NEARFI...

NearFi coupler for contactless power and data transmission



Data sheet
109708_en_06

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1 Description

The NearFi coupler transmits power and real-time Ethernet data contactlessly over an air gap in the centimeter range.

For contactless transmission, you will need at least two devices: a base and one or more remote couplers.

The base coupler transmits the energy inductively to the remote coupler.

Ethernet transmission is bidirectional between the base and the remote.

In maintenance-intensive applications, such as tool changes on robots, this enables wear-prone connections to be replaced easily and minimizes downtime costs.

The base and remote couplers are both available in three versions:

- Power and data transmission (NEARFI PD...)
- Only power transmission (NEARFI P...)
- Only data transmission (NEARFI D...)

Features

- Contactless - and therefore no wear and no maintenance
- Protocol-independent, latency-free Ethernet real-time communication with 100 Mbps (full duplex)
- High power in a compact housing
- All-round visible diagnostics with light ring on the housing
- High degree of mounting freedom with flexible proximity options
- Plug and Play - as easy as a plug
- Degree of protection IP65
- Protocol-transparent transmission of all standard Ethernet protocols

Observe this note

Make sure you always use the latest documentation.
It can be downloaded at: phoenixcontact.com/product/1234224
This document is valid for the products listed in the “Ordering data” chapter.

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3 Ordering data

Description	Type	Item no.	Pcs./Pkt.
NearFi base, contactless power and real-time Ethernet coupler, 50 W (US), 100 Mbps, range ≤10 mm, M12 screw connection, IP65, can be combined with NEARFI PD 2A ETH R. Incompatible with NEARFI 2200 (new)	NEARFI PD 2A ETH B	1234224	1
NearFi remote, contactless power and real-time Ethernet coupler, 50 W (US), 100 Mbps, range ≤10 mm, M12 screw connection, IP65, can be combined with NEARFI PD 2A ETH B. Incompatible with NEARFI 2200 (new)	NEARFI PD 2A ETH R	1234225	1
NearFi base, contactless power coupler, 50 W (US), range ≤10 mm, M12 screw connection, IP65, can be combined with NEARFI P 2A R. Incompatible with NEARFI 200 (new)	NEARFI P 2A B	1234226	1
NearFi remote, contactless power coupler, 50 W (US), range ≤10 mm, M12 screw connection, IP65, can be combined with NEARFI P 2A B. Incompatible with NEARFI 200 (new)	NEARFI P 2A R	1234229	1
NearFi base, contactless real-time Ethernet coupler, 100 Mbps, range ≤40 mm, M12 screw connection, IP65, can be combined with NEARFI D ETH R. Incompatible with NEARFI 2000 (new)	NEARFI D ETH B	1234232	1
NearFi base, contactless real-time Ethernet coupler, 100 Mbps, range ≤40 mm, M12 screw connection, IP65, can be combined with NEARFI D ETH R. Incompatible with NEARFI 2000 (new)	NEARFI D ETH R	1234234	1

Accessories	Type	Item no.	Pcs./Pkt.
Sensor/actuator cable, 5-position, PUR, black-gray RAL 7021, free cable end, on Socket straight M12 SPEEDCON, coding: A, cable length: 2 m	SAC-5P- 2,0-186/FS SCO	1518368	1
Sensor/actuator cable, 5-position, PUR, black-gray RAL 7021, free cable end, on Socket straight M12 SPEEDCON, coding: A, cable length: 5 m	SAC-5P- 5,0-186/FS SCO	1518371	1
Sensor/actuator cable, 5-position, PUR, black-gray RAL 7021, free cable end, on Socket straight M12 SPEEDCON, coding: A, cable length: 10 m	SAC-5P-10,0-186/FS SCO	1518384	1
Sensor/actuator cable, 5-position, PUR, black-gray RAL 7021, free cable end, on Socket straight M12 SPEEDCON, coding: A, cable length: 15 m	SAC-5P-15,0-186/FS SCO	1518397	1
Sensor/actuator cable, 5-position, PUR, black-gray RAL 7021, Plug straight M12 SPEEDCON, coding: A, on Socket straight M12 SPEEDCON, coding: A, cable length: 1 m	SAC-5P-MS/ 1,0-186/FS SCO	1518423	1

Accessories	Type	Item no.	Pcs./Pkt.
Sensor/actuator cable, 5-position, PUR, black-gray RAL 7021, Plug straight M12 SPEEDCON, coding: A, on Socket straight M12 SPEEDCON, coding: A, cable length: 2 m	SAC-5P-MS/ 2,0-186/FS SCO	1518436	1
Sensor/actuator cable, 5-position, PUR, black-gray RAL 7021, Plug straight M12 SPEEDCON, coding: A, on Socket straight M12 SPEEDCON, coding: A, cable length: 5 m	SAC-5P-MS/ 5,0-186/FS SCO	1518449	1
Sensor/actuator cable, 5-position, PUR, black-gray RAL 7021, Plug straight M12 SPEEDCON, coding: A, on Socket straight M12 SPEEDCON, coding: A, cable length: 10 m	SAC-5P-MS/10,0-186/FS SCO	1518452	1
Sensor/actuator cable, 5-position, PUR, black-gray RAL 7021, Plug straight M12 SPEEDCON, coding: A, on Socket straight M12 SPEEDCON, coding: A, cable length: 15 m	SAC-5P-MS/15,0-186/FS SCO	1518465	1
Connector, Universal, 5-position, Plug straight M12, coding: A, Screw connection, knurl material: Zinc die-cast, nickel-plated, cable gland Pg9, external cable diameter 6 mm ... 8 mm	SACC-M12MS-5CON-PG 9-M	1681460	1
Connector, Universal, 5-position, Socket straight M12, coding: A, Screw connection, knurl material: Zinc die-cast, nickel-plated, cable gland Pg9, external cable diameter 6 mm ... 8 mm	SACC-M12FS-5CON-PG9-M	1681486	1
Connector, Universal, 5-position, Plug angled M12, coding: A, Screw connection, knurl material: Zinc die-cast, nickel-plated, cable gland Pg9, external cable diameter 6 mm ... 8 mm	SACC-M12MR-5CON-PG9-M	1681473	1
Connector, Universal, 5-position, Socket angled M12, coding: A, Screw connection, knurl material: Zinc die-cast, nickel-plated, cable gland Pg9, external cable diameter 6 mm ... 8 mm	SACC-M12FR-5CON-PG9-M	1681499	1
Network cable, Ethernet CAT5 (100 Mbps), 4-position, PUR halogen-free, water blue RAL 5021, shielded (Advanced Shielding Technology), Plug straight M12, coding: D / IP67, on free cable end, cable length: free input (0.2 m ... 85.0 m)	NBC-M12MSD/.../...	1408713	1
Network cable, Ethernet CAT5 (100 Mbps), 4-position, PUR halogen-free, water blue RAL 5021, shielded (Advanced Shielding Technology), Plug straight M12, coding: D / IP67, on Plug straight M12, coding: D / IP67, cable length: Free input (0.2 m ... 85.0 m)	NBC-M12MSD-M12MSD/.../...	1408706	1
Network cable, Ethernet CAT5 (100 Mbps), 4-position, PUR halogen-free, water blue RAL 5021, shielded (Advanced Shielding Technology), Plug straight M12, coding: D / IP67, on Plug straight RJ45 / IP20, cable length: Free input (0.2 m ... 85.0 m)	NBC-M12MSD-R4AC/.../...	1408712	1

Accessories	Type	Item no.	Pcs./Pkt.
Network cable, PROFINET CAT5 (100 Mbps), EtherCAT® CAT5 (100 Mbps), 4-position, PVC/PVC, green RAL 6018, shielded (Advanced Shielding Technology), Plug straight M12, coding: D / IP67, on free cable end, cable length: 1 m	NBC-M12MSD/ 1,0-93B	1407495	1
Network cable, PROFINET CAT5 (100 Mbps), EtherCAT® CAT5 (100 Mbps), 4-position, PVC/PVC, green RAL 6018, shielded (Advanced Shielding Technology), Plug straight M12, coding: D / IP67, on free cable end, cable length: 2 m	NBC-M12MSD/ 2,0-93B	1407496	1
Network cable, PROFINET CAT5 (100 Mbps), EtherCAT® CAT5 (100 Mbps), 4-position, PVC/PVC, green RAL 6018, shielded (Advanced Shielding Technology), Plug straight M12, coding: D / IP67, on free cable end, cable length: 5 m	NBC-M12MSD/ 5,0-93B	1407497	1
Network cable, PROFINET CAT5 (100 Mbps), EtherCAT® CAT5 (100 Mbps), 4-position, PVC/PVC, green RAL 6018, shielded (Advanced Shielding Technology), Plug straight M12, coding: D / IP67, on free cable end, cable length: 10 m	NBC-M12MSD/10,0-93B	1407498	1
Network cable, PROFINET CAT5 (100 Mbps), EtherCAT® CAT5 (100 Mbps), 4-position, PVC/PVC, green RAL 6018, shielded (Advanced Shielding Technology), Plug straight M12, coding: D / IP67, on Plug straight RJ45 / IP20, cable length: 1 m	NBC-M12MSD/ 1,0-93B/ R4AC	1407499	1
Network cable, PROFINET CAT5 (100 Mbps), EtherCAT® CAT5 (100 Mbps), 4-position, PVC/PVC, green RAL 6018, shielded (Advanced Shielding Technology), Plug straight M12, coding: D / IP67, on Plug straight RJ45 / IP20, cable length: 2 m	NBC-M12MSD/ 2,0-93B/ R4AC	1407500	1
Network cable, PROFINET CAT5 (100 Mbps), EtherCAT® CAT5 (100 Mbps), 4-position, PVC/PVC, green RAL 6018, shielded (Advanced Shielding Technology), Plug straight M12, coding: D / IP67, on Plug straight RJ45 / IP20, cable length: 5 m	NBC-M12MSD/ 5,0-93B/ R4AC	1407501	1
Network cable, PROFINET CAT5 (100 Mbps), EtherCAT® CAT5 (100 Mbps), 4-position, PVC/PVC, green RAL 6018, shielded (Advanced Shielding Technology), Plug straight M12, coding: D / IP67, on Plug straight RJ45 / IP20, cable length: 10 m	NBC-M12MSD/10,0-93B/ R4AC	1407502	1
Network cable, PROFINET CAT5 (100 Mbps), EtherCAT® CAT5 (100 Mbps), 4-position, PVC/PVC, green RAL 6018, shielded (Advanced Shielding Technology), Plug straight M12, coding: D / IP67, on Plug straight M12 / IP67, cable length: 1 m	NBC-M12MSD/ 1,0-93B/ M12MSD	1407524	1
Network cable, PROFINET CAT5 (100 Mbps), EtherCAT® CAT5 (100 Mbps), 4-position, PVC/PVC, green RAL 6018, shielded (Advanced Shielding Technology), Plug straight M12, coding: D / IP67, on Plug straight M12 / IP67, cable length: 2 m	NBC-M12MSD/ 2,0-93B/ M12MSD	1407525	1

Accessories	Type	Item no.	Pcs./Pkt.
Network cable, PROFINET CAT5 (100 Mbps), EtherCAT® CAT5 (100 Mbps), 4-position, PVC/PVC, green RAL 6018, shielded (Advanced Shielding Technology), Plug straight M12, coding: D / IP67, on Plug straight M12 / IP67, cable length: 5 m	NBC-M12MSD/ 5,0-93B/ M12MSD	1407526	1
Network cable, PROFINET CAT5 (100 Mbps), EtherCAT® CAT5 (100 Mbps), 4-position, PVC/PVC, green RAL 6018, shielded (Advanced Shielding Technology), Plug straight M12, coding: D / IP67, on Plug straight M12 / IP67, cable length: 10 m	NBC-M12MSD/10,0-93B/ M12MSD	1407527	1
Data connector, Ethernet CAT5 (100 Mbps), 4-position, shielded, Plug angled M12, coding: D, Insulation displacement connection, knurl material: Brass, nickel-plated, external cable diameter 4 mm ... 8 mm	SACC-M12MRD-4Q SH	1553624	1
Data connector, Ethernet CAT5 (100 Mbps), 4-position, halogen-free, shielded, Plug straight M12, coding: D, Insulation displacement connection, knurl material: Zinc die-cast, nickel-plated, external cable diameter 5 mm ... 9.7 mm	SACC-M12MSD-4QO SH ETH	1411066	1
Data connector, PROFINET CAT5 (100 Mbps), 4-position, halogen-free, shielded, Plug straight M12, coding: D, Insulation displacement connection, knurl material: Zinc die-cast, nickel-plated, external cable diameter 5 mm ... 9.7 mm	SACC-M12MSD-4QO SH PN	1411068	1
Data connector, PROFINET CAT5 (100 Mbps), 4-position, shielded, Plug angled M12, coding: D, Insulation displacement connection, knurl material: Brass, nickel-plated, external cable diameter 4 mm ... 8 mm	SACC-M12MRD-4Q SH PN	1554539	1
Connector, PROFINET CAT5 (100 Mbps), 4-position, shielded, Plug angled M12, coding: D, Push-lock spring connection, knurl material: Zinc die-cast, nickel-plated, external cable diameter 4 mm ... 8 mm	SACC-M12MRD-4PL SH PN	1424684	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 grey A RAL 7042, Ethernet	VS-08-RJ45-5-Q/IP20	1656725	1
An M12 screw plug for the unoccupied M12 sockets of the sensor/actuator cable, boxes and flush-type connectors	PROT-M12	1680539	5
NearFi remote, contactless power and real-time Ethernet coupler, 50 W (US), 100 Mbps, range ≤10 mm, M12 screw connection, IP65, can be combined with NEARFI PD 2A ETH B. Incompatible with NEARFI 2200 (new)	NEARFI PD 2A ETH R	1234225	1

4 Technical data

Coupling system	NEARFI PD...	NEARFI P...	NEARFI D...
Switch-on time	< 450 ms (ETH Full Duplex operating mode)	< 50 ms	< 450 ms (ETH Full Duplex operating mode)
Range	0 mm ... 10 mm at 55°C	0 mm ... 10 mm at 60 °C	0 mm ... 20 mm at 65°C
	0 mm ... 12 mm at 25 °C	0 mm ... 12 mm at 25 °C	0 mm ... 40 mm at 25 °C
Center offset	± 5 mm	± 10 mm	± 20 mm
Power transmission			
Frequency range	100 ... 148.5 kHz	100 ... 148.5 kHz	-
Test field strength	~ 1.95 µA/m (within 10 m distance)	~ 1.95 µA/m (within 10 m distance)	-
Data transmission			
Frequency range	57 GHz ... 64 GHz	-	57 GHz ... 64 GHz
Frequency	60 GHz	-	60 GHz
Transmission power	< 10 mW (EIRP)	-	< 10 mW (EIRP)
Delay time	≤ 1 µs (typical)	-	≤ 1 µs (typical)

X1, base	NEARFI PD 2A ETH B	NEARFI P 2A B	NEARFI D ETH B
Interface designation	Base energy supply	Base energy supply	Base energy supply
Supply voltage range	19 V DC ... 30 V DC	19 V DC ... 30 V DC	19 V DC ... 30 V DC
Typical current consumption	170 mA (without remote coupler, at 24 V DC, at 25°C)	30 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)	-
Inrush current	≤ 0.8 A (8 ms at 24 V DC, without remote coupler)	≤ 0.8 A (8 ms at 24 V DC, without remote coupler)	≤ 0.25 A (20 ms at 24 V DC, without remote coupler)
	≤ 4.5 A (6 ms at 24 V DC, with remote coupler, without load)	≤ 4.5 A (6 ms at 24 V DC, with remote coupler, without load)	-
Max. current consumption	≤ 3.6 A (with remote coupler, 2 A load, input voltage of 19 V DC)	≤ 3.2 A (with remote coupler, 2 A load, input voltage of 19 V DC)	-
Protective circuit	Transient protection, polarity protection	Transient protection, polarity protection	Transient protection, polarity protection
Connection method	M12 male, A-coded	M12 male, A-coded	M12 male, A-coded

X1, remote	NEARFI PD 2A ETH R	NEARFI P 2A R	NEARFI D ETH R
Interface designation	Remote output	Remote output	Remote energy supply
Output nominal voltage	24 V DC ±5 %	24 V DC ±5 %	-
Output current	≤ 2 A (typical)	≤ 2 A (typical)	-
Maximum output current	3.5 A (peak, for 20 ms, with 5 mm spacing)	4 A (peak, for 20 ms, with 5 mm spacing)	-
Supply voltage range	-	-	19 V DC ... 30 V DC
Typical current consumption	-	-	≤ 195 mA (at 24 V DC, at 25 °C)
Protective circuit	Short-circuit/overload protection	Short-circuit/overload protection	Transient protection, polarity protection
Connection method	M12 female, A-coded	M12 female, A-coded	M12 male, A-coded

X2, remote and base	NEARFI PD...	NEARFI P...	NEARFI D...
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	-	M12 female, D-coded
Note on the connection method	Auto negotiation and autocrossing, fast startup (FSU, <500 ms)	-	Auto negotiation and autocrossing, fast startup (FSU, <500 ms)
Operating mode	full duplex, Autoneg (can be set via DIP switch)	-	full duplex, Autoneg (can be set via DIP switch)
Transmission speed	100 Mbps	-	100 Mbps
Transmission length	100 m (shielded twisted pair)	-	100 m (shielded twisted pair)
Transmission medium	Copper	-	Copper
Protocols supported	Protocol transparent: PROFINET, PROFINET IRT, PROFIsafe, EtherCAT®, Modbus/TCP, Powerlink, TSN, etc.	-	Protocol transparent: PROFINET, PROFINET IRT, PROFIsafe, EtherCAT®, Modbus/TCP, Powerlink, TSN, etc.

Digital input	NEARFI PD...	NEARFI P...	NEARFI D...
Number of inputs	1	1	-
Input signal , Voltage	19 V DC ... 30 V DC	19 V DC ... 30 V DC	-
Switching level "1" signal	19 V DC ... 30 V DC	19 V DC ... 30 V DC	-

Digital output	NEARFI PD...	NEARFI P...	NEARFI D...
Number of outputs	1	1	-
Output signal , Voltage	≤ 24 V DC	≤ 24 V DC	-
Contact switching type	Open collector output, internal pull-up resistor	Open collector output, internal pull-up resistor	-

General data	
Function	contactless power coupler contactless data coupler
Degree of protection	IP65 (Manufacturer's declaration)
Impact strength	IK06
Overvoltage category	II
Pollution degree	2
Flammability rating according to UL 94	V0
Mounting position	any
Mounting type	Panel mounting
Assembly note	Observe derating
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 splashes
Vibration resistance in accordance with EN 60068-2-6/ IEC 60068-2-6	5 g per spatial direction, 10 Hz ... 150 Hz, amplitude ±0.34 mm
Shock in accordance with EN 60068-2-27/IEC 60068-2-27	30 g, 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	10 g, 16 ms duration, half-sine shock pulse, 1,000 shocks per spatial direction
Status indicator	LED ring ETH-LINK-LED
Electromagnetic compatibility	Conformance with EMC Directive 2014/30/EU
Free from substances that could impair the application of coating	VDMA 24364:2018-05

MTTF (mean time to failure)	NEARFI PD...	NEARFI P...	NEARFI D...
SN 29500 standard, temperature 25°C, operating cycle 21%	115 Years	331 Years	239 Years
SN 29500 standard, temperature 40°C, operating cycle 34.25%	60 Years	196 Years	155 Years
SN 29500 standard, temperature 40°C, operating cycle 100%	27 Years	98 Years	81 Years

Ambient conditions	NEARFI PD...	NEARFI P...	NEARFI D...
Ambient temperature			
Operation	-20 °C ... 55 °C (observe derating)	-20 °C ... 60 °C (observe derating)	-20 °C ... 65 °C (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
Humidity			
Operation	10 % ... 95 %	10 % ... 95 %	10 % ... 95 %
Storage/transport	10 % ... 95 %	10 % ... 95 %	10 % ... 95 %
Altitude	2000 m	2000 m	2000 m
Air pressure			
Operation	80 kPa ... 108 kPa (up to 2000 m above sea level)	80 kPa ... 108 kPa (up to 2000 m above sea level)	80 kPa ... 108 kPa (up to 2000 m above sea level)
Storage/transport	66 kPa ... 108 kPa (up to 3500 m above sea level)	66 kPa ... 108 kPa (up to 3500 m above sea level)	66 kPa ... 108 kPa (up to 3500 m above sea level)

Conformance/Approvals	NEARFI PD 2A ETH B	NEARFI PD 2A ETH R	NEARFI P 2A B	NEARFI P 2A R	NEARFI D ETH B	NEARFI D ETH R
CE	CE-compliant					
Wireless approval, Europe	RED 2014/53/EU					
KC approval for South Korea	R-R-PCK-1234232					
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. 61010-1, 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			
Wireless approval USA, FCC	YG3PD2AE-THB	YG3PD2AE-THR	YG3P2AB	YG3P2AR	YG3DETHB	YG3DETHR
Wireless approval Canada, IC	-	-	-	-	4720B-DETHB	4720B-DETHR
Wireless approval Japan, MIC	006-001058	006-001059	-	-	006-001056	006-001057

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 Level 2)
	Discharge in air	± 8 kV (Test Level 3)
	Comments	Criterion B
Electromagnetic HF field	EN 61000-4-3	
	Frequency range	80 MHz ... 1 GHz (Test Level 3)
	Field intensity	10 V/m
	Comments	Criterion A
Fast transients (burst)	EN 61000-4-4	
	Input	± 2 kV (Test Level 3 - asymmetrical)
	Output	± 2 kV (Test Level 3 - asymmetrical)
	Signal	± 2 kV (Test Level 3 - asymmetrical)
	Comments	Criterion B
Surge current loads (surge)	EN 61000-4-5	
	Input	± 0.5 kV (Test Level 1 - symmetrical) ± 1 kV (Test Level 2 - asymmetrical)
	Output	± 1 kV (Test Level 2 - asymmetrical)
	Signal	± 1 kV (Test Level 2 - asymmetrical)
	Comments	Criterion B
Conducted interference	EN 61000-4-6	
	Frequency range	0.15 MHz ... 80 MHz (Test Level 3 - asymmetrical)
	Voltage	10 V (80% amplitude modulation with 1 kHz)
	Comments	Criterion A

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

Emitted interference in acc. with EN 61000-6-4	
Interference emission	EN 55016-2-3 Class A, industrial applications
Conducted noise emission	EN 55032 Class A, industrial applications

Conformance with RED Directive 2014/53/EU	
Safety - protection of personnel with regard to electrical safety	EN 62368
Health - limitation of exposure of the population to electromagnetic fields	EN 62311
Radio - effective use of the frequency spectrum and prevention of radio interference	EN 300330, EN 301417, EN 305550, EN 305550-1, EN 303396

5 Safety regulations and installation notes



Read through the data sheet carefully before mounting, commissioning or operating the devices.

- Installation, operation, and maintenance may only be carried out by qualified electricians. Follow the installation instructions as described.
- When installing and operating the device, observe the applicable regulations and safety directives (including national safety directives), as well as the generally recognized technical regulations.
- Observe the safety information, conditions, and limits of use specified in the product documentation. Comply with them.
- Assembly and electrical installation must correspond to the state of the art.
- The device must not be opened or modified apart from the configuration of the DIP switches. Do not repair the device yourself; replace it with an equivalent device. Repairs may only be carried out by the manufacturer. The manufacturer is not liable for damage resulting from non-compliance.

Installation

- The device is designed exclusively for operation with SELV/PELV from a Class ES1 “electrical energy source” in accordance with EN/IEC 62368-1 and VDE 0868-1. The device may only be connected to devices that meet the requirements of class ES1 in accordance with EN/IEC 62368-1.
- Make sure that the wiring on the primary side and the secondary side is adequately dimensioned.
- Observe the voltage drop across the cable. In the event of undervoltage, the devices can no longer function.
- The connection parameters, such as the required stripping lengths for the wiring, can be found in the installation information for the respective field-side circular connector.
- The parallel connection of multiple remote couplers is not permitted.

Installation location



CAUTION: Hot surface

The device housing can become hot.

The device may remain hot even after disconnecting the supply voltage.

– Ensure sufficient touch protection.
– Prevent inadvertent contact by using a mechanical barrier or clearly visible warning signs.
– Select the installation location so that metallic objects cannot enter the air gap between the base and the remote.

- The die-cast housing and the device-side circular connectors satisfy the requirements of degree of protection IP65.
- Put protective caps on unused connection sockets to ensure an IP65 degree of protection.
- 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.
- The device can heat up due to the effects of induction on the power coils. Maintain a minimum distance of 5 mm from metallic objects.

Electromagnetic fields



WARNING: Electromagnetic fields

During mounting and operation, electromagnetic fields are generated around the device.

– Maintain a distance of at least 30 cm from the devices.

At a clearance of 30 cm, the thresholds for electrical and magnetic field strengths are satisfied. Based on the EU Council Recommendation 1999/519/EC, this clearance is, in accordance with EN 62311, the base threshold value or reference value for the safety of persons in electromagnetic fields. For persons with active medical aids (such as pacemakers), further (operational) threshold values may apply under certain circumstances.

5.1 Approval for Japan

Japanese Radio Law

The device is granted pursuant to the Japanese Radio Law (電波法)
This device should not be modified (otherwise the granted designation number will become invalid).

Contains: 006-001058 (NEARFI PD 2A ETH B)
006-001059 (NEARFI PD 2A ETH R)
006-001056 (NEARFI D ETH B)
006-001057 (NEARFI D ETH R)

NOTE:
The distance between the transmitting aerial and the human body (excluding the side of the head and hands) is 30 centimeters or more.

NOTE:
Limited output power (50 W) in Japan

- Connect an end device to the remote coupler in accordance with the following conditions:

Remote output current		Approval
NEARFI PD 2A ETH R	NEARFI P 2A R	
≤ 1.55 A	≤ 1.8 A	Approval is not required
> 1.55 A	> 1.8 A	Approval is required for installation

5.2 UL notes

CAUTION:
The external circuits intended to be connected to this device shall be separated from MAINS supply or hazardous live voltage by reinforced or double insulation and meet the requirements of SELV/PELV (Class III) circuit of UL/CSA/IEC 61010-1, 61010-2-201.

To install the device(s) according to the UL/CSA standards, the following rules must be observed.

– If the equipment is used in a manner not specified, the protection provided by the equipment may be impaired.
– Minimum ambient temperature rating of the cable assemblies (CYJV2/8, CYJV/7 / PVVA2/8, PVVA/7) connected to the terminals, 65°C, AWG 24 ... 16, min. 60 V DC, min. 4 A
– Use copper conductors only.
– Only use UL-listed or suitable accessories (M12, 60 V DC, minimum, 4 A, minimum, ambient temperature 65°C, minimum).

5.3 FCC approval

Radio approval for USA, FCC			
NEARFI...	**Certificate**	**FCC, part 15**	**FCC, part 18**
PD 2A ETH B	YG3PD2AETHB	X	X
PD 2A ETH R	YG3PD2AETHR	X	
P 2A B	YG3P2AB		X
P 2A R	YG3P2AR	X	
D ETH B	YG3DETHB	X	
D ETH R	YG3DETHR	X	

Part 15

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference.
(2) This device must accept any interference received, including interference that may cause undesired operation.

NOTE: Interference

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case, the user will be required to correct the interference at his own expense.

Part 18

This device complies with Part 18 of the FCC rules.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Increase the separation between the equipment and any other radio device.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

RF Exposure Statement:

Intended use is restricted to industrial robots and turn tables (see examples below,5.3.1 and 5.3.2).

These applications must always be implemented in a restricted area (e.g., in a cage, housing, or safety area), which guarantees a minimum distance of 30 centimeters to the wireless transmitter unit (NEARFI PD 2A ETH B or NEARFI P 2A B). Before a human may access this area the whole machine including the wireless transmitter unit must be deactivated by a safety mechanism.

Part 15, 18

Any changes or modifications not explicitly approved by Phoenix Contact could cause the device to cease to comply with FCC rules Part 15/18, and thus void the user's authority to operate the equipment.

RF Exposure Statement:

This equipment should be installed and operated with a minimum distance of 30 cm between the radiator and your body.

5.3.1 Use case 1: Industrial robots

Industrial robots and systems have a large number of danger points with mechanical hazards, e. g. crushing and shearing. Robot systems must therefore be surrounded by safety equipment to ensure access protection.

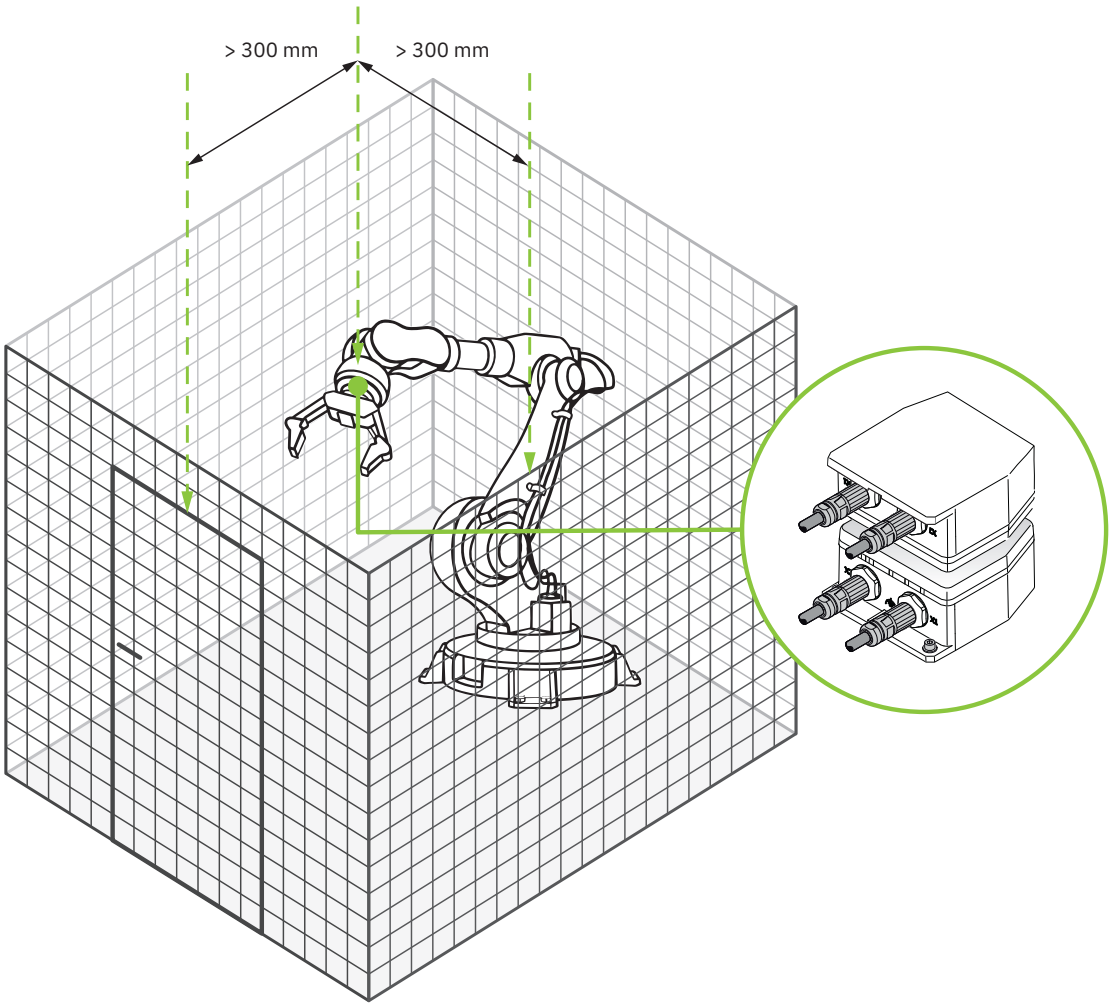
– Safety distances must be maintained in accordance with EN ISO 13857.
– Safety doors must be provided where personnel access to the system is required. For larger systems, several safety doors should generally be provided to minimize the risk of contactors being bypassed.

These requirements are mandatory in an industrial robot type application.

If in such an application a NearFi coupler system is used, the minimum distance of 30 cm between the NearFi devices and the surrounding safety fence must always be ensured.

In the case of opening a door the safety mechanism has not only to stop the robot, but also to power off the NearFi coupler system completely.

Figure 1 Industrial robots



5.3.2 Use case 2: Industrial turn tables

Rotary indexing tables are used quite often for industrial production. They are also known as rotary tables, turn tables, or rotary indexing tables and enable a circular movement on which parts (or workpieces) can be continuously transported to different stations of a work or process step.

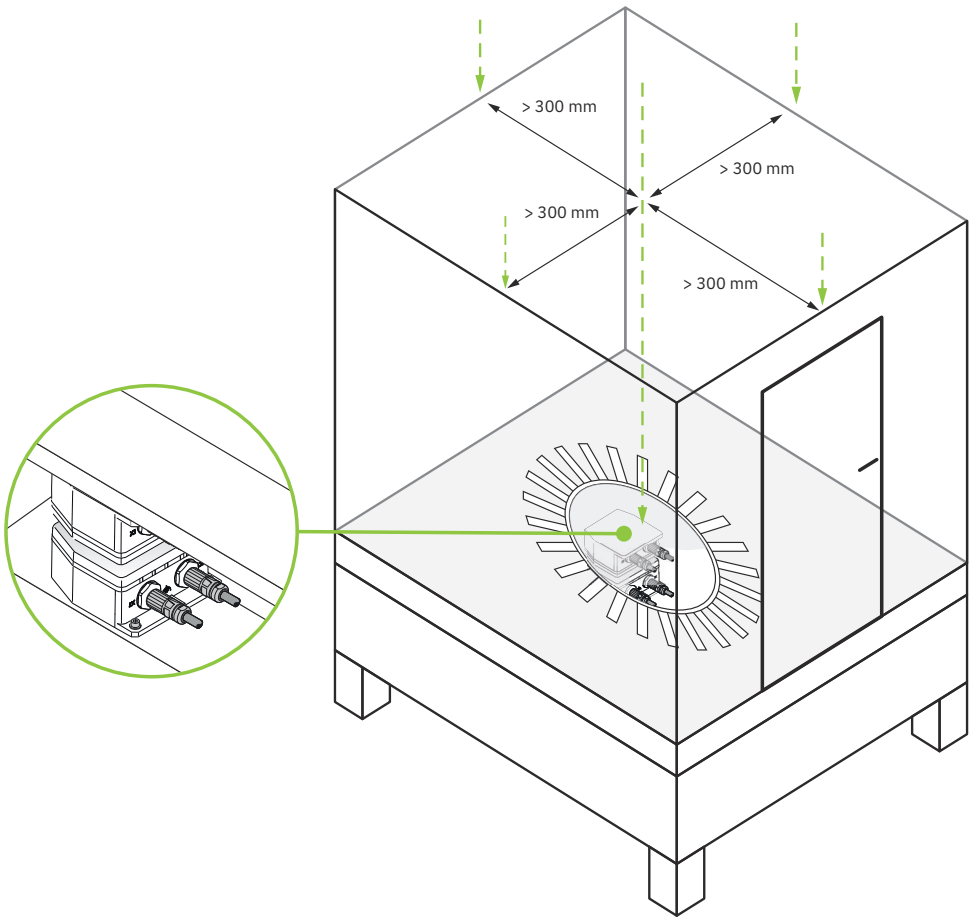
Rotary indexing tables are usually driven electromechanically via gears or a direct drive. Due to the rotating nature of the central platform data and power transfer to this platform must be solved via slip rings. These slip rings cause many problems. Wireless transfer is much more reliable.

However, due to the rotating and moving nature of this machine, a surrounding safety fence must be used to protect humans against mechanical injuries. Safety doors must be provided where personnel access to the machine and systems is required.

If in such an application a NearFi coupler system is used, the minimum distance of 30 cm between the NearFi devices and the surrounding safety fence must always be ensured.

In the case of opening a door the safety mechanism has not only to stop the turn table, but also to power off the NearFi coupler system completely.

Figure 2 Rotary table



5.4 IC approval

Wireless approval for Canada, IC	
NEARFI...	**Certificate**
D ETH B	4720B-DETHB
D ETH R	4720B-DETHR

Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence.
L'exploitation est autorisée aux deux conditions suivantes :
(1) l'appareil ne doit pas produire de brouillage, et
(2) l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

RF Exposure Statement:

This equipment should be installed and operated with a minimum distance of 30 cm between the radiator and your body.

6 Functional principle

The NearFi coupler transmits power and real-time Ethernet data contactlessly over an air gap in the centimeter range.

Power transmission

For contactless transmission, you will need at least two devices: a base and one or more remote couplers.

The base coupler transmits the energy inductively to the remote coupler.

A base coupler can be used to combine as many remote couplers as you like, and vice versa.

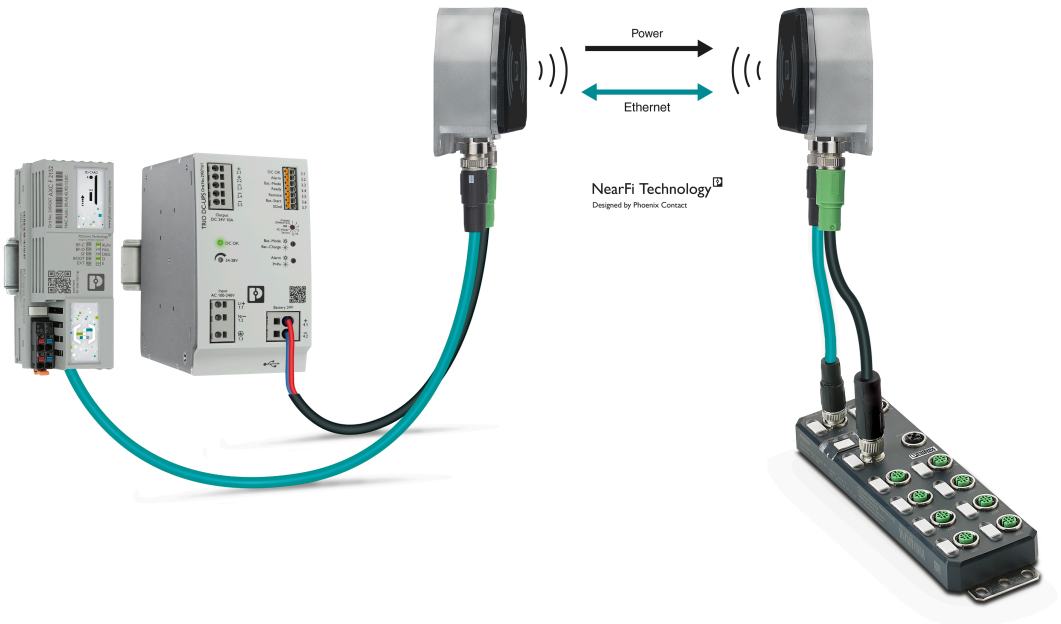
The NearFi couplers transmit 50 W contactless. The base coupler tries to connect to the remote coupler by means of active power polling. Power transmission between the base and remote coupler only becomes active once the connection has been established.

The 24 V output voltage is kept at an output current of 2 A by an active closed-loop control circuit until the maximum transmission distance is reached.

Data transmission

Data is transmitted with two 60 GHz connections in parallel (one uplink and one downlink); you use separate frequency bands to enable full duplex operation. NEARFI allows contactless communication in real time and works entirely independent of protocol.

Figure 3 Example design for contact-free transmission of power and data between a controller and a decentral I/O device with Ethernet interface



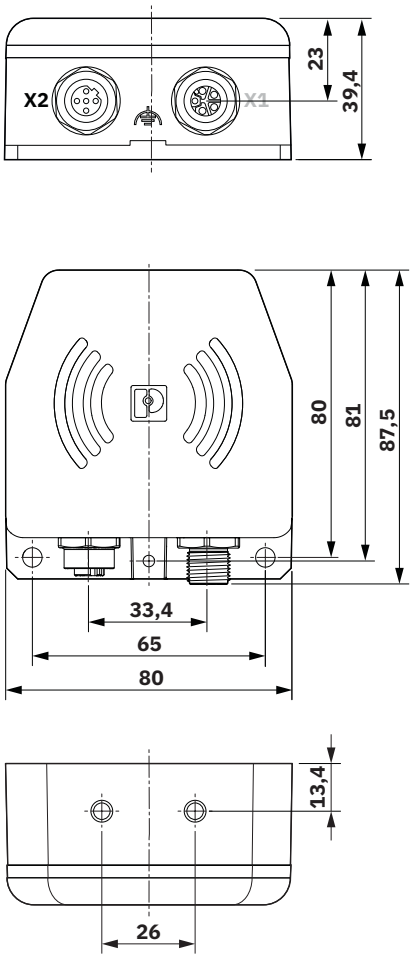
7 Transport and unpacking

- Check the delivery for visible damage caused by transportation.
- Submit claims for any transport damage immediately. Inform Phoenix Contact or your supplier as well as the shipping company without delay.
- Read the entire packing slip carefully.
- Retain the packing slip.
- Keep the packaging for a possible later transport.

8 Product description

8.1 Dimensions

Figure 4 Housing dimensions



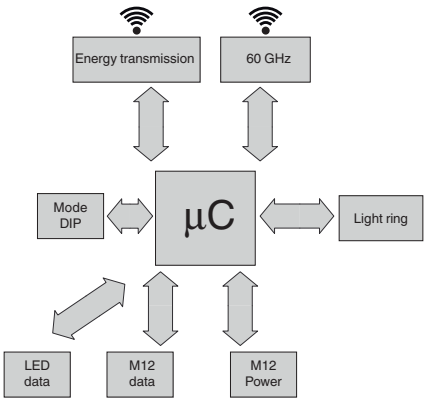
8.2 Compatibility

✓ = Correct ✕ = False	NEARFI...		
	PD 2A ETH R	P 2A R	D ETH R
NEARFI PD 2A ETH B	✓	✓	✓
NEARFI P 2A B	✓	✓	✕
NEARFI D ETH B	✕	✕	✓

8.3 Basic circuit diagram

Power and data coupler (NEARFI PD...)

Figure 5 Basic circuit diagram of power and data couplers

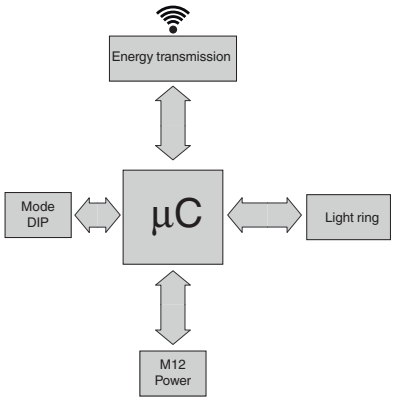


M12, X2	Data
Pin 1	TX+
Pin 2	RX+
Pin 3	TX-
Pin 4	RX-

M12, X1	Power	
	Base	Remote
Pin 1	+24 V DC	+24 V DC
Pin 2	DI	-
Pin 3	GND	GND
Pin 4	DO	-
Pin 5	-	-

Power coupler (NEARFI P...)

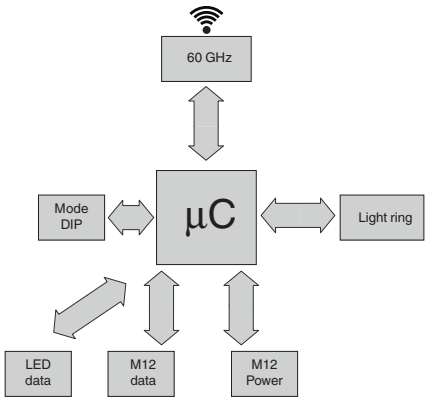
Figure 6 Basic circuit diagram of power coupler



M12, X1	Power	
	Base	Remote
Pin 1	+24 V DC	+24 V DC
Pin 2	DI	-
Pin 3	GND	GND
Pin 4	DO	-
Pin 5	-	-

Data coupler (NEARFI D...)

Figure 7 Basic circuit diagram of data coupler

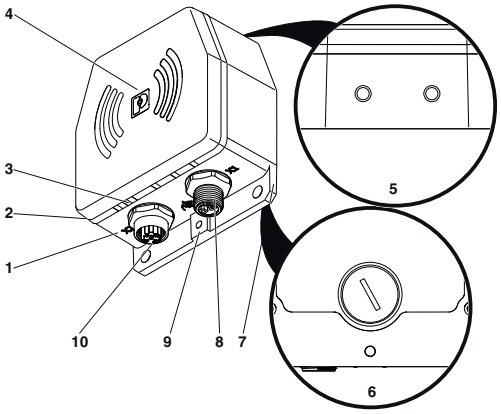


M12, X2	Data
Pin 1	TX+
Pin 2	RX+
Pin 3	TX-
Pin 4	RX-

M12, X1	Power	
	Base	Remote
Pin 1	+24 V DC	+24 V DC
Pin 2	-	-
Pin 3	GND	GND
Pin 4	-	-
Pin 5	-	-

8.4 Function elements

Figure 8 Function elements



1	Die-cast housing
2	LED ring (green/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 inside thread (2x M6, depth = 7 mm)
6	Bottom of the housing: DIP switch, QR code, additional mounting options with inside thread (4x 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 inside thread (1x M4, depth = 5 mm)
10	M12 circular connectors for Ethernet

8.5 ETH LINK

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

8.6 LED ring

Power and data coupler, power coupler (NEARFI PD..., NEARFI P...)

LED ring		Base	Remote
Green	On	Base and remote coupled, transmission active	
	Flashing	Device ready for operation, no transmission, air gap/offset too large	-
		Remote voltage output overload/ short circuit	
	Off	Base not ready for operation or switched off via control input (DI PWR_CTRL)	Remote not coupled
Red	On	Critical error, internal temperature too high, external supply voltage significantly beyond the nominal range	-

Data coupler (NEARFI D...)

LED ring	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

8.7 Digital status output, X1, pin 4

Only NEARFI PD... and NEARFI P..., base coupler:

A 24 V DC output is available for forwarding to a higher-level control system.

To be displayed, the error must be present for at least 1.5 seconds.

Overview of signal codes

Code	Number of pulses	Pulse length [ms]	Pause [ms]	Description
1	1	100	1000	Base error, external supply voltage outside of the nominal range (19 V ... 30 V)
2	2	100	1000	Base error: Internal error in the voltage conditioning, internal temperature outside the nominal range
3	3	100	1000	Remote error: Base and remote not coupled, internal error in the voltage conditioning
4	4	100	1000	Remote error: Voltage output overload, short circuit
5	5	100	1000	Operating status: Power transmission to the remote coupler inactive, digital control input OFF (0 V)
ON	-	-	-	Operating status: Base and remote coupled, power and data transmission active

8.8 Digital control input, X1, pin 2

Only NEARFI PD... and NEARFI P..., base coupler:

You can use the digital input to enable power transmission using a higher-level control system.

You require a higher-level control system with N-switching transistor outputs and relay outputs.

If pin 2 of the base coupler is **not** used: The power is switched through as soon as the base and remote coupler are connected.

Pin 2, base	Power transmission
Not used	Activated
24 V (75% ... 100% of the supply voltage)	
0 V (0% ... 25% of the supply voltage)	Disabled

8.9 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.

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

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

8.10 DIP switch

CAUTION: Electric shock

Make sure that the device is disconnected from the power supply before opening the screw plug.

Only select the mode of operation when the power is disconnected! The change is activated after renewed power up.

NOTE: Electrostatic discharge!

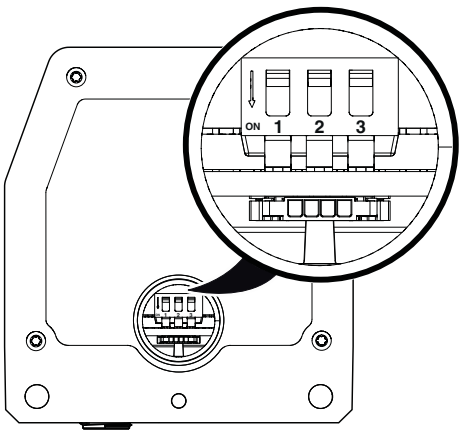
Electrostatic discharge can damage or destroy components.

– 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 P..., 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 bodies cannot penetrate into the device.
- Open the M16 locking screw using a bladed screwdriver.
- Set the operating mode using the DIP switch (see table).
- Tighten the locking screw using a bladed screwdriver with 1 Nm.

Figure 9 DIP switches



DIP		NEARFI PD..., NEARFI D...	
		Base	Remote
1	ON	n. c.	n. c.
	OFF	n.c.	n.c.
2	ON	ETH Full Duplex	ETH Full Duplex
	OFF	ETH Autoneg	ETH Autoneg
3	ON	n. c.	n. c.
	OFF	n. c.	n. c.

ETH Full Duplex

Fixed configuration of Ethernet interface X2:
– 100 Mbps, full duplex
– No auto negotiation
– No autocrossing
– 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 Autoneg

Settings for Ethernet interface X2:
– Auto negotiation, 100 Mbps, half or full duplex
– Autocrossing (RX/TX crossover)

8.11 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 PD... and NEARFI D...)

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

General conditions for measurement:

- Fixed setting of 100 Mbps, full duplex, fast startup
- 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 P...)

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:

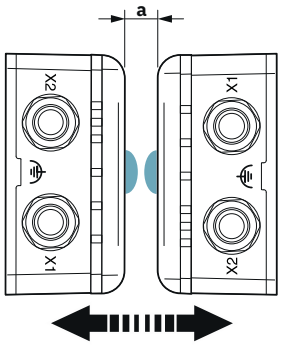
↪ Maximum switch-on time: <50 ms

9 Installation

9.1 Positioning of the devices

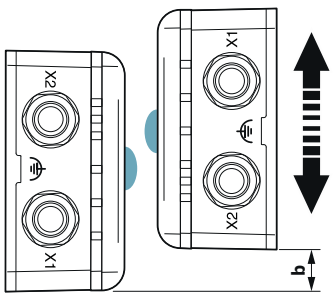
Transmission distance

Figure 10 Transmission distance



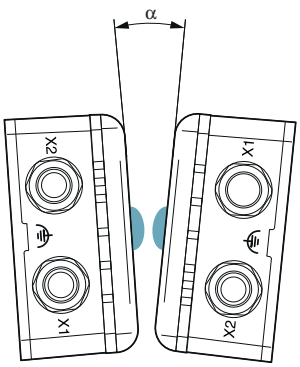
Lateral offset

Figure 11 Lateral offset



Angular offset

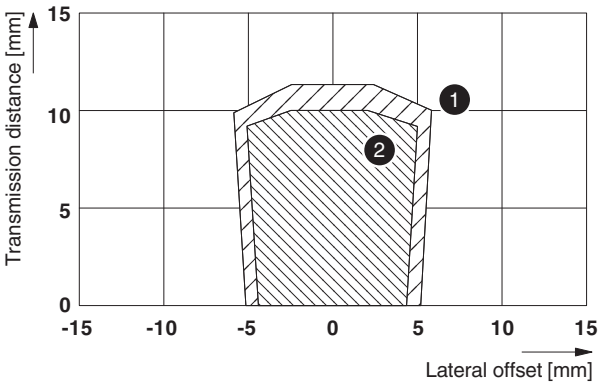
Figure 12 Angular offset



– 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°

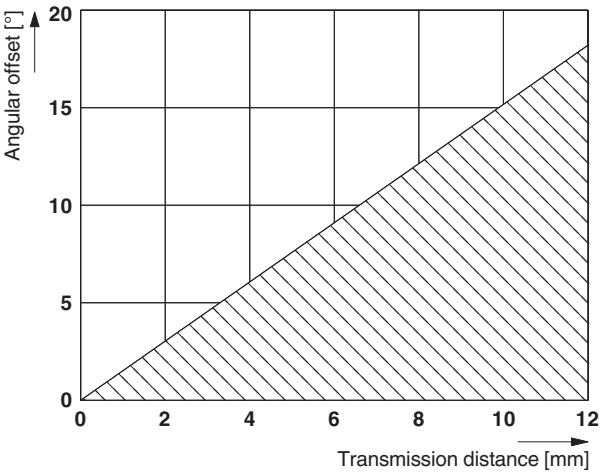
NEARFI PD...

Figure 13 Transmission distance for lateral offset, NEARFI PD...



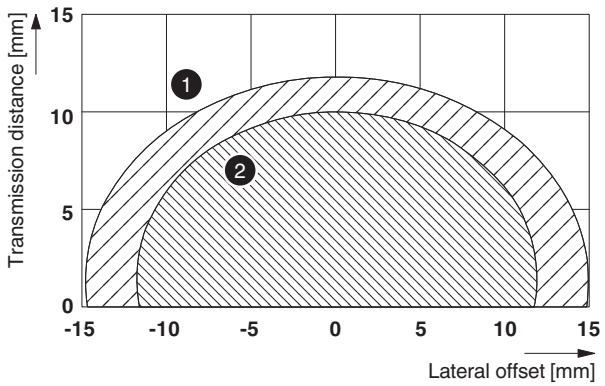
❶ Typically at 25°C, 1 A load, good thermal connection
❷ Typically at 45°C, 2 A load, good thermal connection

Figure 14 Transmission distance for angular offset, NEARFI PD...



NEARFI P...

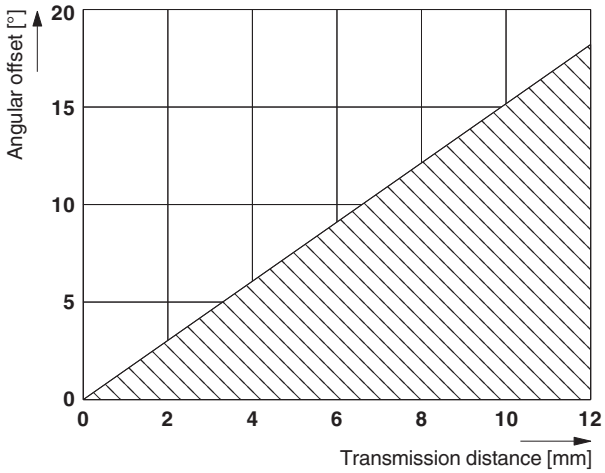
Figure 15 Transmission distance for lateral offset, NEARFI P...



❶ Typically at 25°C, 1 A load, good thermal connection

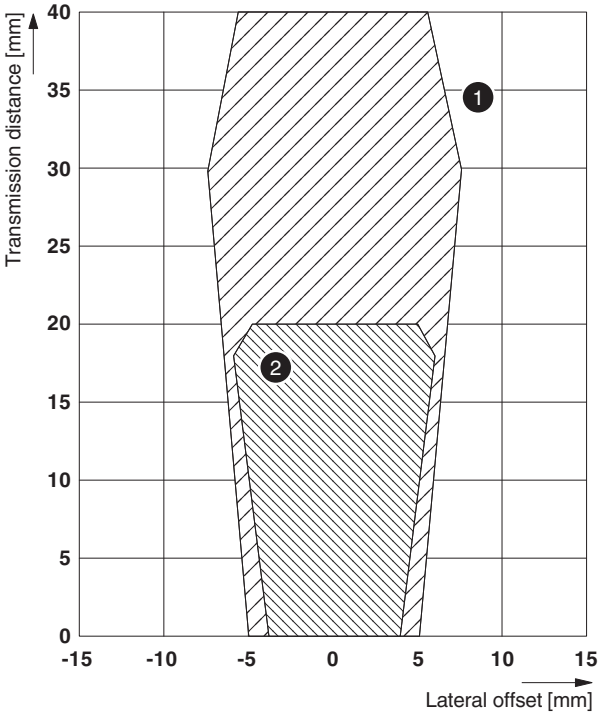
❷ Typically at 60°C, 2 A load, good thermal connection

Figure 16 Transmission distance for angular offset, NEARFI P...



NEARFI D...

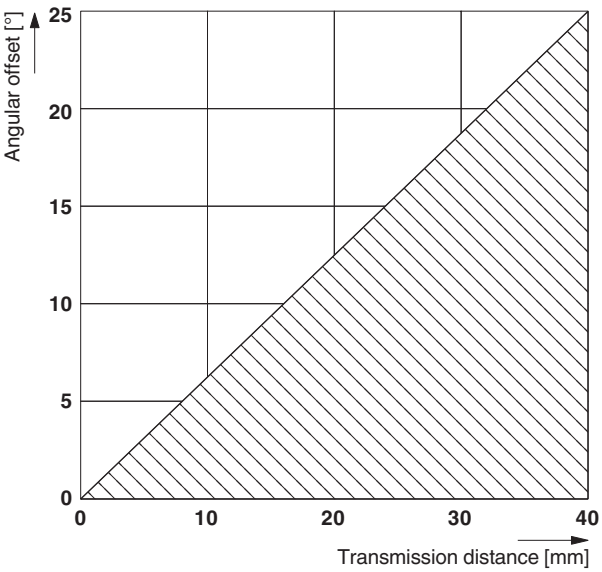
Figure 17 Transmission distance for lateral offset, NEARFI D...



❶ Typically at 25°C, good thermal connection

❷ Typically at 65°C, good thermal connection

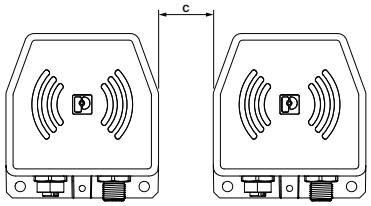
Figure 18 Transmission distance for angular offset, NEARFI D...



9.2 Minimum clearances

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

Figure 19 Minimum distance



c ≥ 5 mm

9.3 Installation in metal

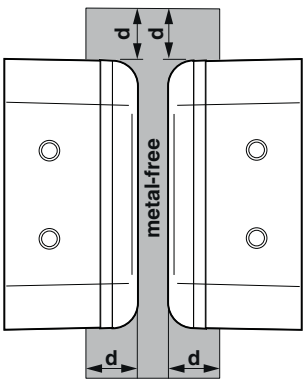
The black plastic side of the devices is the active surface. The power coils are positioned beneath this surface.

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 metallic objects.

Figure 20 Metal-free area



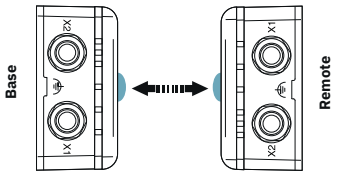
d ≥ 5 mm

9.4 Coupling the base and remote couplers

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

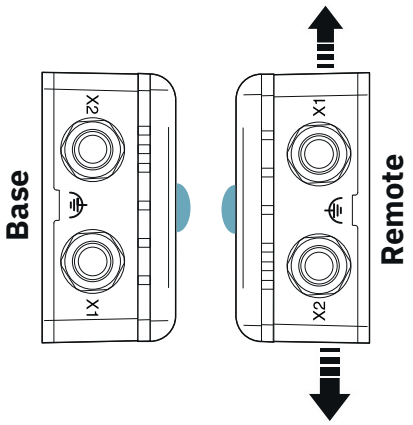
Frontal linear movement

Figure 21 Frontal linear movement



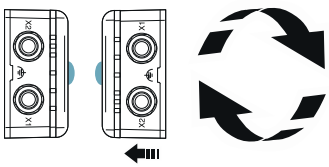
Lateral linear movement

Figure 22 Lateral linear movement



Sideways rotation

Figure 23 Sideways rotation



The operating range is limited in rotating applications. The maximum permissible offset is ±2.5 mm.

9.5 Mounting and removing

CAUTION:

Observe the safety notes in the 5 „Safety regulations and installation notes“ section.

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 multi-tooth screws) and spring washers. Observe the maximum torque of the screws.
- Select the installation location so that metallic 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.

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 in the application note at phoenixcontact.com/product/1234224.

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 24 Drilling diagram

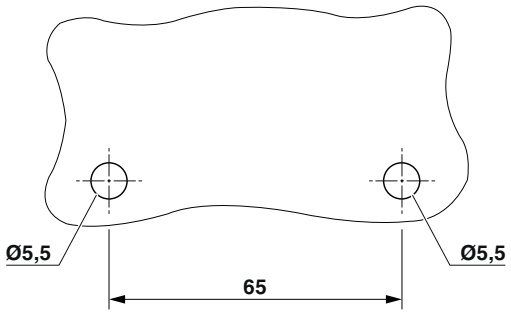
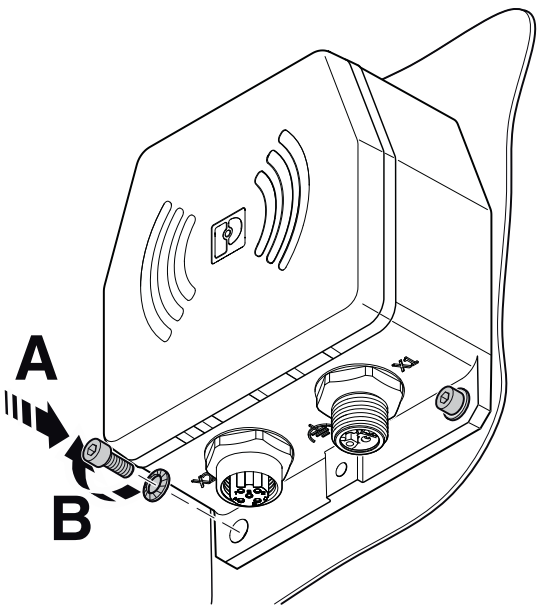


Figure 25 Mounting with two M5 screws



Mounting option with four M6 screws

If there are extremely difficult operating conditions such as vibrations, you can also mount the device with four M6 screws.

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

Figure 26 Drilling diagram

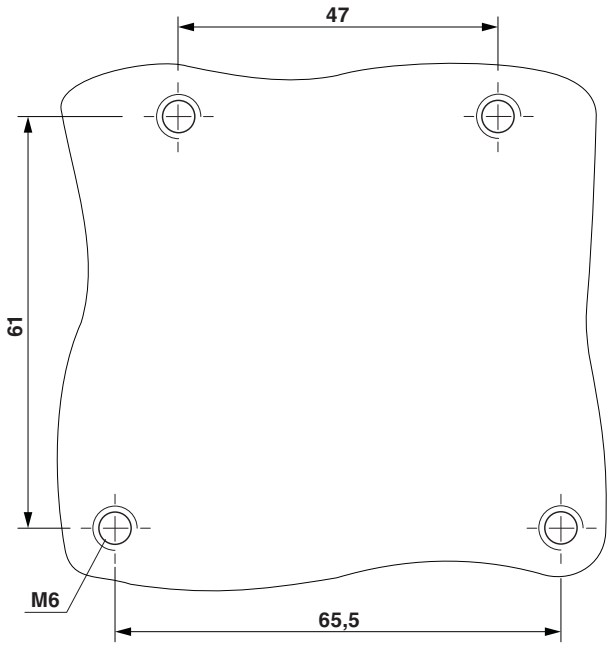
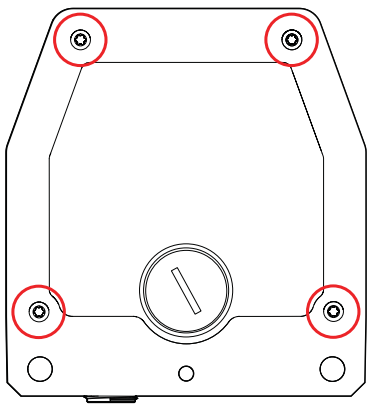


Figure 27 Mounting with four M6 screws



Mounting option 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.
  Inside thread, thread depth = 7 mm, tightening torque 0.7 Nm
- Check that the die-cast housing is securely mounted

Figure 28 Drilling diagram

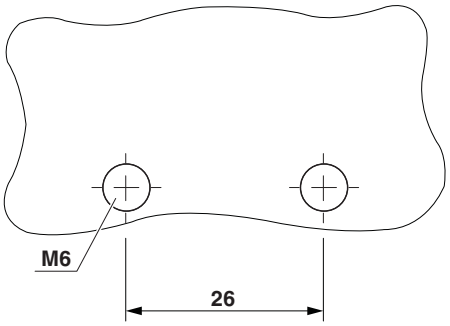
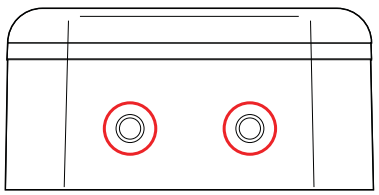


Figure 29 Mounting with two M6 screws



Removing

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

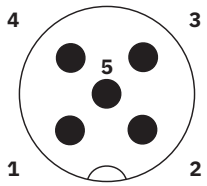
10 Connecting the cables

- 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

10.1 Power transmission (NEARFIP PD... and NEARFI P...)

10.1.1 Base: Connection X1 (power IN)

Figure 30 Power-IN (X1), M12 male, A-coded



Pin	IN	Conductor color
1	+19 V DC ... 30 V DC	Brown
2	DI (control input)	White
3	GND	Blue
4	DO (status output)	Black
5	Not used	Green/yellow or gray

Calculating the cable length

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

$U_A = I \times R \times 2$

Example 1

Cable resistance of a 5 x 0.75 mm² power supply cable, cable type 186 (e.g., SAC-5P-...-186/FS SCO) = 26 Ω/km

– At 2 A:
  $U_A = 2\ A \times 26\ \Omega/km \times 2 = 104\ V/km$
  Corresponds to 1.04 V for 10 m

Example 2

Cable resistance of a 5 x 0.34 mm² power supply cable, cable type PUR (e.g., SAC-5P-...-PUR) = 58 Ω/km

– At 1.5 A:
  $U_A = 1.5\ A \times 58\ \Omega/km \times 2 = 174\ V/km$
  Corresponds to 1.74 V for 10 m

10.1.2 Remote: Connection X1 (power OUT)

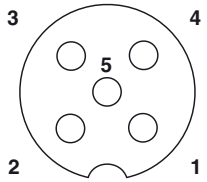
DC voltage is provided at output X1 of the remote coupler (power OUT).

The output is protected electronically from overload and short circuit. In case of 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.

Figure 31 Power-OUT (X1), M12 female, A-coded



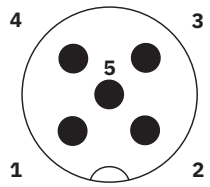
Pin	OUT	Conductor color
1	24 V DC, ±5 % / 2 A	Brown
2	Not used	White
3	GND	Blue
4	Not used	Black
5	Not used	Green/yellow or gray

10.2 Power supply (NEARFI D... data coupler)

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

Base and remote: Connection X1 (power IN)

Figure 32 Power-IN (X1), M12 male, A-coded



Pin	IN	Conductor color
1	+19 V DC ... 30 V DC	Brown
2	Not used	White
3	GND	Blue
4	Not used	Black
5	Not used	Green/yellow or gray

10.3 Data transmission (NEARFI PD... and NEARFI D...)

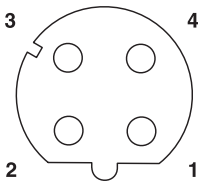
You connect the Ethernet network via the circular connector X2 (DATA-IN / OUT).

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 connectors.

Pin assignment data IN/OUT (X2)

Figure 33 Data IN/OUT (X2), M12 female, D-coded



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

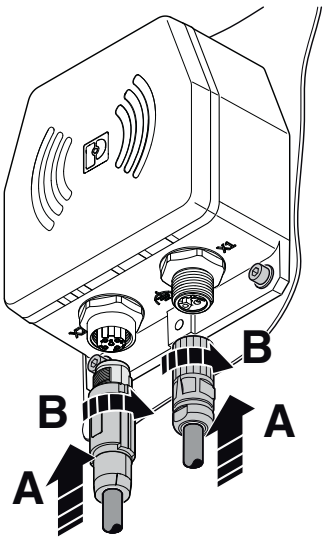
10.4 Circular connector

The device-side circular connectors are coded. It is impossible to accidentally plug 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.

Item No.	NEARFI...	Power, X1	Data, X2
1234224	PD 2A ETH B	M12 male, A-coded	M12 female, D-coded
1234225	PD 2A ETH R	M12 female, A-coded	M12 female, D-coded
1234226	P 2A B	M12 male, A-coded	-
1234229	P 2A R	M12 female, A-coded	-
1234232	D ETH B	M12 male, A-coded	M12 female, D-coded
1234234	D ETH R	M12 male, A-coded	M12 female, D-coded

Figure 34 Connecting the cables



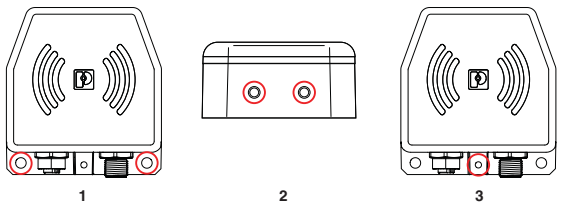
10.5 Functional grounding

There are various ways to ground the device:

– Via the mounting screws at bottom, with toothed lock washer
– Via the mounting screws at top
– Via the grounding connection with an M4 screw and toothed lock washer

  Inside thread, thread depth = 5 mm, tightening torque 0.6 Nm

Figure 35 Options for functional grounding



10.6 Startup

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

11 Maintenance and disposal

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

11.1 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 www.phoenixcontact.com.

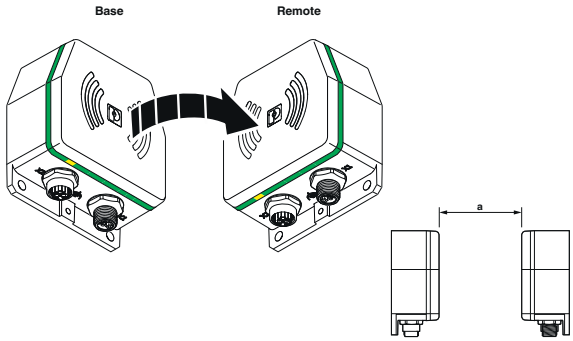
12 Troubleshooting

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

- Next, check the diagnostics LEDs.

12.1 Normal operation

Figure 36 LED ring in normal operation

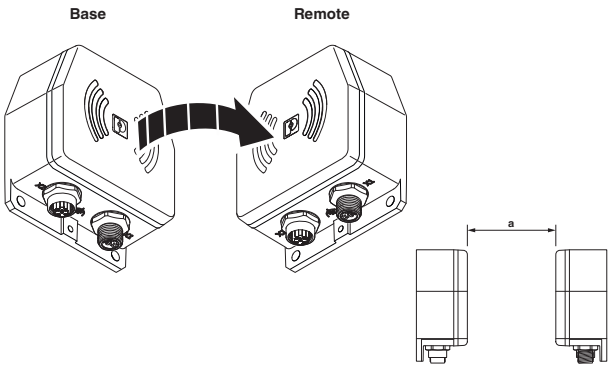


a ≤ 10 mm

12.2 Base and remote not coupled

Base LED ring is switched off

Figure 37 Base not ready for operation

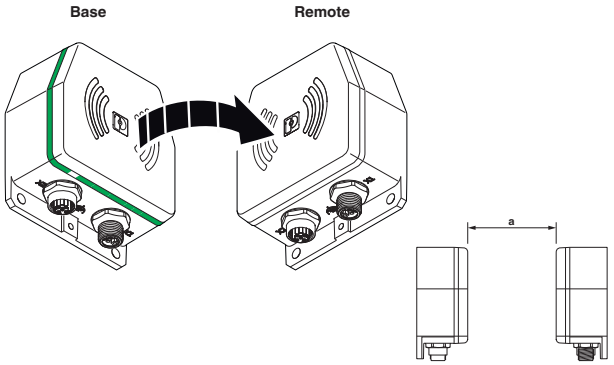


If the base coupler LED ring is switched off, the device is not ready for operation.

- Check the power supply unit.
- Check the status of the DI PWR_CTRL control input.

Remote LED ring is switched off

Figure 38 Remote not coupled, overload/short circuit at Remote



If the base coupler is supplied with power, it will try to connect to the remote coupler. The LED ring on the base coupler will flash 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.

12.3 Mixed operation

If you combine a NEARFI PD... base coupler with a NEARFI P... or NEARFI D... remote coupler:

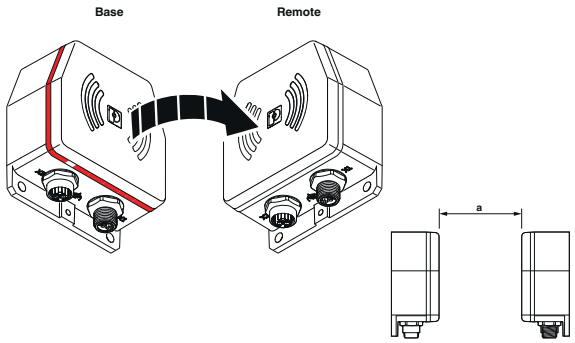
– The LED ring on the remote coupler is permanently on.
– The LED ring on the base coupler flashes green.

This is not a malfunction, transmission is possible.

12.4 Critical error on the base

Only for the power and data couplers (NEARFI PD 2A ETH...) and the power couplers (NEARFI P 2A...)

Figure 39 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

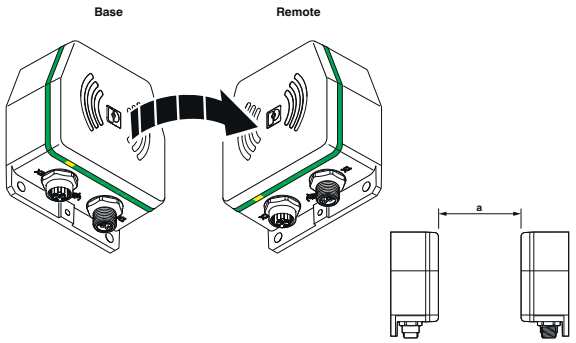
To protect the coupler and other devices, the remote coupler switches off. No more power is transmitted.

- 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.

12.5 Malfunction on the data line

Only for the power and data couplers (NEARFI PD 2A ETH...) and the data couplers (NEARFI D ETH...)

Figure 40 LAN malfunction



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

Fast startup

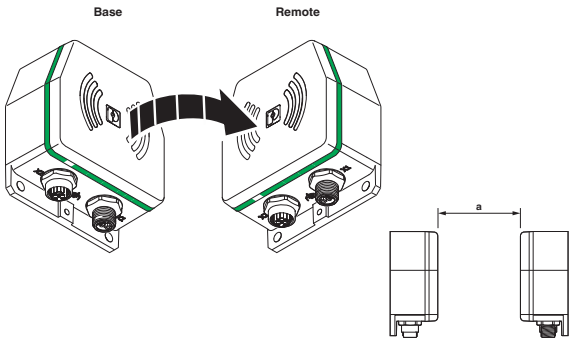
The “Fast startup” function is also referred to as prioritized startup or fast restart. When using network devices with this function, note the following:

- Only use routers and switches that support fast start-up.
- To ensure the 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

12.6 Wireless connection not optimal

Only for the NEARFI D ETH... data couplers

Figure 41 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.

13 Derating

13.1 Derating curve

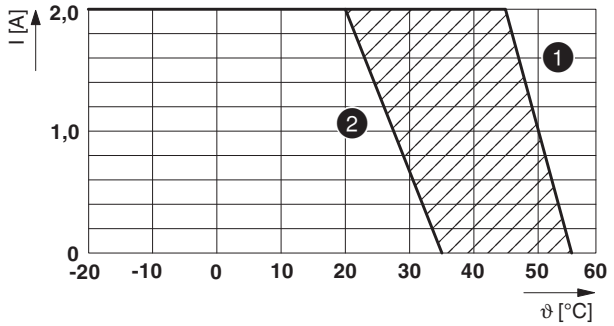
The derating curve shows the dependence of the maximum permissible ambient temperature on the following factors:

– 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.

Power and data coupler (NEARFI PD...)

Figure 42 Derating curve



❶ Optimal thermal connection
❷ No thermal connection

Power coupler (NEARFI P...)

Thermal connection	Ambient temperature (operation)
Optimal	≤ 60 °C
None	≤ 50 °C

Data coupler (NEARFI D...)

Thermal connection	Ambient temperature (operation)
Optimal	≤ 65 °C
None	≤ 55 °C

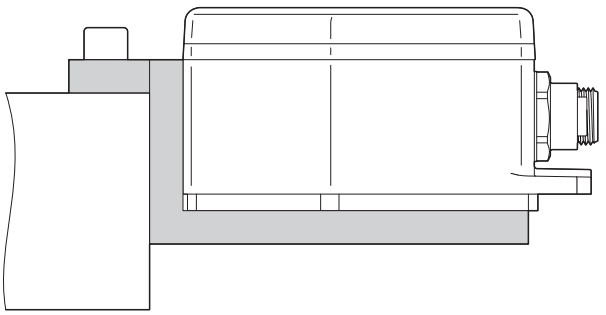
13.2 Thermal connection by mounting on metal

- 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

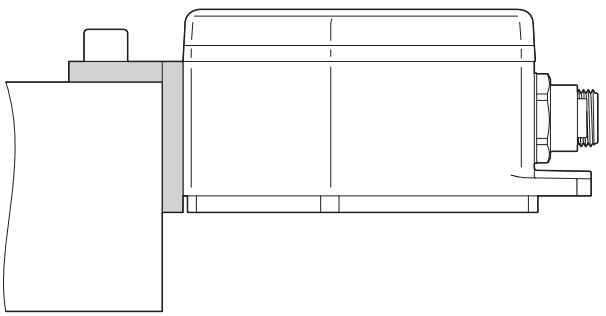
Figure 43 Optimal thermal connection



Good thermal connection

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

Figure 44 Good thermal connection



No thermal connection

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

13.3 Derating in accordance with UL

Power and data coupler (NEARFI PD...)

- **≤40°C:** OUTPUT CURRENT 2 A, thermal connection with mounting adapter and external heatsink (machine head)
- **max. 55°C:** OUTPUT CURRENT 0 A, thermal connection with mounting adapter and external heatsink (machine head)

Power coupler (NEARFI P...)

Thermal connection	Ambient temperature (operation)
Optimal	≤ 40 °C
None	≤ 40 °C

Data coupler (NEARFI D...)

Thermal connection	Ambient temperature (operation)
Optimal	≤ 65 °C
None	≤ 55 °C

UL CONDITIONS OF ACCEPTABILITY for:

- NEARFI PD 2A ETH B (Base)
- NEARFI PD 2A ETH 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 45 Installation example with external heatsink (processing head)

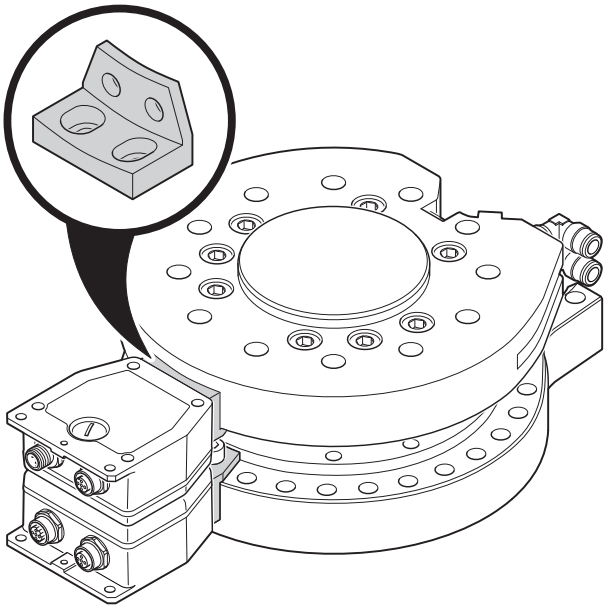
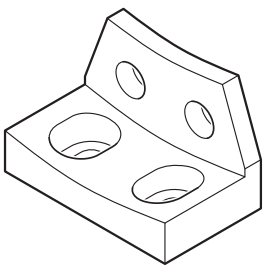


Figure 46 Adapter



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

Figure 47 Dimensions of adapter

