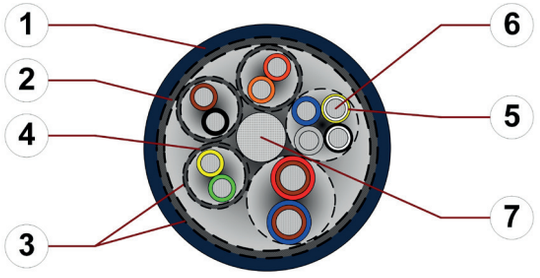
Data sheet
chainflex® CFROBOT4

Measuring system cable (Class 6.1.3.3) ● For torsion applications ● PUR outer jacket ● Shielded ● Oil-resistant and coolant-resistant ● Flame retardant ● PVC and halogen-free ● Notch-resistant ● Hydrolysis and microbe-resistant

Example image



1. Outer jacket: Pressure extruded PUR mixture
2. Overall shield: Extremely torsion-resistant wrapping made of tinned copper wires
3. Banding: Plastic fleece
4. Element shield: Extremely torsion-resistant wrapping made of tinned copper wires
5. Core insulation: Mechanically high-quality TPE mixture
6. Conductor: Fine-wire strand in especially bending-stable version consisting of tinned copper wires
7. Filling: Plastic yarns

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Example image
For detailed overview please see design table

Cable structure

Conductor	Stranded conductor in especially bending-resistant version consisting of tinned copper wires (following DIN EN 60228).
Core insulation	Mechanically high-quality TPE mixture.
Core identification	According to measuring system specification. ▶ Product range table
Element shield	Extremely torsion-resistant tinned wound copper shield.
Overall shield	Extremely torsion-resistant tinned wound copper shield. Coverage optical approx. 80 %
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) **Printing:** white

* **Length printing:** Not calibrated. Only intended as an orientation aid.
① / ② Cable identification according to Part No. (see technical table).
Example: chainflex **CFROBOT4.009 (4x(2x0.25)+(2x0.5))C**

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Example image

Dynamic information

Bend radius	**e-chain® twisted**	min. 10 x d
	flexible	min. 8 x d
	fixed	min. 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 50305)
v max.	**twisted**	180 °/s
a max.	**twisted**	60 °/s²
Travel distance	Robots and 3D movements, Class 1	

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

Guaranteed service life according to guarantee conditions

Cycles	5 million	7.5 million	10 million
Temperature, from/to [°C]	Torsion max. [°/m]	Torsion max. [°/m]	Torsion max. [°/m]
-25/-15	±150	±90	±30
-15/+70	±180	±120	±60
+70/+80	±150	±90	±30

Minimum guaranteed service life of the cable under the specified conditions.
The installation of the cable is recommended within the middle temperature range.

Electrical information

Nominal voltage	50 V 30 V (following UL)
Testing voltage	500 V

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Example image

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, 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 verified	Certificate No. B129699: „igus 36-month chainflex cable guarantee and service life calculator based on 2 billion test cycles per year“
UL/CSA AWM	See table UL/CSA AWM for details
NFPA	Following NFPA 79-2018, chapter 12.9
EAC	Certificate No. RU C-DE.ME77.B.00295/19 (TR ZU)
REACH	In accordance with regulation (EC) No. 1907/2006 (REACH)
Lead-free	Following 2011/65/EC (RoHS-II/RoHS-III)
Cleanroom	According to ISO Class 1. The outer jacket material of this series complies with CF77. UL.05.12.D - tested by IPA according to standard DIN EN ISO 14644-1
CE	Following 2014/35/EU

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Properties and approvals

UL/CSA AWM Details

Part No.	UL style core insulation	UL style outer jacket	UL Voltage Rating [V]	UL Temperature Rating [°C]
CFROBOT4.001	1589	20236	30	80
CFROBOT4.006	1589	20236	30	80
CFROBOT4.009	1589	20236	30	80
CFROBOT4.015	1589	20236	30	80
CFROBOT4.028	1589	20236	30	80

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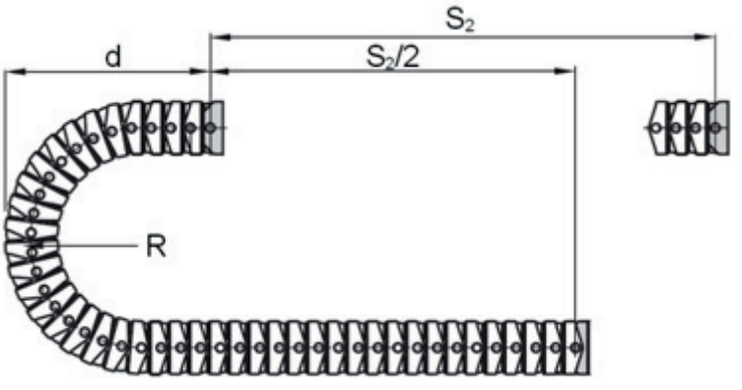
Example image

Typical lab test setup for this cable series

Test bend radius R	approx. 75 - 100 mm
Test travel S/S_2	approx. 1 - 12 m
Test duration	minimum 1.5 - 3 million double strokes
Test speed	approx. 0.5 m/s
Test acceleration	approx. 1.5 m/s²



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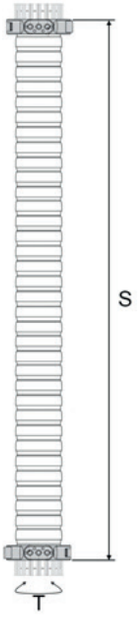
Typical lab test setup (torsion) for this cable series

Torsion range T	±180°/m
Length 3D e-chain®	1 m
Test duration (torsion)	minimum 3 - 5 million cycles
Test speed (torsion)	approx. 80 - 120 °/s
Test acceleration (torsion)	approx. 40°/s²



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Example image

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 1m cable length, Class 3
- Indoor and outdoor applications, UV-resistant
- Robots, Handling, spindle drives

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Technical tables:

Mechanical information

Part No.	Number of cores and conductor nominal cross section [mm²]	Outer diameter (d) max. [mm]	Copper index [kg/km]	Weight [kg/km]
CFROBOT4.001	(3x(2x0.14)C +(4x0.14)+(2x0.5))C	10.5	62	115
CFROBOT4.006	(3x(2x0.14)C+(4x0.14) +(4x0.22)+(2x0.5))C	11.5	74	135
CFROBOT4.009	(4x(2x0.25)+(2x0.5))C	9.0	48	90
CFROBOT4.015	(4x(2x0.14)+4x0.5)C	9.0	49	91
CFROBOT4.028 [13)]	(2x(2x0.20)+(2x0.38))C	7.5	44	72

[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

Technical tables:

Electrical information

Conductor nominal cross section [mm²]	Maximum conductor resistance at 20 °C (following DIN EN 50289-1-2) [Ω/km]	Maximum current rating at 30 °C [A]
0.14	146.0	2.5
0.2	94.0	3.5
0.22	91.0	4
0.25	86.0	5
0.38	55.0	7
0.5	43.0	10

The final maximum current rating depends among other things on the ambient conditions, the type of the installation and the number of loaded cores.

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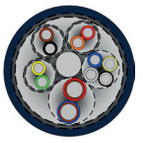
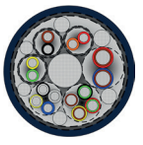
Example image

Design table

Part No.	Core group	Colour code	Core design
CFROBOT4.001	3x(2x0.14)C	green/yellow, black/brown, red/orange	
	4x0.14	grey/blue/white-yellow/white-black	
	2x0.5	brown-red/brown-blue	
CFROBOT4.006	3x(2x0.14)C	green/yellow, black/brown, red/orange	
	(4x0.14)	grey/blue/white-yellow/white-black	
	(4x0.22)	yellow-brown/grey-brown/green-black/green-red	
	(2x0.5)	brown-red/brown-blue	
CFROBOT4.009	4x(2x0.25)	brown/green, blue/violet, grey/pink, red/black	
	2x0.5	white, brown	
CFROBOT4.015	4x(2x0.14)	brown/green, yellow/violet, grey/pink, red/black	
	4x0.5	blue, white, brown-green, white-green	
CFROBOT4.028	2x(2x0.20)	green/yellow, pink/blue	
	(2x0.38)	red/black	

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