CFROBOT

TPE - 3D - e-chain® - power cable for maximum torsion load (class 6.7.4): shielded, oil- and biooil-resistant, hydrolysis- and microbe-resistant, flame-retardant as well as UV-resistant.

Core design:
Conductor: Conductor strand in bending-stable version consisting of bare copper wires.
Core insulation: Mechanically high-quality TPE mixture.
Core identification: Black

Shield design:
Material: Extremely torsion-stable wrapping made of tinned copper wires.
Shield coverage: Optical: approx. 90 %

Jacket design:
Outer jacket: Low-adhesion mixture on the basis of TPE, especially abrasion-stable and highly bending-stable, adapted to suit the requirements in e-chains®.
  - oil-resistant (following DIN EN 60811-2-1)
  - biooil-resistant (following VDMA 24568 (tested by DEA with Plantocut 8 S-MB))
  - flame-retardant (following IEC 60332-1-2, CEI 20-35, FT-1 & VW-1)
  - hydrolysis- and microbe-resistant
  - silicon-free (following PV 3.10.7 - status 1992)
  - lead-free (following 2011/65/EU (RoHS-II))
  - clean room ISO class 1 (following DIN ISO 14644-1 tested by IPA)
  - UV-resistance: High

Colour outer jacket: Jet Black (similar to RAL 9005)

Cable marking (White):
00000 m*  igus chainflex CFROBOT.--- 600/1000V E310776
4RUus AWM Style 21387 VW-1 AWM U/II A/B 90°C 1000V FT-1 CE
RoHS-II conform www.igus.de +++ chainflex cable works +++

* Length printing: Not calibrated. Only intended as an orientation aid.
⊕ / ⊕: Cable identification according to part no. (see technical table for details).

Ex.: CFROBOT.035: ⇒ ...chainflex CFROBOT.035 (1x10,0)C E3010776...

General mechanical values:
(for individual details see technical table)

<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>Maximum torsion area (*) related to 1 m cable length. (Ex.: At ±180°/m with a 3m long cable, the moving end can twist max. ±540°)</td>
<td>±150</td>
<td>±90</td>
</tr>
<tr>
<td>-35 / -25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-25 / +80</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>+80 / +90</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*: Minimum guarantee lifetime of the cable under the specified conditions.
The installation of the cable is recommended within the middle temperature range.

<table>
<thead>
<tr>
<th>Temperature range</th>
<th>-40 °C</th>
<th>-35 °C</th>
<th>-25 °C</th>
<th>+80 °C</th>
<th>+90 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min. bending radius for 3D-e-chain use</td>
<td>---</td>
<td>12,5 x d</td>
<td>10,0 x d</td>
<td>12,5 x d</td>
<td></td>
</tr>
<tr>
<td>Min. bending radius for e-chain use</td>
<td>---</td>
<td>10,0 x d</td>
<td>7,5 x d</td>
<td>10,0 x d</td>
<td></td>
</tr>
<tr>
<td>Min. bending radius for fixed installation</td>
<td>10,0 x d</td>
<td>7,5 x d</td>
<td>5,0 x d</td>
<td>7,5 x d</td>
<td></td>
</tr>
</tbody>
</table>

www.igus.de
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General electrical values:
(For individual details see technical table)
Nominal voltage: 600 / 1000 V (following DIN VDE 0245)
Test voltage: 4 kV (following VDE 0281-2)
Certifications: cURus: (E310776: Style 10258 & 21387, 1000 V / 90 °C)
Guidelines: CE, NFPA (following 79-2012 chapter 12.9), EAC & TR (CTP)

Dynamic values:
Max. speed for 3D - e-chain® use:** Twisted: v = 180 ° / s
Max. acceleration for 3D - e-chain® use:** Twisted: a = 60 ° / s²
Max. speed in e-chain® use:** Unsupported: v = 10 m / s Gliding (up to 10 m): v = 2 m / s
Max. acceleration in e-chain® use:** a = 10 m / s²

** These values are based on specific applications or tests. They do not represent the limit of what is technically feasible.

Typical test setup for this cable group:

Torsion:
Torsion range T: ± 180° / m
3D - e-chain® length S: 1 m
Test period: min. 3 - 5 million cycles
Test speed: approx. 80 - 120 ° / s
Test acceleration: approx. 40 ° / s²

Linear:
Test bending radius R: approx. 100 - 175 mm
Test travel S₂: approx. 1 - 12 m
Test period (linear): min. 1,5 - 3 million double strokes
Test speed: approx. 0,5 m / s
Test acceleration: approx. 1,5 m / s²

3D-e-chain® - power cable / single core for maximum torsion load:
- especially abrasion-stable
- almost unlimited resistance to oil, also with biooils
- especially for torsion applications, but also for unsupported travel distances and up to 10 m in gliding applications
- UV-resistant
- CE, RoHS-II, cURus, NFPA, EAC & TR (CTP)

Typical application areas:
Indoor and outdoor applications.
Robots, handling, spindles drives.

Subject to misprints and errors.
Technical modifications are possible at any time.
Please refer regarding the availability of the items also the information in the latest chainflex® catalogue.
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Technical tables:

Mechanical values:

<table>
<thead>
<tr>
<th>Part no.</th>
<th>Number of cores &amp; nominal cross section [mm²]</th>
<th>External diameter (d)*** [max. mm]</th>
<th>Copper index [kg / km]</th>
<th>Weight [kg / km]</th>
</tr>
</thead>
<tbody>
<tr>
<td>CFROBOT.035</td>
<td>(1x10,0)C</td>
<td>10,5</td>
<td>134</td>
<td>209</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>

**** External diameters are maximum values and may tend toward lower tolerance limits.

Electrical values (resistance & max. current rating):

<table>
<thead>
<tr>
<th>Nominal cross section [mm²]</th>
<th>Conductor resistance [approx. Ω / km] at 20 °C</th>
<th>Max. current rating [A] at 30 °C*</th>
</tr>
</thead>
<tbody>
<tr>
<td>(following)</td>
<td>DIN EN 50289-1-2</td>
<td>DIN VDE 0298-4</td>
</tr>
<tr>
<td>10,0</td>
<td>1,91</td>
<td>74</td>
</tr>
<tr>
<td>16,0</td>
<td>1,21</td>
<td>99</td>
</tr>
<tr>
<td>25,0</td>
<td>0,78</td>
<td>131</td>
</tr>
<tr>
<td>35,0</td>
<td>0,554</td>
<td>162</td>
</tr>
<tr>
<td>50,0</td>
<td>0,386</td>
<td>202</td>
</tr>
</tbody>
</table>

* The max. current rating depends on factors such as the individual environmental conditions and the type of installation.

Electrical values (capacitance & inductance):

<table>
<thead>
<tr>
<th>Art.-Nr.</th>
<th>Capacitance [approx. pF / m]**</th>
<th>Inductance [approx. pH / m]**</th>
</tr>
</thead>
<tbody>
<tr>
<td>CFROBOT.035</td>
<td>390</td>
<td>0,27</td>
</tr>
<tr>
<td>CFROBOT.036</td>
<td>450</td>
<td>0,26</td>
</tr>
<tr>
<td>CFROBOT.037</td>
<td>440</td>
<td>0,25</td>
</tr>
<tr>
<td>CFROBOT.038</td>
<td>490</td>
<td>0,25</td>
</tr>
<tr>
<td>CFROBOT.039</td>
<td>500</td>
<td>0,24</td>
</tr>
</tbody>
</table>

** Theoretically calculated values.