

## Network cable - NBC-MSD/ 2,0-937/MSD SCO RAIL - 1407342

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Network cable, PROFINET CAT5 (100 Mbps), Ethernet CAT5 (100 Mbps), 4-position, PE-X, black RAL 9005, shielded, Plug straight M12 SPEEDCON / IP65, coding: D, on Plug straight M12 SPEEDCON / IP65, coding: D, cable length: 2 m, For railway applications

### Your advantages

- ✓ Easy and safe: 100% electrically tested plug-in components
- ✓ Safety thanks to flame retardancy: PA 6.6 grip and radiation-cross-linked cables satisfy the most stringent requirements
- ✓ Securely locked by special vibration brake
- ✓ Resistant to temperature influences – tested for an extended temperature range and for resistance to temperature shocks
- ✓ Reliable signal transmission – 360° shielding in environments with electromagnetic interference



### Key Commercial Data

Packing unit	1 pc
GTIN	 4 046356 774581
GTIN	4046356774581
Weight per Piece (excluding packing)	150.000 g
Custom tariff number	85444290
Country of origin	Poland

### Technical data

#### Dimensions

Length of cable	2 m
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#### Ambient conditions

Degree of protection	IP65
Ambient temperature (operation)	-40 °C ... 85 °C (Plug / socket)

#### General data

Note	Further products with variable cable type and variable cable length can be found in the accessories section
Rated current at 40°C	4 A

# Network cable - NBC-MSD/ 2,0-937/MSD SCO RAIL - 1407342

## Technical data

### General data

Rated voltage	48 V AC
	60 V DC
Number of positions	4
Signal type/category	PROFINET CAT5 (IEC 11801), 100 Mbps
	Ethernet CAT5 (IEC 11801), 100 Mbps
Standards/regulations	M12 connector IEC 61076-2-101
	Shock, vibration EN 50155
Overvoltage category	II
Degree of pollution	3
Contact material	CuSn
Contact carrier material	PA 6.6
Contact surface material	Ni/Au

### Characteristics head 1

Head type	Plug straight M12 SPEEDCON / IP65
No. of positions (pin connector pattern)	4
Coding	D (Data)
Color	black
Material (component)	CuSn (Contact)
	Ni/Au (Contact surface)
	PA 6.6 (Contact carriers)
	PA 6.6 (Grip)
	Zinc die-cast, nickel-plated (Screw connection)
Standards/regulations material	PA 6.6: Fire protection in rail vehicles - requirement sets R22, R23, and R24 acc. to DIN EN 45545-2 (Risk level HL1 - HL3)
Shielded	yes
Insulation resistance	≥ 100 MΩ
Insertion/withdrawal cycles	≥ 100
Torque	0.4 Nm
Ambient temperature (operation)	-40 °C ... 85 °C

### Characteristics head 2

Head type	Plug straight M12 SPEEDCON / IP65
No. of positions (pin connector pattern)	4
Coding	D (Data)
Color	black
	black
Material (component)	CuSn (Contact)
	Ni/Au (Contact surface)
	PA 6.6 (Contact carriers)
	PA 6.6 (Grip)
	Zinc die-cast, nickel-plated (Screw connection)

# Network cable - NBC-MSD/ 2,0-937/MSD SCO RAIL - 1407342

## Technical data

### Characteristics head 2

Standards/regulations material	PA 6.6: Fire protection in rail vehicles - requirement sets R22, R23, and R24 acc. to DIN EN 45545-2 (Risk level HL1 - HL3)
Shielded	yes
Insulation resistance	≥ 100 MΩ
Insertion/withdrawal cycles	≥ 100
Torque	0.4 Nm
Ambient temperature (operation)	-40 °C ... 85 °C

### Standards and Regulations

Standard designation	M12 connector
Standards/regulations	IEC 61076-2-101
Standard designation	Shock, vibration
Standards/regulations	EN 50155
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® 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 ±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	≤ 54.4 Ω/km
Working capacitance	≤ 65 pF (core-core) ≤ 100 pF (core-shield)
Wave impedance	100 Ω ±5 Ω (f = 100 MHz)
Near end crosstalk attenuation (NEXT)	73 dB (with 1 MHz) 70 dB (at 4 MHz)

## Network cable - NBC-MSD/ 2,0-937/MSD SCO RAIL - 1407342

### Technical data

#### Cable

	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
	UL 1685, 12 (FT4)

# Network cable - NBC-MSD/ 2,0-937/MSD SCO RAIL - 1407342

## Technical data

### Cable

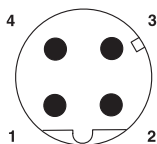
	in accordance with ISO 6722-1 5.22 (UN ECE-R 118.01)
Halogen-free	According to EN 50267-2-1
Resistance to oil	according to IRM 902, 72 h at 100 °C
Other resistance	Resistance to fuels according to IRM 903, 168 h at 70 °C
Concentration of fumes	BS 6853 D.8.7
	EN 61034-2
	UL 1685, 12 (FT4)
Fume corrosiveness	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



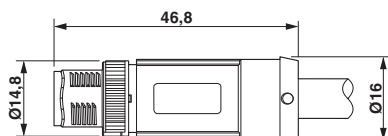
Pin assignment M12 male connector, 4-pos., D-coded, male side

Cable cross section



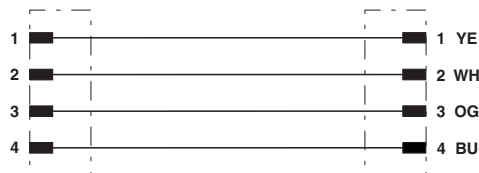
PROFINET railway applications [937]

Dimensional drawing



M12 SPEEDCON plug, straight, shielded

Circuit diagram



Contact assignment of the M12 plugs

## Network cable - NBC-MSD/ 2,0-937/MSD SCO RAIL - 1407342

### Classifications

#### eCl@ss

eCl@ss 4.0	27060307
eCl@ss 4.1	27060307
eCl@ss 5.0	27060307
eCl@ss 5.1	27060300
eCl@ss 6.0	27279200
eCl@ss 7.0	27279218
eCl@ss 8.0	27279218
eCl@ss 9.0	27060308

#### ETIM

ETIM 3.0	EC000830
ETIM 4.0	EC001855
ETIM 5.0	EC002599
ETIM 6.0	EC000830

#### UNSPSC

UNSPSC 6.01	31261501
UNSPSC 7.0901	31261501
UNSPSC 11	31261501
UNSPSC 12.01	31261501
UNSPSC 13.2	31251501

### Accessories

#### Accessories

##### Conductor marking

Cable marker - WMTB HF (40X12)R YE - 0830408



Cable marker, Roll, yellow, unlabeled, can be labeled with: THERMOMARK ROLLMASTER 300/600, THERMOMARK X1.2, THERMOMARK ROLL X1, THERMOMARK ROLL 2.0, THERMOMARK ROLL, mounting type: Assembly with cable binders, cable diameter:  $\geq 6$  mm, lettering field size: 40 x 12 mm

Cable marker - WMTB HF (55X15)R YE - 0830410



Cable marker, Roll, yellow, unlabeled, can be labeled with: THERMOMARK ROLLMASTER 300/600, THERMOMARK X1.2, THERMOMARK ROLL X1, THERMOMARK ROLL 2.0, THERMOMARK ROLL, mounting type: Assembly with cable binders, cable diameter:  $\geq 6$  mm, lettering field size: 55 x 15 mm

## Network cable - NBC-MSD/ 2,0-937/MSD SCO RAIL - 1407342

### Accessories

Cable marker - WMTB HF (55X25)R YE - 0830412



Cable marker, Roll, yellow, unlabeled, can be labeled with: THERMOMARK ROLLMASTER 300/600, THERMOMARK X1.2, THERMOMARK ROLL X1, THERMOMARK ROLL 2.0, THERMOMARK ROLL, mounting type: Assembly with cable binders, cable diameter:  $\geq 6$  mm, lettering field size: 55 x 25 mm

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Conductor marking - UCT-WMCO 5,4 (23X8) - 0832105



Conductor marking, Sheet, white, unlabeled, can be labeled with: TOPMARK NEO, TOPMARK LASER, BLUEMARK ID COLOR, BLUEMARK ID, BLUEMARK CLED, THERMOMARK PRIME, THERMOMARK CARD 2.0, THERMOMARK CARD, mounting type: clip on, cable diameter range: 4.7 - 5.4 mm, lettering field size: 23 x 8 mm

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Conductor marking - UCT-WMCO 6,1 (23X8) - 0832106



Conductor marking, Sheet, white, unlabeled, can be labeled with: TOPMARK NEO, TOPMARK LASER, BLUEMARK ID COLOR, BLUEMARK ID, BLUEMARK CLED, THERMOMARK PRIME, THERMOMARK CARD 2.0, THERMOMARK CARD, mounting type: clip on, cable diameter range: 5.4 - 6.1 mm, lettering field size: 23 x 8 mm

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Conductor marking - UCT-WMCO 6,8 (23X8) - 0832107



Conductor marking, Sheet, white, unlabeled, can be labeled with: TOPMARK NEO, TOPMARK LASER, BLUEMARK ID COLOR, BLUEMARK ID, BLUEMARK CLED, THERMOMARK PRIME, THERMOMARK CARD 2.0, THERMOMARK CARD, mounting type: clip on, cable diameter range: 6.1 - 6.8 mm, lettering field size: 23 x 8 mm

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Conductor marking - UCT-WMCO 7,5 (23X8) - 0832108



Conductor marking, Sheet, white, unlabeled, can be labeled with: TOPMARK NEO, TOPMARK LASER, BLUEMARK ID COLOR, BLUEMARK ID, BLUEMARK CLED, THERMOMARK PRIME, THERMOMARK CARD 2.0, THERMOMARK CARD, mounting type: clip on, cable diameter range: 6.8 - 7.5 mm, lettering field size: 23 x 8 mm

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## Network cable - NBC-MSD/ 2,0-937/MSD SCO RAIL - 1407342

### Accessories

Cable marker - WMTB-AL (40X15) - 0830524



Cable marker, Aluminum label, aluminum color, unlabeled, can be labeled with: BLUEMARK ID COLOR, BLUEMARK ID, BLUEMARK CLED, mounting type: Assembly with cable binders, cable diameter: > 4.6 mm, lettering field size: 40 x 15 mm

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Cable marker - WMTB-AL (60X15) - 0830525



Cable marker, Aluminum label, aluminum color, unlabeled, can be labeled with: BLUEMARK ID COLOR, BLUEMARK ID, BLUEMARK CLED, mounting type: Assembly with cable binders, cable diameter: > 4.6 mm, lettering field size: 60 x 15 mm

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Cable marker - LS-WMTB-AL (40X15) - 0831501



Cable marker, Aluminum label, aluminum color, unlabeled, can be labeled with: TOPMARK NEO, TOPMARK LASER, mounting type: Assembly with cable binders, cable diameter: > 4.6 mm, lettering field size: 40 x 15 mm

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Cable marker - LS-WMTB-AL (40X15) BK - 0831509



Cable marker, Aluminum label, black, unlabeled, can be labeled with: TOPMARK NEO, TOPMARK LASER, mounting type: Assembly with cable binders, cable diameter: > 4.6 mm, lettering field size: 40 x 15 mm

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Cable marker - LS-WMTB-AL (60X15) - 0831502



Cable marker, Aluminum label, aluminum color, unlabeled, can be labeled with: TOPMARK NEO, TOPMARK LASER, mounting type: Assembly with cable binders, cable diameter: > 4.6 mm, lettering field size: 60 x 15 mm

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## Network cable - NBC-MSD/ 2,0-937/MSD SCO RAIL - 1407342

### Accessories

#### Cable marker - LS-WMTB-AL (60X15) BK - 0831510

Cable marker, Aluminum label, black, unlabeled, can be labeled with: TOPMARK NEO, TOPMARK LASER, mounting type: Assembly with cable binders, cable diameter: > 4.6 mm, lettering field size: 60 x 15 mm



#### Cable marker - LS-WMTB-AL (100X15) - 0831503

Cable marker, Aluminum label, aluminum color, unlabeled, can be labeled with: TOPMARK NEO, TOPMARK LASER, mounting type: Assembly with cable binders, cable diameter: > 4.6 mm, lettering field size: 100 x 15 mm



#### Cable marker - LS-WMTB-AL (100X15) BK - 0831511

Cable marker, Aluminum label, black, unlabeled, can be labeled with: TOPMARK NEO, TOPMARK LASER, mounting type: Assembly with cable binders, cable diameter: > 4.6 mm, lettering field size: 100 x 15 mm



### Data cable preassembled

#### Network cable - NBC-MSD SCO RAIL/.../... - 1412178



Network cable, PROFINET CAT5 (100 Mbps), Ethernet CAT5 (100 Mbps), 4-position, Variable cable type, shielded, Plug straight M12 SPEEDCON / IP65, coding: D, on free cable end, cable length: Free input (0.2 ... 40.0 m), For railway applications

#### Network cable - NBC-MRD SCO RAIL/.../... - 1412179



Network cable, PROFINET CAT5 (100 Mbps), Ethernet CAT5 (100 Mbps), 4-position, Variable cable type, shielded, Plug angled M12 SPEEDCON / IP65, coding: D, on free cable end, cable length: Free input (0.2 ... 40.0 m), For railway applications

## Network cable - NBC-MSD/ 2,0-937/MSD SCO RAIL - 1407342

### Accessories

Network cable - NBC-MSD-MSD SCO RAIL/.../... - 1412177



Network cable, PROFINET CAT5 (100 Mbps), Ethernet CAT5 (100 Mbps), 4-position, Variable cable type, shielded, Plug straight M12 SPEEDCON / IP65, coding: D, on Plug straight M12 SPEEDCON / IP65, coding: D, cable length: Free input (0.2 ... 40.0 m), For railway applications

Network cable - NBC-FSD SCO RAIL/.../... - 1412181



Network cable, PROFINET CAT5 (100 Mbps), Ethernet CAT5 (100 Mbps), 4-position, Variable cable type, shielded, free cable end, on Socket straight M12 SPEEDCON / IP65, coding: D, cable length: Free input (0.2 ... 40.0 m), For railway applications

Network cable - NBC-FRD SCO RAIL/.../... - 1412182



Network cable, PROFINET CAT5 (100 Mbps), Ethernet CAT5 (100 Mbps), 4-position, Variable cable type, shielded, free cable end, on Socket angled M12 SPEEDCON / IP65, coding: D, cable length: Free input (0.2 ... 40.0 m), For railway applications

Network cable - NBC-MSD-FSD SCO RAIL/.../... - 1412180



Network cable, PROFINET CAT5 (100 Mbps), Ethernet CAT5 (100 Mbps), 4-position, Variable cable type, shielded, Plug straight M12 SPEEDCON / IP65, coding: D, on Socket straight M12 SPEEDCON / IP65, coding: D, cable length: Free input (0.2 ... 40.0 m), For railway applications

Network cable - NBC-MSD-QCMS SCO RAIL/.../... - 1412183



Network cable, PROFINET CAT5 (100 Mbps), Ethernet CAT5 (100 Mbps), 4-position, Variable cable type, shielded, Plug straight M12 SPEEDCON / IP65, coding: D, on EMC pin insert straight / IP20, cable length: Free input (0.2 ... 40.0 m), For railway applications

## Network cable - NBC-MSD/ 2,0-937/MSD SCO RAIL - 1407342

### Accessories

#### Network cable - NBC-MSD-QCFS SCO RAIL/.../... - 1412184



Network cable, PROFINET CAT5 (100 Mbps), Ethernet CAT5 (100 Mbps), 4-position, Variable cable type, shielded, Plug straight M12 SPEEDCON / IP65, coding: D, on EMC socket insert straight / IP20, cable length: Free input (0.2 ... 40.0 m), For railway applications

#### Network cable - NBC-QCMS RAIL/.../... - 1412186



Network cable, PROFINET CAT5 (100 Mbps), Ethernet CAT5 (100 Mbps), 4-position, Variable cable type, shielded, EMC pin insert straight / IP20, on free cable end, cable length: Free input (0.2 ... 40.0 m), For railway applications

#### Network cable - NBC-QCFS RAIL/.../... - 1412185



Network cable, PROFINET CAT5 (100 Mbps), Ethernet CAT5 (100 Mbps), 4-position, Variable cable type, shielded, free cable end, on EMC socket insert straight / IP20, cable length: Free input (0.2 ... 40.0 m), For railway applications

### Marker carrier cable

#### Cable marker carrier - KMK HP (25X6) - 0830720



Cable marker carrier, transparent, unlabeled, mounting type: Assembly with cable binders, cable diameter:  $\geq 6$  mm, lettering field size: 25 mm x 6 mm

#### Cable marker carrier - KMK HP (29X8) - 0830721



Cable marker carrier, transparent, unlabeled, mounting type: Assembly with cable binders, cable diameter:  $\geq 6$  mm, lettering field size: 29 x 8 mm

### Marker pen

## Network cable - NBC-MSD/ 2,0-937/MSD SCO RAIL - 1407342

### Accessories

Marker pen - B-STIFT - 1051993



Marker pen, for manual labeling of unprinted Zack strips, smear-proof and waterproof, line thickness 0.5 mm

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### Protective cap

Sealing cap - PROT-M12 FS-PA-CHAIN - 1430873

M12 sealing cap made of plastic with fixing band, for sensor cables, for free M12 plugs



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### Safety locking

Locking clip - SAC-M12-EXCLIP-M - 1558988



Locking clip for the pin side of sensor/actuator cables with M12 connector and M12 connectors for assembly, for knurl diameter: 15 mm or for Allen key with a wrench size of 14 mm, prevents the disconnection of plug-in connections without tools

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### Screwdriver tools

Adapter insert - TSD-M SAC-BIT ADAPTER - 1212600



Adapter bit for TSD-M...torque tools, E6.3-1/4" drive with 4 mm hexagon to accommodate SAC bits

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Tool - SAC BIT M12-D15 - 1208432



Nut for assembling sensor/actuator cables with M12 connector and M12 connectors for assembly, with a knurl diameter of 15 mm, for 4 mm hexagonal drive

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### Torque tool

## Network cable - NBC-MSD/ 2,0-937/MSD SCO RAIL - 1407342

### Accessories

Torque screwdriver - TSD 04 SAC - 1208429



Torque screwdriver, with preset torque of 0.4 Nm and 4 mm hexagonal drive for M12 connectors

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Torque screwdriver - TSD-M 1,2NM - 1212224



Torque screw driver, accuracy as per EN ISO 6789 standard, adjustable from 0.3 - 1.2 Nm

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