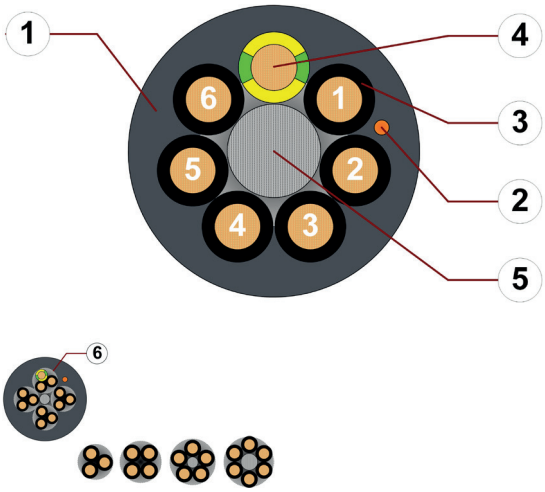
Data sheet
chainflex® CF9.UL

Control cable (Class 6.6.4.2) ● For extremely heavy duty applications ● TPE outer jacket ● Oil and bio-oil resistant ● Flame retardant ● PVC-free ● Low-temperature-flexible ● Hydrolysis and microbe-resistant

Example image



1. Outer jacket: Pressure extruded, gusset-filling, flame-retardant TPE mixture
2. CFRIP: Tear strip for faster cable stripping
3. Core insulation: Mechanically high-quality TPE mixture
4. Conductor: Stranded conductor in especially bend-resistant version consisting of bare copper wires
5. Strain relief: Tensile stress-resistant centre element
6. 12 cores or more: Bundles with optimised pitch length and pitch direction

Example image
For detailed overview please see design 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 structure	**Number of cores < 12:** Cores wound in a layer with 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. Especially low-torsion structure.
Core identification	**Cores < 0.75 mm²:** Colour code in accordance with DIN 47100. **Cores ≥ 0.75 mm²:** Black cores with white numbers, one green-yellow core. **CF9.UL.02.03.INI:** brown, blue, black **CF9.UL.03.04.INI:** brown, blue, black, white **CF9.UL.03.05.INI:** brown, blue, black, white, green-yellow
Outer jacket	Low-adhesion, extremely abrasion-resistant and highly flexible TPE mixture, adapted to suit the requirements in e-chains®. Colour: Slate grey (similar to RAL 7015) Printing: white
CFRIP®	Strip cables faster: a tear strip is moulded into the outer jacket Video ▶ www.igus.eu/CFRIP

„00000 m“** igus chainflex CF9.UL.--.--① -----② 300/500V E310776

cЯUus AWM Style -----③ VW-1 AWM I/II A/B 90°C ---V④ FT-1 DNV-GL TAE00003X2

EAC/CTP CE RoHS-II conform www.igus.de +++ chainflex cable works +++

* **Length printing:** Not calibrated. Only intended as an orientation aid.
① / ② Cable identification according to Part No. (see technical table).
③ / ④ Printing of the UL style (see related chapter).
Example: ... chainflex ... **CF9.UL.02.02** ... **2x0.25** ... **300 V/500 V** ...

Guarantee igus chainflex 36 month guarantee

igus 36-month chainflex cable guarantee and service life calculator based on 2 billion test cycles per year

CFRIP

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Example image

Dynamic information

Bend radius	e-chain® linear	minimum 5 x d
	flexible	minimum 4 x d
	fixed	minimum 3 x d
Temperature	e-chain® linear	-35 °C up to +100 °C
	flexible	-45 °C up to +100 °C (following DIN EN 60811-504)
	fixed	-50 °C up to +100 °C (following DIN EN 50305)
v max.	unsupported	10 m/s
	gliding	6 m/s
a max.		100 m/s²
Travel distance		Unsupported travel distances and up to 400 m for gliding applications, Class 6
Torsion		± 90°, with 1 m cable length, Class 2

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

Double strokes	5 million	7.5 million	10 million
Temperature, from/to [°C]	R min. [factor x d]	R min. [factor x d]	R min. [factor x d]
-35/-25	6.8	7.5	8.5
-25/+90	5	6	7
+90/+100	6.8	7.5	8.5

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	300/500 V (following DIN VDE 0298-3) **Cores < 0.5 mm²:** 300 V (following UL) **Cores ≥ 0.5 mm²:** 1000 V (following UL)
Testing voltage	2000 V (following DIN EN 50395)

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Example image

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, FT1, VW-1
Silicone-free	Free from silicone which can affect paint adhesion (following PV 3.10.7 – status 1992)
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 for details
NFPA	Following NFPA 79-2018, chapter 12.9
DNV-GL	Type approval certificate No. TAE00003X2
EAC	Certificate No. RU C-DE.ME77.B.00300/19 (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 CF34. UL.25.04.D - tested by IPA according to standard DIN EN ISO 14644-1
CE	Following 2014/35/EU

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Example image

Properties and approvals

UL/CSA AWM Details (from manufacturing date 01/2021)

Conductor nominal cross section [mm²]	Number of cores	UL style core insultation	UL style outer jacket	UL Voltage Rating [V]	UL Temperature Rating [°C]
0.25	2-8	11884	22345	300	90
0.25	12	11884	22344	300	90
0.34	4-8	11884	22345	300	90
0.5	2-7	11886	22022	1000	90
0.5	12-25	11886	22021	1000	90
0.75	5-7	11886	22022	1000	90
0.75	12-25	11886	22021	1000	90
1	3-4	11886	22022	1000	90
1	12-25	11886	22021	1000	90
1.5	4-7	11886	22022	1000	90
1.5	12-25	11886	22021	1000	90
2.5	4-7	11886	22022	1000	90
2.5	12-25	11886	22021	1000	90
4	4	11886	22022	1000	90
6	4	11886	22022	1000	90

Properties and approvals

UL/CSA AWM Details (until manufacturing date 12/2020)

Conductor nominal cross section [mm²]	Number of cores	UL style core insultation	UL style outer jacket	UL Voltage Rating [V]	UL Temperature Rating [°C]
0.25	2-12	10479	21529	300	90
0.34	4-8	10479	21529	300	90
0.5	2-25	10258	21387	1000	90
0.75	5-25	10258	21387	1000	90
1	3-25	10258	21387	1000	90
1.5	4-25	10258	21387	1000	90
2.5	4-25	10258	21387	1000	90
4	4	10258	21387	1000	90
6	4	10258	21387	1000	90

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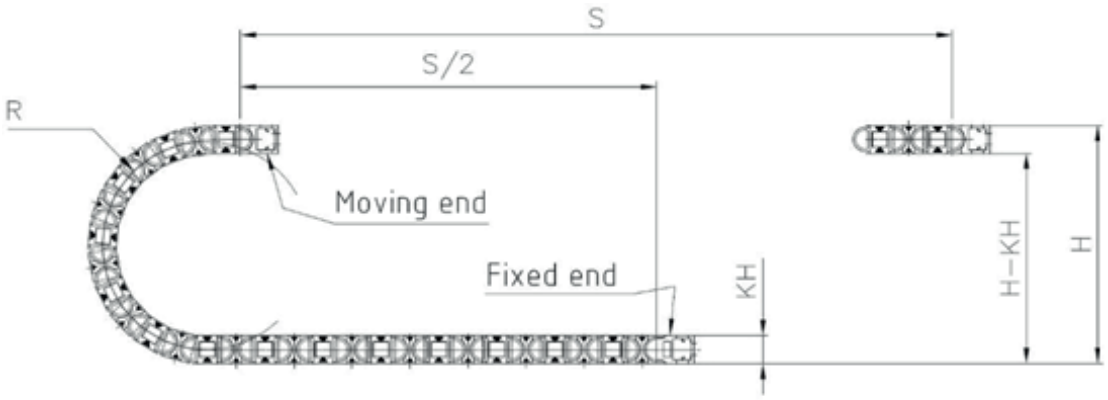
Example image

Typical lab test setup for this cable series

Test bend radius R	approx. 28 - 125 mm
Test travel S	approx. 1 - 15 m
Test duration	minimum 2 - 4 million double strokes
Test speed	approx. 0.5 - 2 m / s
Test acceleration	approx. 0.5 - 1.5 m / s²



Typical application areas

- For heaviest duty applications, Class 6
- Unsupported travel distances and up to 400 m and more for gliding applications, Class 6
- Almost unlimited resistance to oil, also with bio-oils, Class 4
- Torsion ± 90°, with 1 m cable length, Class 2
- Indoor and outdoor applications, UV-resistant
- Storage and retrieval units for high-bay warehouses, Machining units/machine tools, quick handling, Clean room, semiconductor insertion, Ship to shore, outdoor cranes, low temperature applications

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Example image

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]
CF9.UL.02.02	2x0.25	5.0	5	24
CF9.UL.02.03.INI	3x0.25	5.0	8	28
CF9.UL.02.04	4x0.25	5.5	10	33
CF9.UL.02.06	6x0.25	6.0	15	42
CF9.UL.02.08	8x0.25	7.5	20	58
CF9.UL.02.12	12x0.25	7.5	30	82
CF9.UL.03.04.INI	4x0.34	5.5	14	38
CF9.UL.03.05.INI	5x0.34	6.0	17	44
CF9.UL.03.06	6x0.34	6.5	21	52
CF9.UL.03.08	8x0.34	7.5	27	67
CF9.UL.05.02	2x0.5	5.5	10	35
CF9.UL.05.03	3x0.5	6.0	15	41
CF9.UL.05.04	4x0.5	6.0	20	50
CF9.UL.05.05	5x0.5	6.5	25	56
CF9.UL.05.07	7x0.5	7.5	35	78
CF9.UL.05.12	12x0.5	9.5	60	136
CF9.UL.05.18	18x0.5	12.0	90	200
CF9.UL.05.25 [11]	25x0.5	13.5	124	260
CF9.UL.07.05	5G0.75	7.0	38	78
CF9.UL.07.07	7G0.75	8.5	53	104
CF9.UL.07.12	12G0.75	11.0	90	191
CF9.UL.07.25	25G0.75	15.0	186	366
CF9.UL.10.03	3G1.0	6.5	30	62
CF9.UL.10.04	4G1.0	7.0	40	79
CF9.UL.10.12	12G1.0	11.5	119	229
CF9.UL.10.18	18G1.0	14.5	178	332
CF9.UL.10.25	25G1.0	16.0	248	439
CF9.UL.15.04	4G1.5	8.0	60	102
CF9.UL.15.05	5G1.5	8.5	75	123
CF9.UL.15.07 [17]	7G1.5	10.0	104	167
CF9.UL.15.12	12G1.5	13.0	178	307
CF9.UL.15.18	18G1.5	16.0	267	448
CF9.UL.15.25	25G1.5	19.0	371	652

[11] Phase-out model

[17] When using the cables with „7G1.5mm²“ and „G2.5mm²“ minimum bend radius must be 17.5xd with gliding travel distance ≥ 5m.

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

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igus 36-month chainflex cable guarantee and service life calculator based on 2 billion test cycles per year

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Example image

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]
CF9.UL.25.04	4G2.5	9.0	100	165
CF9.UL.25.05	5G2.5	10.0	125	202
CF9.UL.25.07 [17)]	7G2.5	12.0	174	282
CF9.UL.25.12	12G2.5	16.0	297	521
CF9.UL.25.18	18G2.5	20.0	445	769
CF9.UL.25.25	25G2.5	23.5	612	1045
CF9.UL.40.04	4G4.0	10.5	159	222
CF9.UL.60.04 [11)]	4G6.0	12.5	238	334

[11)] Phase-out model
[17)] When using the cables with „7G1.5mm²“ and „G2.5mm²“ minimum bend radius must be 17.5xd with gliding travel distance ≥ 5m.

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

Electrical information

Conductor nominal cross section [mm²]	Maximum conductor resistance at 20 °C (following DIN EN 50289-1-2) [Ω/km]	Max. current rating at 30 °C [A]
0.25	79	5
0.34	57	7
0.5	39	10
0.75	26	14
1	19.5	17
1.5	13.3	21
2.5	8	30
4	4.95	41
6	3.3	53

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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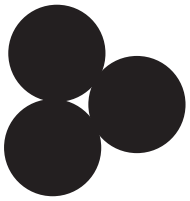
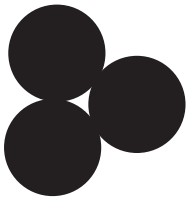
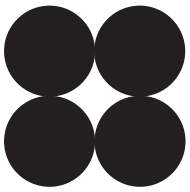
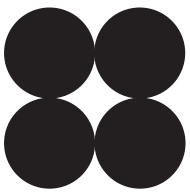
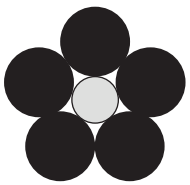
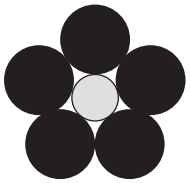
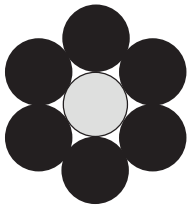
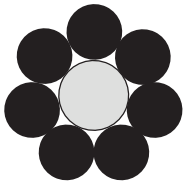
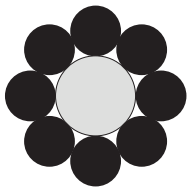
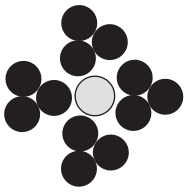
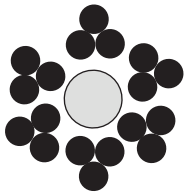
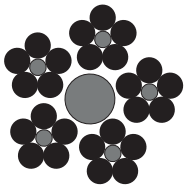
Example image

Design table

Part No.	Number of cores	Core design
CF9.UL.XX.02	2	
CF9.UL.XX.03.INI	3	
CF9.UL.XX.03	3	
CF9.UL.XX.04	4	
CF9.UL.XX.04.INI	4	
CF9.UL.XX.05.INI	5	
CF9.UL.XX.05	5	

Part No.	Number of cores	Core design
CF9.UL.XX.06	6	
CF9.UL.XX.07	7	
CF9.UL.XX.08	8	
CF9.UL.XX.12	4x3	
CF9.UL.XX.18	6x3	
CF9.UL.XX.25	5x5	

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igus 36-month chainflex cable guarantee and service life calculator based on 2 billion test cycles per year

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Example image

Colour code in accordance with DIN 47100.

Conductor no.	Colours according to DIN ISO 47100
1	white
2	brown
3	green
4	yellow
5	grey
6	pink
7	blue
8	red
9	black
10	violet
11	grey-pink
12	red-blue
13	white-green
14	brown-green
15	white-yellow
16	brown-yellow
17	white-grey
18	brown-grey
19	white-pink
20	white-brown
21	white-blue

Conductor no.	Colours according to DIN ISO 47100
22	brown-blue
23	white-red
24	brown-red
25	white-black
26	brown-black
27	grey-green
28	yellow-grey
29	pink-green
30	yellow-pink
31	green-blue
32	yellow-blue
33	green-red
34	yellow-red
35	green-black
36	yellow-black
37	grey-blue
38	pink-blue
39	grey-red
40	pink-red
41	grey-black
42	pink-black

Conductor no.	Colours according to DIN ISO 47100
43	blue-black
44	red-black
45	white-brown-black
46	yellow-green-black
47	grey-pink-black
48	red-blue-black
49	white-green-black
50	brown-green-black
51	white-yellow-black
52	yellow-brown-black
53	white-grey-black
54	grey-brown-black
55	white-pink-black
56	pink-brown-black
57	white-blue-black
58	brown-blue-black
59	white-red-black
60	brown-red-black
61	black-white

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CFRIP