### Twistable cables

#### Information about twistable cables

<table>
<thead>
<tr>
<th>Chainflex® cable</th>
<th>Guidance</th>
<th>Minimum bend radius (factor x d)</th>
<th>Temperature range (°C)</th>
<th>Applicable standards</th>
<th>Oil-resistant</th>
<th>Torsion resistant</th>
<th>v max. twisted [°/s]</th>
<th>a max. twisted [°/s²]</th>
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**36 month 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 or multi-axis flexible cables with a long service life, similar to the classic chainflex® cables for use in linear e-chainsystems®.

Stranding, structure, shields and jacket materials must compensate both for major changes in bending load and changes in diameter due to torsional movements. To achieve this, different "soft" structural elements e.g. rayon fibres, PTFE elements or filling elements that absorb torsion forces are used in chainflex® CFROBOT cables.

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

With twistable bus cables in particular, the transmission characteristics such as attenuation, cable capacitance 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 capacitance values.

The highly abrasion-resistant, halogen-free and flameresistant PUR jacket material in motor, hybrid/control cables and bus cables protects the torsion-optimised stranded elements from possible damage. The highly abrasion-resistant, halogen-free TPE jacket achieves the special requirements of the twistable FOC and individual as well as the single core cables.

Unlike cables for linear e-chainsystems®, the mechanical stress on these cables is in the combination of bending, torsion and centrifugal forces that cannot usually be determined by design 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 use of a particular cable in torsion applications.

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

According to this standard, all chainflex® CFROBOT cables of a triflex® 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 on 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 igus® standard and have been approved for use in torsion applications.

The following twistable CFROBOT 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® CFROBOT cables pre-fitted with the connectors of your choice as a readycable®, or as a ready-to-install readychain® cable assembly.

Test data ➤ page 37
### chainflex® guarantee

#### Guaranteed lifetime (1)

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(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

10 million
Double strokes guaranteed
6.8 x d
3D movements
Bend radius, e-chain®
Travel distance, e-chain®

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

Dynamic information

Bend radius
- e-chain® linear: minimum 6.8 x d
- flexible: minimum 5 x d
- fixed: minimum 4 x d

Temperature
- e-chain® linear: -25 °C up to +80 °C (following DIN EN 60811-504)
- flexible: -40 °C up to +80 °C (following DIN EN 50303)
- fixed: -50 °C up to +80 °C (following DIN EN 60754)

v max.
- twisted: 180 °/s

a max.
- twisted: 60 °/s²

Travel distance
- Robots and 3D movements, Class 1

Torsion
- ± 180°, with 1 m cable length, Class 3
(except for 5-core types ≥ 4.0 mm²)

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 short pitch length.
- Number of cores ≥ 12: Cores in bundles and wound around together a centre for high-tensile stresses with optimised short pitch length and direction, especially low-torsion structure.

Core identification
- Cores < 0.5 mm²: Colour code in accordance with DIN 47100.
- Cores ≥ 0.5 mm²: Black cores with white numbers, one green-yellow core.

CF77.UL.03.04.INI: brown, blue, black, white

Outer jacket
- Low-adhesion, halogen-free, highly abrasion resistant PUR mixture, adapted to suit the requirements in e-chains® (following DIN EN 60754).
- Colour: Window-grey (similar to RAL 7040)
- CF77.UL.03.04.INI: Colour: Colza yellow (similar to RAL 1021)

Electrical information

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

Testing voltage
- 2000 V (following DIN EN 50095)

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
NFPA: Following NFPA 79-2012, chapter 12.9
DNV-GL: Type approval 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 protection)
CEI: Following CEI 20-35
CE: Following 2014/35/EU

Clean room: According to ISO Class 1, material/cable tested by IPA according to DIN EN ISO standard 14644-1

Guaranteed service life (details see page 22-23)

Double strokes*
- 5 million: 7.5 million: 10 million
- Temperature, from/to [°C]: -25/-15 8.5 10 9.5 11 10.5 12
- 15/-70: 6.8 7.5 9.5 11 8.5 9.5
- +70/-50: 8.5 10 9.5 11 10 12

* Higher number of double strokes? Service life calculation online ◄ www.igus.eu/chainflexlife

Typical application areas

• For heavy duty applications, Class 5
• Especially for robots and 3D movements, Class 1
• Almost unlimited resistance to oil, Class 3
• Torsion ± 180°, with 1 m cable length, Class 3
• Indoor and outdoor applications with average sun radiation
• Robots, handling, spindle drives

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

New
### Basic requirements

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<td>70</td>
<td>115</td>
</tr>
<tr>
<td>CF77.UL.10.12.D</td>
<td>12x1.0</td>
<td>12.5</td>
<td>119</td>
<td>225</td>
</tr>
<tr>
<td>CF77.UL.10.18.D</td>
<td>18x1.0</td>
<td>15.0</td>
<td>178</td>
<td>328</td>
</tr>
<tr>
<td>CF77.UL.10.25.D</td>
<td>25x1.0</td>
<td>17.5</td>
<td>248</td>
<td>436</td>
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<tr>
<td>CF77.UL.10.42.D</td>
<td>42x1.0</td>
<td>22.5</td>
<td>433</td>
<td>679</td>
</tr>
</tbody>
</table>

### Guarantee

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

### Delivery

Delivery time means time until goods are shipped.

### Order example

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

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

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

Delivery time 24hrs or today.
Control cable | PUR | chainflex® CFROBOT2

10 million 
Double strokes guaranteed

10 x d 
Bend radius, e-chain®

3D movements 
Travel distance, e-chain®

For torsion applications
PUR outer jacket
Shielded
Oil resistant 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 up to +80 °C
- flexible: -40 °C up to +80 °C (following DIN EN 60811-504)
- fixed: -50 °C up to +80 °C (following DIN EN 50306)

v max.
- twisted: 180 °/s

a max.
- twisted: 60 °/s²

Travel distance
- Robots and 3D movements, Class 1

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

Cable structure

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

Core insulation
- Mechanically high-quality TPE mixture.

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

Element shield
- Extremely torsion-resistant tinned braided copper shield.
- Coverage approx. 85 % optical

Outer jacket
- Low-adhesion, halogen-free, highly abrasion resistant PUR mixture, adapted to suit the requirements in e-chains® (following DIN EN 50306-10-2).
- 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 50295)

Properties and approvals

UV resistance 
High

Oil resistance 
Oil-resistant (following DIN EN 50383-10-2), 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 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 protection)

CEI 
Following CEI 20-35

Lead-free 
Following 2013/53/EU

Clean room 
According to ISO Class 1. The outer jacket material of this series complies with CF27.07.05.02.01.D – tested by IPA according to standard DIN EN ISO 14644-1

CE 
Following 2014/35/EU

Guaranteed service life (details see 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/+40</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 double strokes? Service life calculation online 
www.igus.eu/chainflexlife

Typical application areas

For heaviest duty applications with torsion movements, Class 6
Especially for robots and 3D movements, Class 1
Almost unlimited resistance to oil, Class 3
Torsion ±180°, with 1 m cable length, Class 3
Indoor and outdoor applications, UV-resistant
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]

| CFROBOT2.07.04.C | (4x0.75)C | 8.5 | 42 | 61 |
| CFROBOT2.07.05.C | (5x0.75)C | 8.5 | 51 | 91 |
| CFROBOT2.07.07.C | (7x0.75)C | 10.0 | 71 | 126 |
| CFROBOT2.07.12.C | (12x0.75)C | 14.0 | 122 | 208 |
| CFROBOT2.07.18.C | (18x0.75)C | 16.5 | 185 | 309 |

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

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

- **For torsion applications**
- **PUR outer jacket**
- **Shielded**
- **Oil resistant and coolant-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 up to +80 °C (following DIN EN 60811-504)
  - flexible: -50 °C up to +80 °C (following DIN EN 50303)
- **v max.**
  - twisted: 180 °/s
- **a max.**
  - twisted: 60 °/s²
- **Travel distance**
  - Robots and 3D movements, Class 1
- **Torsion**
  - ± 180°, with 1 m cable length, Class 3

### Cable structure

- **Conductor**
  - Stranded conductor in especially bending-resistant version 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. Coverage approx. 85 % optical
- **Outer jacket**
  - Low-adhesion, halogen-free, 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 50295)

### 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)
- **Temperature**
  - e-chain® twisted: -25 °C up to +80 °C (following DIN EN 60811-504)
  - flexible: -40 °C up to +80 °C (following DIN EN 60811-504)
  - fixed: -50 °C up to +80 °C (following DIN EN 50305)
- **v max.**
  - twisted: 180 °/s
- **a max.**
  - twisted: 60 °/s²

### Cycles & Temperature

<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>±60</td>
</tr>
<tr>
<td>-15/+70</td>
<td>±180</td>
<td>±120</td>
<td>±60</td>
</tr>
<tr>
<td>+70/+90</td>
<td>±150</td>
<td>±90</td>
<td>±30</td>
</tr>
</tbody>
</table>

* Higher number of double strokes? Service life calculation online ▶ www.igus.eu/chainflexlife

### Typical application areas

- For heaviest duty applications with torsion movements, Class 6
- Especially for robots and 3D movements, Class 1
- Almost unlimited resistance to oil, Class 3
- Torsion ± 180°, with 1 m cable length, Class 3
- Indoor and outdoor applications, UV-resistant
- Robots, handling, spindle drives

### Part No.

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Number of cores and conductor nominal cross section</th>
<th>Outer diameter (d) max. [mm]</th>
<th>Copper index [kg/km]</th>
<th>Weight [kg/km]</th>
</tr>
</thead>
<tbody>
<tr>
<td>CFROBOT3.02.03.02</td>
<td>(3x(2x0.25))C</td>
<td>9.0</td>
<td>32</td>
<td>83</td>
</tr>
<tr>
<td>CFROBOT3.02.04.02</td>
<td>(4x(2x0.25))C</td>
<td>10.5</td>
<td>38</td>
<td>100</td>
</tr>
<tr>
<td>CFROBOT3.02.06.02</td>
<td>(6x(2x0.25))C</td>
<td>11.5</td>
<td>52</td>
<td>126</td>
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<tr>
<td>CFROBOT3.02.08.02</td>
<td>(8x(2x0.25))C</td>
<td>14.0</td>
<td>66</td>
<td>153</td>
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<tr>
<td>CFROBOT3.05.05.02</td>
<td>(5x(2x0.5))C</td>
<td>12.5</td>
<td>75</td>
<td>159</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/CFROBOT3
Measuring system cable | PUR | chainflex® CFROBOT4

10 million
Double strokes guaranteed

10 x d
Bend radius, e-chain®

3D movements
Travel distance, e-chain®

● For torsion applications
● PUR outer jacket
● Shielded
● Oil resistant and coolant-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 up to +80 °C |
|            | flexible         | -40 °C up to +80 °C (following DIN EN 60811-504) |
|            | fixed            | -50 °C up to +80 °C (following DIN EN 50303) |
| v max.     | twisted          | 180 °/s        |
| a max.     | twisted          | 60 °/s²        |
| Travel distance | Robots and 3D movements, Class 1 |
| Torsion    | ± 180°, with 1 m cable length, Class 3 |

Cable structure

Conductor
Stranded conductor in especially bending-resistant version 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, halogen-free, 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
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 protection)
- CE: Following CEI 20-35
- Lead-free: Following 2011/65/EC (RoHS-II)
- Clean room: According to ISO Class 1. The outer jacket material of this series complies with CF27.07.05.02.01.D - tested by IPA according to standard DIN EN ISO 14644-1
- CE: Following 2014/35/EU

Guaranteed service life (details see 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>
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<tr>
<td>-15/+70</td>
<td>±180</td>
<td>±120</td>
<td>±90</td>
</tr>
<tr>
<td>+70/+80</td>
<td>±150</td>
<td>±90</td>
<td>±30</td>
</tr>
</tbody>
</table>

* Higher number of double strokes? Service life calculation online ➤ www.igus.eu/chainflexlife

Typical application areas

- For heaviest duty applications with torsion movements, Class 6
- Especially for robots and 3D movements, Class 1
- Almost unlimited resistance to oil, Class 3
- Torsion ± 180°, with 1 m cable length, Class 3
- Indoor and outdoor applications, UV-resistant
- Robots, handling, spindle drives

EPLAN download, configurators ➤ www.igus.eu/CFROBOT4
## Measuring system cable | PUR | chainflex® CFROBOT4

### Class 6.1.3.3

**Example image**

**Order example:** CFROBOT4.001 – to your desired length (0.5 m steps)

**CFROBOT4 chainflex® series .009 Code measuring system type**

**Online order** ▶️ www.chainflex.eu/CFROBOT4

**Delivery time 24hrs or today.**

Delivery time means time until goods are shipped.

---

<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>
<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>62</td>
<td>115</td>
<td>CFROBOT4.001</td>
<td>3x(2x0.14)C</td>
<td>green/yellow, black/brown, red/orange</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4x0.14</td>
<td>Grey/blue/white-yellow/white-black</td>
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<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>2x0.5</td>
<td>brown-red/brown-blue</td>
</tr>
<tr>
<td>CFROBOT4.006</td>
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<td>11.5</td>
<td>74</td>
<td>138</td>
<td>CFROBOT4.006</td>
<td>3x(2x0.14)C</td>
<td>green/yellow, black/brown, red/orange</td>
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<td></td>
<td>(4x0.14)</td>
<td>grey/blue/white-yellow/white-black</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(4x0.22)</td>
<td>brown-yellow/brown-grey/green-black/green-red</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(2x0.5)</td>
<td>brown-red/brown-blue</td>
</tr>
<tr>
<td>CFROBOT4.009</td>
<td>(4x(2x0.25)+(2x0.5))C</td>
<td>9.5</td>
<td>48</td>
<td>90</td>
<td>CFROBOT4.009</td>
<td>4x(2x0.25)</td>
<td>brown/green, blue/violet, Grey/pink, red/black</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2x0.5</td>
<td>white, brown</td>
</tr>
<tr>
<td>CFROBOT4.015</td>
<td>(4x(2x0.14)+4x0.5)C</td>
<td>9.0</td>
<td>49</td>
<td>93</td>
<td>CFROBOT4.015</td>
<td>4x(2x0.14)</td>
<td>brown/green, yellow/violet, Grey/pink, red/black</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4x0.5</td>
<td>blue, white, brown-green, white-green</td>
</tr>
<tr>
<td>CFROBOT4.028</td>
<td>(2x(2x0.20)+(2x0.38))C</td>
<td>7.5</td>
<td>44</td>
<td>72</td>
<td>CFROBOT4.028</td>
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<td>green/yellow, pink/blue</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(2x0.38)</td>
<td>red/black</td>
</tr>
</tbody>
</table>

---

13) 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

---
Fibre Optic Cable | TPE | chainflex® CFROBOT5

10 million
Double strokes guaranteed

10 x d
Bend radius, e-chain®

3D movements
Travel distance, e-chain®

- For torsion applications
- TPE outer jacket
- Oil and 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 up to +80 °C (following DIN EN 60811-504)
  - flexible: -55 °C up to +80 °C (following DIN EN 50305)

- v max. twisted: 180 °/s
- a max. twisted: 60 °/s²

- Travel distance:
  - Robots and 3D movements, Class 1
- Torsion: ± 180°, with 1 m cable length, Class 3

Cable structure

- Fibre optic core: 50/125 μm, 62.5/125 μm bending-resistant solid glass fibre optic cores, with aramid strain relief elements.
- Core structure: FCC cores wound with high-tensile aramid 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/EC (RoHS-II)
- Clean room: According to ISO Class 1. The outer jacket material of this series complies with CFR 15.07 - tested by IPA according to standard DIN EN ISO 14644-1 Following 2014/35/EU

- Colour: Jet black (similar to RAL 9005)

Typical application areas

- For heaviest duty applications with torsion movements, Class 6
- Especially for robots and 3D movements, Class 1
- Almost unlimited resistance to oil, also with bio-oils, Class 4
- Torsion ± 180°, with 1 m cable length, Class 3
- Indoor and outdoor applications, UV-resistant
- Robots, Handling

Part No. | Number of fibres/
Fibre diameter/
Conductor nominal cross section
| Outer diameter (d) max. | Weight [kg/km]
---|---|---
CFROBOT5.500 | 2x62.5/125 | 8.5 | 53
CFROBOT5.501 | 2x50/125 | 8.5 | 53

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: CFROBOT5.501 – to your desired length (0.5 m steps)

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

EPLAN download, configurators ► www.igus.eu/CFROBOT5
Motor cable | PUR | chainflex® CFROBOT6

10 million Double strokes guaranteed
10 x d Bend radius, e-chain®
3D movements Travel distance, e-chain®

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

Dynamic information

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bend radius</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e-chain® twisted</td>
<td>minimum 10 x d</td>
<td></td>
<td></td>
</tr>
<tr>
<td>flexible</td>
<td>minimum 8 x d</td>
<td></td>
<td></td>
</tr>
<tr>
<td>fixed</td>
<td>minimum 5 x d</td>
<td></td>
<td></td>
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<tr>
<td>e-chain® twisted</td>
<td>-25 °C up to +80 °C</td>
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<tr>
<td>flexible</td>
<td>-40 °C up to +80 °C (following DIN EN 60811-504)</td>
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<tr>
<td>fixed</td>
<td>-50 °C up to +80 °C (following DIN EN 50305)</td>
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<tr>
<td><strong>v max.</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>twisted</td>
<td>180 °/s</td>
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<tr>
<td><strong>a max.</strong></td>
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</tr>
<tr>
<td>twisted</td>
<td>60 °/s²</td>
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Temperature

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<thead>
<tr>
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<tbody>
<tr>
<td><strong>Travel distance</strong></td>
<td>Robots and 3D movements, Class 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Torsion</strong></td>
<td>± 180°, with 1 m cable length, Class 3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Cable structure

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

Core insulation
Mechanically high-quality TPE mixture.

Core identification
Black cores with white numbers 1-2, one green-yellow core.

Outer jacket
Low-adhesion, halogen-free, 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 50089)

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

NFPA
Following NFPA 79-2012, chapter 12.9

EAC
Certificate No. RI C-DE.ME77.B.02324 (TR ZU)

CTP
Certificate No. C-DE.PB49.B.00420 (Fire protection)

CEI
Following CEI 20-35

Lead-free
Following 2011/65 /EC (RoHS-II)

Clean room
According to ISO Class 1. The outer jacket material of this series complies with CF27.07.05.02.01.D - tested by IPA according to standard DIN EN ISO 14644-1.

CE
Following 2014/35/EU

Guaranteed service life (details see page 22-23)

<table>
<thead>
<tr>
<th></th>
<th>5 million</th>
<th>7.5 million</th>
<th>10 million</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Temperature, from/to [°C]</strong></td>
<td><strong>Torsion max. [°/m]</strong></td>
<td><strong>Torsion max. [°/m]</strong></td>
<td><strong>Torsion max. [°/m]</strong></td>
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<tr>
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<tr>
<td>±70/+80</td>
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<td>±30</td>
</tr>
</tbody>
</table>

* Higher number of double strokes? Service life calculation online ◄ www.igus.eu/chainflexlife

Typical application areas

For heaviest duty applications with torsion movements, Class 6
Especially for robots and 3D movements, Class 1
Almost unlimited resistance to oil, Class 3
Torsion ± 180°, with 1 m cable length, Class 3
Indoor and outdoor applications, UV-resistant
Robots, handling, spindle drives

Part No. | Number of cores and conductor | Outer diameter (d) max. | Copper index | Weight |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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</thead>
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<tr>
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<td>[mm]</td>
<td>[kg/km]</td>
<td>[kg/km]</td>
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<tr>
<td>CFROBOT6.100.03</td>
<td>3G10.0</td>
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<td>297</td>
<td>389</td>
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<tr>
<td>CFROBOT6.160.03</td>
<td>3G16.0</td>
<td>18.0</td>
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<td>CFROBOT6.250.03</td>
<td>3G25.0</td>
<td>25.5</td>
<td>737</td>
<td>895</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

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

**Properties and approvals**

<table>
<thead>
<tr>
<th>Basic requirements</th>
<th>Travel distance</th>
<th>Oil resistance</th>
<th>Torsion</th>
</tr>
</thead>
<tbody>
<tr>
<td>UV resistance</td>
<td></td>
<td></td>
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<tr>
<td>Oil resistant</td>
<td>3</td>
<td>High</td>
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</tr>
<tr>
<td>Flame retardant</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Flame retardant</td>
<td>3</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Silicone-free</td>
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<td>4</td>
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</tr>
<tr>
<td>Silicone-free</td>
<td>5</td>
<td>3</td>
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</tr>
<tr>
<td>Halogen-free</td>
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<td>6</td>
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</tr>
<tr>
<td>Halogen-free</td>
<td>7</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

**Dynamic information**

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

- **Temperature**
  - e-chain® twisted:
    - -25 °C up to +80 °C (following DIN EN 60811-504)
  - e-chain® flexible:
    - -40 °C up to +80 °C (following DIN EN 50303)

- **v max.**
  - twisted: 180 °/s

- **a max.**
  - twisted: 60 °/s²

- **Travel distance**
  - Robots and 3D movements, Class 1

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

**Cable structure**

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

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

- **Core identification**
  - Power cores: Black cores with white numbers, one green-yellow core
  - 2 Control pairs: Black cores with white numbers.
    - 1. Control core: 5
    - 2. Control core: 6
  - 3. Control core: 74, 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, halogen-free, highly abrasion resistant PUR mixture, adapted to suit the requirements in e-chains® (following DIN EN 50303).
  - 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)

**Guaranteed service life (details see 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>
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<tr>
<td>-25/-15</td>
<td>±150</td>
<td>±90</td>
<td>±30</td>
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<td>±120</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 double strokes? Service life calculation online ➤ www.igus.eu/chainflexlife

**Typical application areas**

- For heaviest duty applications with torsion movements, Class 6
- Especially for robots and 3D movements, Class 1
- Almost unlimited resistance to oil, Class 3
- Torsion ± 180°, with 1 m cable length, Class 3
- Indoor and outdoor applications, UV-resistant
- Robots, handling, spindle drives

**Guarantee**

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

Class 6.1.3.3

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

Basic requirements
- Travel distance
- Oil resistance
- Torsion

- unsupported
- none
- none
- ±180°
- none

Travel distance unsupported
- ≥ 400 m
- 1 2 3 4 5 6

Oil resistance none
- 1 2 3 4

Torsion none
- ±180°
- 1 2 3

Online order ➤ www.chainflex.eu/CFROBOT7

Delivery time 24hrs or today.
Delivery time means time until goods are shipped.

Part No. | Number of cores and conductor nominal cross section | Outer diameter (d) max. [mm] | Copper index [kg/km] | Weight [kg/km]
--- | --- | --- | --- | ---
without control pair
CFROBOT7.15.03.C | (3G1.5)C | 8.5 | 60 | 97
CFROBOT7.15.04.C | (4G1.5)C | 9.0 | 77 | 120
CFROBOT7.25.03.C | (3G2.5)C | 10.0 | 93 | 141
CFROBOT7.25.04.C | (4G2.5)C | 10.5 | 119 | 172
2 Control pairs
CFROBOT7.15.02.02.C | (4G1.5+2x2x1.5)C | 16.5 | 197 | 304
CFROBOT7.25.02.02.C | (4G2.5+2x2x1.5)C | 16.5 | 243 | 348
4 Control pairs
CFROBOT7.40.02.02.04.C | (4G4.0+4x2x0.25)C | 17.0 | 253 | 365

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

36 month guarantee ... 1,354 types from stock ... no cutting charges
Spindle cable/Single core | TPE | chainflex® CFROBOT

10 million
Double strokes guaranteed
10 x d
Bend radius, e-chain®
3D movements
Travel distance, e-chain®

- For torsion applications
- TPE outer jacket
- Shielded
- Oil and bio-oil resistant
- PVC-free
- UV-resistant
- Flame retardant
- 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>
<tr>
<td>Temperature</td>
<td>e-chain® twisted</td>
<td>-35 °C up to +90 °C</td>
</tr>
<tr>
<td></td>
<td>flexible</td>
<td>-45 °C up to +100 °C (following DIN EN 60811-504)</td>
</tr>
<tr>
<td></td>
<td>fixed</td>
<td>-50 °C up to +100 °C (following DIN EN 50305)</td>
</tr>
<tr>
<td>v max.</td>
<td>twisted</td>
<td>180 °/s</td>
</tr>
<tr>
<td>a max.</td>
<td>twisted</td>
<td>60 °/s²</td>
</tr>
</tbody>
</table>

Travel distance
Robots and 3D movements, Class 1

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

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)

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 60811-404), bio-oil resistant (following VDMA 24568 with Plantocut 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)
- 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 protection)
- CEI: Following CEI 20-35
- Lead-free: Following 2011/65/EC (RoHS-II)
- Clean room: According to ISO Class 1. The outer jacket material of this series complies with CF34.UL.25.04.D - tested by IPA according to standard DIN EN ISO 14644-1 Following 2014/35/EU

Guaranteed service life (details see page 22-23)

<table>
<thead>
<tr>
<th>Cycles*</th>
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</tr>
<tr>
<td>+70/+80</td>
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<td>±90</td>
<td>±30</td>
</tr>
</tbody>
</table>

* Higher number of double strokes? Service life calculation online ▶️ www.igus.eu/chainflexlife

Typical application areas

- For heaviest duty applications with torsion movements, Class 6
- Especially for robots and 3D movements, Class 1
- Almost unlimited resistance to oil, also with bio-oils, Class 4
- Torsion ± 180°, with 1 m cable length, Class 3
- Indoor and outdoor applications, UV-resistant
- Robots, handling, spindle drives

Part No.

| Number of cores and conductor nominal cross section | Outer diameter (d) max. [mm] | Copper index [kg/km] | Weight [kg/km] |
|---------------------------------------------------|------------------------------|----------------------|----------------|---|
| CFROBOT.035 | (1x10.0)C | 10.5 | 125 | 200 |
| CFROBOT.036 | (1x16.0)C | 12.0 | 189 | 280 |
| CFROBOT.037 | (1x25.0)C | 14.5 | 298 | 434 |
| CFROBOT.038 | (1x35.0)C | 15.5 | 403 | 546 |

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/CFROBOT

36 month guarantee ... 1,354 types from stock ... no cutting charges
Bus cable | PUR | chainflex® CFROBOT8

10 million Double strokes guaranteed 10 x d Bend radius, e-chain® 3D movements Travel distance, e-chain®

- For torsion applications
- PUR outer jacket
- Shielded
- Oil resistant and coolant-resistant

Dynamic information

<table>
<thead>
<tr>
<th>Bend radius</th>
<th>e-chain® twisted</th>
<th>minimum 10 x d</th>
</tr>
</thead>
<tbody>
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</tr>
<tr>
<td></td>
<td>fixed</td>
<td>minimum 5 x d</td>
</tr>
<tr>
<td>Temperature</td>
<td>e-chain® twisted</td>
<td>-25 °C up to +70 °C</td>
</tr>
<tr>
<td></td>
<td>flexible</td>
<td>-40 °C up to +70 °C (following DIN EN 60811-504)</td>
</tr>
<tr>
<td></td>
<td>fixed</td>
<td>-50 °C up to +70 °C (following DIN EN 50303)</td>
</tr>
<tr>
<td>v max.</td>
<td>twisted</td>
<td>180 °/s</td>
</tr>
<tr>
<td>a max.</td>
<td>twisted</td>
<td>60 °/s²</td>
</tr>
<tr>
<td>Travel distance</td>
<td>Robots and 3D movements, Class 1</td>
<td></td>
</tr>
<tr>
<td>Torsion</td>
<td>± 180°, with 1 m cable length, Class 3</td>
<td></td>
</tr>
</tbody>
</table>

Cable structure

- Conductor: Stranded conductor in especially bending-resistant version 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 external layer.
- Overall shield: Torsion resistant tinned braided copper shield. Coverage approx. 80 % optical
- Outer jacket: Low-adhesion, halogen-free, highly abrasion resistant PUR mixture, adapted to suit the requirements in e-chains® (following DIN EN 50363-10-2).

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 protection)
- CE: Following CEI 20-35
- Lead-free: Following 2011/65/EC (RoHS-II)
- Clean room: According to ISO Class 1. The outer jacket material of this series complies with CF27.07.05.02.01.D - tested by IPA according to standard DIN EN ISO 14644-1 Following 2014/35/EU

Guaranteed service life (details see page 22-23)

<table>
<thead>
<tr>
<th>Cycles*</th>
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<th>7.5 million</th>
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<td>+60/+70</td>
<td>±150</td>
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</table>

* Higher number of double strokes? Service life calculation online ➤ www.igus.eu/chainflexlife

Typical application areas

- For heaviest duty applications with torsion movements, Class 6
- Especially for robots and 3D movements, Class 1
- Almost unlimited resistance to oil, also with bio-ols, Class 3
- Torsion ± 180°, with 1 m cable length, Class 3
- Indoor and outdoor applications, UV-resistant
- Robots, handling, spindle drives

Guarantee

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

EPLAN download, configurators ➤ www.igus.eu/CFROBOT8
Bus cable | PUR | chainflex® CFROBOT8

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.

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 (1x2x0.64 mm) | | | | | | | | |
CFROBOT8.001 | (2x0.35)C | 8.0 | 27 | 60 | CFROBOT8.001 | 150 | (2x0.35)C | red, green |
CAN-Bus | | | | | | | | |
CFROBOT8.022 | (4x0.5)C | 7.5 | 41 | 70 | CFROBOT8.022 | 120 | (4x0.5)C | white, green, brown, yellow(Star-quad) |
DeviceNet | | | | | | | | |
CFROBOT8.030 | (2xAWG24)C+(2xAWG22)C | 9.5 | 29 | 74 | CFROBOT8.030 | 120 | (2xAWG24)C | white/blue, 2xAWG22 red, black | |
Ethernet/CAT5e | | | | | | | | |
CFROBOT8.045 | 4x(2x0.14)C | 9.5 | 48 | 90 | 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 | 9.5 | 49 | 90 | 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 | 51 | 124 | 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 | 52 | 126 | CFROBOT8.052 | 100 | 4x(2x0.15)C | white-green/green, white-orange/orange, white-blue/blue, white-brown/brown |
Profinet | | | | | | | | |
CFROBOT8.060 | (2x2x0.34)C | 8.5 | 34 | 68 | CFROBOT8.060 | 100 | (2x2x0.34)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

Guarantee... 36 month guarantee... 1,354 types from stock... no cutting charges...
# Hybrid cable | PUR | chainflex® CFROBOT9

**Properties and approvals**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>UV resistance</td>
<td>High</td>
</tr>
<tr>
<td>Oil resistance</td>
<td>Oil-resistant (following DIN 50383-10-2), Class 3</td>
</tr>
<tr>
<td>Flame retardant</td>
<td>According to IEC 60332-1-2, CEI 20-35, FT1, VW-1</td>
</tr>
<tr>
<td>Silicone-free</td>
<td>Free from silicone which can affect paint adhesion (following PV 3.10.7 – status 1992)</td>
</tr>
<tr>
<td>Halogen-free</td>
<td>Following DIN 60754</td>
</tr>
<tr>
<td>UL/CSA</td>
<td>Cores ≤ 0.5 mm²: Style 10467 and 20317, 300 V, 80 °C</td>
</tr>
<tr>
<td></td>
<td>Cores &gt; 0.5 mm²: Style 10493 and 20317, 300 V, 80 °C (following NFPA 79-2012, chapter 12.9)</td>
</tr>
<tr>
<td>NFPA</td>
<td>Following CE 20-35</td>
</tr>
<tr>
<td>EAC</td>
<td>Certificate No. RIU C-DE.ME77.B.01254 (TR ZU)</td>
</tr>
<tr>
<td>CTP</td>
<td>Certificate No. C-DE.PB49.B.00416 (Fire protection)</td>
</tr>
<tr>
<td>CEI</td>
<td>Following CEI 20-35</td>
</tr>
<tr>
<td>Lead-free</td>
<td>Following 2011/65/EC (RoHS-II)</td>
</tr>
<tr>
<td>Clean room</td>
<td>According to ISO Class 1. The outer jacket material of this series complies with CF27.07.05.02.01.D - tested by IPA according to standard DIN EN ISO 14644-1 Following 2014/35/EU</td>
</tr>
<tr>
<td>CE</td>
<td></td>
</tr>
</tbody>
</table>

**Basic requirements**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Travel distance</td>
<td>≥ 400 m</td>
</tr>
<tr>
<td>Oil resistance</td>
<td>none</td>
</tr>
<tr>
<td>Torsion</td>
<td>none</td>
</tr>
<tr>
<td></td>
<td>±180°, with 1 m cable length, Class 3</td>
</tr>
</tbody>
</table>

**Guaranteed service life (details see 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</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>from/to [°C]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Torsion max. [°/m]</td>
<td></td>
<td></td>
<td></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 double strokes? Service life calculation online [www.igus.eu/chainflexlife](http://www.igus.eu/chainflexlife)

**Typical application areas**

- For heaviest duty applications with torsion movements, Class 6
- Especially for robots and 3D movements, Class 1
- Almost unlimited resistance to oil, Class 3
- Torsion ±180°, with 1 m cable length, Class 3
- Indoor and outdoor applications, UV-resistant
- Robots, handling, spindle drives

**Technical specifications**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bend radius</td>
<td>Bend radius, e-chain®. Minimum 10 x d</td>
</tr>
<tr>
<td></td>
<td>Bend radius, e-chain®. Minimum 8 x d</td>
</tr>
<tr>
<td></td>
<td>Bend radius, e-chain®. Minimum 5 x d</td>
</tr>
<tr>
<td>Temperature</td>
<td>-25 °C up to +80 °C (following DIN EN 60811-504)</td>
</tr>
<tr>
<td></td>
<td>-40 °C up to +80 °C (following DIN EN 50303)</td>
</tr>
<tr>
<td></td>
<td>-50 °C up 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>60 °/s²</td>
</tr>
<tr>
<td>Travel distance</td>
<td>Robots and 3D movements, Class 1</td>
</tr>
<tr>
<td>Torsion</td>
<td>±180°, with 1 m cable length, Class 3</td>
</tr>
</tbody>
</table>

**Conductor**

- Stranded conductor in especially bending-resistant version 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, halogen-free, highly abrasion resistant PUR mixture, adapted to suit the requirements in e-chains® (following DIN EN 50383-10-2).

**Product range table**

- 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 50095)

**Applications**

- For torsion applications
- PUR outer jacket
- Unshielded/shielded
- Oil resistant 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
- e-chain® twisted - -25 °C up to +80 °C
- Flexible - -40 °C up to +80 °C (following DIN EN 60811-504)
- Fixed - -50 °C up to +80 °C (following DIN EN 50303)

**Travel distance**

- Robots and 3D movements, Class 1

**Torsion**

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

**Cable structure**

- Conductors: Stranded conductor in especially bending-resistant version 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.
- Coverage approx. 85 % optical.
- Outer jacket: Low-adhesion, halogen-free, 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: 300/500 V (following DIN VDE 0298-3)
- Testing voltage: 2000 V (following DIN EN 50095)
**Hybrid cable | PUR | chainflex® CFROBOT9**

Class 6.1.3.3

### 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>
</tbody>
</table>

### Part No. Number of cores and conductor nominal cross section

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Number of cores and conductor nominal cross section</th>
<th>Outer diameter (d) max. [mm]</th>
<th>Copper index</th>
<th>Weight [kg/km]</th>
<th>Part No.</th>
<th>Core group</th>
<th>Colour code</th>
</tr>
</thead>
<tbody>
<tr>
<td>CFROBOT9.001</td>
<td>5G1.0+(2x1.0)C</td>
<td>10.5</td>
<td>81</td>
<td>138</td>
<td>CFROBOT9.001</td>
<td>5G1.0 white with black numbers 1-4, one green-yellow core</td>
<td>(2x1.0)C white with black numbers 5-6</td>
</tr>
<tr>
<td>CFROBOT9.004</td>
<td>16G1.0+(2x1.0)C</td>
<td>16.0</td>
<td>194</td>
<td>311</td>
<td>CFROBOT9.004</td>
<td>16G1.0 white with black numbers 1-4, 7-17, one green-yellow core</td>
<td>(2x1.0)C white with black numbers 5-6</td>
</tr>
<tr>
<td>CFROBOT9.005</td>
<td>23G1.0+(2x1.0)C</td>
<td>19.5</td>
<td>268</td>
<td>444</td>
<td>CFROBOT9.005</td>
<td>23G1.0 white with black numbers 1-4, 7-24, one green-yellow core</td>
<td>(2x1.0)C white with black numbers 5-6</td>
</tr>
<tr>
<td>CFROBOT9.006</td>
<td>24G1.0+(2x1.0)C</td>
<td>20.0</td>
<td>280</td>
<td>457</td>
<td>CFROBOT9.006</td>
<td>24G1.0 white with black numbers 1-4, 7-25, one green-yellow core</td>
<td>(2x1.0)C white with black numbers 5-6</td>
</tr>
<tr>
<td>CFROBOT9.007</td>
<td>(15x(2x0.25)C+(4x0.25)C)C</td>
<td>18.5</td>
<td>229</td>
<td>368</td>
<td>CFROBOT9.007</td>
<td>Colour code in accordance with DIN 47100.</td>
<td>15x(2x0.25)C white/green/brown/yellow(CAN-Bus)</td>
</tr>
<tr>
<td>CFROBOT9.010</td>
<td>(4x(2x0.25)C)C</td>
<td>10.5</td>
<td>62</td>
<td>117</td>
<td>CFROBOT9.010</td>
<td>4x(2x0.25)C white/brown, green/yellow, Grey/pink, blue/red</td>
<td></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.