

# SAC-4P-M12MS-M12FR BK/.../... - Sensor/actuator cable



1405915

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Sensor/actuator cable, 4-position, Plug straight M12, coding: A, on Socket angled M12, coding: A, cable length: Free input (0.2 m ... 85.0 m)

## Commercial data

|                                      |                                |
|--------------------------------------|--------------------------------|
| Item number                          | 1405915                        |
| Packing unit                         | 1 pc                           |
| Minimum order quantity               | 1 pc                           |
| Note                                 | Made to order (non-returnable) |
| Sales key                            | AF1ICB                         |
| Product key                          | AF1ICB                         |
| Weight per piece (including packing) | 50 g                           |
| Weight per piece (excluding packing) | 50 g                           |
| Customs tariff number                | 85444290                       |
| Country of origin                    | US                             |

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## Technical data

### Product properties

|                      |                        |
|----------------------|------------------------|
| Application          | Standard, U.S. cables  |
|                      | Robots and drag chains |
| Number of positions  | 4                      |
| No. of cable outlets | 1                      |
| Shielded             | no                     |
| Coding               | A                      |

### Insulation characteristics

|                      |    |
|----------------------|----|
| Overvoltage category | II |
| Degree of pollution  | 3  |

### Material specifications

|                                        |                                             |
|----------------------------------------|---------------------------------------------|
| Flammability rating according to UL 94 | HB                                          |
| Seal material                          | NBR                                         |
| Material of grip body                  | TPU, hardly inflammable, self-extinguishing |
| Contact material                       | CuSn                                        |
| Contact surface material               | Ni/Au                                       |
| Contact carrier material               | TPU GF                                      |
| Material for screw connection          | Zinc die-cast, nickel-plated                |

### Electrical properties

|                       |                            |
|-----------------------|----------------------------|
| Insulation resistance | $\geq 100 \text{ M}\Omega$ |
| Nominal voltage $U_N$ | 250 V AC                   |
|                       | 250 V DC                   |
| Nominal current $I_N$ | 4 A                        |

### Mechanical properties

#### Mechanical data

|                             |            |
|-----------------------------|------------|
| Insertion/withdrawal cycles | $\geq 100$ |
|-----------------------------|------------|

### Signaling

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

### Connection data

#### Conductor connection

|                   |                        |
|-------------------|------------------------|
| Tightening torque | 0.4 Nm (M12 connector) |
|-------------------|------------------------|

### Connector

#### Connection 1

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|                     |                   |
|---------------------|-------------------|
| Type                | Plug straight M12 |
| Number of positions | 4                 |
| Coding type         | A                 |

## Connection 2

|                     |                   |
|---------------------|-------------------|
| Type                | Socket angled M12 |
| Number of positions | 4                 |
| Coding type         | A                 |

## Cable/line

|              |                               |
|--------------|-------------------------------|
| Cable length | Free input (0.2 m ... 85.0 m) |
|--------------|-------------------------------|

## PUR halogen-free black [PUR]

|                                               |                                                                                                                                                                |
|-----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cable weight                                  | 30 kg/km                                                                                                                                                       |
| UL AWM Style                                  | 20549 / 10493 (80°C/300 V)                                                                                                                                     |
| Number of positions                           | 4                                                                                                                                                              |
| Shielded                                      | no                                                                                                                                                             |
| Cable type                                    | PUR halogen-free black [PUR]<br>PUR halogen-free black PUR                                                                                                     |
| Conductor structure signal line               | 42x 0.10 mm                                                                                                                                                    |
| AWG signal line                               | 22                                                                                                                                                             |
| Conductor cross-section                       | 4x 0.34 mm <sup>2</sup> (Signal line)                                                                                                                          |
| Wire diameter incl. insulation                | 1.27 mm ±0.02 mm                                                                                                                                               |
| External cable diameter                       | 4.20 mm ±0.15 mm                                                                                                                                               |
| Outer sheath, material                        | PUR                                                                                                                                                            |
| External sheath, color                        | black-gray RAL 7021                                                                                                                                            |
| Conductor material                            | Bare Cu litz wires                                                                                                                                             |
| Material wire insulation                      | PP                                                                                                                                                             |
| Single wire, color                            | brown, white, blue, black                                                                                                                                      |
| Thickness, insulation                         | ≥ 0.21 mm                                                                                                                                                      |
| Thickness, outer sheath                       | approx. 0.50 mm                                                                                                                                                |
| Overall twist                                 | 4 wires, twisted                                                                                                                                               |
| Max. conductor resistance                     | ≤ 58 Ω/km                                                                                                                                                      |
| Insulation resistance                         | ≥ 1 GΩ*km                                                                                                                                                      |
| Nominal voltage, cable                        | ≤ 300 V                                                                                                                                                        |
| Test voltage                                  | ≥ 3000 V                                                                                                                                                       |
| Minimum bending radius, fixed installation    | 5 x D                                                                                                                                                          |
| Minimum bending radius, flexible installation | 10 x D                                                                                                                                                         |
| Smallest bending radius, fixed installation   | 21 mm                                                                                                                                                          |
| Smallest bending radius, movable installation | 42 mm                                                                                                                                                          |
| Dynamic load capacity (bending)               | Max. bending cycles: 10000000, Bending radius: 42 mm, Bending radius: 10 x D, Traversing path: 10 m, Traversing rate: 3 m/s, Acceleration: 10 m/s <sup>2</sup> |
| Dynamic load capacity (torsion)               | Torsion: ±180 °/m, Torsion cycles: ≥2000000, Torsional frequency: 35 cycles/min.                                                                               |
| Halogen-free                                  | in accordance with DIN VDE 0472 part 815                                                                                                                       |

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|                                 |                                                                     |
|---------------------------------|---------------------------------------------------------------------|
|                                 | in accordance with DIN EN 50267-2-1                                 |
| Flame resistance                | in accordance with UL 758/1581 FT2                                  |
|                                 | DIN EN 60332-2-2 (20 s)                                             |
| Resistance to oil               | in accordance with DIN EN 60811-2-1                                 |
| Other resistance                | Highly resistant to acids, alkaline solutions and solvents          |
|                                 | hydrolysis and microbe resistant                                    |
|                                 | partly UV-resistant (in accordance with DIN EN ISO 4892-2-A)        |
|                                 | Low adhesion                                                        |
|                                 | abrasion-resistant                                                  |
| Special properties              | Flexible cable conduit capable                                      |
|                                 | Silicone-free                                                       |
|                                 | Free of substances which would hinder coating with paint or varnish |
|                                 | flexible                                                            |
| Ambient temperature (operation) | -40 °C ... 80 °C (cable, fixed installation)                        |
|                                 | -25 °C ... 80 °C (Cable, flexible installation)                     |

## Black PVC 105°C [535]

|                                               |                                                 |
|-----------------------------------------------|-------------------------------------------------|
| Cable weight                                  | 36 kg/km                                        |
| UL AWM Style                                  | 2517 (105 °C / 300 V)                           |
| Number of positions                           | 4                                               |
| Shielded                                      | no                                              |
| Cable type                                    | Black PVC 105°C [535]                           |
|                                               | Black PVC 105°C 535                             |
| Conductor structure signal line               | 7x 0.25 mm                                      |
| AWG signal line                               | 22                                              |
| Wire diameter incl. insulation                | 1.27 mm ±0.03 mm                                |
| External cable diameter                       | 5.00 mm ±0.2 mm                                 |
| Outer sheath, material                        | PVC                                             |
| External sheath, color                        | black                                           |
| Conductor material                            | Tin-plated Cu litz wires                        |
| Material wire insulation                      | PVC                                             |
| Single wire, color                            | brown, blue, black, white                       |
| Overall twist                                 | 4 wires, twisted                                |
| Nominal voltage, cable                        | 300 V                                           |
| Minimum bending radius, flexible installation | 8 x D                                           |
| Smallest bending radius, movable installation | 40 mm                                           |
| Flame resistance                              | FT4                                             |
| Other resistance                              | UV resistant                                    |
| Special properties                            | UL standards PLTC and ITC                       |
| Ambient temperature (operation)               | -30 °C ... 105 °C (cable, fixed installation)   |
|                                               | -5 °C ... 105 °C (Cable, flexible installation) |

## PVC yellow 105 °C [542]

|              |          |
|--------------|----------|
| Cable weight | 36 kg/km |
|--------------|----------|

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|                                               |                                                                                                  |
|-----------------------------------------------|--------------------------------------------------------------------------------------------------|
| UL AWM Style                                  | 2517 (105 °C / 300 V)                                                                            |
| Number of positions                           | 4                                                                                                |
| Shielded                                      | no                                                                                               |
| Cable type                                    | PVC yellow 105 °C [542]<br>PVC yellow 105 °C 542                                                 |
| Conductor structure signal line               | 7x 0.25 mm                                                                                       |
| AWG signal line                               | 22                                                                                               |
| Wire diameter incl. insulation                | 1.27 mm ±0.03 mm                                                                                 |
| External cable diameter                       | 5.00 mm ±0.2 mm                                                                                  |
| Outer sheath, material                        | PVC                                                                                              |
| External sheath, color                        | yellow                                                                                           |
| Conductor material                            | Tin-plated Cu litz wires                                                                         |
| Material wire insulation                      | PVC                                                                                              |
| Single wire, color                            | brown, blue, black, white                                                                        |
| Overall twist                                 | 4 wires, twisted                                                                                 |
| Max. conductor resistance                     | max. 50.5 Ω/km (20 °C)                                                                           |
| Insulation resistance                         | ≥ (550 M Ohms/m @ 500V)                                                                          |
| Nominal voltage, cable                        | 300 V                                                                                            |
| Minimum bending radius, flexible installation | 8 x D                                                                                            |
| Smallest bending radius, movable installation | 40 mm                                                                                            |
| Flame resistance                              | FT4                                                                                              |
| Other resistance                              | UV resistant                                                                                     |
| Special properties                            | UL standards PLTC and ITC                                                                        |
| Ambient temperature (operation)               | -30 °C ... 105 °C (cable, fixed installation)<br>-5 °C ... 105 °C (Cable, flexible installation) |

## Gray, highly flexible PUR [800]

|                                 |                                                                                                  |
|---------------------------------|--------------------------------------------------------------------------------------------------|
| Note                            | Due to the extremely robust outer sheath, this cable should only be stripped in 5 cm increments. |
| Cable weight                    | 33.5 kg/km                                                                                       |
| UL AWM Style                    | 20549                                                                                            |
| Number of positions             | 4                                                                                                |
| Shielded                        | no                                                                                               |
| Cable type                      | Gray, highly flexible PUR [800]<br>Gray, highly flexible PUR 800                                 |
| Conductor structure signal line | 42x 0.10 mm                                                                                      |
| AWG signal line                 | 22                                                                                               |
| Conductor cross-section         | 4x 0.34 mm <sup>2</sup> (Signal line)                                                            |
| Wire diameter incl. insulation  | 1.3 mm ±0.05 mm (Signal line)                                                                    |
| External cable diameter         | 4.80 mm ±0.2 mm                                                                                  |
| Outer sheath, material          | PUR                                                                                              |
| External sheath, color          | gray RAL 7001                                                                                    |
| Conductor material              | Bare Cu litz wires                                                                               |
| Material wire insulation        | PP                                                                                               |

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|                                               |                                                                                                                                                                                                                                                                                              |
|-----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Single wire, color                            | brown, white, blue, black                                                                                                                                                                                                                                                                    |
| Overall twist                                 | 4 wires, twisted                                                                                                                                                                                                                                                                             |
| Max. conductor resistance                     | approx. 53 Ω/km                                                                                                                                                                                                                                                                              |
| Insulation resistance                         | ≥ 20 MΩ*km                                                                                                                                                                                                                                                                                   |
| Nominal voltage, cable                        | 300 V                                                                                                                                                                                                                                                                                        |
| Test voltage                                  | 2000 V                                                                                                                                                                                                                                                                                       |
| Minimum bending radius, fixed installation    | 4 x D                                                                                                                                                                                                                                                                                        |
| Minimum bending radius, flexible installation | 7.5 x D                                                                                                                                                                                                                                                                                      |
| Smallest bending radius, fixed installation   | 20 mm                                                                                                                                                                                                                                                                                        |
| Smallest bending radius, movable installation | 36 mm                                                                                                                                                                                                                                                                                        |
| Dynamic load capacity (bending)               | <p>Max. bending cycles: 10000000, Bending radius: 7,5 x D, Traversing path: 5 m, Traversing rate: 3.3 m/s, Acceleration: 5 m/s<sup>2</sup></p> <p>Max. bending cycles: 15000000, Bending radius: 50 mm, Traversing path: 0.9 m, Traversing rate: 5 m/s, Acceleration: 30 m/s<sup>2</sup></p> |
| Dynamic load capacity (torsion)               | Torsion: ±360 °/m, Torsion cycles: 1000000, Torsional frequency: 35 cycles/min.                                                                                                                                                                                                              |
| Halogen-free                                  | in accordance with DIN VDE 0472 part 815                                                                                                                                                                                                                                                     |
| Flame resistance                              | in accordance with UL 758/1581 FT2                                                                                                                                                                                                                                                           |
| Resistance to oil                             | in accordance with DIN EN 60811-2-1                                                                                                                                                                                                                                                          |
| Other resistance                              | Highly resistant to acids, alkaline solutions and solvents                                                                                                                                                                                                                                   |
| Special properties                            | Silicone-free                                                                                                                                                                                                                                                                                |
|                                               | Cable jacket is welding spark-resistant, recyclable, matt, low-adhesion, abrasion-resistant, flame-retardant, and self-extinguishing                                                                                                                                                         |
|                                               | Free from silicone and cadmium                                                                                                                                                                                                                                                               |
| Ambient temperature (operation)               | Free of substances which would hinder coating with paint or varnish                                                                                                                                                                                                                          |
|                                               | -40 °C ... 80 °C (cable, fixed installation)                                                                                                                                                                                                                                                 |
|                                               | -25 °C ... 80 °C (Cable, flexible installation)                                                                                                                                                                                                                                              |

## PVC gray 105 °C [544]

|                                 |                           |
|---------------------------------|---------------------------|
| Cable weight                    | 40 kg/km                  |
| UL AWM Style                    | 2517 (105 °C / 300 V)     |
| Number of positions             | 4                         |
| Cable type                      | PVC gray 105 °C [544]     |
|                                 | PVC gray 105 °C 544       |
| Conductor structure signal line | 7x 0.25 mm                |
| AWG signal line                 | 22                        |
| Wire diameter incl. insulation  | 1.27 mm ±0.03 mm          |
| External cable diameter         | 5.00 mm ±0.2 mm           |
| Outer sheath, material          | PVC                       |
| External sheath, color          | gray                      |
| Conductor material              | Tin-plated Cu litz wires  |
| Material wire insulation        | PVC                       |
| Single wire, color              | brown, white, blue, black |

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|                                               |                                                 |
|-----------------------------------------------|-------------------------------------------------|
| Overall twist                                 | 3 wires, twisted                                |
| Max. conductor resistance                     | max. 50.5 Ω/km (20 °C)                          |
| Insulation resistance                         | ≥ (550 M Ohms/m @ 500V)                         |
| Nominal voltage, cable                        | 300 V                                           |
| Minimum bending radius, flexible installation | 12 x D                                          |
| Smallest bending radius, movable installation | 60 mm                                           |
| Flame resistance                              | FT4                                             |
| Other resistance                              | UV resistant                                    |
| Special properties                            | UL standards PLTC and ITC                       |
| Ambient temperature (operation)               | -30 °C ... 105 °C (cable, fixed installation)   |
|                                               | -5 °C ... 105 °C (Cable, flexible installation) |
|                                               | -30 °C ... 105 °C (cable, fixed installation)   |

## PVC AWG 18 yellow 105°C [547]

|                                             |                                               |
|---------------------------------------------|-----------------------------------------------|
| UL AWM Style                                | 2517 (105 °C / 300 V)                         |
| Number of positions                         | 4                                             |
| Shielded                                    | no                                            |
| Cable type                                  | PVC AWG 18 yellow 105°C [547]                 |
|                                             | PVC AWG 18 yellow 105°C 547                   |
| Conductor structure signal line             | 41x 0.16 mm                                   |
| AWG signal line                             | 18                                            |
| Wire diameter incl. insulation              | 1.7 mm ±0.03 mm                               |
| External cable diameter                     | 6.00 mm ±0.2 mm                               |
| Outer sheath, material                      | PVC                                           |
| External sheath, color                      | yellow                                        |
| Conductor material                          | Tin-plated Cu litz wires                      |
| Material wire insulation                    | PVC                                           |
| Single wire, color                          | brown, white, blue, black                     |
| Overall twist                               | 4 wires, twisted                              |
| Nominal voltage, cable                      | 300 V                                         |
| Minimum bending radius, fixed installation  | 8 x D                                         |
| Smallest bending radius, fixed installation | 48 mm                                         |
| Flame resistance                            | FT4                                           |
| Special properties                          | UL ITC/PLTC 105 °C                            |
|                                             | CSA AWM I/II A/B FT4 105 °C / 300 V           |
| Ambient temperature (operation)             | -30 °C ... 105 °C (cable, fixed installation) |

## Environmental and real-life conditions

### Ambient conditions

|                                                                   |                                  |
|-------------------------------------------------------------------|----------------------------------|
| Degree of protection                                              | IP65                             |
|                                                                   | IP67                             |
|                                                                   | IP68                             |
| Ambient temperature (operation) (male connector/female connector) | -25 °C ... 90 °C (Plug / socket) |

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## Standards and regulations

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

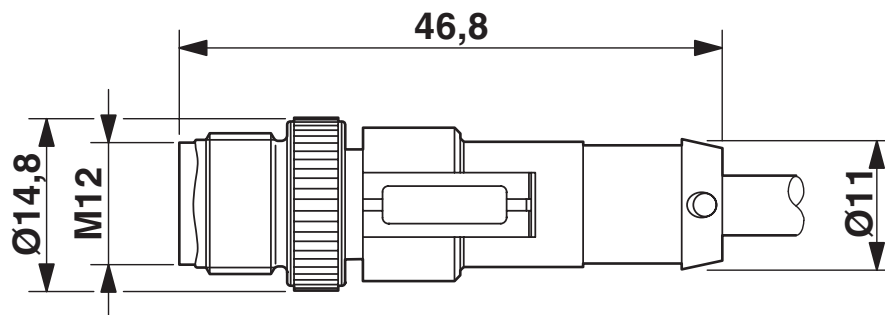
# SAC-4P-M12MS-M12FR BK/.../... - Sensor/actuator cable

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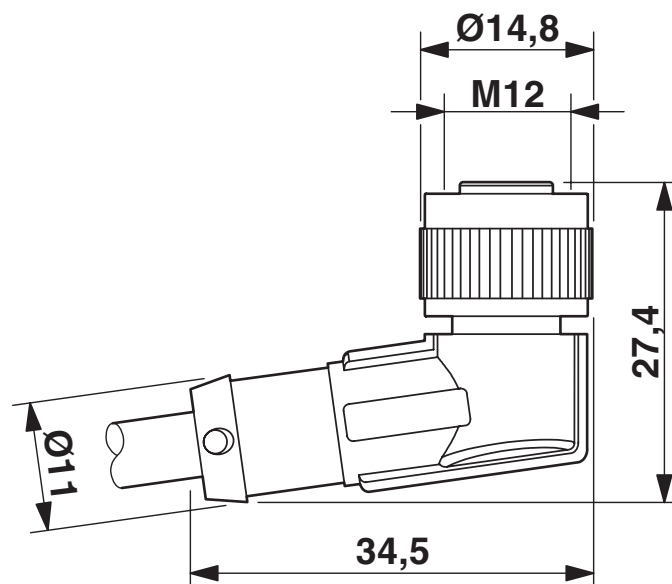
## Drawings

Dimensional drawing



Plug, M12 x 1, straight

Dimensional drawing



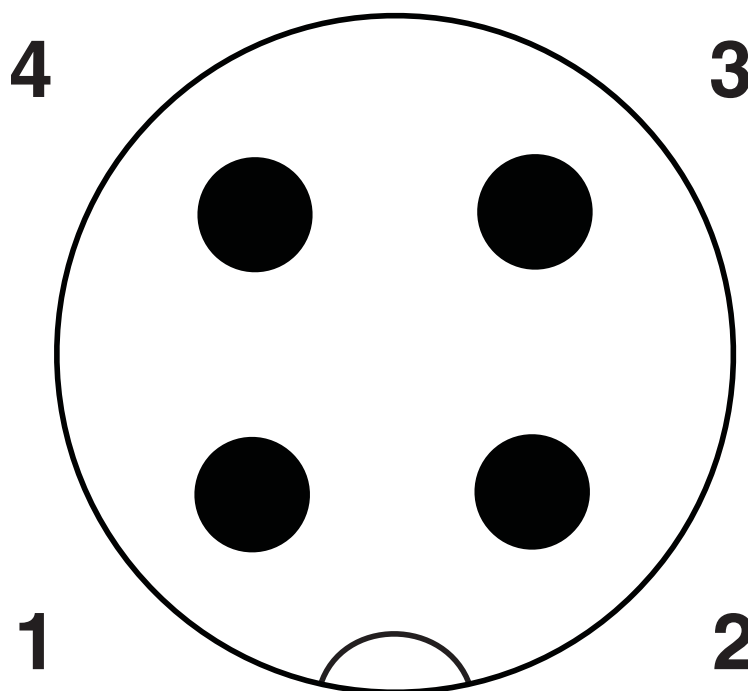
M12 x 1 socket, angled

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Schematic diagram



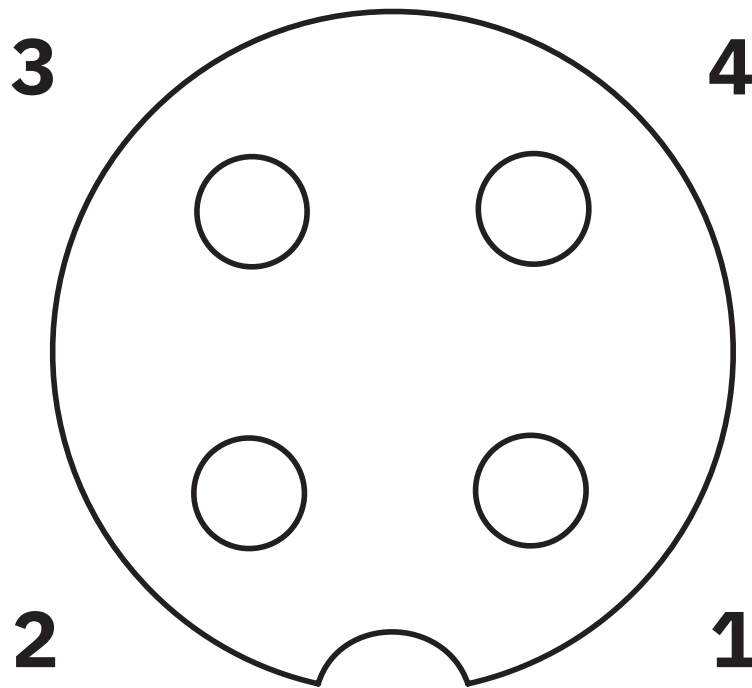
Pin assignment M12 plug, 4-pos., A-coded, view plug side

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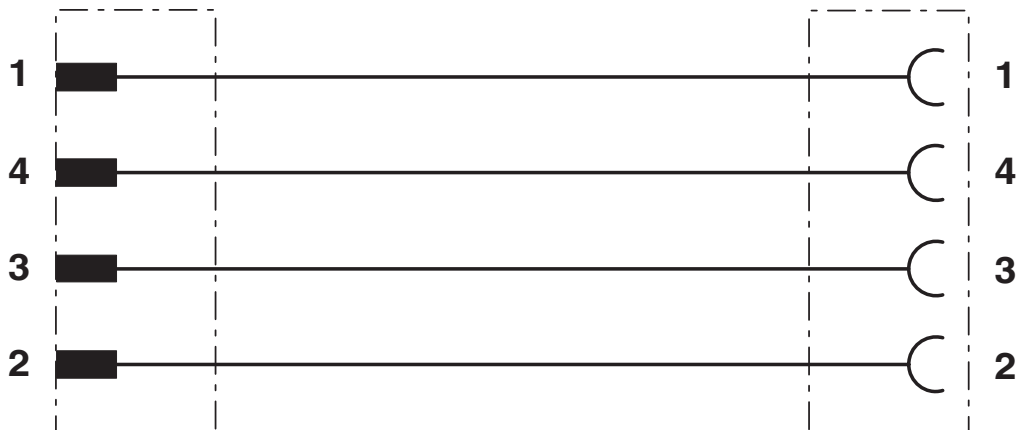
<https://www.phoenixcontact.com/nl/products/1405915>

Schematic diagram



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

Circuit diagram



Contact assignment of the M12 plug and the M12 socket

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## Approvals

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|  <b>UL Listed</b><br>Approval ID: FILE E 221474 |                                |                                |                   |                               |
|----------------------------------------------------------------------------------------------------------------------------------|--------------------------------|--------------------------------|-------------------|-------------------------------|
|                                                                                                                                  | Nominal voltage U <sub>N</sub> | Nominal current I <sub>N</sub> | Cross section AWG | Cross section mm <sup>2</sup> |
| keine                                                                                                                            |                                |                                |                   |                               |
|                                                                                                                                  | 300 V                          | 4 A                            | -                 | -                             |

|  <b>cUL Listed</b><br>Approval ID: FILE E 221474 |                                |                                |                   |                               |
|-----------------------------------------------------------------------------------------------------------------------------------|--------------------------------|--------------------------------|-------------------|-------------------------------|
|                                                                                                                                   | Nominal voltage U <sub>N</sub> | Nominal current I <sub>N</sub> | Cross section AWG | Cross section mm <sup>2</sup> |
| keine                                                                                                                             |                                |                                |                   |                               |
|                                                                                                                                   | 300 V                          | 4 A                            | -                 | -                             |

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## Classifications

### ECLASS

|             |          |
|-------------|----------|
| ECLASS-13.0 | 27060311 |
| ECLASS-15.0 | 27060311 |

### ETIM

|          |          |
|----------|----------|
| ETIM 9.0 | EC001855 |
|----------|----------|

### 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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