

# NBC-FRD-R4AC SCO-EC/.../... - Network cable



1408583

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Network cable, EtherCAT® CAT5 (100 Mbps), 4-position, Variable cable type, shielded, Plug straight RJ45 / IP20, on Socket angled M12 SPEEDCON, coding: D / IP67, cable length: Free input (0.2 ... 40.0 m)

## Commercial data

|                       |                                |
|-----------------------|--------------------------------|
| Item number           | 1408583                        |
| Packing unit          | 1 pc                           |
| Note                  | Made to order (non-returnable) |
| Sales key             | BF04                           |
| Product key           | AF1CJP                         |
| Customs tariff number | 85444290                       |
| Country of origin     | PL                             |

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## Technical data

### Product properties

|                     |                         |
|---------------------|-------------------------|
| Product type        | Data cable preassembled |
| Application         | Standard                |
| Sensor type         | EtherCAT®               |
| Number of positions | 4                       |
| Shielded            | yes                     |
| Coding              | D                       |

### Interfaces

|                      |                                      |
|----------------------|--------------------------------------|
| Bus system           | EtherCAT®                            |
| Signal type/category | EtherCAT® CAT5 (IEC 11801), 100 Mbps |

### Signaling

|                        |    |
|------------------------|----|
| Status display         | no |
| Status display present | no |

### Electrical properties

|   |                       |
|---|-----------------------|
| Nominal voltage $U_N$                   | 48 V AC               |
|   | 60 V DC               |
| Nominal current $I_N$                   | 1 A                   |
| Transmission medium                     | Copper                |
| Transmission speed                      | 100 Mbps              |
| Transmission characteristics (category) | CAT5 (IEC 11801:2002) |

### Material specifications

|               |     |
|---------------|-----|
| Seal material | NBR |
|---------------|-----|

### Connector

#### Connection 1

|                                 |                           |
|---------------------------------|---------------------------|
| Type                            | Plug straight RJ45 / IP20 |
| Number of positions             | 4 (8)                     |
| Handle color                    | black                     |
| Material                        | CuSn (Contact)            |
|                                 | Ni/Au (Contact surface)   |
|                                 | PA (Contact carrier)      |
|                                 | PA (Housing)              |
| Insertion/withdrawal cycles     | ≥ 750                     |
| Degree of protection            | IP20                      |
| Ambient temperature (operation) | -25 °C ... 80 °C          |

#### Connection 2

|      |                                   |
|------|-----------------------------------|
| Type | Socket angled M12 SPEEDCON / IP67 |
|------|-----------------------------------|

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|                                 |   |
|---------------------------------|---|
| Number of positions             | 4   |
| Locking type                    | SPEEDCON  |
| Coding type                     | D (Data)  |
| Handle color                    | black   |
| Material                        | CuSn (Contact)<br>Ni/Au (Contact surface)<br>TPU GF (Contact carrier)<br>TPU, hardly inflammable, self-extinguishing (Grip body)<br>Zinc die-cast, nickel-plated (Screw connection) |
| Insertion/withdrawal cycles     | ≥ 100   |
| Insulation resistance           | ≥ 100 MΩ  |
| Tightening torque               | 0.4 Nm  |
| Degree of protection            | IP67  |
| Ambient temperature (operation) | -25 °C ... 90 °C  |

## Cable/line

|              |                             |
|--------------|-----------------------------|
| Cable length | Free input (0.2 ... 40.0 m) |
|--------------|-----------------------------|

### EtherCAT® [93G]

|                                 |  |
|---------------------------------|--|
| Cable weight                    | 67 kg/km   |
| UL AWM Style                    | 21694  |
| Number of positions             | 4  |
| Shielded                        | yes  |
| Cable type                      | EtherCAT® [93G]<br>EtherCAT® 93G                   |
| Conductor structure             | 1x4xAWG22/7, SF/TQ                                 |
| Signal runtime                  | 5.3 ns/m   |
| Signal speed                    | 0.66 c   |
| Conductor structure signal line | 7x 0.25 mm   |
| AWG signal line                 | 22   |
| Conductor cross-section         | 4x 0.34 mm <sup>2</sup>                            |
| Wire diameter incl. insulation  | 1.55 mm  |
| External cable diameter         | 6.50 mm ±0.2 mm                                    |
| Outer sheath, material          | PVC  |
| External sheath, color          | green RAL 6018                                     |
| Conductor material              | Tin-plated Cu litz wires                           |
| Material wire insulation        | PE   |
| Single wire, color              | white, yellow, blue, orange                        |
| Thickness, outer sheath         | approx. 0.90 mm                                    |
| Overall twist                   | Star quad  |
| Shielding                       | Aluminum-coated foil, tinned copper braided shield |
| Optical shield covering         | 85 %   |
| Insulation resistance           | ≥ 500 MΩ*km  |
| Coupling resistance             | ≤ 20.00 mΩ/m (at 10 MHz)                           |

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|   |   |
|---|---|
| Loop resistance                               | ≤ (per km)  |
| Wave impedance                                | 100 Ω ±15 Ω (at 100 MHz)  |
| Nominal voltage, cable                        | 600 V   |
| Test voltage Core/Core                        | 2000 V (50 Hz, 1 min.)  |
| Test voltage Core/Shield                      | 2000.00 V (50 Hz, 1 min.)   |
| Minimum bending radius, fixed installation    | 3 x D   |
| Minimum bending radius, flexible installation | 7 x D   |
| Smallest bending radius, fixed installation   | 20 mm   |
| Smallest bending radius, movable installation | 46 mm   |
| Flame resistance                              | according to UL 1685 (CSA FT 4)   |
| Resistance to oil                             | Resistant to oil to a limited extent  |
| Other resistance                              | UV resistant (according to UL 1581, Section 1200)   |
| Ambient temperature (operation)               | -40 °C ... 70 °C (cable, fixed installation)<br>-40 °C ... 70 °C (Cable, flexible installation) |

## EtherCAT® drag chain CAT5 [93H]

|                                 |  |
|---------------------------------|--|
| Cable weight                    | 61 kg/km   |
| Number of positions             | 4  |
| Shielded                        | yes  |
| Cable type                      | EtherCAT® drag chain CAT5 [93H]<br>EtherCAT® drag chain CAT5 93H |
| Conductor structure             | 1x4xAWG22/7, SF/TQ   |
| Signal runtime                  | 5.3 ns/m   |
| Signal speed                    | 0.66 c   |
| Conductor structure signal line | 7x 0.25 mm   |
| AWG signal line                 | 22   |
| Conductor cross-section         | 4x 0.34 mm <sup>2</sup>  |
| Wire diameter incl. insulation  | 1.5 mm   |
| External cable diameter         | 6.50 mm ±0.2 mm  |
| Outer sheath, material          | PUR  |
| External sheath, color          | green RAL 6018   |
| Conductor material              | Tin-plated Cu litz wires   |
| Material wire insulation        | PE   |
| Single wire, color              | white, yellow, blue, orange                                      |
| Thickness, outer sheath         | approx. 0.90 mm  |
| Overall twist                   | Star quad  |
| Shielding                       | Aluminum-coated foil, tinned copper braided shield               |
| Optical shield covering         | 85 %   |
| Insulation resistance           | ≥ 500 MΩ*km  |
| Coupling resistance             | ≤ 20.00 mΩ/m (at 10 MHz)   |
| Loop resistance                 | ≤ (per km)   |
| Wave impedance                  | 100 Ω ±15 Ω (at 1 ... 100 MHz)                                   |
| Nominal voltage, cable          | 600 V (UL rating)  |
| Test voltage Core/Core          | 2000 V (50 Hz, 1 min.)   |

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|   |   |
|---|---|
| Test voltage Core/Shield                      | 2000.00 V (50 Hz, 1 min.)   |
| Minimum bending radius, fixed installation    | 5 x D   |
| Minimum bending radius, flexible installation | 7.5 x D   |
| Smallest bending radius, fixed installation   | 33 mm   |
| Smallest bending radius, movable installation | 49 mm   |
| Dynamic load capacity (bending)               | Max. bending cycles: 3000000, Bending radius: 100 mm, Traversing path: 10 m, Traversing rate: 4 m/s, Acceleration: 4 m/s <sup>2</sup> |
| Dynamic load capacity (torsion)               | Torsion: ±30 °/m  |
| Flame resistance                              | according to IEC 60332-1-2  |
| Resistance to oil                             | in accordance with DIN EN 60811-2-1   |
| Other resistance                              | UV resistant  |
| Special properties                            | Electrical properties in accordance with EN 50288-2-2   |
| Ambient temperature (operation)               | -40 °C ... 70 °C (cable, fixed installation)<br>-40 °C ... 70 °C (Cable, flexible installation)                                       |

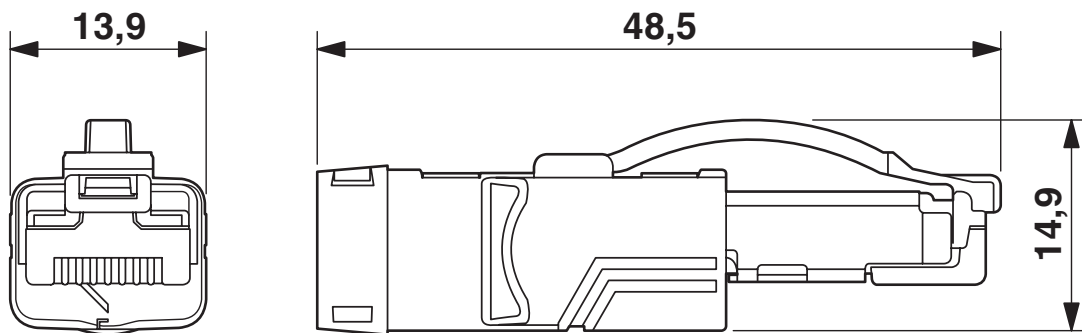
## Standards and regulations

### M12

|                          |                 |
|--------------------------|-----------------|
| Standard designation     | M12 connector   |
| Standards/specifications | IEC 61076-2-101 |

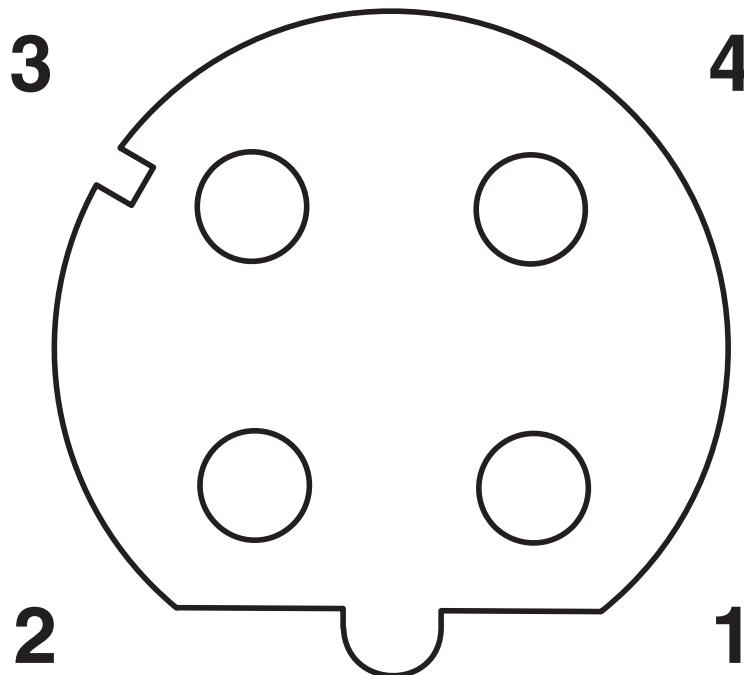
Drawings

Dimensional drawing



RJ45 connector, IP20

Schematic diagram



Pin assignment M12 socket, 4-pos., D-coded, female side

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Schematic diagram



Connector pin assignment plug RJ45

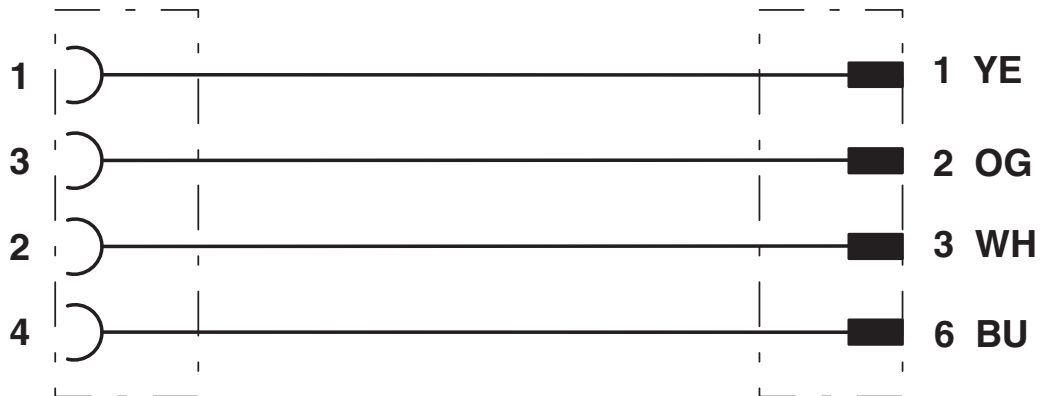
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Circuit diagram



Contact assignment of the M12 socket and the RJ45 plug

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## Classifications

### ECLASS

|             |          |
|-------------|----------|
| ECLASS-13.0 | 27060307 |
| ECLASS-15.0 | 27060307 |

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## Environmental product compliance

### EU RoHS

|   |                    |
|---|--------------------|
| Fulfills EU RoHS substance requirements | Yes, No exemptions |
|---|--------------------|

### China RoHS

|  |  |
|--|--|
| Environment friendly use period (EFUP) | EFUP-E                                   |
|  | No hazardous substances above the limits |

### EU REACH SVHC

|                                     |                            |
|-------------------------------------|----------------------------|
| REACH candidate substance (CAS No.) | No substance above 0.1 wt% |
|-------------------------------------|----------------------------|

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Phoenix Contact USA  
586 Fulling Mill Road  
Middletown, PA 17057, United States  
(+717) 944-1300  
[info@phoenixcon.com](mailto:info@phoenixcon.com)