### Twistable cables

#### Control cables

<table>
<thead>
<tr>
<th>CF77.UL.D</th>
<th>PUR</th>
<th>6.8</th>
<th>-25/ +80</th>
<th>✔</th>
<th>✔</th>
<th>✔</th>
<th>✔</th>
<th>✔</th>
<th>✔</th>
<th>180</th>
<th>60</th>
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<tbody>
<tr>
<td>CFROBOT2</td>
<td>PUR</td>
<td>✔</td>
<td>10</td>
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<td>✔</td>
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<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>180</td>
<td>60</td>
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</tbody>
</table>

#### Data cable

| CFROBOT3 | PUR | ✔ | 10 | -25/ +80 | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | 180 | 60 | 358 |

#### Measuring system cable

| CFROBOT4 | PUR | ✔ | 10 | -25/ +80 | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | 180 | 60 | 360 |

#### Fibre optic cable

| CFROBOT5 | TPE | 10 | -35/ +80 | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | 180 | 60 | 364 |

#### Motor cable

| CFROBOT6 | PUR | 10 | -25/ +80 | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | 180 | 60 | 366 |
| CFROBOT7 | PUR | ✔ | 10 | -25/ +80 | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | 180 | 60 | 368 |
| CFROBOT | TPE | ✔ | 10 | -35/ +90 | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | 180 | 60 | 372 |

#### Bus cable

| CFROBOT8 | PUR | ✔ | 10 | -25/ +70 | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | 180 | 60 | 374 | New |

#### Hybrid cable

| CFROBOT9 | PUR | ✔ | 10 | -25/ +80 | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | 180 | 60 | 378 |

---

**36 months chainflex® guarantee**

Guaranteed lifetime for predictable reliability

▶ Selection table page 350

With the help of the chainflex® service life calculator, you can quickly and easily calculate the expected service life of chainflex® cables specifically for your application:

[www.igus.eu/chainflexlife](http://www.igus.eu/chainflexlife)
Ever more complex sequences of movements in industrial applications demand twistable and/or three-dimensional flexible cables with a long service life similar to the classic chainflex® cables for use in linear e-chainsystems®.

Wires, stranded, shields and sheathing materials must compensate both major changes in bending load and changes in diameter due to torsional movements. For this purpose, different „soft“ structural elements e.g. rayon fibres, PTFE elements or filling elements that absorb torsion forces are used in chainflex® ROBOT cables.

Special demands are made on the braided shielding in torsion cables. Torsion-optimised shield structures are chosen that can carry out the necessary compensatory movements thanks to special PTFE gliding films.

With twistable bus cables in particular, the transmission characteristics such as attenuation, cable capacity and signal quality must remain within very tight tolerance ranges over the whole service life. This is achieved through the use of particularly torsion-optimised insulating materials and mechanical attenuation elements with matching capacity values.

The highly abrasion-resistant, halogen-free and flame-resistant PUR sheathing mixture in motor, hybrid/control cables and bus cables protects the torsion-optimised stranded elements from possible damage.

The highly abrasion-resistant, halogen-free TPE-sheath mixture matches the special requirements of the twistable FOC and individual wires, and also protects the stranded elements.

Unlike cables for linear e-chainsystems®, the „mechanical stress“ for these cables is in the combination of bending, torsion and centrifugal forces that cannot usually be determined by design in advance or during use by means of measurement. For this reason, and unlike the situation with linear e-chain® applications, a clear „yes/no“ statement cannot be made about the possibility of using a certain cable in torsion applications.

To enable evaluation to take place nevertheless, based on sensible and comparable test results, the igus® „torsion test standard“ was developed.

According to this standard, all chainflex® ROBOT cables of a triflex® R energy chain® are twisted with a fixed-point distance of one metre and a torsion of +/- 180° at least 3 million times.

In addition, a test is carried out on a test bench with a chain length of approx. 2500 mm with 270° torsion with an extreme load through centrifugal forces and heavy blows such as those that can occur with an industrial robot.

All the non-shielded, gusset-filled extruded standard chainflex® control cables of the series CF130.UL, CF5, CF9 and CF9.UL correspond to the above-mentioned igus® standard and have been approved for use in torsion applications.

The following twistable CF ROBOT cable types are currently available:
- Control cable (shielded and unshielded)
- Data and Measuring system cables
- Fibre optic cables
- Motor and Servo cables
- Bus cables
- Hybrid cables

We can also offer you chainflex® ROBOT cables pre-fitted with the plug-in connectors of your choice as ready cable®, or as a ready-to-install readychain® cable assembly.

Test data ➤ page 37
<table>
<thead>
<tr>
<th><strong>chainflex® guarantee</strong></th>
<th><strong>Guaranteed lifetime (1)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Temperature, from/to [°C]</strong></td>
<td><strong>v max. [°/s]</strong></td>
</tr>
<tr>
<td><strong>Twistable cables</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Control cables</strong></td>
<td></td>
</tr>
<tr>
<td>CF77.UL.D</td>
<td>-25 / -15</td>
</tr>
<tr>
<td></td>
<td>-15 / +70</td>
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<tr>
<td></td>
<td>+70 / +80</td>
</tr>
<tr>
<td>CFROBOT2</td>
<td>-25 / -15</td>
</tr>
<tr>
<td></td>
<td>-15 / +70</td>
</tr>
<tr>
<td></td>
<td>+70 / +80</td>
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<tr>
<td><strong>Data cable</strong></td>
<td></td>
</tr>
<tr>
<td>CFROBOT3</td>
<td>-25 / -15</td>
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<tr>
<td></td>
<td>-15 / +70</td>
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<tr>
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<td>+70 / +80</td>
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<tr>
<td><strong>Measuring system cable</strong></td>
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<td>CFROBOT4</td>
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<td><strong>Fibre optic cable</strong></td>
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<td><strong>Motor cable</strong></td>
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</tr>
<tr>
<td>CFROBOT</td>
<td>-35 / -25</td>
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<tr>
<td></td>
<td>-15 / +80</td>
</tr>
<tr>
<td></td>
<td>+80 / +90</td>
</tr>
<tr>
<td><strong>Bus cable</strong></td>
<td></td>
</tr>
<tr>
<td>CFROBOT8</td>
<td>-25 / -15</td>
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<tr>
<td></td>
<td>-15 / +60</td>
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<tr>
<td></td>
<td>+60 / +70</td>
</tr>
<tr>
<td><strong>Hybrid cable</strong></td>
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</tr>
<tr>
<td>CFROBOT9</td>
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</tr>
<tr>
<td></td>
<td>-15 / +70</td>
</tr>
<tr>
<td></td>
<td>+70 / +80</td>
</tr>
</tbody>
</table>

(1) Exclusive! Guaranteed lifetime for this series according to the guarantee conditions ► Page 22-23

* Higher number of cycles? Online lifetime calculation ► www.igus.eu/chainflexlife
Control cable | PUR | chainflex® CF77.UL.D

- For torsion applications
- PUR outer jacket
- Oil and coolant-resistant
- Flame retardant
- PVC and halogen-free
- Notch-resistant
- Hydrolysis and microbe-resistant

Dynamic information

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
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<tbody>
<tr>
<td>Bend radius</td>
<td>e-chain® twisted minimum 6.8 x d flexible minimum 5 x d fixed minimum 4 x d</td>
</tr>
<tr>
<td>Temperature</td>
<td>e-chain® twisted -25 °C to +80 °C flexible -40 °C to +80 °C (following DIN EN 60811-504) fixed -50 °C to +80 °C (following DIN EN 50335)</td>
</tr>
<tr>
<td>v max.</td>
<td>twisted 180 °/s</td>
</tr>
<tr>
<td>a max.</td>
<td>twisted 60 °/s²</td>
</tr>
<tr>
<td>Travel distance</td>
<td>Robots and multi-axis movements, Class 1</td>
</tr>
<tr>
<td>Torsion</td>
<td>± 180°, with 1 m cable length, Class 3 (except 5-core types ≥ 4.0 mm²)</td>
</tr>
</tbody>
</table>

Cable structure

- Conductor: Finely stranded conductor consisting of bare copper wires (following DIN EN 60228).
- Core insulation: Mechanically high-quality TPE mixture.
- Core structure: Number of cores < 12: Cores wound in a layer with a short pitch length. Number of cores ≥ 12: Cores wound in bundles which are then wound around a high tensile strength centre element, all with optimised short pitch lengths and directions.
- Core identification: Cores < 0.5 mm²: Colour code in accordance with DIN 47100. Cores ≥ 0.5 mm²: Black cores with white numerals, one core green-yellow.
- Outer jacket: Low-adhesion, highly abrasion-resistant PUR mixture, adapted to suit the requirements in e-chains® (following DIN EN 50363-10-2). Colour: Window-grey (similar to RAL 7040).

Electrical information

- Nominal voltage: 300/500 V (following DIN VDE 0298-3).
- Testing voltage: 2000 V (following DIN EN 50395).

Properties and approvals

- UV resistance: Medium.
- Oil resistance: Oil-resistant (following DIN EN 50363-10-2), Class 3.
- Offshore: MUD-resistant following NEK 606 - status 2009.
- Flame retardant: According to IEC 60332-1-2, CEI 20-35, FT1, VW-1.
- Silicone-free: Free from silicone which can affect paint adhesion (following PV 3.10.7 – status 1992).
- Halogen-free: Following DIN EN 60754.
- UL/CSA: Cores < 0.5 mm²: Style 10493 and 20233, 300 V, 80 °C Cores ≥ 0.5 mm²: Style 11323 and 21223, 1000 V, 80 °C Following NFPA 79-2012 chapter 12.9.
- DNV-GL: Certified according to GL type testing – Certificate no.: 61 935-14 HH.
- EAC: Certificate no. RU C-DE.ME77.B.01254 (TR ZU).
- CTP: Certificate no. C-DE.PB49.B.00416 (Fire safety).
- CEI: Following CEI 20-35.
- Lead-free: Following 2011/65/EU (RoHS-II).
- Cleanroom: According to ISO Class 1, material/cable tested by IPA according to ISO standard 14644-1.
- DESINA: According to VDW, DESINA standardisation.
- CE: Following 2014/35/EU.

Guaranteed lifetime according to guarantee conditions (Page 22-23)

<table>
<thead>
<tr>
<th>Cycles*</th>
<th>5 million</th>
<th>7.5 million</th>
<th>10 million</th>
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<tr>
<td>Temperature, °C</td>
<td>Torsion max., °/m</td>
<td>Torsion max., °/m</td>
<td>Torsion max., °/m</td>
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<tr>
<td>-25/-15</td>
<td>±150</td>
<td>±90</td>
<td>±30</td>
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<tr>
<td>-15/+70</td>
<td>±180</td>
<td>±120</td>
<td>±60</td>
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<tr>
<td>+70/+80</td>
<td>±150</td>
<td>±90</td>
<td>±30</td>
</tr>
</tbody>
</table>

* Higher number of cycles? Online lifetime calculation: www.igus.eu/chainflexlife

Typical mechanical application areas

- For heavy duty applications with torsional movements
- Almost unlimited resistance to oil
- Indoor and outdoor applications with average sun radiation
- Especially for robots and multi-axis movements
- Robots, Handling, spindle drives

EPLAN download, configurators | www.igus.eu/CF77.UL.D

CF77.UL.D

PVC | PUR | TPE

CF77.UL.D

6.8 x d

36 months guarantee ... 1,354 types from stock ... no cutting charges
Control cable | PUR | chainflex® CF77.UL.D

**Class 5.1.3.3**

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Number of cores and conductor nominal cross section [mm²]</th>
<th>Outer diameter (d) max. [mm]</th>
<th>Copper index [kg/km]</th>
<th>Weight [kg/km]</th>
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<td>729</td>
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</tbody>
</table>

---

**Note:**
- The given outer diameters are maximum values and may tend toward lower tolerance limits.
- G = with green-yellow earth core,
- x = without earth core.

**Order example:** CF77.UL.02.04.D – to your desired length (0.5 m steps)

CF77.UL.D chainflex® series .02 Code nominal cross section .04 Code Number of cores

Online order ➤ www.chainflex.eu/CF77.UL.D

Delivery time 24h or today.

Delivery time means time until shipping of goods.

---

36 months guarantee ... 1,354 types from stock ... no cutting charges
Control cable | PUR | chainflex® CFROBOT2

- For torsion applications
- PUR outer jacket
- Shielded
- Oil and coolant-resistant
- Flame retardant
- PVC and halogen-free
- Notch-resistant
- Hydrolysis and microbe-resistant

Dynamic information

<table>
<thead>
<tr>
<th>Bend radius</th>
<th>e-chain® twisted</th>
<th>minimum 10 x d</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>flexible</td>
<td>minimum 8 x d</td>
</tr>
<tr>
<td></td>
<td>fixed</td>
<td>minimum 5 x d</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Temperature</th>
<th>e-chain® twisted</th>
<th>-25 °C to +80 °C (following DIN EN 60811-504)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>flexible</td>
<td>-40 °C to +80 °C (following DIN EN 60811-504)</td>
</tr>
<tr>
<td></td>
<td>fixed</td>
<td>-50 °C to +80 °C (following DIN EN 50303)</td>
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</table>

<table>
<thead>
<tr>
<th>v max.</th>
<th>twisted</th>
<th>180 °/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>a max.</td>
<td>twisted</td>
<td>60 °/s²</td>
</tr>
</tbody>
</table>

Travel distance
- Robots and multi-axis movements, Class 1

Torsion
- ±180°, with 1 m cable length, Class 3

Cable structure

Conductor
- Stranded conductor in especially bending-resistant design consisting of bare copper wires (following DIN EN 60228).

Core insulation
- Mechanically high-quality TPE mixture.

Core identification
- Black cores with white numerals, one core green-yellow.

Element shield
- Extremely torsion-resistant tinned braided copper shield.

Outer jacket
- Low-adhesion, highly abrasion-resistant PUR mixture, adapted to suit the requirements in e-chains® (following DIN EN 50363-10-2).

Colour: Steel-blue (similar to RAL 5011)

Electrical information

<table>
<thead>
<tr>
<th>Nominal voltage</th>
<th>300/500 V (following DIN VDE 0298-3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Testing voltage</td>
<td>2000 V (following DIN EN 50395)</td>
</tr>
</tbody>
</table>

Properties and approvals

<table>
<thead>
<tr>
<th>UV resistance</th>
<th>High.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil resistance</td>
<td>Oil-resistant (following DIN EN 50363-10-2), Class 3.</td>
</tr>
<tr>
<td>Flame retardant</td>
<td>According to IEC 60332-1-2, CEI 20-35, FT1, VW-1</td>
</tr>
</tbody>
</table>

Class 6.1.3.3

- Silicone-free
- Halogen-free
- UL/CSA Style 10493 and 20317, 300 V, 80 °C
- NFPA Following NFPA 79-2012 chapter 12.9.
- EAC Certificate no. RI C-DE.ME77.B.01254 (TR ZU)
- CTP Certificate no. C-DE.PB49.B.00416 (Fire safety)
- CE Following CEI 20-35.
- Lead-free Following 2011/65/EU (RoHS-II).
- Cleanroom According to ISO Class 1. Outer jacket material complies with CF27.07.05.02.01.D, tested by IPA according to standard 14644-1.
- CE Following 2014/35/EU.

Guaranteed lifetime according to guarantee conditions (Page 22-23)

<table>
<thead>
<tr>
<th>Cycles*</th>
<th>5 million</th>
<th>7.5 million</th>
<th>10 million</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature, from/to [°C]</td>
<td>Torsion max. [°/m]</td>
<td>Torsion max. [°/m]</td>
<td>Torsion max. [°/m]</td>
</tr>
<tr>
<td>-25/-15</td>
<td>±150</td>
<td>±90</td>
<td>±30</td>
</tr>
<tr>
<td>-15/+70</td>
<td>±180</td>
<td>±120</td>
<td>±60</td>
</tr>
<tr>
<td>+70/+80</td>
<td>±150</td>
<td>±90</td>
<td>±30</td>
</tr>
</tbody>
</table>

* Higher number of cycles? Online lifetime calculation: www.igus.eu/chainflexlife

Typical mechanical application areas

- For extremely heavy duty applications with torsional movements
- Almost unlimited resistance to oil
- Indoor and outdoor applications, UV resistant
- Especially for robots and multi-axis movements
- Robots, Handling, spindle drives

Part No. | Number of cores and conductor nominal cross section [mm²] | Outer diameter (d) max. [mm] | Copper index [kg/km] | Weight [kg/km] |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CFROBOT2.07.04.C</td>
<td>(4G0.75)C</td>
<td>8.5</td>
<td>45</td>
<td>84</td>
</tr>
<tr>
<td>CFROBOT2.07.05.C</td>
<td>(5G0.75)C</td>
<td>8.5</td>
<td>54</td>
<td>94</td>
</tr>
<tr>
<td>CFROBOT2.07.07.C</td>
<td>(7G0.75)C</td>
<td>10.0</td>
<td>75</td>
<td>130</td>
</tr>
<tr>
<td>CFROBOT2.07.12.C</td>
<td>(12G0.75)C</td>
<td>14.0</td>
<td>131</td>
<td>219</td>
</tr>
<tr>
<td>CFROBOT2.07.18.C</td>
<td>(18G0.75)C</td>
<td>16.5</td>
<td>197</td>
<td>321</td>
</tr>
</tbody>
</table>

Note: The given outer diameters are maximum values and may tend toward lower tolerance limits.
G = with green-yellow earth core | x = without earth core

EPLAN download, configurators ➤ www.igus.eu/CFROBOT2

36 months guarantee ... 1,354 types from stock ... no cutting charges
Data cable | PUR | chainflex® CFROBOT3

- For torsion applications
- PUR outer jacket
- Shielded
- Oil and coolant-resistant
- Flame retardant
- Notch-resistant
- Hydrolysis and microbioreistant

Dynamic information

<table>
<thead>
<tr>
<th>Bend radius</th>
<th>minimum 10 x d</th>
</tr>
</thead>
<tbody>
<tr>
<td>flexible</td>
<td>minimum 8 x d</td>
</tr>
<tr>
<td>fixed</td>
<td>minimum 5 x d</td>
</tr>
<tr>
<td>Temperature</td>
<td>25 °C to +80 °C</td>
</tr>
<tr>
<td>flexible</td>
<td>-40 °C to +80 °C (following DIN EN 60811-504)</td>
</tr>
<tr>
<td>fixed</td>
<td>-50 °C to +80 °C (following DIN EN 50303)</td>
</tr>
<tr>
<td>v max.</td>
<td>180 °/s</td>
</tr>
<tr>
<td>a max.</td>
<td>twisted 60 °/s²</td>
</tr>
<tr>
<td>Travel distance</td>
<td>Robots and multi-axis movements, Class 1</td>
</tr>
<tr>
<td>Torsion</td>
<td>± 180°, with 1 m cable length, Class 3</td>
</tr>
</tbody>
</table>

Cable structure

- Conductor: Stranded conductor in especially bending-resistant design consisting of bare copper wires (following DIN EN 60228).
- Core insulation: Mechanically high-quality TPE mixture.
- Core identification: Colour code in accordance with DIN 47100.
- Overall shield: Extremely torsion-resistant tinned braided copper shield.
- Outer jacket: Low-adhesion, highly abrasion-resistant PUR mixture, adapted to suit the requirements in e-chains® (following DIN EN 50363-10-2). Colour: Steel-blue (similar to RAL 5011).

Electrical information

- Nominal voltage: 300/500 V (following DIN VDE 0298-3)
- Testing voltage: 2000 V (following DIN EN 50395)

Basic requirements

- Travel distance
- Oil resistance
- Torsion

Class 6.1.3.3

Properties and approvals

- UV resistance: High.
- Oil resistance: Oil-resistant (following DIN EN 50363-10-2), Class 3.
- Flame retardant: According to IEC 60332-1-2, CEI 20-35, FT1, VW-1
- Silicone-free: Free from silicone which can affect paint adhesion (following PV 3.10.7 – status 1992).
- UL/CSA: Style 10497 and 20911, 300 V, 80 °C
- EAC: Certificate no. RU C-DE.ME77.B.01254 (TR ZU)
- CTP: Certificate no. C-DE.PB49.B.00416 (Fire safety)
- CEI: Following CEI 20-35.
- Lead-free: Following 2011/65/EU (RoHS-II).
- Cleanroom: According to ISO Class 1. Outer jacket material complies with CF27.07.05.02.01.D, tested by IPA according to standard 14644-1. Following 2014/35/EU.

Guaranteed lifetime according to guarantee conditions (Page 22-23)

Cycles*: 5 million 7.5 million 10 million

<table>
<thead>
<tr>
<th>Temperature, from/to [°C]</th>
<th>Torsion max. [°/m]</th>
<th>Torsion max. [°/m]</th>
<th>Torsion max. [°/m]</th>
</tr>
</thead>
<tbody>
<tr>
<td>-25/-15</td>
<td>±150</td>
<td>±90</td>
<td>±30</td>
</tr>
<tr>
<td>-15/+70</td>
<td>±180</td>
<td>±120</td>
<td>±60</td>
</tr>
<tr>
<td>+70/+85</td>
<td>±150</td>
<td>±90</td>
<td>±30</td>
</tr>
</tbody>
</table>

* Higher number of cycles? Online lifetime calculation: www.igus.eu/chainflexlife

Typical mechanical application areas

- For extremely heavy duty applications with torsional movements
- Almost unlimited resistance to oil
- Indoor and outdoor applications, UV resistant
- Especially for robots and multi-axis movements
- Robots, Handling, spindle drives

Part No.

- Number of cores and conductor nominal cross section [mm²]
- Outer diameter (d) max. [mm]
- Copper index [kg/km]
- Weight [kg/km]

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Number of cores and conductor nominal cross section [mm²]</th>
<th>Outer diameter (d) max. [mm]</th>
<th>Copper index</th>
<th>Weight [kg/km]</th>
</tr>
</thead>
<tbody>
<tr>
<td>CFROBOT3.02.04.02</td>
<td>(4x2x0.25)</td>
<td>10.5</td>
<td>40</td>
<td>102</td>
</tr>
<tr>
<td>CFROBOT3.02.06.02</td>
<td>(6x2x0.25)</td>
<td>11.5</td>
<td>55</td>
<td>139</td>
</tr>
<tr>
<td>CFROBOT3.02.08.02</td>
<td>(8x2x0.25)</td>
<td>14.0</td>
<td>70</td>
<td>167</td>
</tr>
<tr>
<td>CFROBOT3.05.05.02</td>
<td>(8x2x0.5)</td>
<td>12.5</td>
<td>80</td>
<td>184</td>
</tr>
</tbody>
</table>

Note: The given outer diameters are maximum values and may tend toward lower tolerance limits.
G = with green-yellow earth core x = without earth core
Guarantee

36 months guarantee

361360

CFROBOT4
PUR
± 180°/m

Measuring system cable | PUR | chainflex® CFROBOT4

● For torsion applications
● PUR outer jacket
● Shielded
● Oil and coolant-resistant
● Flame retardant
● PVC and halogen-free
● Notch-resistant
● Hydrolysis and microbe-resistant

Dynamic information

- **Bend radius**
  - e-chain® twisted: minimum 10 x d
  - flexible: minimum 8 x d
  - fixed: minimum 5 x d
- **Temperature**
  - e-chain® twisted:
    - flexible: -25 °C to +80 °C (following DIN EN 60811-504)
    - fixed: -50 °C to +80 °C (following DIN EN 50303)
- **v max.**
  - twisted: 180 °/s
- **a max.**
  - twisted: 60 °/s²
- **Travel distance**
  - Robots and multi-axis movements, Class 1

Cable structure

- **Conductor**
  - Stranded conductor in especially bending-resistant design consisting of bare copper wires (following DIN EN 60228).
- **Core insulation**
  - Mechanically high-quality TPE mixture.
- **Core identification**
  - According to measuring system specification.
- **Element shield**
  - Extremely torsion-resistant tinned braided copper shield.
- **Overall shield**
  - Torsion resistant tinned braided copper shield. Coverage approx. 80 % optical
- **Outer jacket**
  - Low-adhesion, highly abrasion-resistant PUR mixture, adapted to suit the requirements in e-chains® (following DIN EN 50383-10-2). Colour: Steel-blue (similar to RAL 5011)

Electrical information

- **Nominal voltage**
  - 50 V
- **Testing voltage**
  - 500 V

Properties and approvals

- **UV resistance**
  - High.
- **Oil resistance**
  - Oil-resistant (following DIN EN 50363-10-2), Class 3.
- **Flame retardant**
  - According to IEC 60332-1-2, CEI 20-35, FT1, VW-1
- **Silicone-free**
  - Free from silicone which can affect paint adhesion (following PV 3.10.7 – status 1992).
- **Halogen-free**
  - Following DIN EN 60754.
- **UL/CSA**
  - Style 1589 and 20236, 30 V, 80 °C
- **NFPA**
  - Following NFPA 79-2012 chapter 12.9.
- **EAC**
  - Certificate no. RU C-DE.ME77.B.01218 (TR ZU)
- **CTP**
  - Certificate no. C-DE.PB49.B.00416 (Fire safety)
- **CEI**
  - Following CEI 20-35.
- **Lead-free**
  - Following 2011/65/EU (RoHS-II).
- **Cleanroom**
  - According to ISO Class 1. Outer jacket material complies with CF27.07.05.02.01.D, tested by IPA according to standard 14644-1.

Guaranteed lifetime according to guarantee conditions (Page 22-23)

<table>
<thead>
<tr>
<th>Cycles*</th>
<th>5 million</th>
<th>7.5 million</th>
<th>10 million</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature, from/to [°C]</td>
<td>Torsion max. [°/m]</td>
<td>Torsion max. [°/m]</td>
<td>Torsion max. [°/m]</td>
</tr>
<tr>
<td>-25/-15</td>
<td>±150</td>
<td>±90</td>
<td>±30</td>
</tr>
<tr>
<td>-15/+70</td>
<td>±180</td>
<td>±120</td>
<td>±60</td>
</tr>
<tr>
<td>+70/+80</td>
<td>±150</td>
<td>±90</td>
<td>±30</td>
</tr>
</tbody>
</table>

* Higher number of cycles? Online lifetime calculation: www.igus.eu/chainflexlife

Typical mechanical application areas

- For extremely heavy duty applications with torsional movements
- Almost unlimited resistance to oil
- Indoor and outdoor applications, UV resistant
- Especially for robots and multi-axis movements
- Robots, Handling, spindle drives

Example image

PVC | iguPUR | PUR | TPE

EPLAN download, configurators ★ www.igus.eu/CFROBOT4

36 months guarantee ... 1,354 types from stock ... no cutting charges
Measuring system cable | PUR | chainflex® CFROBOT4

### Guarantee

36 months guarantee

### Example image

### Measuring system cable | PUR | chainflex® CFROBOT4

**Class 6.1.3.3**

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Number of cores and conductor nominal cross section</th>
<th>Outer diameter (d) max.</th>
<th>Copper index</th>
<th>Weight</th>
<th>Part No.</th>
<th>Core group</th>
<th>Colour code</th>
</tr>
</thead>
<tbody>
<tr>
<td>CFROBOT4.001</td>
<td>(3x(2x0.14)+4x0.14)+(2x0.5)C</td>
<td>10.5</td>
<td>65</td>
<td>119</td>
<td>CFROBOT4.001</td>
<td>3x(2x0.14)C</td>
<td>green/yellow, black/brown, red/orange grey/blue/white-yellow/white-black brown-red/brown-blue</td>
</tr>
<tr>
<td>CFROBOT4.006</td>
<td>(3x(2x0.14)+4x0.14)+(4x0.22)+(2x0.5)C</td>
<td>11.5</td>
<td>78</td>
<td>143</td>
<td>CFROBOT4.006</td>
<td>3x(2x0.14)C</td>
<td>green/yellow, black/brown, red/orange grey/blue/white-yellow/white-black brown-yellow/brown-grey/green-black/green-red brown-red/brown-blue</td>
</tr>
<tr>
<td>CFROBOT4.009</td>
<td>(4x2x0.14)+(2x0.5)C</td>
<td>9.5</td>
<td>51</td>
<td>93</td>
<td>CFROBOT4.009</td>
<td>4x2x0.25C</td>
<td>brown/green, blue/violet, grey/pink, red/black white, brown</td>
</tr>
<tr>
<td>CFROBOT4.015</td>
<td>(4x(2x0.14)+4x0.5)C</td>
<td>9.0</td>
<td>52</td>
<td>96</td>
<td>CFROBOT4.015</td>
<td>4x(2x0.14)C</td>
<td>brown/green, blue/violet, grey/pink, red/black white, brown-green, white-green</td>
</tr>
<tr>
<td>CFROBOT4.028</td>
<td>(2x2x0.20)+(2x0.38)C</td>
<td>7.5</td>
<td>47</td>
<td>75</td>
<td>CFROBOT4.028</td>
<td>2x(2x0.20)C</td>
<td>green/yellow, pink/blue red/black</td>
</tr>
</tbody>
</table>

6) Colour outer jacket: Yellow-green (RAL 6018)

Note: The given outer diameters are maximum values and may tend toward lower tolerance limits.

G = with green-yellow earth core  x = without earth core

---

**Order example:** CFROBOT4.009 – To your desired length (0.5 m steps)

CFROBOT4 chainflex® series .009 Code measuring system type

Online order: ► www.chainflex.eu/CFROBOT4

Delivery time 24h or today.

Delivery time means time until shipping of goods.
Fibre optic cable | TPE | chainflex® CFROBOT5

- For torsion applications
- TPE outer jacket
- Oil-resistant, bio-oil-resistant
- UV-resistant
- Low-temperature-flexible
- Hydrolysis and microbe-resistant
- PVC and halogen-free

Dynamic information

- Bend radius
  - e-chain® twisted: minimum 10 x d
  - flexible: minimum 8 x d
  - fixed: minimum 5 x d
- Temperature
  - e-chain® twisted: -35 °C to +80 °C (following DIN EN 60811-504)
  - flexible: -50 °C to +80 °C (following DIN EN 60811-504)
  - fixed: -55 °C to +80 °C (following DIN EN 50305)
- v max.
  - twisted: 180 °/s
- a max.
  - twisted: 60 °/s²
- Travel distance
  - Robots and multi-axis movements, Class 1
- Torsion
  - ± 180°, with 1 m cable length, Class 3

Cable structure

- Conductor
  - 50/125 μm, 62.5/125 μm especially bending-resistant solid glass fibre optic cores, with aramid strain relief elements.
- Core structure
  - FCC cores wound with high-tensile aramide dampers around a GRP central element.
- Core identification
  - ▶ Product range table
- Outer jacket
  - Low-adhesion, extremely abrasion-resistant and highly flexible TPE mixture, adapted to suit the requirements in e-chains®, Colour: Jet black (similar to RAL 9005)

Properties and approvals

- UV resistance
  - High.
- Oil resistance
  - Oil resistant (following DIN EN 60811-404), bio-oil resistant (following VDMA 24568 with Plantocut 8 S-MB tested by DEA), Class 4.
- Silicone-free
  - Free from silicone which can affect paint adhesion (following PV 3.10.7 – status 1992).
- Halogen-free
  - Following DIN EN 60754.
- Lead-free
  - Following 2011/65/EU (RoHS-II).
- Cleanroom
  - According to ISO Class 1. Outer jacket material complies with CF9.15.07, tested by IPA according to standard 14644-1. Following 2014/35/EU.

Order example: CFROBOT5.501 – To your desired length (0.5 m steps)
CFROBOT chainflex® series .501 Code Type of fibres

Online order: ▶ www.chainflex.eu/CFROBOT5

Delivery time 24h or today.
Delivery time means time until shipping of goods.
Motor cable | PUR | chainflex® CFROBOT6

- For torsion applications
- PUR outer jacket
- Oil and coolant-resistant
- Flame retardant
- PVC and halogen-free
- Notch-resistant
- Hydrolysis and microbe-resistant

**Dynamic information**

- **Bend radius**
  - e-chain® twisted: minimum 10 x d
  - flexible: minimum 8 x d
  - fixed: minimum 5 x d
- **Temperature**
  - e-chain® twisted: -25 °C to +80 °C
  - flexible: -40 °C to +80 °C (following DIN EN 60811-504)
  - fixed: -50 °C to +80 °C (following DIN EN 50303)
- **v max.**
  - twisted: 180 °/s
- **a max.**
  - twisted: 60 °/s²
- **Travel distance**
  - Robots and multi-axis movements, Class 1
- **Torsion**
  - ± 180°, with 1 m cable length, Class 3

**Cable structure**

- **Conductor**
  - Stranded conductor in especially bending-resistant design consisting of bare copper wires (following DIN EN 60228).
- **Core insulation**
  - Mechanically high-quality TPE mixture.
- **Core identification**
  - Black cores with white numerals 1-2, one core green-yellow.
- **Outer jacket**
  - Low-adhesion, highly abrasion-resistant PUR mixture, adapted to suit the requirements in e-chains® (following DIN EN 50363-10-2).
  - Colour: Steel-blue (similar to RAL 5011)

**Electrical information**

- **Nominal voltage**
  - 600/1000 V (following DIN VDE 0298-3)
- **Testing voltage**
  - 4000 V (following DIN EN 50395)

**Properties and approvals**

- **UV resistance**
  - High.
- **Oil resistance**
  - Oil-resistant (following DIN EN 50363-10-2), Class 3.
- **Flame retardant**
  - According to IEC 60332-1-2, CEI 20-35, FT1, VW-1
- **Silicone-free**
  - Free from silicone which can affect paint adhesion (following PV 3.10.7 – status 1992).

**Guaranteed lifetime according to guarantee conditions (Page 22-23)**

<table>
<thead>
<tr>
<th>Cycles*</th>
<th>5 million</th>
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<tr>
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<td>Torsion max. [°/m]</td>
</tr>
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<td>±90</td>
<td>±30</td>
</tr>
<tr>
<td>-15/+70</td>
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</tr>
<tr>
<td>+70/+80</td>
<td>±150</td>
<td>±90</td>
<td>±30</td>
</tr>
</tbody>
</table>

* Higher number of cycles? Online lifetime calculation: www.igus.eu/chainflexlife

**Typical mechanical application areas**

- For extremely heavy duty applications with torsional movements
- Almost unlimited resistance to oil
- Indoor and outdoor applications, UV resistant
- Especially for robots and multi-axis movements
- Robots, Handling, spindle drives

**Part No.**

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Number of cores and conductor nominal cross section [mm²]</th>
<th>Outer diameter [mm]</th>
<th>Copper index</th>
<th>Weight [kg/km]</th>
</tr>
</thead>
<tbody>
<tr>
<td>CFROBOT6.100.03</td>
<td>3G10.0</td>
<td>16.0</td>
<td>317</td>
<td>414</td>
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<tr>
<td>CFROBOT6.160.03</td>
<td>3G16.0</td>
<td>18.5</td>
<td>508</td>
<td>618</td>
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<tr>
<td>CFROBOT6.250.03</td>
<td>3G25.0</td>
<td>23.0</td>
<td>795</td>
<td>962</td>
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<tr>
<td>CFROBOT6.350.03</td>
<td>3G35.0</td>
<td>25.5</td>
<td>1122</td>
<td>1298</td>
</tr>
</tbody>
</table>

1: Phase-out model

Note: The given outer diameters are maximum values and may tend toward lower tolerance limits.

G = with green-yellow earth core
x = without earth core

---

**CFROBOT6 PUR ± 180°/m**

6 months guarantee ... 1,354 types from stock ... no cutting charges

---

**EPLAN download, configurators**

- www.igus.eu/CFROBOT6

---

**Basic requirements**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Travel distance</td>
<td>unsupported</td>
</tr>
<tr>
<td>Oil resistance</td>
<td>none</td>
</tr>
<tr>
<td>Torsion</td>
<td>none</td>
</tr>
</tbody>
</table>

---

**Class 6.1.3.3**

- Halogen-free
  - Following DIN EN 60754.
- UL/CB
  - Style 10492 and 21223, 1000 V, 80 °C
- NFPA
  - Following NFPA 79-2012 chapter 12.9.
- EAC
  - Certificate no. RU C-DE.ME77.B.02324 (TR ZU)
- CE
  - Certificate no. C-DE.PB49.B.00420 (Fire safety)

---

**Lead-free**

- Following 2011/65/EU (RoHS-II).

---

**Cleanroom**

- According to ISO Class 1. Outer jacket material complies with CF27.07.05.02.01.D, tested by IPA according to standard 14644-1.
- Following 2014/35/EU.

---

**Technical data**

- **Motor cable**
  - PUR
  - ± 180°/m

---

**Dynamic performance**

- **Bend radius**
  - e-chain® twisted: minimum 10 x d
  - flexible: minimum 8 x d
  - fixed: minimum 5 x d
- **Temperature**
  - e-chain® twisted: -25 °C to +80 °C
  - flexible: -40 °C to +80 °C (following DIN EN 60811-504)
  - fixed: -50 °C to +80 °C (following DIN EN 50303)
- **v max.**
  - twisted: 180 °/s
- **a max.**
  - twisted: 60 °/s²
- **Travel distance**
  - Robots and multi-axis movements, Class 1
- **Torsion**
  - ± 180°, with 1 m cable length, Class 3

---

**Cable structure**

- **Conductor**
  - Stranded conductor in especially bending-resistant design consisting of bare copper wires (following DIN EN 60228).
- **Core insulation**
  - Mechanically high-quality TPE mixture.
- **Core identification**
  - Black cores with white numerals 1-2, one core green-yellow.
- **Outer jacket**
  - Low-adhesion, highly abrasion-resistant PUR mixture, adapted to suit the requirements in e-chains® (following DIN EN 50363-10-2).
  - Colour: Steel-blue (similar to RAL 5011)

---

**Electrical information**

- **Nominal voltage**
  - 600/1000 V (following DIN VDE 0298-3)
- **Testing voltage**
  - 4000 V (following DIN EN 50395)

---

**Properties and approvals**

- **UV resistance**
  - High.
- **Oil resistance**
  - Oil-resistant (following DIN EN 50363-10-2), Class 3.
- **Flame retardant**
  - According to IEC 60332-1-2, CEI 20-35, FT1, VW-1
- **Silicone-free**
  - Free from silicone which can affect paint adhesion (following PV 3.10.7 – status 1992).

---

**Guaranteed lifetime according to guarantee conditions (Page 22-23)**

<table>
<thead>
<tr>
<th>Cycles*</th>
<th>5 million</th>
<th>7.5 million</th>
<th>10 million</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature, from/to [°C]</td>
<td>Torsion max. [°/m]</td>
<td>Torsion max. [°/m]</td>
<td>Torsion max. [°/m]</td>
</tr>
<tr>
<td>-25/-15</td>
<td>±150</td>
<td>±90</td>
<td>±30</td>
</tr>
<tr>
<td>-15/+70</td>
<td>±180</td>
<td>±120</td>
<td>±60</td>
</tr>
<tr>
<td>+70/+80</td>
<td>±150</td>
<td>±90</td>
<td>±30</td>
</tr>
</tbody>
</table>

* Higher number of cycles? Online lifetime calculation: www.igus.eu/chainflexlife

---

**Typical mechanical application areas**

- For extremely heavy duty applications with torsional movements
- Almost unlimited resistance to oil
- Indoor and outdoor applications, UV resistant
- Especially for robots and multi-axis movements
- Robots, Handling, spindle drives

---

**Part No.**

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Number of cores and conductor nominal cross section [mm²]</th>
<th>Outer diameter [mm]</th>
<th>Copper index</th>
<th>Weight [kg/km]</th>
</tr>
</thead>
<tbody>
<tr>
<td>CFROBOT6.100.03</td>
<td>3G10.0</td>
<td>16.0</td>
<td>317</td>
<td>414</td>
</tr>
<tr>
<td>CFROBOT6.160.03</td>
<td>3G16.0</td>
<td>18.5</td>
<td>508</td>
<td>618</td>
</tr>
<tr>
<td>CFROBOT6.250.03</td>
<td>3G25.0</td>
<td>23.0</td>
<td>795</td>
<td>962</td>
</tr>
<tr>
<td>CFROBOT6.350.03</td>
<td>3G35.0</td>
<td>25.5</td>
<td>1122</td>
<td>1298</td>
</tr>
</tbody>
</table>

1: Phase-out model

Note: The given outer diameters are maximum values and may tend toward lower tolerance limits.

G = with green-yellow earth core
x = without earth core
Motor cable | PUR | chainflex® CFROBOT7

- For torsion applications
- PUR outer jacket
- Shielded
- Oil and coolant-resistant
- Flame retardant
- PVC and halogen-free
- Notch-resistant
- Hydrolysis and microbe-resistant

Dynamic information

<table>
<thead>
<tr>
<th>Bend radius</th>
<th>e-chain® twisted</th>
<th>e-chain® flexible</th>
<th>flexible</th>
<th>fixed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>e-chain® twisted</td>
<td>-25 °C to +80 °C</td>
<td>-40 °C to +80 °C (following DIN EN 60811-504)</td>
<td>-50 °C to +80 °C (following DIN EN 50305)</td>
</tr>
<tr>
<td>v max.</td>
<td>twisted</td>
<td>180 °/s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a max.</td>
<td>twisted</td>
<td>60 °/s²</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Travel distance</td>
<td>Robots and multi-axis movements, Class 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Torsion</td>
<td>±180°, with 1 m cable length, Class 3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Cable structure

- Conductor: Stranded conductor in especially bending-resistant design consisting of bare copper wires (following DIN EN 60228).
- Core insulation: Mechanically high-quality TPE mixture.
- Core identification: Power cores: Black cores with white numerals, one core green-yellow. Products range table: 2 Control pairs; Black cores with white numerals, 1. Control core: 5.2. Control core: 6.3. Control core: 7.4. Control core: 8.4 Control pairs: Colour code in accordance with DIN 47100
- Overall shield: Extremely torsion-resistant tinned braided copper shield. Coverage approx. 85 % optical
- Outer jacket: Low-adhesion, highly abrasion-resistant PUR mixture, adapted to suit the requirements in e-chains® (following DIN EN 50363-10-2). Colour: Steel-blue (similar to RAL 5011)
- Electrical information:
  - Nominal voltage: 600/1000 V (following DIN VDE 0298-3)
  - Testing voltage: 4000 V (following DIN EN 50395)

Class 6.1.3.3

Properties and approvals

- UV resistance: High.
- Oil resistance: Oil-resistant (following DIN EN 50363-10-2), Class 3.
- Flame retardant: According to IEC 60332-1-2, CEI 20-35, FT1, VW-1
- Silicone-free: Free from silicone which can affect paint adhesion (following PV 3.10.7 – status 1992).
- Halogen-free: Following DIN EN 60754.
- UL/CSA: Style 10492 and 21223, 1000 V, 80 °C
- EAC: Certificate no. RU C-DE.ME77.B.02224 (TR ZU)
- CTP: Certificate no. C-DE.PB49.B.00420 (Fire safety)
- CEI: Following CEI 20-35.
- Lead-free: Following 2011/65/EU (RoHS-II).
- Cleanroom: According to ISO Class 1. Outer jacket material complies with CF27.07.05.02.01.D, tested by IPA according to standard 14644-1. Following 2014-35/EU.

Guaranteed lifetime according to guarantee conditions (Page 22-23)

<table>
<thead>
<tr>
<th>Temperature, from/to [°C]</th>
<th>Cycles*</th>
<th>5 million</th>
<th>7.5 million</th>
<th>10 million</th>
</tr>
</thead>
<tbody>
<tr>
<td>-25/-15</td>
<td>±150</td>
<td>±90</td>
<td>±30</td>
<td></td>
</tr>
<tr>
<td>-15/+70</td>
<td>±180</td>
<td>±120</td>
<td>±60</td>
<td></td>
</tr>
<tr>
<td>+70/+80</td>
<td>±150</td>
<td>±90</td>
<td>±30</td>
<td></td>
</tr>
</tbody>
</table>

- Higher number of cycles? Online lifetime calculation: www.igus.eu/chainflexlife

Typical mechanical application areas

- For extremely heavy duty applications with torsional movements
- Almost unlimited resistance to oil
- Indoor and outdoor applications, UV resistant
- Especially for robots and multi-axis movements
- Robots, Handling, spindle drives

EPLAN download, configurators ➤ www.igus.eu/CFROBOT7

36 months guarantee ... 1,354 types from stock ... no cutting charges
Motor cable | PUR | chainflex® CFROBOT7

Class 6.1.3.3

### Part No.

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Number of cores and conductor nominal cross section [mm²]</th>
<th>Outer diameter (d) max. [mm]</th>
<th>Copper index [kg/km]</th>
<th>Weight [kg/km]</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>without control pair</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CFROBOT7.15.03.C</td>
<td>(3G1.5)C</td>
<td>8.5</td>
<td>64</td>
<td>103</td>
</tr>
<tr>
<td>CFROBOT7.15.04.C</td>
<td>(4G1.5)C</td>
<td>9.5</td>
<td>82</td>
<td>127</td>
</tr>
<tr>
<td>CFROBOT7.25.03.C</td>
<td>(3G2.5)C</td>
<td>10.0</td>
<td>98</td>
<td>147</td>
</tr>
<tr>
<td>CFROBOT7.25.04.C</td>
<td>(4G2.5)C</td>
<td>10.5</td>
<td>127</td>
<td>182</td>
</tr>
<tr>
<td>CFROBOT7.60.04.C</td>
<td>(4G6.0)C</td>
<td>15.0</td>
<td>236</td>
<td>403</td>
</tr>
<tr>
<td><strong>2 Control pairs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CFROBOT7.15.02.02.C</td>
<td>(4G1.5+2x(2x1.5))C</td>
<td>16.5</td>
<td>211</td>
<td>325</td>
</tr>
<tr>
<td>CFROBOT7.25.02.02.C</td>
<td>(4G2.5+2x(2x1.5))C</td>
<td>17.0</td>
<td>259</td>
<td>381</td>
</tr>
<tr>
<td><strong>4 Control pairs</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CFROBOT7.40.02.04.C</td>
<td>(4G4.0+4x(2x0.25))C</td>
<td>17.0</td>
<td>270</td>
<td>384</td>
</tr>
</tbody>
</table>

**Note:** The given outer diameters are maximum values and may tend toward lower tolerance limits.

G = with green-yellow earth core
x = without earth core

Order example: CFROBOT7.15.03.C – To your desired length (0.5 m steps)

Online order: [www.chainflex.eu/CFROBOT7](http://www.chainflex.eu/CFROBOT7)

Delivery time 24h or today.
Delivery time means time until shipping of goods.

---

Example image

---

### Class 6.1.3.3

<table>
<thead>
<tr>
<th>Basic requirements</th>
<th>Travel distance</th>
<th>Oil resistance</th>
<th>Torsion</th>
</tr>
</thead>
<tbody>
<tr>
<td>lowest</td>
<td>1m</td>
<td>none</td>
<td>±180°</td>
</tr>
<tr>
<td>lowest</td>
<td>2m</td>
<td>none</td>
<td>±180°</td>
</tr>
<tr>
<td>lowest</td>
<td>3m</td>
<td>none</td>
<td>±180°</td>
</tr>
<tr>
<td>intermediate</td>
<td>4m</td>
<td>none</td>
<td>±180°</td>
</tr>
<tr>
<td>highest</td>
<td>5m</td>
<td>none</td>
<td>±180°</td>
</tr>
</tbody>
</table>

### Travel distance

<table>
<thead>
<tr>
<th>Travel distance</th>
<th>unsupported</th>
</tr>
</thead>
<tbody>
<tr>
<td>1m</td>
<td>2</td>
</tr>
<tr>
<td>2m</td>
<td>3</td>
</tr>
<tr>
<td>3m</td>
<td>4</td>
</tr>
<tr>
<td>4m</td>
<td>5</td>
</tr>
<tr>
<td>5m</td>
<td>6</td>
</tr>
</tbody>
</table>

### Oil resistance

<table>
<thead>
<tr>
<th>Oil resistance</th>
<th>none</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

### Torsion

<table>
<thead>
<tr>
<th>Torsion</th>
<th>none</th>
</tr>
</thead>
<tbody>
<tr>
<td>±180°</td>
<td>1</td>
</tr>
</tbody>
</table>

---

EPLAN download, configurators [www.igus.eu/CFROBOT7](http://www.igus.eu/CFROBOT7)

36 months guarantee ... 1,354 types from stock ... no cutting charges
**Chainflex® CFROBOT**

- For torsion applications
- TPE outer jacket
- Shielded
- Oil-resistant, bio-oil-resistant
- PVC-free
- UV-resistant
- Flame retardant
- Hydrolysis and microbe-resistant

### Electrical information

- **Nominal voltage**: 600/1000 V (following DIN VDE 0298-3)
- **Testing voltage**: 4000 V (following DIN EN 50395)

### Cable structure

- **Conductor**: Extremely bend-resistant cable.
- **Core insulation**: Mechanically high-quality TPE mixture.
- **Overall shield**: Extremely torsion-resistant tinned braided copper shield;
  - Coverage approx. 90 % optical
- **Outer jacket**: Low-adhesion, extremely abrasion-resistant and highly flexible TPE mixture, adapted to suit the requirements in e-chains®;
  - Colour: Jet black (similar to RAL 9005)

### Properties and approvals

- **UV resistance**: High.
- **Oil resistance**: Oil resistant (following DIN EN 60811-404), bio-oil resistant (following VDMA 24568 with Plantocut B 8 S-MB tested by DEA), Class 4
- **Flame retardant**: According to IEC 60332-1-2, CEI 20-35, FT1, VW-1
- **Silicone-free**: Free from silicone which can affect paint adhesion (following PV 3.10.7 – status 1992)

### Typical mechanical application areas

- For extremely heavy duty applications with torsional movements
- Almost unlimited resistance to oil, also with bio-oils
- Indoor and outdoor applications, UV resistant
- Especially for robots and multi-axis movements
- Robots, Handling, spindle drives

### Part No.

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Number of cores and conductor</th>
<th>Outer diameter</th>
<th>Copper index</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>CFROBOT.035</td>
<td>(1x10.0)C</td>
<td>10.5</td>
<td>134</td>
<td>299</td>
</tr>
<tr>
<td>CFROBOT.036</td>
<td>(1x16.0)C</td>
<td>12.0</td>
<td>202</td>
<td>293</td>
</tr>
<tr>
<td>CFROBOT.037</td>
<td>(1x25.0)C</td>
<td>14.5</td>
<td>318</td>
<td>454</td>
</tr>
<tr>
<td>CFROBOT.038</td>
<td>(1x35.0)C</td>
<td>15.5</td>
<td>431</td>
<td>574</td>
</tr>
<tr>
<td>CFROBOT.039</td>
<td>(1x50.0)C</td>
<td>18.0</td>
<td>601</td>
<td>781</td>
</tr>
</tbody>
</table>

**Notes**: The given outer diameters are maximum values and may tend toward lower tolerance limits.

G = with green-yellow earth core x = without earth core

---

**Class 6.1.4.3**

- **UL/CSA**: Style 10258 and 21387, 1000 V, 90 °C
- **NFPA**: Following NFPA 79-2012 chapter 12.9.
- **EAC**: Certificate no. RU C-DE.ME77.B.02324 (TR ZU)
- **CTP**: Certificate no. C-DE.PB49.B.00420 (Fire safety)
- **CEI**: Following CEI 20-35.
- **Lead-free**: Following 2011/65/EU (RoHS-II).

**Guaranteed lifetime according to guarantee conditions (Page 22-23)**

<table>
<thead>
<tr>
<th>Cycles*</th>
<th>Temperature, from/to [°C]</th>
<th>Torsion max. [°/m]</th>
<th>Torsion max. [°/m]</th>
<th>Torsion max. [°/m]</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 million</td>
<td>-35/-25</td>
<td>±150</td>
<td>±90</td>
<td>±30</td>
</tr>
<tr>
<td>7.5 million</td>
<td>-25/+70</td>
<td>±180</td>
<td>±120</td>
<td>±60</td>
</tr>
<tr>
<td>10 million</td>
<td>+70/+80</td>
<td>±150</td>
<td>±90</td>
<td>±30</td>
</tr>
</tbody>
</table>

* Higher number of cycles? Online lifetime calculation: www.igus.eu/chainflexlife

---

**Basic requirements**

- Travel distance:
  - unsupported: ≥ 400 m
- Oil resistance: none
- Torsion: none
  - ±180°

**Cleanroom**

- According to ISO Class 1. Outer jacket material complies with CF34.UL.25.04.D, tested by IPA according to standard 14644-1.
- Following 2014/35/EU.

---

**36 months guarantee ... 1,354 types from stock ... no cutting charges**

---

**Dynamic information**

- **Bend radius**
  - e-chain® twisted: minimum 10 x d
  - flexible: minimum 8 x d
  - fixed: minimum 5 x d
- **Temperature**
  - e-chain® twisted: -35 °C to +90 °C (following DIN EN 60811-504)
  - flexible: -45 °C to +100 °C (following DIN EN 60811-504)
  - fixed: -50 °C to +100 °C (following DIN EN 50305)
- **v max.**
  - twisted: 180 °/s
- **a max.**
  - twisted: 60 °/s²
- **Travel distance**
  - Robots and multi-axis movements, Class 1
- **Torsion**
  - ± 180°, with 1 m cable length, Class 3
Bus cable | PUR | chainflex® CFROBOT8

- For torsion applications
- PUR outer jacket
- Shielded
- Oil and coolant-resistant
- Flame retardant
- notch-resistant
- Hydrolysis and microbe-resistant

**Dynamic information**

- **Bend radius**
  - e-chain® twisted: minimum 10 x d
  - flexible: minimum 8 x d
  - fixed: minimum 5 x d

- **Temperature**
  - e-chain® twisted: -25 °C to +70 °C (following DIN EN 60811-504)
  - flexible: -40 °C to +70 °C (following DIN EN 50303)
  - fixed: -50 °C to +70 °C (following DIN EN 50303)

- **v max.**
  - twisted: 180 °/s

- **a max.**
  - twisted: 60 °/s²

- **Travel distance**
  - Robots and multi-axis movements, Class 1

- **Torsion**
  - ± 180°, with 1 m cable length, Class 3

**Cable structure**

- **Conductor**
  - Stranded conductor in especially bending-resistant design consisting of bare copper wires (following DIN EN 60228).

- **Core insulation**
  - According to bus specification.

- **Core structure**
  - According to bus specification.

- **Core identification**
  - According to bus specification.

- **Intermediate layer**
  - Foil taping over the outer layer.

- **Overall shield**
  - Torsion resistant tinned braided copper shield.

- **Outer jacket**
  - Low-adhesion, highly abrasion-resistant PUR mixture, adapted to suit the requirements in e-chains® (following DIN EN 50363-10-2).

  - Coverage approx. 80 % optical

**Electrical information**

- **Nominal voltage**
  - 50 V

- **Testing voltage**
  - 500 V

---

**Properties and approvals**

- **UV resistance**
  - High.

- **Oil resistance**
  - Oil-resistant (following DIN EN 50363-10-2), Class 3.

- **Flame retardant**
  - According to IEC 60332-1-2, CEI 20-35, FT1

- **Silicone-free**
  - Free from silicone which can affect paint adhesion (following PV 3.10.7 – status 1992).

- **UL/CSA**
  - Style 1589 and 20236, 30 V, 80 °C

- **EAC**
  - Certificate no. RU C-DE.ME77.B.01218 (TR ZU)

- **CTP**
  - Certificate no. C-DE.PB49.B.00416 (Fire safety)

- **CEI**
  - Following CEI 20-35.

- **Lead-free**
  - Following 2011/65/EU (RoHS-II).

- **Cleanroom**
  - According to ISO Class 1. Outer jacket material complies with CF27.07.05.02.01.D, tested by IPA according to standard 14644-1. Following 2014/35/EU.

**Guaranteed lifetime according to guarantee conditions (Page 22-23)**

<table>
<thead>
<tr>
<th>Cycles*</th>
<th>5 million</th>
<th>7.5 million</th>
<th>10 million</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature, from/to [°C]</td>
<td>Torsion max. [°/m]</td>
<td>Torsion max. [°/m]</td>
<td>Torsion max. [°/m]</td>
</tr>
<tr>
<td>-25/-15</td>
<td>±150</td>
<td>±90</td>
<td>±30</td>
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<tr>
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</tr>
<tr>
<td>+60/+70</td>
<td>±150</td>
<td>±90</td>
<td>±30</td>
</tr>
</tbody>
</table>

* Higher number of cycles? Online lifetime calculation: www.igus.eu/chainflexlife

**Typical mechanical application areas**

- For extremely heavy duty applications with torsional movements
- Almost unlimited resistance to oil, also with bio-oils
- Indoor and outdoor applications, UV resistant
- Especially for robots and multi-axis movements
- Robots, handling, spindle drives

---

**EPLAN download, configurators**

- [www.igus.eu/CFROBOT8](http://www.igus.eu/CFROBOT8)

---

**World premiere! CAT5e to CAT7 for Torsion**

**Basic requirements**

- Travel distance
  - Oil resistance

**Torsion**

- ± 180°/m
Bus cable | PUR | chainflex® CFROBOT8

**Guarantee**

36 months guarantee ... 1,354 types from stock ... no cutting charges

---

**Example image**

*Bus cable | PUR | chainflex® CFROBOT8.845*

---

**Technical note on bus cables**

chainflex® bus cables have been specially developed and tested for continuously moving use in e-chains®. Depending on the material used for the outer jacket and on the underlying construction principle, the bus cables are designed for different mechanical requirements and resistance to diverse media. The cables have been electrically designed in such a way that, on the one hand, the electrical requirements of the respective bus specification are reliably met and, on the other, that greater value is placed on a high degree of EMC reliability.

It is also ensured that the electrical values remain stable over the long term in spite of permanent movement. The overall quality of transmission in a complete bus communication system, however, is not solely dependent on the cable used. What is also essential is that all components (electronic parts, connecting system and cable) are precisely matched to each other and that the maximum transmission lengths, which are dependent on the respective system, are adhered to with regard to the data transmission rates needed. A cable is thus not solely responsible for the reliable transmission of signals. igus® advises you when you are designing your bus system so that all these factors are taken into account and, with extensive tests, helps you to ensure the process reliability of your system from the very beginning.

---

**Part No.** | Number of cores and conductor nominal cross section | Outer diameter (d) max. | Copper index | Weight | Part No. | Characteristic wave impedance approx. | Core group | Colour code
---|---|---|---|---|---|---|---|---
Profibus | | | | | | | |
CFROBOT8.001 | (2x0.35)C | 8.0 | 29 | 62 | CFROBOT8.001 | 150 | (2x0.35)C | red, green
CAN-Bus | | | | | | | |
CFROBOT8.022 | (4x0.5)C | 7.5 | 43 | 72 | CFROBOT8.022 | 120 | (4x0.5)C | white, green, brown, yellow (star-quad stranding)
DeviceNet | New | | | | | | |
CFROBOT8.030 | (2xAWG24)+ (2xAWG22)C | 9.5 | 31 | 75 | CFROBOT8.030 | 120 | (2xAWG24) | white/blue, red, black
Ethernet/CAT5e | | | | | | | |
CFROBOT8.045 | 4x(2x0.14)C | 8.5 | 39 | 69 | CFROBOT8.045 | 100 | 4x(2x0.14)C | white-green/green, white-orange/orange, white-blue/blue, white-brown/brown
Ethernet/CAT6 | | | | | | | |
CFROBOT8.049 | 4x(2x0.14)C | 8.5 | 38 | 68 | CFROBOT8.049 | 100 | 4x(2x0.14)C | white-green/green, white-orange/orange, white-blue/blue, white-brown/brown
Ethernet/CAT6A | | | | | | | |
CFROBOT8.050 | 4x(2x0.15)C | 10.5 | 54 | 127 | CFROBOT8.050 | 100 | 4x(2x0.15)C | white-green/green, white-orange/orange, white-blue/blue, white-brown/brown
Ethernet/CAT7 | | | | | | | |
CFROBOT8.052 | 4x(2x0.15)C | 10.5 | 55 | 129 | CFROBOT8.052 | 100 | 4x(2x0.15)C | white-green/green, white-orange/orange, white-blue/blue, white-brown/brown
Profinet | New | | | | | | |
CFROBOT8.060 | (2x0x0.34)C | 8.5 | 36 | 70 | CFROBOT8.060 | 100 | (2x0x0.34)C | white/blue, yellow/orange

**Note:**

The given outer diameters are maximum values and may tend toward lower tolerance limits.

G = with green-yellow earth core
x = without earth core

**Basic requirements**

<table>
<thead>
<tr>
<th>Travel distance</th>
<th>Oil resistance</th>
<th>Torsion</th>
</tr>
</thead>
<tbody>
<tr>
<td>unsupported</td>
<td>none</td>
<td>±180°</td>
</tr>
<tr>
<td>highest</td>
<td>highest</td>
<td>±180°</td>
</tr>
</tbody>
</table>

**Class 6.1.3.3**

**Technical note on bus cables**

chainflex® bus cables have been specially developed and tested for continuously moving use in e-chains®. Depending on the material used for the outer jacket and on the underlying construction principle, the bus cables are designed for different mechanical requirements and resistance to diverse media. The cables have been electrically designed in such a way that, on the one hand, the electrical requirements of the respective bus specification are reliably met and, on the other, that greater value is placed on a high degree of EMC reliability.

It is also ensured that the electrical values remain stable over the long term in spite of permanent movement. The overall quality of transmission in a complete bus communication system, however, is not solely dependent on the cable used. What is also essential is that all components (electronic parts, connecting system and cable) are precisely matched to each other and that the maximum transmission lengths, which are dependent on the respective system, are adhered to with regard to the data transmission rates needed. A cable is thus not solely responsible for the reliable transmission of signals. igus® advises you when you are designing your bus system so that all these factors are taken into account and, with extensive tests, helps you to ensure the process reliability of your system from the very beginning.

**Order example:** CFROBOT8.052 – To your desired length (0.5 m steps)

**CFROBOT8 chainflex® series .052 Code Bus type**

**Online order:** [www.chainflex.eu/CFROBOT8](http://www.chainflex.eu/CFROBOT8)

**Delivery time:** 24h or today.

Delivery time means time until shipping of goods.

---

**36 months guarantee ... 1,354 types from stock ... no cutting charges**
Hybrid cable | PUR | chainflex® CFROBOT9

- For torsion applications
- PUR outer jacket
- Unshielded/shielded
- Oil and coolant-resistant
- Flame retardant
- PVC and halogen-free
- Notch-resistant
- Hydrolysis and microbe-resistant

Dynamic information

- **Bend radius**
  - e-chain® twisted: minimum 10 x d
  - flexible: minimum 8 x d
  - fixed: minimum 5 x d

- **Temperature**
  - e-chain® twisted: -25 °C to +80 °C (following DIN EN 60811-504)
  - flexible: -40 °C to +80 °C (following DIN EN 60811-504)
  - fixed: -50 °C to +80 °C (following DIN EN 50305)

- **v max.**
  - twisted: 180 °/s

- **a max.**
  - twisted: 60 °/s²

- **Travel distance**
  - Robots and multi-axis movements, Class 1

- **Torsion**
  - ±180°, with 1 m cable length, Class 3

Cable structure

- **Conductor**
  - Stranded conductor in especially bending-resistant design consisting of bare copper wires (following DIN EN 60228).

- **Core insulation**
  - Mechanically high-quality TPE mixture.

- **Core identification**
  - Product range table

- **Element shield**
  - Extremely torsion-resistant tinned braided copper shield.

- **Outer jacket**
  - Low-adhesion, highly abrasion-resistant PUR mixture, adapted to suit the requirements in e-chains® (following DIN EN 50363-10-2).

  - Colour: Steel-blue (similar to RAL 5011)

Electrical information

- **Nominal voltage**
  - 300/500 V (following DIN VDE 0298-3)

- **Testing voltage**
  - 2000 V (following DIN EN 50395)

Properties and approvals

- **UV resistance**
  - High

- **Oil resistance**
  - Oil-resistant (following DIN EN 50363-10-2), Class 3

- **Flame retardant**
  - According to IEC 60332-1-2, CEI 20-35, FT1, VW-1

Guaranteed lifetime according to guarantee conditions (Page 22-23)

<table>
<thead>
<tr>
<th>Cycles</th>
<th>5 million</th>
<th>7.5 million</th>
<th>10 million</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature, from/to [°C]</td>
<td>Torsion max. [°/m]</td>
<td>Torsion max. [°/m]</td>
<td>Torsion max. [°/m]</td>
</tr>
<tr>
<td>-25/-15</td>
<td>±150</td>
<td>±90</td>
<td>±90</td>
</tr>
<tr>
<td>-15/+70</td>
<td>±180</td>
<td>±120</td>
<td>±60</td>
</tr>
<tr>
<td>+70/+80</td>
<td>±150</td>
<td>±90</td>
<td>±30</td>
</tr>
</tbody>
</table>

* Higher number of cycles? Online lifetime calculation: www.igus.eu/chainflexlife

Typical mechanical application areas

- For extremely heavy duty applications with torsional movements
- Almost unlimited resistance to oil
- Indoor and outdoor applications, UV resistant
- Especially for robots and multi-axis movements
- Robots, Handling, spindle drives

Guarantee

- 36 months guarantee
- ... 1,354 types from stock
- ... no cutting charges

EPLAN download, configurators ► www.igus.eu/CFROBOT9

---

Note: The image contains additional text and diagrams related to the cable, but the main content is provided above. The image also includes a table showing guaranteed lifetimes for different conditions, which is not fully transcribed here due to space constraints.
## Guarantee

month guarantee

36 months guarantee

1,354 types from stock

... no cutting charges

---

**Hybrid cable | PUR | chainflex® CFROBOT9**

---

**Example image**

**Part No.** | **Number of cores and conductor nominal cross section** | **Outer diameter (d) max. [mm]** | **Copper index [kg/km]** | **Weight [kg/km]** | **Part No.** | **Core group** | **Colour code**
--- | --- | --- | --- | --- | --- | --- | ---
CFROBOT9.001 | 5G1.0+(2x1.0)C | 10.5 | 86 | 142 | CFROBOT9.001 | 5G1.0 (2x1.0)C | white with black numbers 1-4, one core green-yellow white with black numbers 5-6

CFROBOT9.002 | 2x3x0.75+(3x0.75)C | 11.5 | 82 | 145 | CFROBOT9.002 | 2x3x0.75 (3x0.75)C | white with black numbers 4-9 white with black numbers 1-3

CFROBOT9.003 | 2x0.5+(2x0.5)C | 10.0 | 29 | 80 | CFROBOT9.003 | 2x0.5 (2x0.5)C | blue/black white/brown

CFROBOT9.004 | 16G1.0+(2x1.0)C | 16.0 | 207 | 324 | CFROBOT9.004 | 16G1.0 (2x1.0)C | white with black numbers 1-4, 7-17, one core green-yellow white with black numbers 5-6

CFROBOT9.005 | 23G1.0+(2x1.0)C | 19.5 | 286 | 462 | CFROBOT9.005 | 23G1.0 (2x1.0)C | white with black numbers 1-4, 7-24, one core green-yellow white with black numbers 5-6

CFROBOT9.006 | 24G1.0+(2x1.0)C | 20.0 | 299 | 476 | CFROBOT9.006 | 24G1.0 (2x1.0)C | white with black numbers 1-4, 7-25, one core green-yellow white with black numbers 5-6

CFROBOT9.007 | (15x(2x0.25)C+(4x0.25)C)C | 18.5 | 245 | 384 | CFROBOT9.007 | 15x(2x0.25)C (4x0.25)C | Colour code in accordance with DIN 47100. white/green/brown/yellow(CAN-Bus) white/brown

CFROBOT9.010 | (4x2x0.25)C | 10.5 | 66 | 120 | CFROBOT9.010 | 4x(2x0.25)C | white/brown, green/yellow, grey/pink, blue/red

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1) Phase-out model

Note: The given outer diameters are maximum values and may tend toward lower tolerance limits.

G = with green-yellow earth core x = without earth core

---

**Basic requirements**

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Class 6.1.3.3

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EPLAN download, configurators ► [www.igus.eu/CFROBOT9](http://www.igus.eu/CFROBOT9)

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Guarantee for 36 months ... 1,354 types from stock ... no cutting charges