

NBC-M12MSD-R4AC-PN/.../... - Network cable



1408639

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Network cable, PROFINET CAT5 (100 Mbps), EtherCAT® CAT5 (100 Mbps), 4-position, Variable cable type, shielded (Advanced Shielding Technology), Plug straight M12, coding: D / IP67, on Plug straight RJ45 / IP20, cable length: Free input (0.2 m ... 100.0 m)

Commercial data

| | |
|------------------------|--------------------------------|
| Item number | 1408639 |
| Packing unit | 1 pc |
| Minimum order quantity | 1 pc |
| Note | Made to order (non-returnable) |
| Sales key | BF17 |
| Product key | AF1CJN |
| Customs tariff number | 85444290 |
| Country of origin | PL |

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Technical data

Product properties

| | |
|---------------------|-------------------------|
| Product type | Data cable preassembled |
| Application | Standard |
| Number of positions | 4 |
| Shielded | yes |

Interfaces

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

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 |

Connector

Connection 1

| | |
|-----------------------------|---|
| Dimensional drawing |  <p>Pin assignment M12 male connector, 4-pos., D-coded, male side</p> |
| Type | M12 Plug, straight, 4-position, shielded (Advanced Shielding Technology), Keying: D |
| Number of positions | 4 |
| Shielded | yes |
| Shielding | Advanced Shielding Technology |
| Signal type/category | EtherCAT® CAT5 (IEC 11801), 100 Mbps PROFINET CAT5 (IEC 11801) |
| Insertion/withdrawal cycles | ≥ 100 |
| Insulation resistance | ≥ 100 MΩ |
| Overvoltage category | II |
| Degree of pollution | 3 |
| Tightening torque | 0.4 Nm |
| Material Contact | CuSn |
| Material Contact surface | Ni/Au |
| Material Contact carrier | PA 6.6 |

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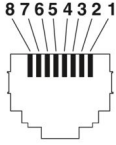


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| | |
|--|---|
| Material Screw connection | Die-cast zinc, nickel-plated |
| Material Grip body | TPU, hardly inflammable, self-extinguishing |
| Material Seal | FKM |
| Flammability rating according to UL 94 | V0 |
| Degree of protection | IP65 IP67 |
| Ambient temperature (operation) | -25 °C ... 85 °C |
| Standard designation | M12 connector |
| Standards/regulations | IEC 61076-2-101 |

Connection 2

| | |
|--|--|
| Dimensional drawing |  <p>Connector pin assignment plug RJ45</p> |
| Type | RJ45, straight |
| Signal type/category | PROFINET CAT5 (IEC 11801), 100 Mbps EtherCAT® CAT5 (IEC 11801) |
| Insertion/withdrawal cycles | ≥ 750 |
| Insulation resistance | ≥ 100 MΩ |
| Overvoltage category | I |
| Degree of pollution | 2 |
| Material Contact | CuSn |
| Material Contact surface | Ni/Au |
| Material Contact carrier | PA |
| Material Housing | PA |
| Color (Housing) | black |
| Flammability rating according to UL 94 | V2 |
| Degree of protection | IP20 |
| Ambient temperature (operation) | -25 °C ... 80 °C |

Cable/line

| | |
|----------------------------------|--|
| Cable length | Free input (0.2 m ... 100.0 m) |
| PROFINET PVC stranded CAT5 [93B] | |
| UL AWM Style | 21695 (80 °C / 600 V) |
| Number of positions | 4 |
| Shielded | yes |
| Cable type | PROFINET PVC stranded CAT5 [93B] PROFINET PVC stranded CAT5 93B |

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| | |
|---|--|
| Conductor structure | 1x4xAWG22/7, SF/TQ |
| AWG signal line | 22 |
| Conductor cross-section | 4x 0.34 mm ² |
| Wire diameter incl. insulation | 1.5 mm ±0.1 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 |
| Overall twist | Star quad |
| Shielding | Aluminum-coated foil, tinned copper braided shield |
| Optical shield covering | 85 % |
| Insulation resistance | ≥ 5 GΩ*km |
| Loop resistance | ≤ 120.00 Ω/km |
| Wave impedance | 100 Ω ±5 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 | 4 x D |
| Minimum bending radius, flexible installation | 8 x D |
| Flame resistance | UL 1581, Section 1060 and UL 2556, Section 9.3 (FT1) UL 1685 (CSA FT 4) UL 1581, Section 1100 and UL 2556, Section 9.1 (HFT/FT2) |
| Resistance to oil | OIL RES I according to UL 2256 |
| Other resistance | UV resistant (according to UL 1581, Section 1200) |
| Ambient temperature (operation) | -40 °C ... 80 °C (cable, fixed installation) -10 °C ... 70 °C (Cable, flexible installation) |

PROFINET drag chain CAT5 [93C]

| | |
|--------------------------------|--|
| UL AWM Style | 20233 (80°C/300 V) |
| Number of positions | 4 |
| Shielded | yes |
| Cable type | PROFINET drag chain CAT5 [93C] PROFINET drag chain CAT5 93C |
| Conductor structure | 1x4xAWG22/7, SF/TQ |
| AWG signal line | 22 |
| Conductor cross-section | 4x 0.34 mm ² |
| Wire diameter incl. insulation | 1.5 mm ±0.05 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 |

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| | |
|---|---|
| Single wire, color | white, yellow, blue, orange |
| Overall twist | Star quad |
| Shielding | Aluminum-coated foil, tinned copper braided shield |
| Optical shield covering | 85 % |
| Insulation resistance | ≥ 500 MΩ*km |
| Loop resistance | ≤ 120.00 Ω/km |
| Wave impedance | 100 Ω ±15 Ω (at 1 ... 100 MHz) |
| Nominal voltage, cable | ≤ 300 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 | 5 x D |
| Minimum bending radius, flexible installation | 7.5 x D |
| Dynamic load capacity (bending) | Max. bending cycles: 3000000, Bending radius: 200 mm, Traversing path: 10 m, Traversing rate: 4 m/s, Acceleration: 4 m/s ² |
| Dynamic load capacity (torsion) | Torsion: ±30 °/m |
| Halogen-free | according to IEC 60754-1 |
| Flame resistance | according to IEC 60332-1-2 in accordance with UN ECE-R 118.03 according to CSA C 22.2 No. 210-FT1 |
| Resistance to oil | in accordance with DIN EN 60811-404 |
| Other resistance | UV resistant |
| Special properties | Flexible cable conduit capable |
| Ambient temperature (operation) | -40 °C ... 70 °C (cable, fixed installation) -40 °C ... 70 °C (Cable, flexible installation) |

PROFINET robot CAT5 [93R]

| | |
|---------------------------------|--|
| Cable weight | 55 kg/km |
| UL AWM Style | 20233 (80°C/300 V) |
| Number of positions | 4 |
| Shielded | yes |
| Cable type | PROFINET robot CAT5 [93R] PROFINET robot CAT5 93R |
| Conductor structure | 1x4xAWG22/19, S/TQ |
| Signal runtime | 4.8 ns/m |
| Conductor structure signal line | 19x 0.15 mm |
| AWG signal line | 22 |
| Conductor cross-section | 4x 0.34 mm ² |
| 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 | Foamed PE |
| Single wire, color | white, yellow, blue, orange |

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| | |
|---|---|
| Thickness, outer sheath | approx. 1.00 mm |
| Overall twist | Star quad |
| Shielding | Tinned copper braided shield |
| Optical shield covering | 85 % |
| Insulation resistance | ≥ 500 MΩ*km |
| Loop resistance | ≤ 120.00 Ω/km |
| Wave impedance | 100 Ω ±5 Ω (at 100 MHz) |
| Nominal voltage, cable | 300 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 | 5 x D |
| Smallest bending radius, fixed installation | 33 mm |
| Dynamic load capacity (torsion) | Torsion: ±180 °/m, Torsion cycles: 1000000 |
| Wave attenuation | 2.9 dB (with 1 MHz) |
| | 5 dB (at 4 MHz) |
| | 8.1 dB (at 10 MHz) |
| | 10.4 dB (at 16 MHz) |
| | 11.9 dB (at 20 MHz) |
| | 15.5 dB (at 31.25 MHz) |
| | 26.5 dB (at 62.5 MHz) |
| | 41 dB (at 100 MHz) |
| Halogen-free | according to IEC 60754-1 |
| Flame resistance | according to IEC 60332-1-2 |
| Resistance to oil | in accordance with DIN EN 60811-2-1 |
| Other resistance | UV resistant (according to UL 1581, Section 1200) |
| Ambient temperature (operation) | -40 °C ... 80 °C |
| | -40 °C ... 80 °C |

PROFINET RADOX® railway application CAT5 [937]

| | |
|---------------------------------|--|
| Cable weight | 70 kg/km |
| Number of positions | 4 |
| Shielded | yes |
| Cable type | PROFINET RADOX® railway application CAT5 [937] |
| | PROFINET RADOX® railway application CAT5 937 |
| Conductor structure | 1x4xAWG22/7, SF/TQ |
| Signal speed | 75 c |
| Conductor structure signal line | 7x 0.25 mm |
| AWG signal line | 22 |
| Conductor cross-section | 4x 0.34 mm ² |
| Wire diameter incl. insulation | approx. 1.5 mm |
| External cable diameter | 6.60 mm ±0.4 mm |
| Outer sheath, material | PE-X |
| External sheath, color | black RAL 9005 |
| Conductor material | silver-plated Cu litz wires |

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| | |
|---|--|
| Material wire insulation | Foamed PE |
| Single wire, color | white-blue, orange-yellow |
| Thickness, outer sheath | approx. 1.00 mm |
| Overall twist | Star quad |
| Shielding | Plastic-coated aluminum foil, tinned copper braided shield |
| Max. conductor resistance | ≤ 54.4 Ω/km |
| Coupling resistance | 200.00 mΩ/m (f ≤ 30 MHz) |
| Wave impedance | 100 Ω ±5 Ω (f = 100 MHz) |
| Working capacitance | ≤ 65 pF (Line-line) |
| | ≤ 100 pF (Line-shield) |
| Nominal voltage, cable | 300 V AC |
| Test voltage | 2000 V AC (50 Hz, 5 minutes) |
| Minimum bending radius, fixed installation | 6 x D |
| Smallest bending radius, fixed installation | 40 mm |
| Near end crosstalk attenuation (NEXT) | 73 dB (with 1 MHz) |
| | 70 dB (at 4 MHz) |
| | 65 dB (at 10 MHz) |
| | 57 dB (at 31.5 MHz) |
| | 52 dB (at 62.5 MHz) |
| | 48 dB (at 100 MHz) |
| Return attenuation (RL) | 25 dB (at 4 MHz) |
| | 30 dB (at 10 MHz) |
| | 30 dB (at 31.5 MHz) |
| | 30 dB (at 62.5 MHz) |
| | 28 dB (at 100 MHz) |
| Remote crosstalk attenuation (FEXT) | 25 dB (at 4 MHz) |
| | 30 dB (at 10 MHz) |
| | 30 dB (at 31.5 MHz) |
| | 30 dB (at 62.5 MHz) |
| | 28 dB (at 100 MHz) |
| Wave attenuation | 2 dB (with 1 MHz) |
| | 4.4 dB (at 4 MHz) |
| | 7.4 dB (at 10 MHz) |
| | 14 dB (at 31.5 MHz) |
| | 20 dB (at 62.5 MHz) |
| | 26 dB (at 100 MHz) |
| Halogen-free | in accordance with EN 50267-2-1 |
| Flame resistance | IEC 60332-1-2 |
| | EN 50266 |
| | EN 60332-3-25 |
| | NF C32-070, 2.1 |
| | NF C32-070, 2.2 |
| | UL 1685, 12 (FT4) |
| | in accordance with ISO 6722-1 5.22 (UN ECE-R 118.01) |

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|----------------------------------|--|
| Fume corrosiveness | EN 50267-2-2 |
| Fume toxicity | BS 6853 B.1 |
| | EN 50305, 9.2 |
| Concentration of fumes | BS 6853 D.8.7 |
| | EN 61034-2 |
| | UL 1685, 12 (FT4) |
| Resistance to oil | according to IRM 902, 72 h at 100 °C |
| Fire protection in rail vehicles | BS 6853 (Category Ia, Ib, II) |
| | GM/RT 2130 (Category Ia, Ib, II) |
| | EN 45545 (Risk level HL1 - HL3) |
| | DIN 5510 (Fire protection level 1, 2, 3, 4) |
| | NF F16-101 (Category A1, A2, B) |
| | NF F16-101 (Class C/F0) |
| | NFPA 130 |
| | UNI CEI 11170 (Risk level LR1 - LR4) |
| Other resistance | Resistance to fuels (according to IRM 903, 168 h at 70 °C) |
| Ambient temperature (operation) | -50 °C ... 90 °C (cable, fixed installation) |
| | -40 °C ... 90 °C (Cable, flexible installation) |

PROFINET stranded CAT5 [93M]

| | |
|--------------------------------|--|
| UL AWM Style | 21238 (80 °C / 600 V) |
| Number of positions | 4 |
| Shielded | yes |
| Cable type | PROFINET stranded CAT5 [93M] |
| | PROFINET stranded CAT5 93M |
| Conductor structure | 1x4xAWG22/7, SF/TQ |
| AWG signal line | 22 |
| Conductor cross-section | 4x 0.34 mm ² |
| Wire diameter incl. insulation | 1.56 mm ±0.05 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 |
| Overall twist | Star quad |
| Shielding | Aluminum-coated foil, tinned copper braided shield |
| Optical shield covering | 85 % |
| Insulation resistance | ≥ 500 MΩ*km |
| Loop resistance | ≤ 120.00 Ω/km |
| Wave impedance | 100 Ω ±15 Ω (at 100 MHz) |
| Nominal voltage, cable | ≤ 100 V |
| Test voltage Core/Core | 2000 V (50 Hz, 1 min.) |
| Test voltage Core/Shield | 2000.00 V (50 Hz, 1 min.) |

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| | |
|---|---|
| Minimum bending radius, fixed installation | 5 x D |
| Minimum bending radius, flexible installation | 10 x D |
| Halogen-free | according to IEC 60754-1 |
| Flame resistance | according to CSA C 22.2 No. 210-FT1 |
| Ambient temperature (operation) | -40 °C ... 80 °C |
| | -40 °C ... 80 °C (Cable, flexible installation) |

Sercos III [93K]

| | |
|---|---|
| Cable weight | 68 kg/km |
| UL AWM Style | 21694 (60 °C / 600 V) |
| Number of positions | 4 |
| Shielded | yes |
| Cable type | Sercos III [93K] Sercos III 93K |
| Conductor structure | 1x4xAWG22/7, SF/TQ |
| Signal runtime | 5.3 ns/m |
| Conductor structure signal line | 7x 0.25 mm |
| AWG signal line | 22 |
| Conductor cross-section | 4x 0.34 mm ² |
| Wire diameter incl. insulation | approx. 1.55 mm |
| External cable diameter | 6.50 mm ±0.2 mm |
| Outer sheath, material | PVC |
| External sheath, color | signal red RAL 3020 |
| 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 |
| Type of pair shielding | Aluminum-lined polyester foil |
| Overall twist | Star quad |
| Shielding | Tinned copper braided shield |
| Max. conductor resistance | ≤ 120 Ω/km |
| Insulation resistance | ≥ 0.5 GΩ*km |
| Coupling resistance | ≤ 20.00 mΩ/m (at 10 Hz) |
| 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) |

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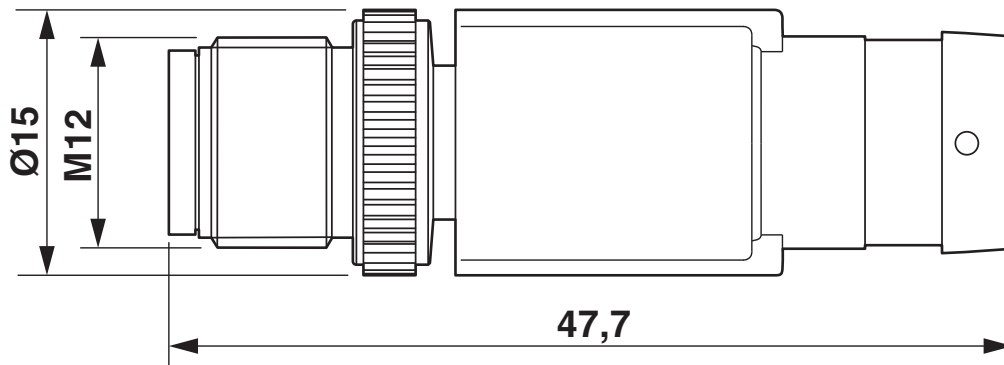
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| | |
|---------------------------------|---|
| Ambient temperature (operation) | -40 °C ... 70 °C (cable, fixed installation) |
| | -40 °C ... 70 °C (Cable, flexible installation) |

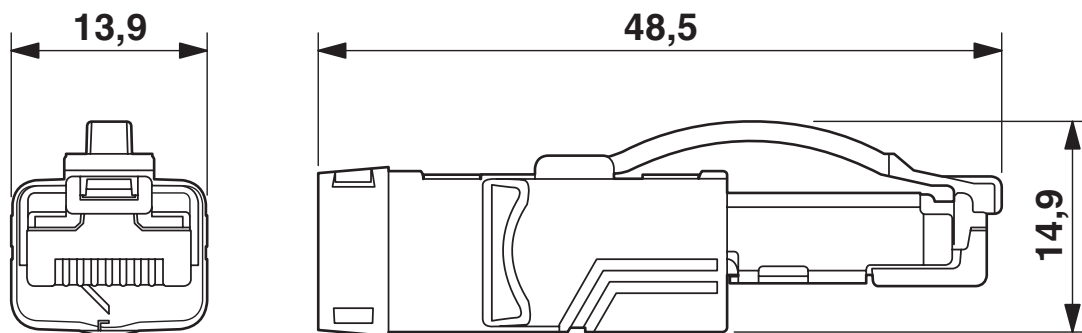
Drawings

Dimensional drawing



Plug, M12 x 1, straight, shielded

Dimensional drawing

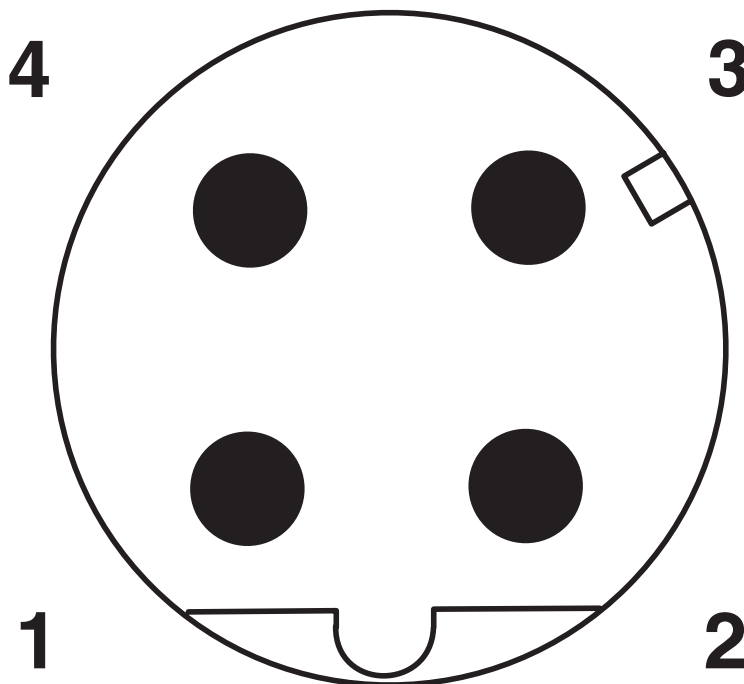


RJ45 connector, IP20

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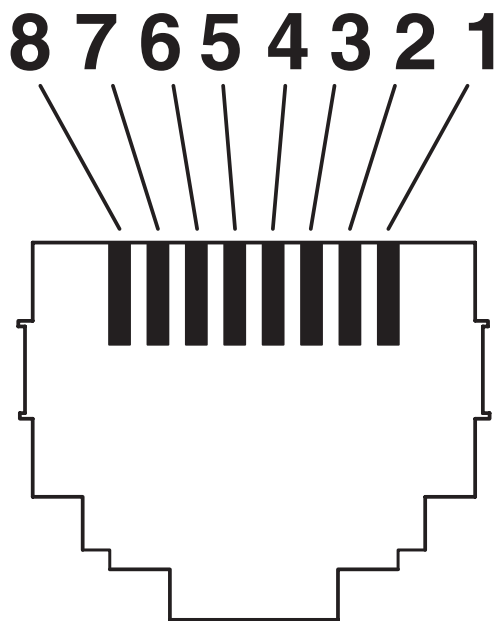
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Schematic diagram



Pin assignment M12 male connector, 4-pos., D-coded, male side

Schematic diagram



Connector pin assignment plug RJ45

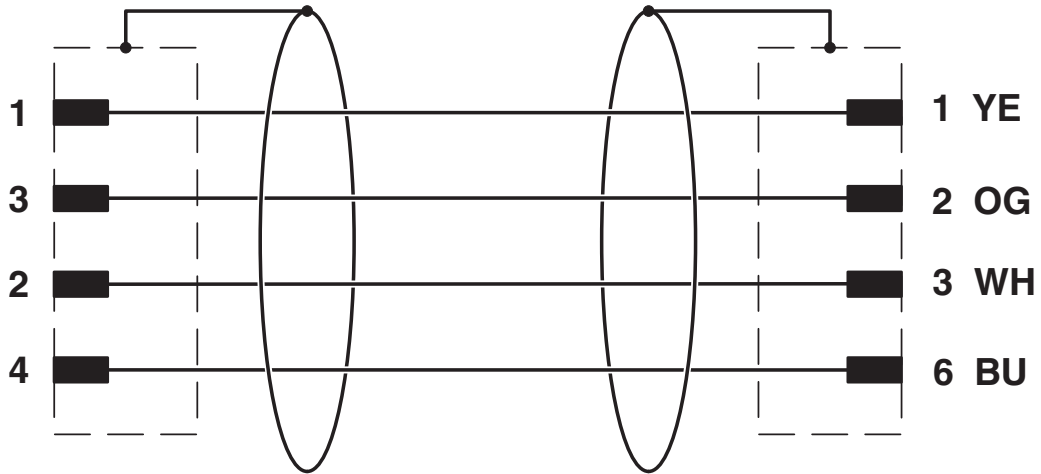
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Circuit diagram



Contact assignment of the M12 and RJ45 plug

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Approvals

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|  UL Listed Approval ID: FILE E 335024 | | | | |
|--|-----------------------|-----------------------|-------------------|-----------------------------|
| | Nominal voltage U_N | Nominal current I_N | Cross section AWG | Cross section mm^2 |
| keine | | | | |
| | 30 V | 4 A | - | - |

|  cUL Listed Approval ID: FILE E 335024 | | | | |
|---|-----------------------|-----------------------|-------------------|-----------------------------|
| | Nominal voltage U_N | Nominal current I_N | Cross section AWG | Cross section mm^2 |
| keine | | | | |
| | 60 V | 0.5 A | - | - |

|  EAC-RoHS Approval ID: RU D-DE.HB35.B.00387 | | | | |
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Classifications

ECLASS

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

UNSPSC

| | |
|-------------|----------|
| UNSPSC 21.0 | 26121600 |
|-------------|----------|

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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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