

## Network cable - NBC-MSD/2,0-937/MSD RX-TX - 1412282

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Network cable, PROFINET CAT5, PROFINET CAT5e, 4-pos., RADOX® GKW S, RAL 9005 (black), shielded, straight M12-SPEEDCON plug/IP65, coding: D to straight M12-SPEEDCON plug/IP65, coding D, cable length: 2 m, product checked according to customer specification/railway application



### Key Commercial Data

|                        |                                                                                                         |
|------------------------|---------------------------------------------------------------------------------------------------------|
| Packing unit           | 1 pc                                                                                                    |
| Minimum order quantity | 50 pc                                                                                                   |
| GTIN                   | <br>4 046356 953146 |
| GTIN                   | 4046356953146                                                                                           |

### Technical data

#### Dimensions

|                 |     |
|-----------------|-----|
| Length of cable | 2 m |
|-----------------|-----|

#### General data

|                       |                                |
|-----------------------|--------------------------------|
| Rated current at 40°C | 4 A                            |
| Rated voltage         | 48 V AC                        |
|                       | 60 V DC                        |
| Number of positions   | 4                              |
| Signal type/category  | PROFINET CAT5 (IEC 11801:2002) |
| Standards/regulations | M12 connector IEC 61076-2-101  |
| Overvoltage category  | II                             |
| Degree of pollution   | 3                              |

#### Characteristics head 2

|                                          |                                   |
|------------------------------------------|-----------------------------------|
| Head type                                | Plug straight M12 SPEEDCON / IP65 |
| No. of positions (pin connector pattern) | 4                                 |
| Coding                                   | D (Data)                          |
| Color                                    | black                             |
| Material (component)                     | CuSn (Contact)                    |

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### Characteristics head 2

|                                 |                                                                  |
|---------------------------------|------------------------------------------------------------------|
|                                 | Ni/Au (Contact surface)                                          |
|                                 | PA (Contact carriers)                                            |
|                                 | TPU, hardly inflammable, self-extinguishing (Grip)               |
|                                 | Zinc die-cast, nickel-plated (Screw connection)                  |
| Shielded                        | yes                                                              |
| Insulation resistance           | $\geq 100 \text{ M}\Omega$                                       |
| Insertion/withdrawal cycles     | $\geq 100$ (Quantity: 500 with Phoenix Contact mating connector) |
| Torque                          | 0.4 Nm                                                           |
| Ambient temperature (operation) | -40 °C ... 90 °C                                                 |
| Weight                          | 10 g $\pm$ 5 g                                                   |

### Standards and Regulations

|                                        |                 |
|----------------------------------------|-----------------|
| Standard designation                   | M12 connector   |
| Standards/regulations                  | IEC 61076-2-101 |
| Flammability rating according to UL 94 | V0              |

### Cable

|                                            |                                                            |
|--------------------------------------------|------------------------------------------------------------|
| Cable type                                 | PROFINET railway applications                              |
| Cable type (abbreviation)                  | 937                                                        |
| Signal type/category                       | PROFINET CAT5 (IEC 11801), 100 Mbps                        |
|                                            | EtherCAT <sup>®</sup> CAT5 (IEC 11801), 100 Mbps           |
| Cable structure                            | 1x4xAWG22/7; SF/TQ                                         |
| Conductor cross section                    | 4x 0.34 mm <sup>2</sup>                                    |
| AWG signal line                            | 22                                                         |
| Conductor structure signal line            | 7x 0.25 mm                                                 |
| Core diameter including insulation         | approx. 1.5 mm                                             |
| Wire colors                                | white-blue, orange-yellow                                  |
| Overall twist                              | Star quad                                                  |
| Shielding                                  | Plastic-coated aluminum foil, tinned copper braided shield |
| External sheath, color                     | black RAL 9005                                             |
| Outer sheath thickness                     | approx. 1 mm                                               |
| External cable diameter D                  | 6.6 mm $\pm$ 0.4 mm                                        |
| Minimum bending radius, fixed installation | 6 x D                                                      |
| Cable weight                               | 70 kg/km                                                   |
| Outer sheath, material                     | PE-X                                                       |
| Material conductor insulation              | Foamed PE                                                  |
| Conductor material                         | silver-plated Cu litz wires                                |
| Conductor resistance                       | $\leq 54.4 \text{ }\Omega/\text{km}$                       |
| Working capacitance                        | $\leq 65 \text{ pF (core-core)}$                           |
|                                            | $\leq 100 \text{ pF (core-shield)}$                        |
| Wave impedance                             | 100 $\Omega \pm 5 \text{ }\Omega$ (f = 100 MHz)            |
| Near end crosstalk attenuation (NEXT)      | 73 dB (with 1 MHz)                                         |

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## Technical data

### Cable

|                                     |                                             |
|-------------------------------------|---------------------------------------------|
|                                     | 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)                          |
| Remote crosstalk attenuation (FEXT) | 78 dB (with 1 MHz)                          |
|                                     | 77 dB (at 4 MHz)                            |
|                                     | 70 dB (at 10 MHz)                           |
|                                     | 65 dB (at 31.5 MHz)                         |
|                                     | 56 dB (at 62.5 MHz)                         |
|                                     | 48 dB (at 100 MHz)                          |
| 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)                          |
| Return loss (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)                          |
| Signal speed                        | 75 c                                        |
| Shield attenuation                  | 40 dB (30 MHz ≤ f ≤ 100 MHz)                |
| Coupling resistance                 | 200.00 mΩ/m (f ≤ 30 MHz)                    |
| Nominal voltage, cable              | 300 V AC                                    |
| Test voltage, cable                 | 2000 V AC (50 Hz, 5 minutes)                |
| 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)        |
| Flame resistance                    | EN 60332-1-2                                |
|                                     | EN 50266                                    |
|                                     | EN 60332-3-25                               |
|                                     | NF C32-070, 2.1                             |
|                                     | NF C32-070, 2.2                             |

## Network cable - NBC-MSD/2,0-937/MSD RX-TX - 1412282

### Technical data

#### Cable

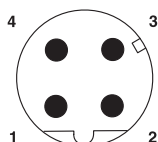
|                                    |                                                          |
|------------------------------------|----------------------------------------------------------|
|                                    | UL 1685, 12 (FT4)                                        |
|                                    | in accordance with ISO 6722-1 5.22 (UN ECE-R 118.01)     |
| Halogen-free                       | According to EN 50267-2-1                                |
| Resistance to oil                  | according to IRM 902, 72 h at 100 °C                     |
| Other resistance                   | Resistance to fuels according to IRM 903, 168 h at 70 °C |
| Concentration of fumes             | BS 6853 D.8.7                                            |
|                                    | EN 61034-2                                               |
|                                    | UL 1685, 12 (FT4)                                        |
| Fume corrosiveness                 | EN 50267-2-2                                             |
| Fume toxicity                      | BS 6853 B.1                                              |
|                                    | EN 50305, 9.2                                            |
| Ambient temperature (operation)    | -50 °C ... 90 °C (cable, fixed installation)             |
|                                    | -40 °C ... 90 °C (cable, flexible installation)          |
| Ambient temperature (installation) | -25 °C ... 90 °C                                         |

#### Environmental Product Compliance

|            |                                                         |
|------------|---------------------------------------------------------|
| China RoHS | Environmentally friendly use period: unlimited = EFUP-e |
|            | No hazardous substances above threshold values          |

### Drawings

Schematic diagram



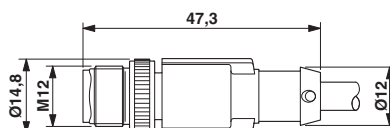
Pin assignment M12 male connector, 4-pos., D-coded, male side

Cable cross section



PROFINET railway applications [937]

Dimensional drawing



M12 SPEEDCON plug, straight, shielded

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