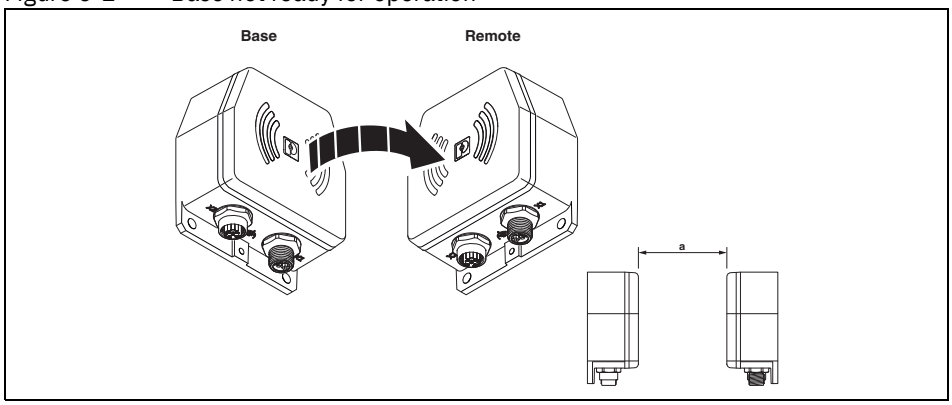


a ≤ 10 mm

6.1.1 Base and remote not coupled

Base LED ring is switched off

Figure 6-2 Base not ready for operation

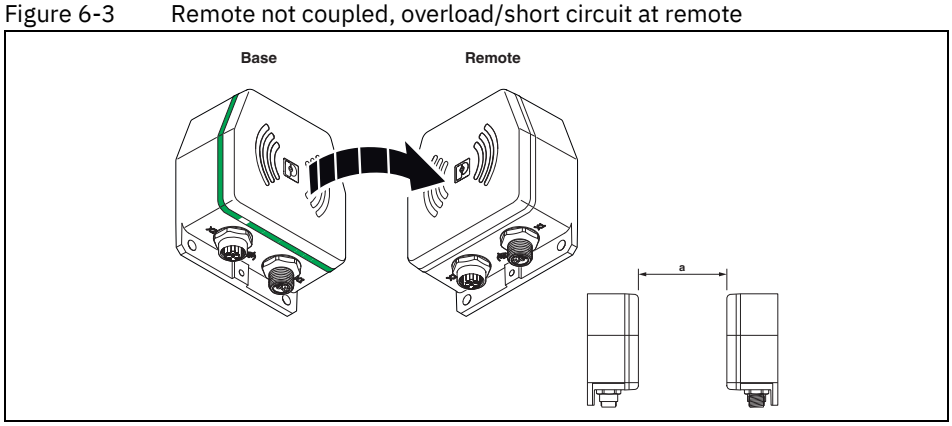


If the base coupler LED ring is switched off, the device is not ready for operation.

- Check the power supply unit.

Remote LED ring is switched off

Figure 6-3 Remote not coupled, overload/short circuit at remote



When the base coupler is supplied with power, it will try to connect to the remote coupler. The LED ring on the base coupler flashes green. If the LED ring on the remote coupler remains off, the devices are either too far away from each other or there is an overload or short circuit on the remote coupler.

In this case, the remote coupler automatically switches off the output voltage. It cyclically tries to switch it back on again. The cycle time depends on the output current.

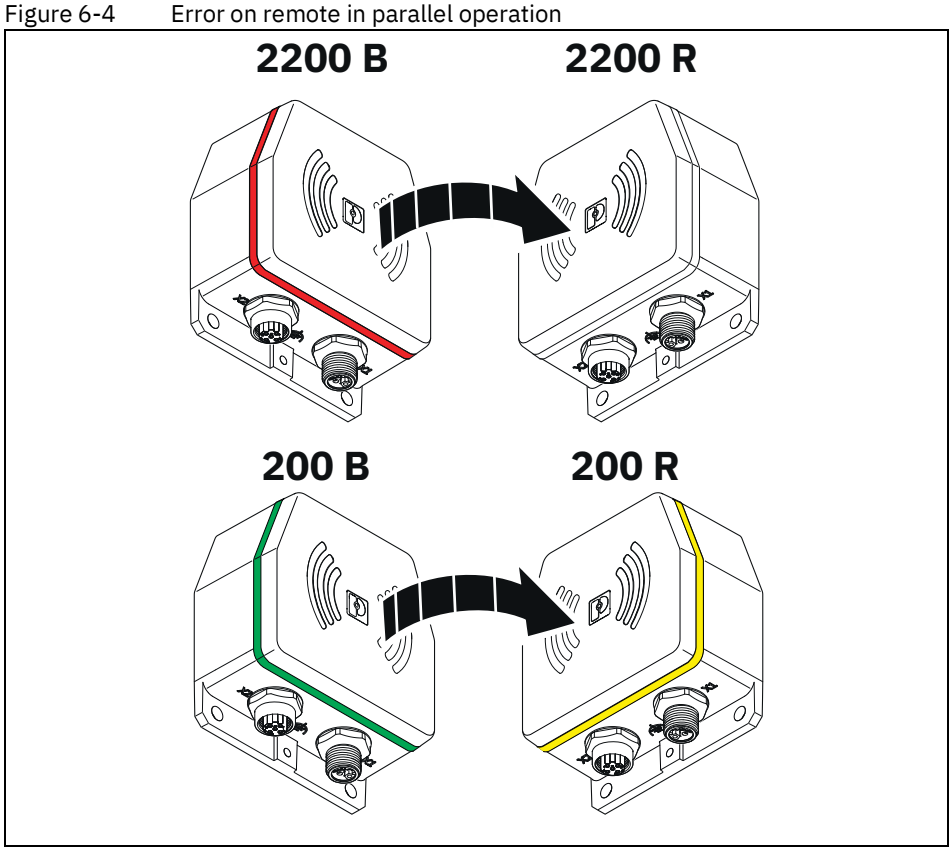
- Check the air gap between the devices.
- Reduce the distance, the offset, or the angle between the devices if necessary.
- Check the connected load on the remote side.

6.1.2 Parallel connection of two NearFi paths

LED ring on the remote coupler flashing yellow

Only for the NEARFI 200 R power coupler

Figure 6-4 Error on remote in parallel operation



When the base coupler is supplied with power, it automatically establishes a connection to the remote coupler in range.

If one of the two paths connected in parallel is not working correctly, the remote coupler LED ring flashes yellow. Automatic load distribution may not work. In this case, the remote coupler limits the output to 0 A. It then cyclically attempts to increase the output current back to 4 A.

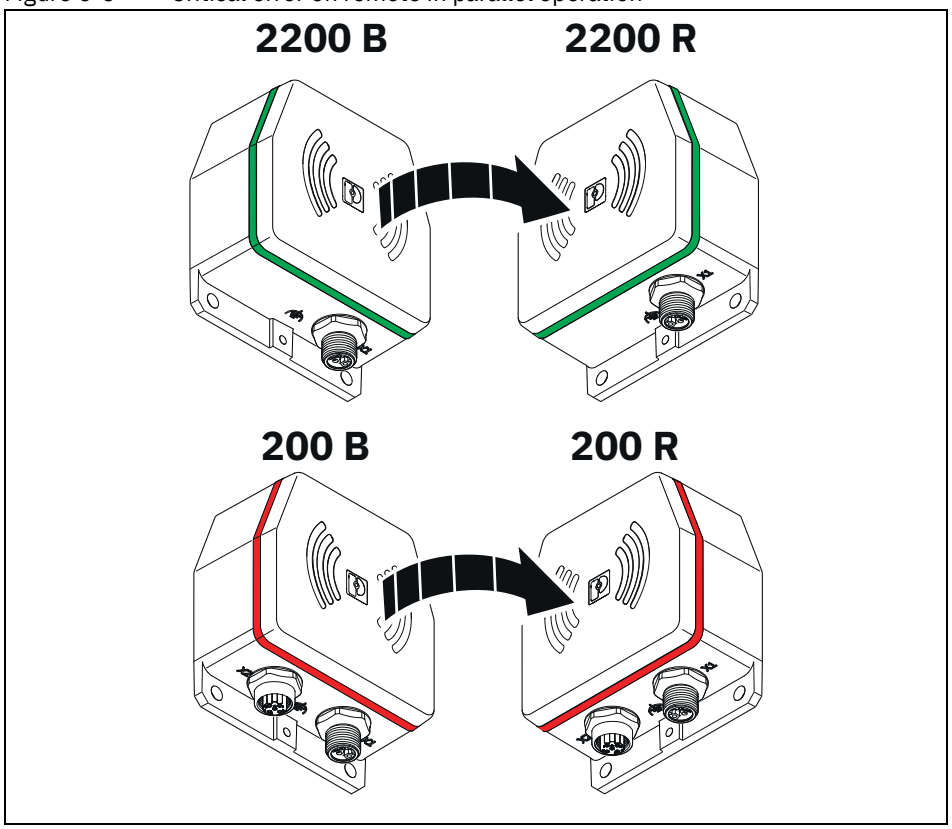
One of the two NearFi paths is not working correctly.

- Reduce the distance, the offset, or the angle between the devices if necessary.
- Check the connected load on the remote side.

LED ring on the remote coupler lights up red

Only for the NEARFI 200 R power coupler

Figure 6-5 Critical error on remote in parallel operation



If the remote coupler LED ring lights up red, there is a critical error.

Possible reasons:

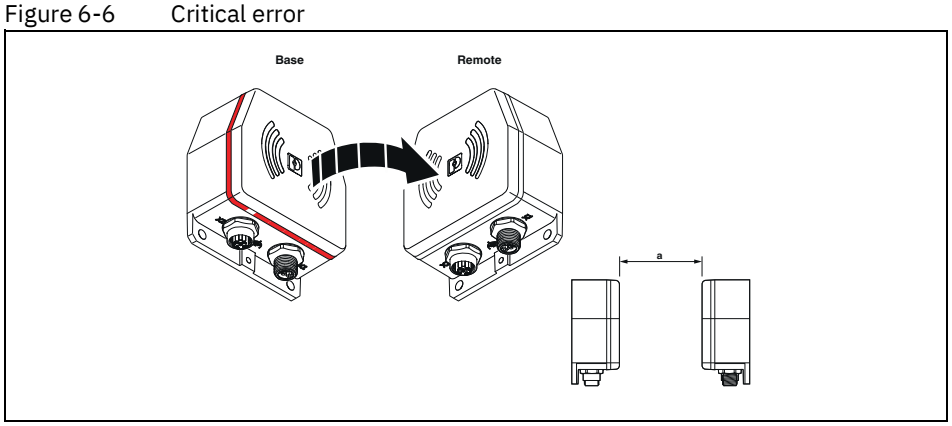
– NEARFI 200 B not transmitting power to NEARFI 200 R
– Internal temperature too high
– Internal error

- Check the power supply unit.
- Check the connected load on the remote side.
- Check the air gap between the devices.
- Reduce the distance, the offset, or the angle between the devices if necessary.
- Contact Phoenix Contact if these measures do not help.

6.1.3 Critical error on the base

Only for the NEARFI 2200 power and data couplers and the NEARFI 200/300 power couplers

Figure 6-6 Critical error



If the base coupler LED ring lights up red, there is a critical error.

Possible reasons:

– Supply voltage outside of the nominal range (19 V DC ... 30 V DC)
– Internal temperature too high
– Internal error

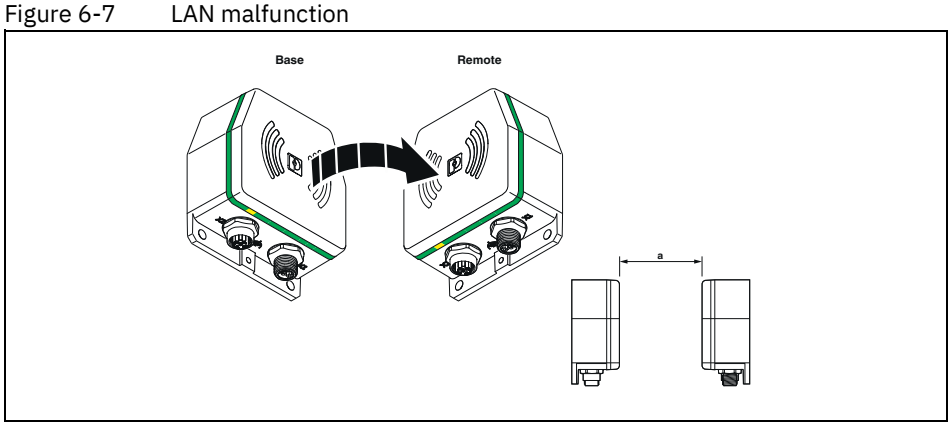
To protect the coupler and other devices, the remote coupler switches off. No more power is transmitted.

- Check the power supply unit.
- Check the connected load on the remote side.
- Check the air gap between the devices.
- Reduce the distance, the offset, or the angle between the devices if necessary.
- Contact Phoenix Contact if these measures do not help.

6.1.4 Malfunction on the data line

Only for the NEARFI 2200 power and data couplers and the NEARFI 2000 data couplers

Figure 6-7 LAN malfunction



If a twisted pair segment malfunctions, only the ETH LINK LED of the corresponding port will go out.

Fast startup

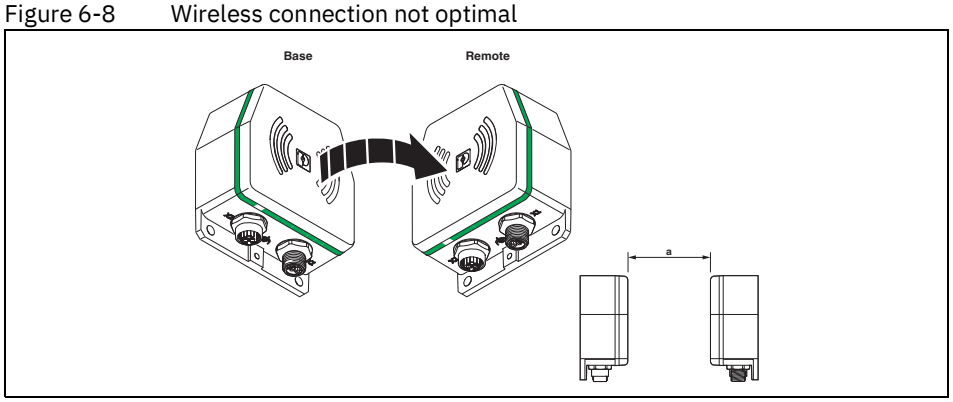
The “Fast startup” function is also referred to as prioritized startup or fast restart. When using network devices with this function, note the following:

- Only use routers and switches that support fast startup.
- To ensure fast startup of network devices, select “ETH full duplex” operating mode on the NearFi couplers.
- Please note that crossover detection is not available in “ETH full duplex” operating mode. The pin assignment of the network connection changes to “Crossover” on the remote coupler.
- Select the connecting cable according to the connected device:
  - Crossover cable with same port assignment
  - Patch cable with different port assignment

6.1.5 Wireless connection not optimal

Only for the NEARFI 2000 data couplers

Figure 6-8 Wireless connection not optimal



The LED ring on the base and the remote flashes green if the distance or the offset between the couplers is too great.

- Check the air gap between the devices.
- Reduce the distance, the offset, or the angle between the devices if necessary.

7 Device replacement, device defect and repair

7.1 Device replacement

NOTE: Device damage
Only mount and remove devices when the power supply is disconnected.

You can replace the device if necessary.

- Disconnect the device from the power supply.
- Remove all cables.
- Remove the device as described in “Mounting and removal” on page 58.
- Replace the device with an identical device (the same item no.).

7.2 Device defect and repair

Repairs may only be carried out by Phoenix Contact.

- Send defective devices back to Phoenix Contact for repair or to receive a replacement device.
- We strongly recommend using the original packaging to return the product.
- Include a note in the packaging indicating that the contents are returned goods.
- Include an error description with the returned product.
- If the original packaging is no longer available, observe the following points:
  - Observe the humidity specifications and the temperature range specified for transport (see “Ambient conditions” on page 91).
  - Use dehumidifying agents if necessary.
  - Use suitable ESD packaging to protect components that are sensitive to electrostatic discharge.
  - Make sure that the packaging you select is large enough and sufficiently thick.
  - Only use plastic bubble wrap sheets as wadding.
  - Attach warnings to the transport packaging so that they are clearly visible.
  - Please ensure that the delivery note is placed inside the package if the package is to be shipped domestically. However, if the package is being shipped internationally, the delivery note must be placed inside a delivery note pocket and attached to the outside so that it is clearly visible.

8 Maintenance and disposal

8.1 Maintenance

The device is maintenance-free.

8.2 Disposal

The symbol with the crossed-out trash can indicates that this item must be collected and disposed of separately. Phoenix Contact or our service partners will take the item back for free disposal. For information on the available disposal options, visit phoenixcontact.com.

- Set all DIP switches to “off” before disposal.
- Dispose of packaging materials that are no longer needed (cardboard packaging, paper, bubble wrap sheets, etc.) with household waste in accordance with the currently applicable national regulations.

9 Technical data

9.1 Ordering data

NEARFI	Type	Item no.	Pcs./Pkt.
Power and data coupler, 50 W (US), 100 Mbps full duplex, M12 push-pull, IP65, optional: 100 W (US) in conjunction with NEARFI 200 or 2 x 50 W (US+UA) with NEARFI 300			
Base coupler	NEARFI 2200 B	1433050	1
Remote coupler	NEARFI 2200 R	1433049	1
Power coupler, 50 W (UA), M12 push-pull, IP65, optional: 2 x 50 W (US+UA) in conjunction with NEARFI 2200/200			
Base coupler	NEARFI 300 B	1464614	1
Remote coupler	NEARFI 300 R	1509989	1
Power coupler, 50 W (US), M12 push-pull, IP65, optional: 100 W (US) in conjunction with NEARFI 2200/200 or 2 x 50 W (US+UA) with NEARFI 300			
Base coupler	NEARFI 200 B	1433047	1
Remote coupler	NEARFI 200 R	1433046	1
Data coupler, 100 Mbps full duplex, range up to 10 cm, M12 push-pull, IP65			
Base coupler	NEARFI 2000 B	1433041	1
Remote coupler	NEARFI 2000 R	1433040	1

9.1.1 Accessories

Screw plugs	Type	Item no.	Pcs./Pkt.
M12 screw plug for unused M12 females of shielded sensor/actuator cable, boxes, and flush-type connectors	PROT-M12 SH	1503302	5
Metal M12 sealing cap for unused M12 males of sensor/actuator cables, flush-type connectors, and I/O devices in the field	PROT-M12 FS-M	1430488	10
M12 sealing cap for unused M12 males of sensor/actuator cables, flush-type connectors, and I/O devices in the field	PROT-M12 FS	1560251	5
M12 screw plug for unused M12 females of M12 power connectors, boxes, and flush-type connectors	PROT M12 MS PWR	1092802	5
Power cables and power connectors			
Power cable, 4-pos., PUR halogen-free, black gray RAL 7021, coding: L, for DC current up to 12 A/63 V			
Free cable end to M12 straight socket Cable length: 5 m	SAC-4P- 5,0-105/M12FSL	1425035	1
Free cable end to M12 angled socket Cable length: 5 m	SAC-4P- 5,0-105/M12FRL	1425039	1
M12 straight connector to free cable end Cable length: 5 m	SAC-4P-M12MSL/ 5,0-105	1425027	1
M12 angled connector to free cable end Cable length: 5 m	SAC-4P-M12MRL/ 5,0-105	1425031	1
M12 straight connector to M12 straight socket Cable length: 0.6 m	SAC-4P-M12MSL/0,6-105/FSL	1425042	1
M12 straight connector to M12 straight socket Cable length: 3 m	SAC-4P-M12MSL/3,0-105/FSL	1425044	1
Power connector, power, 4-pos., shielded, coding: L, Push-Lock spring connection, knurled material: brass, nickel-plated, outer cable diameter: 6 mm ... 11 mm			
M12 straight socket	SACC-M12FSL-4PL-CM SH	1080237	1
M12 straight connector	SACC-M12MSL-4PL-CM SH	1080239	1

Network cables			
Network cable, Ethernet CAT5 (100 Mbps), 4-pos., PUR halogen-free, water blue RAL 5021, shielded (Advanced Shielding Technology), M12 straight push-pull connector, coding: D/IP67, cable length: 5 m			
M12 straight connector to free cable end	NBC-P12MSD/ 5,0-93E	1476013	1
M12 straight connector to RJ45 straight connector/IP20	NBC-P12MSD/ 5,0-93E/R4AC	1476025	1
M12 straight connector to M12 straight connector	NBC-P12MSD/ 5,0-93E/P12MSD	1476051	1
Network cable, PROFINET CAT5 (100 Mbps), EtherCAT® CAT5 (100 Mbps), 4-pos., PVC/PVC, green RAL 6018, shielded (Advanced Shielding Technology), M12 straight connector, coding: D/IP67, cable length: 5 m			
M12 straight connector to free cable end	NBC-M12MSD/ 5,0-93B	1407497	1
M12 straight connector to RJ45 straight connector/IP20	NBC-M12MSD/ 5,0-93B/R4AC	1407501	1
M12 straight connector to M12 straight connector	NBC-M12MSD/ 5,0-93B/M12MSD	1407526	1
Network cable, PROFINET CAT5 (100 Mbps), EtherCAT® CAT5 (100 Mbps), 4-pos., PUR/FRNC halogen-free, green RAL 6018, shielded (Advanced Shielding Technology), M12 angled connector, coding: D/IP67, to M12 angled connector, coding: D/IP67, cable length: 5 m	NBC-M12MRD/ 5,0-93C/M12MRD	1416749	1

Network connectors			
Connector, PROFINET CAT5 (100 Mbps), 4-pos., shielded, coding: D, Push-Lock spring connection, knurled material: zinc die-cast, nickel-plated, outer cable diameter: 4 mm ... 8 mm			
M12 angled connector	SACC-M12MRD-4PL SH PN	1424684	1
M12 straight connector	SACC-M12MSD-4PL SH PN	1424682	1
RJ45 connector, design: RJ45, degree of protection: IP20, number of positions: 8, 1 Gbps, CAT5, material: plastic, connection method: insulation displacement connection, connection cross-section: AWG 26 ... 23, cable outlet: straight, color: traffic gray A RAL 7042, Ethernet	VS-08-RJ45-5-Q/IP20	1656725	1

You will find additional accessories with the product at phoenixcontact.com/products.

9.2 Technical data

Coupling system	NEARFI 2200	NEARFI 300	NEARFI 200	NEARFI 2000
Product characteristic	Power and data coupler	Power coupler, actuator supply	Power coupler, communications power	Data coupler
Range	0 mm ... 10 mm	0 mm ... 10 mm	0 mm ... 10 mm	0 mm ... 100 mm, adjustable via DIP switch
Center offset	±5 mm	±10 mm	±10 mm	± 5 mm (no spacing between the devices) ± 20 mm (at 100 mm spacing between the devices)
Inclination tolerance	< 15°	< 15°	< 15°	< 25°
Power transmission				
Frequency range	110 kHz ... 148.5 kHz	110 kHz ... 148.5 kHz	110 kHz ... 148.5 kHz	-
Test field strength	~ 1.95 µA/m (at a 10 m distance)	~ 1.95 µA/m (at a 10 m distance)	~ 1.95 µA/m (at a 10 m distance)	-
Output power				
Individual operation	50 W communications power	50 W actuator supply	50 W communications power	-
Parallel operation	100 W communications power, for parallel operation with NEARFI 200	50 W 2 x 50 W, communications power and actuator supply electrically isolated, for parallel operation with NEARFI 2200/200	100 W communications power, for parallel operation with NEARFI 2200	-
	50 W 2 x 50 W, communications power and actuator supply electrically isolated, for parallel operation with NEARFI 300	-	50 W 2 x 50 W, communications power and actuator supply electrically isolated, for parallel operation with NEARFI 300	-
Data transmission				
Frequency range	59 GHz ... 64 GHz	-	-	59 GHz ... 64 GHz
Transmission power	< 10 mW (EIRP)	-	-	< 10 mW (EIRP)
Delay time	≤ 1 µs (typical)	-	-	≤ 1 µs (typical)
Bit error rate	≤ 10^{-12} (typical)	-	-	≤ 10^{-12} (typical)

X1, base	NEARFI 2200 B	NEARFI 300 B	NEARFI 200 B	NEARFI 2000 B
Interface designation	Base power supply	Base power supply	Base power supply	Base power supply
Supply voltage range	19 V DC ... 30 V DC	19 V DC ... 30 V DC	19 V DC ... 30 V DC	19 V DC ... 30 V DC
Typical current consumption				
Individual operation	170 mA without remote coupler, at 24 V DC, at 25°C	40 mA without remote coupler, at 24 V DC, at 25°C	40 mA without remote coupler, at 24 V DC, at 25°C	195 mA at 24 V DC, at 25°C
	480 mA with remote coupler, without load, at 24 V DC, at 25°C	125 mA with remote coupler, without load, at 24 V DC, at 25°C	130 mA with remote coupler, without load, at 24 V DC, at 25°C	-
Parallel operation	240 mA parallel operation with NEARFI 200, without remote coupler, at 24 V DC, at 25°C	-	125 mA parallel operation with NEARFI 200, without remote coupler, at 24 V DC, at 25°C	-
	650 mA parallel operation with NEARFI 200, without remote coupler, without load, at 24 V DC, at 25°C	-	330 mA parallel operation with NEARFI 200, without remote coupler, without load, at 24 V DC, at 25°C	-
Current consumption, maximum				
Individual operation	< 3.7 A with remote coupler, 2 A load, 19 V DC input voltage	< 3.2 A with remote coupler, 2 A load, 19 V DC input voltage	< 3.2 A with remote coupler, 2 A load, 19 V DC input voltage	-
Parallel operation	< 7.1 A parallel operation with NEARFI 200, with remote coupler, 4 A load, 19 V DC input voltage	-	< 6.2 A parallel operation with NEARFI 200, with remote coupler, 4 A load, 19 V DC input voltage	

X1, base	NEARFI 2200 B	NEARFI 300 B	NEARFI 200 B	NEARFI 2000 B
Inrush current				
Individual operation	1.9 A for approx. 1.5 ms, at 24 V DC, without remote coupler	2.3 A for approx. 1 ms, at 24 V DC, without remote coupler	2 A for approx. 1.5 ms, at 24 V DC, without remote coupler	0.4 A for 0.2 ms at 24 V DC, without remote coupler
	4.3 A for approx. 4.5 ms, at 24 V DC, with remote coupler, without load	4.5 A for approx. 4.5 ms, at 24 V DC, with remote coupler, without load	4.4 A for approx. 4.5 ms, at 24 V DC, with remote coupler, without load	-
Parallel operation	3.9 A parallel operation with NEARFI 200, for approx. 1.5 ms, at 24 V DC, without remote coupler	-	3.9 A parallel operation with NEARFI 200, for approx. 1.5 ms, at 24 V DC, without remote coupler	-
	8.1 A parallel operation with NEARFI 200, for approx. 4.5 ms, at 24 V DC, with remote coupler, without load	-	8.1 A parallel operation with NEARFI 200, for approx. 4.5 ms, at 24 V DC, with remote coupler, without load	-
Protective circuit	Transient protection, protection against polarity reversal	Transient protection, protection against polarity reversal	Transient protection, protection against polarity reversal	Transient protection, protection against polarity reversal
Connection method	M12 connector (L-coded)	M12 connector (L-coded)	M12 connector (L-coded)	M12 connector (L-coded)
	Push-pull fast connection or screw connection	Push-pull fast connection or screw connection	Push-pull fast connection or screw connection	Push-pull fast connection or screw connection

X1, remote	NEARFI 2200 R	NEARFI 300 R	NEARFI 200 R	NEARFI 2000 R
Interface designation	Remote output	Remote output	Remote output	Remote power supply
Nominal output voltage	24 V DC ±5%	24 V DC ±5%	24 V DC ±5%	-
Output current				
Individual operation	≤ 2 A (typical)	≤ 2 A (typical)	≤ 2 A (typical)	-
Parallel operation	-	-	≤ 4 A (typical, parallel operation)	-
Maximum output current				
Individual operation	3.5 A peak, for 20 ms, with 5 mm spacing	4 A peak, for 20 ms, with 5 mm spacing	4 A peak, for 20 ms, with 5 mm spacing	-
Parallel operation	-	-	6.8 A parallel operation, peak, for 20 ms, with 5 mm spacing	-
Supply voltage range	-	-	-	19 V DC ... 30 V DC
Typical current consumption	-	-	-	≤ 160 mA at 24 V DC, at 25°C
Inrush current	-	-	-	0.4 A for 0.2 ms at 24 V DC, without remote coupler
Protective circuit	Short circuit protection, overload protection	Short circuit protection, overload protection	Short circuit protection, overload protection	Transient protection, protection against polarity reversal
Connection method	M12 female, L-coded Screw connection	M12 female, L-coded Screw connection	M12 female, L-coded Screw connection	M12 connector, L-coded Push-pull fast connection or screw connection

X2, remote and base	NEARFI 2200	NEARFI 300	NEARFI 200	NEARFI 2000
Designation	Ethernet interface, 100Base-T(X) in accordance with IEEE 802.3	-	-	Ethernet interface, 100Base-T(X) in accordance with IEEE 802.3
Number of ports	1	-	-	1
Connection method	M12 female, D-coded Push-pull fast connection or screw connection	-	-	M12 female, D-coded Push-pull fast connection or screw connection
Note on the connection method	Auto negotiation and auto crossing, fast startup (FSU, < 500 ms), LFPT	-	-	Auto negotiation and auto crossing, fast startup (FSU, < 500 ms), LFPT
Operating mode	Full duplex, auto neg (can be set via DIP switch)	-	-	Full duplex, auto neg (can be set via DIP switch)
Transmission speed	100 Mbps	-	-	100 Mbps
Transmission length	100 m (twisted pair, shielded)	-	-	100 m (twisted pair, shielded)
Transmission medium	Copper	-	-	Copper
Supported protocols	Protocol-transparent: PROFINET, PROFINET IRT, PROFIsafe, EtherCAT®, Modbus/TCP, Powerlink, TSN, etc.	-	-	Protocol-transparent: PROFINET, PROFINET IRT, PROFIsafe, EtherCAT®, Modbus/TCP, Powerlink, TSN, etc.

General data	
Degree of protection	IP65/IP66 (manufacturer’s declaration)
Impact strength	IK06
Overvoltage category	II
Pollution degree	2
Flammability rating in accordance with UL 94	V0
Mounting position	Any
Mounting type	Panel mounting
Mounting note	Observe derating, see page 53
Dimensions (W/H/D)	80 mm x 86 mm x 39 mm
Material	
Enclosure	PBT
Enclosure	Die-cast zinc
Color	
Housing	Black (9005)
Other resistance	Resistant to welding splash
Vibration resistance in accordance with EN 60068-2-6/IEC 60068-2-6	5g per spatial direction, 10 Hz ... 150 Hz, amplitude ±0.34 mm
Shock in accordance with EN 60068-2-27/IEC 60068-2-27	30g, 11 ms duration, half-sine shock pulse, three shocks per spatial direction
Continuous shock in accordance with EN 60068-2-27/IEC 60068-2-27	10g, 16 ms duration, half-sine shock pulse, 1000 shocks per spatial direction
Electromagnetic compatibility	Conformance with EMC Directive 2014/30/EU
Free from substances that would hinder coating with paint or varnish	VDMA 24364:2018:05

MTTF (mean time to failure)	NEARFI 2200	NEARFI 300	NEARFI 200	NEARFI 2000
SN 29500 standard, temperature 25°C, operating cycle 21%	126 years	221 years	221 years	191 years
SN 29500 standard, temperature 40°C, operating cycle 34.25%	67 years	112 years	112 years	110 years
SN 29500 standard, temperature 40°C, operating cycle 100%	31 years	51 years	51 years	53 years

Ambient conditions	NEARFI 2200	NEARFI 300	NEARFI 200	NEARFI 2000
Ambient temperature				
Operation	-20°C ... 55°C (observe derating)	-20°C ... 60°C (observe derating)	-20°C ... 55°C (observe derating)	-20°C ... 65°C (observe derating)
	-	-20°C ... 40°C (in accordance with UL, observe derating)	-20°C ... 40°C (in accordance with UL, observe derating)	-
Storage/transport	-40°C ... 85°C	-40°C ... 85°C	-40°C ... 85°C	-40°C ... 85°C
Humidity				
Operation	10% ... 95%	10% ... 95%	10% ... 95%	10% ... 95%
Storage/transport	10% ... 95%	10% ... 95%	10% ... 95%	10% ... 95%
Altitude	2000 m	2000 m	2000 m	2000 m
Air pressure				
Operation	80 kPa ... 108 kPa (up to 2000 m above mean sea level)	80 kPa ... 108 kPa (up to 2000 m above mean sea level)	80 kPa ... 108 kPa (up to 2000 m above mean sea level)	80 kPa ... 108 kPa (up to 2000 m above mean sea level)
Storage/transport	66 kPa ... 108 kPa (up to 3500 m above mean sea level)	66 kPa ... 108 kPa (up to 3500 m above mean sea level)	66 kPa ... 108 kPa (up to 3500 m above mean sea level)	66 kPa ... 108 kPa (up to 3500 m above mean sea level)

Please note that the lower derating value of the respective item version applies for parallel operation, see 4.15 “Derating”.

Conformity/approvals	NEARFI 2200	NEARFI 300	NEARFI 200	NEARFI 2000
CE	CE compliant			
Wireless approval, Europe	RED 2014/53/EU			
UL, USA	UL 61010 recognized UL 61010-2-201, 2nd Edition UL 61010-1, 3rd Edition E238705	UL 61010 Listed UL 61010-2-201, 2nd Edition UL 61010-1, 3rd Edition E238705		
UL, Canada	cUL 61010 recognized CSA C22.2 No. 61010-2-201:18, 2nd Edition CSA C22.2 No. 610 10-1, 3rd Edition E238705	cUL 61010 listed CSA C22.2 No. 61010-2-201:18, 2nd Edition CSA C22.2 No. 61010-1, 3rd Edition E238705		
Radio approval for USA, FCC	YG32200B YG32200R	YG3300B YG3300R	YG3200B YG3200R	YG32000B YG32000R

Conformance with EMC Directive 2014/30/EU		
Immunity in accordance with EN 61000-6-2		
Electrostatic discharge	EN 61000-4-2	
	Contact discharge	±4 kV (test severity level 2)
	Air discharge	±8 kV (test severity level 3)
	Comment	Criterion B
Electromagnetic HF field	EN 61000-4-3	
	Frequency range	80 MHz ... 1 GHz (test severity level 3)
	Field strength	10 V/m
	Comment	Criterion A
Fast transients (burst)	EN 61000-4-4	
	Input	±2 kV (test severity level 3 - asymmetrical)
	Output	±2 kV (test severity level 3 - asymmetrical)
	Signal	±2 kV (test severity level 3 - asymmetrical)
	Comment	Criterion B
Surge current loads (surge)	EN 61000-4-5	
	Input	±0.5 kV (test severity level 1 - symmetrical) ±1 kV (test severity level 2 - asymmetrical)
	Output	±1 kV (test severity level 2 - asymmetrical)
	Signal	±1 kV (test severity level 2 - asymmetrical)
	Comment	Criterion B
Conducted influence	EN 61000-4-6	
	Frequency range	0.15 MHz ... 80 MHz (test severity level 3 - asymmetrical)
	Voltage	10 V (80% amplitude modulation with 1 kHz)
	Comment	Criterion A

Criterion A	Normal operating behavior within the specified limits
Criterion B	Temporary impairment of operating behavior that is corrected by the device itself

Noise emission in accordance with EN 61000-6-4	
Interference emission	EN 55016-2-3, Class A, industrial area of application
Conducted noise emission	EN 55032, Class A, industrial area of application

Conformance with RED Directive 2014/53/EU	
Safety – Protection of personnel with regard to electrical safety	EN 62368
Health – Limiting public exposure to electromagnetic fields	EN 62311
Wireless communication – Effective use of the frequency spectrum and prevention of wireless communication interference	EN 300330, EN 301417, EN 305550, EN 305550-1, EN 303396

9.3 Dimensions

Figure 9-1 Dimensions

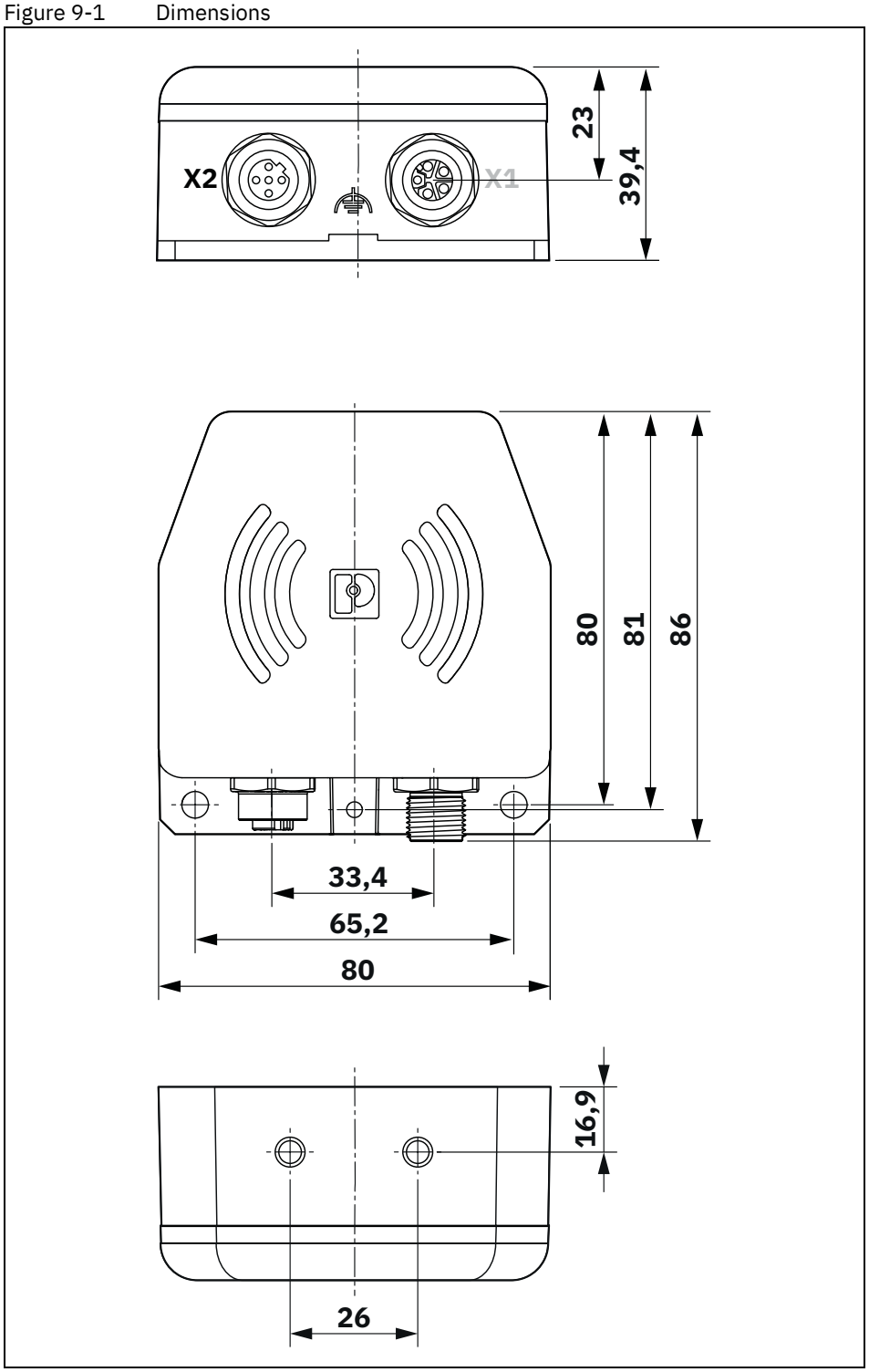
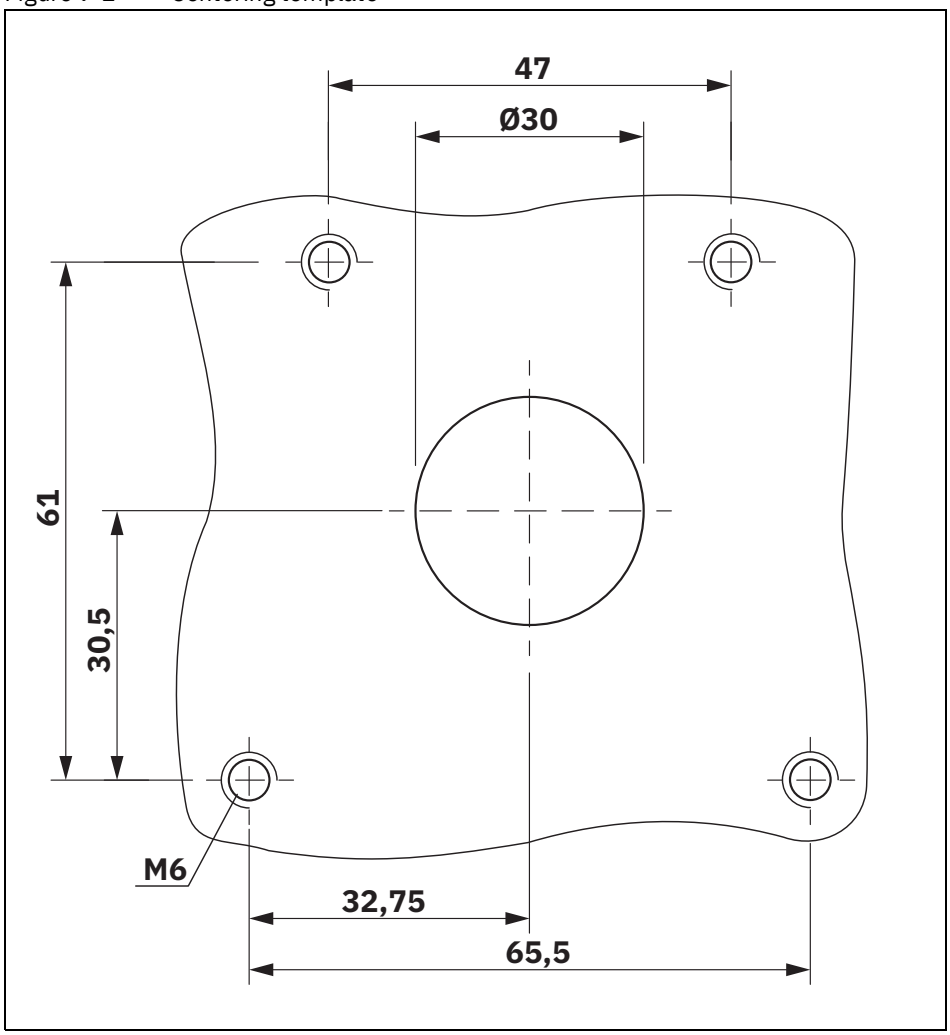


Figure 9-2 Centering template



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B Revision history

Table B-1 Revision history

Document revision	Production batch V/C of the product		Date	Description
	NEARFI...B	NEARFI...R		
00	00	00	2024-08-30	First publication
01	00	00	2024-11-20	Table 3-4 “LED ring“ revised Section 3.8 “Switch-on time (operational readiness time“ revised Figure 3-29 “Transmission distance for lateral offset, NEARFI 200/300“ corrected Bit error rate added to the technical data
02	02	01	2026-04-30	FCC approval, UL approval Section “Protection against tampering“ added Section “Derating in accordance with UL“ added Figure 6-5 “Critical error on remote in parallel operation“ revised Section “Disposal“ revised

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