

igus

Chainflex Cables

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Chainflex robotic cables

Chainflex

The tricks and ingenious features of the Chainflex® design
and why we feel so confident about this design

From the customer's point of view, a flexible energy supply system only needs to function properly. However, this demand presupposes the perfect operation of all components, including the cables being used in this system. And this is exactly where problems came up in the early 1980s. Due to constantly – and frequently even tremendously – increasing loads resulting from the application of automation technology, guided cables often failed although the energy supply system itself was functioning perfectly. In extreme cases, failures caused by “corkscrews” and core ruptures brought the entire production process to a standstill and resulted in high costs.

In order to find a solution to this unsatisfactory situation for its customers, igus® decided to take the initiative. As the first company worldwide, igus® began to develop complete Energy Chain Systems®. Chainflex® cables and Energy Chains® are now being offered as a delivery from a single source and with a system guarantee depending on the application in each case. Based on the increasing know-how gained since 1989 and on the very sophisticated series of tests that have been conducted since then, design principles were and are still being created that help prevent machine downtimes in factories throughout the world today.

How can “corkscrews” be prevented?

Here, the term “corkscrew” does not refer to a useful instrument for wine connoisseurs. Instead, it refers to the permanent deformation of guided, moved cables caused by excessive stressing – which, in most cases, results in core rupture almost immediately afterwards. How does this happen? How can “corkscrews” be prevented?

An important factor here – in addition to a sensible design of the total Energy Chain System® – is the construction of the guided cables.

Basically speaking, a clear distinction can be made between cables stranded in bundles and cables stranded in layers.



Properties of stranding in layers

Stranding in layers is significantly easier to produce and is therefore offered on the market in so-called “chain-suitable” cables at low cost. But what appears to be tempting at first glance can quickly turn into an expensive mistake when a “corkscrew” immobilizes the system being operated with these cables. In the case of stranding in layers, the cable cores are mostly stranded more or less firmly and relatively long in several layers around a center and are then provided with a jacket extruded to the form of a tube. In the case of shielded cables, the cores are wrapped up with fleece or foils. But what, for example, happens to a similarly structured 12-core cable during normal operation?

The bending process compresses in the movement of the core, the inner radius of the cable stretches the core in the outer radius. Initially, this works quite well because the elasticity of the material is still sufficient. But very soon, material fatigue causes permanent deformations and then due to excursion from the specified paths, the cores make their “own compressing and stretching zones”: The corkscrew is created, then followed rather quickly by core ruptures most of the time.

Stranding in bundles tried and tested extensively and efficiently millions of times since 1989

Stranding in bundles eliminates these problems by means of its very sophisticated, multiple stranded internal structure. Here, the litz wires are stranded with a special pitch length first and then the resulting cores are stranded into single core bundles. For large cross sections, this is done around a strain relief element. The next step is the renewed stranding of this core bundle around a tension-proof center – a genuine center cord.

Due to this multiple stranding of the cores, all cores change the inner radius and the outer radius of the bent cable several times at identical spacing distances. Pulling and compressing forces balance one another around the high-tensile center cord that gives the stranded structure its necessary inner stability. Accordingly, the stranding remains stable even under maximum bending stress.

What are EMC problems and shield wire breakage?

In principle, cable shields must fulfil two tasks:

- Protecting the cables from external interferences
- Shielding any interferences before transmitting them to the outside

In the case of so-called “chain-suitable” cables, for example, the stranding bond of an intermediate layer is wrapped up with foils or fleeces. This stranding bond is supposed to guarantee the separation between the cores and the shield braid. But something that functions quite well for the fixed installation of cables is often quite insufficient in the case of moving cables. This has to do with the fact that the foils and fleeces do not create a bond between the stranding, shield and jacket and may fall apart under stress. Consequently, the metallic shield then rubs on the insulation of the cores – short circuits are then to be expected. Open shields only possess a limited shielding effect in their moved state – motion and expansion reduce this effect even further. The type of shield is therefore an important point that is not even mentioned in some catalogues.

Up to approx. 70% linearly and approx. 90% optically covered cables, igus® eliminates these weak points by means of an optimized internal structure. In virtually all shielded Chainflex® cables, a gusset-filled extruded inner jacket over the stranded structure is therefore used. This “second jacket” fulfils two tasks:

- It holds the stranded structure together and guides the individual cores in a channel.
- It serves as a firm, round base for a very tight-fitting shield.

Shield wire breakage – and how this can be prevented

During the production of the shield, there are many things that can be done correctly – or incorrectly. Here, an important parameter is the braiding angle.

In the case of “chain-suitable” cables, a tensile load of the shield wires in the outer radius of the cable must usually be taken into account. If an unfavorable braiding angle is to be added, the tensile load increases even further and shield wire breakage is the result. The consequences range from reduced shielding effects right up to short circuits whenever the sharp wire ends penetrate through the fleeces or foils into the cores. Here, is a useful tip: If, after the insulation has been stripped off, the shield can be easily pushed back over the jacket, the shield is then usually unsuitable for use in moved flexible energy supply systems!

This is a problem that igus® has now solved with its direct approach:

The shield braiding angle determined in long-term tests efficiently neutralizes the tensile forces and is therefore highly suitable for:

- Energy Chains®.
- Due to the stable inner jacket, the shield cannot wander uncontrolled.
- The shield itself has a torsion protection effect on the stranded structure.

Jacket abrasion/ jacket breakage

Whereas defects in the internal structure are hardly detectable on the outside, jacket problems strike the eye immediately. The jacket is the first protection for the complicated internal structure. This is why broken, worn and swollen jackets are a serious quality defect.

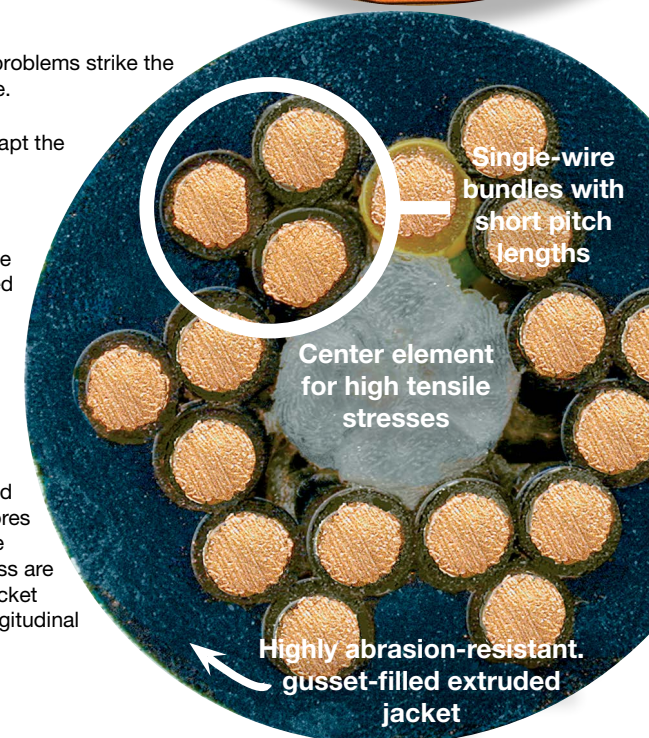
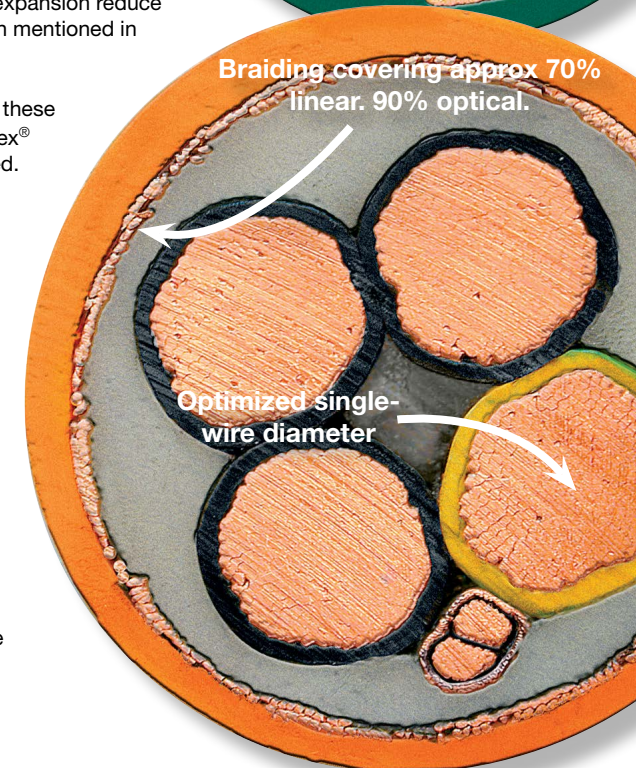
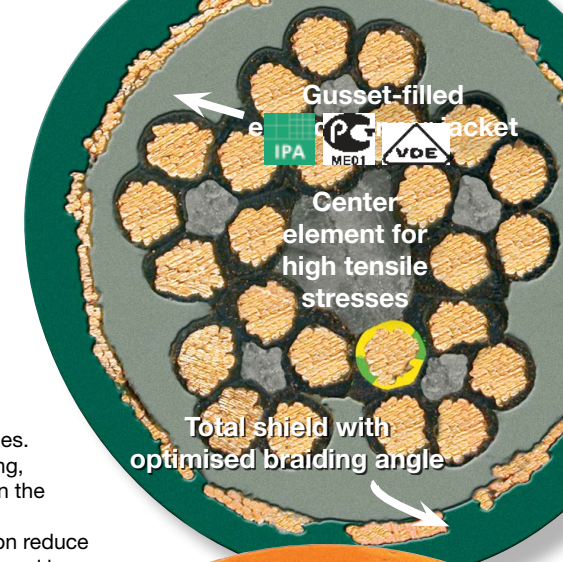
To prevent this problem the igus® customer can select among 7 jacket materials to adapt the Energy Chain® cables to suit the conditions of the respective environment.

Gusset-filled extruded jacket

Here not only the material is an important factor but also the production process. In the case of the so-called “chain-suitable” cables the jackets are usually produced extruded to the form of a tube and therefore do not provide the stranded structure with the necessary support for constant bending processes. The stranded structure can fall apart.

Therefore, igus® is the first manufacturer of Energy Chain Systems® to offer the so-called “gusset-filled extruded” jacket.

Here, the jacket material is injected between the core stranding powdered with talc and ensures that the stranded structure does not open up and also makes sure that the cores are guided in a channel. The special characteristic of this type of production is that the intermediate spaces, which are created between the cores during the stranding process are completely filled with jacket material by the high extrusion pressure. As a result, the jacket material creates a channel-like guide which allows the cores to carry out a defined longitudinal movement. The jacket also provides a supporting function for the stranding.



36 month guarantee on every chainflex® cable in this catalogue



IPA
ME01
VDE

Guarantee
igus chainflex
36
month guarantee

The chainflex® guarantee – predictable safety through laboratory and field experience

Safety is of utmost importance, operationally, legally and financially. Plant and machine constructors have to make binding statements about operational safety and reliability. However, a guarantee declaration to the end customer always entails a considerable risk. The chainflex® guarantee on igus® cables in e-chains® now makes this risk not only more predictable, but reduces it significantly. With the unique 36 month guarantee on every chainflex® cable in this catalogue, we assume part of the responsibility and create valuable planning security for the manufacturer. Twenty-five years of experience from tried and tested applications and from intensive tests in the world's largest test laboratory for cables and e-chains® allow us to make reliable and verifiable statements about durability and service life.

Predictable reliability for every user!

Guarantee instead of just warranty or defects liability expands the assurance in legal terms. The assurance of a guarantee is done voluntarily by the manufacturer, and goes beyond the mandatory assurance or warranty by the seller. For the customer not only receives the promise to obtain a defect-free product, but also the ability to function over a certain period.

"In case of guarantee the buyer is entitled to the rights under the guarantee as per the terms set down in the guarantee statement vis-à-vis the person who has given the guarantee, regardless of the legal claims (§ 443 I BGB)."

In Germany, quality and durability guarantees are used. The latter in particular is of great importance for many customers. A mere extension of the guarantee is not enough for them, they want binding statements on the durability. The chainflex® guarantee based on the reliable data from laboratory and field experience, was created precisely for this purpose.



Analysis of the measured data: igus® "AutoMess" system

Direct overview of the service life using the "double strokes" selection tables

For each chainflex® series you will find a selection table called "Double strokes – guaranteed service life". This gives the technical parameters for using the respective chainflex® cable. If the cable is operated in accordance with the operating conditions specified in the selection table, a guaranteed service life of 5, 7.5 or 10 million double strokes is applicable depending on the application. The service life itself, measured by the number of possible double strokes,

- 1

Temperature, from/to [°C]
- 2

Guaranteed double strokes
- 3

Minimum bend radius [factor x d]

Cycles*	25 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]
-25/-35	6.8	7.5	8.5
-25/+90	5	6	7
+90/+100	6.8	7.5	8.5

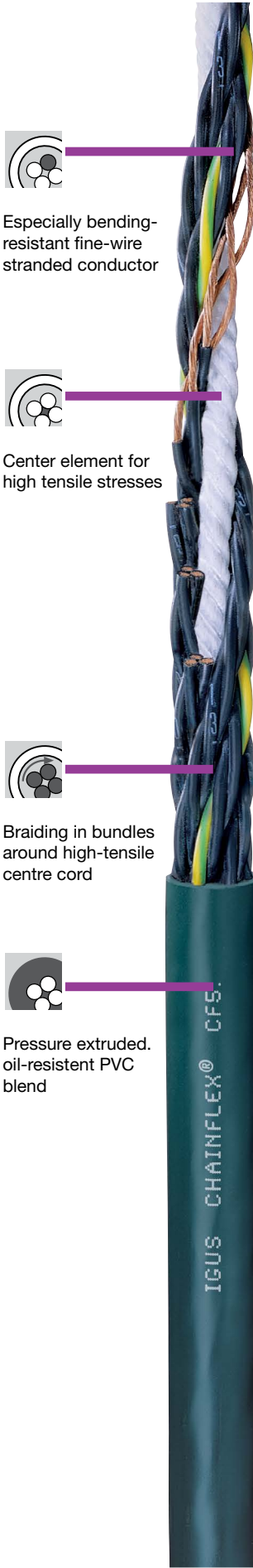
Example: Selection table "Guaranteed service life" for CF9

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

Example: A cable with a diameter of 12 mm in an energy chain® with a radius of 100 mm results in a bending factor of 8.3 (100 mm/12 mm). In order to determine the guaranteed durability, you set the technical conditions from the data ranges 1 & 2. In data range 3, you can now see that (with an assumed temperature range of -25/+90°C) with 8.3 x d the effective bending factor is above the minimum limit of 7 and

therefore for that cable you have a guaranteed operation of 10 million double strokes. Should the temperature become higher or lower, the necessary factor for this guarantee level would be 8.5, meaning that the number of guaranteed double strokes is reduced to 7.5 million. This very clear statement provides reliability and planning safety for your machine and can be further refined with the online service life calculator.

PVC Control Cable



Chainflex® CF5

- For high load requirements
- Oil-resistant
- PVC outer jacket
- Flame-retardant

	Bend Radius. moving	-5 °C to +70 °C. minimum bending radius 6.8 x d with < 10 m travel; minimum bending radius 7.5 x d with ≥ 10 m travel
	Bend Radius. fixed	-20 °C to +70 °C. minimum bending radius 4 x d
	V max.	Unsupported/gliding 10 m/s. 5 m/s
	a max.	80 m/s ²
	UV-resistant	Medium
	Nominal voltage	300/500 V (following DIN VDE 0245).
	Testing voltage	2000 V (following DIN VDE 0281-2).
	Oil	Oil-proof (following DIN EN 60811-2-1. DIN EN 50363-4-1).
	Flame-retardant	According to IEC 332-1. CEI 20-35. FT1.
	Silicon-free	Free from silicon which can affect paint adhesion (in compliance with PV 3.10.7 – status 1992).
	Conductor	Fine-wire stranded conductor consisting of bare copper wires (following EN 60228).
	Core insulation	Mechanically high-quality PVC mixture (following DIN VDE 0207 Part 4).
	Core stranding	Number of cores < 12: cores stranded in a layer with short pitch length. Number of cores ≥ 12: cores combined in bundles and stranded together around a centre for high tensile stresses with adapted short pitch lengths and pitch directions, especially low-torsion structure.
	Core identification	Cores < 0.5 mm ² : color code in accordance with DIN 47100 Cores ≥ 0.5 mm ² : cores black with white numerals, one core green/yellow. Inner jacket PVC mixture adapted to suit the requirements in Energy Chains®.
	Outer jacket	Low-adhesion, oil-resistant mixture on the basis of PVC, adapted to suit the requirements in Energy Chains® (following DIN VDE 0282 Part 10). Colour: green (similar to RAL 6005)
	UL/CSA	≤ 1.5 mm ² : Style 1007 and 2464. 300 V. 80 °C ≥ 2.5 mm ² : Style 1011 and 2570. 600 V. 80 °C
	CEI	Following CEI 20-35
	CE	Following 2006/95/EG
	Lead Free	Following EU guideline (RoHS) 2002/95/EC
	Clean Room	According to ISO Class 2. material/cable tested by IPA according to ISO standard 14644-1

Double Strokes*	5 million		7.5 million		10 million	
Temperature, from/to [°C]	<10 m	≤10 m	<10 m	≤10 m	<10 m	≤10 m
	R min. (factor x d)	R min. (factor x d)	R min. (factor x d)	R min. (factor x d)	R min. (factor x d)	R min. (factor x d)
+5/+15	7.5	10	8.5	11	9.5	12
15/+60	6.8	7.5	7.8	8.5	8.8	9.5
+60/+70	7.5	10	8.5	11	9.5	12

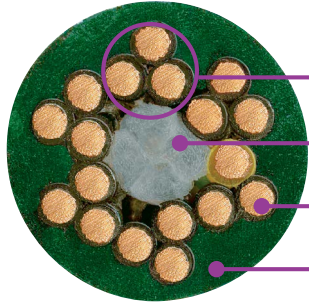
*Higher number of double strokes required? Service life calculator online ► www.igus.eu/chainflexlife

Typical application area

For high load requirements
Light oil influence
Preferably indoor applications, but also outdoor ones for temperatures > 5 °c
Especially for freely suspended and gliding travel distances up to 100 m handling.
Storage and retrieval units for high-bay warehouses, machining units/packages machines, quick handling and indoor cranes

Delivery program Part No.	Number of cores and conductor nominal cross section [mm ²]	External diameter in mm approx.	Copper index [kg/km]	Weight [kg/km]
CF5.02.36	36 x 0.25	15.0	105	215
CF5.03.15	15 x 0.34	10.0	54	142
CF5.03.18	18 x 0.34	11.5	65	209
CF5.03.25	25 x 0.34	13.5	90	295
CF5.05.02	2 x 0.5	6.0	11	39
CF5.05.03	3 G 0.5	6.0	16	42
CF5.05.05	5 G 0.5	7.0	24	72
CF5.05.07	7 G 0.5	8.0	34	77
CF5.05.12	12 G 0.5	11.5	58	158
CF5.05.18	18 G 0.5	13.5	86	230
CF5.05.25	25 G 0.5	17.0	121	310
CF5.05.30	30 G 0.5	18.0	159	451
CF5.07.03	3 G 0.75	6.5	24	56
CF5.07.04	4 G 0.75	7.0	29	72
CF5.07.05	5 G 0.75	8.0	36	85
CF5.07.07	7 G 0.75	9.0	50	108
CF5.07.12	12 G 0.75	12.0	86	240
CF5.07.18	18 G 0.75	15.5	130	322
CF5.07.25	25 G 0.75	19.0	181	432
CF5.07.36	36 G 0.75	22.0	259	564
CF5.07.42	42 G 0.75	24.0	333	658
CF5.10.03	3 G 1.0	7.0	29	62
CF5.10.04	4 G 1.0	8.0	39	85
CF5.10.05	5 G 1.0	8.5	48	100
CF5.10.07	7 G 1.0	10.0	68	145
CF5.10.12	12 G 1.0	13.5	116	260
CF5.10.18	18 G 1.0	17.5	173	450
CF5.10.25	25 G 1.0	19.5	241	590
CF5.15.03	3 G 1.5	8.0	44	95
CF5.15.04	4 G 1.5	8.0	58	120
CF5.15.05	5 G 1.5	10.0	72	170
CF5.15.07*	7 G 1.5	11.0	101	220
CF5.15.12	12 G 1.5	16.0	173	320
CF5.15.18	18 G 1.5	22.0	260	550
CF5.15.25	25 G 1.5	24.0	361	810
CF5.25.04	4 G 2.5	11.0	96	200
CF5.25.05	5 G 2.5	12.0	120	250
CF5.25.07*	7 G 2.5	15.0	168	340
CF5.25.12	12 G 2.5	21.0	288	667
CF5.25.18	18 G 2.5	27.5	432	970
CF5.15.36	36 G 1.5	26.5	570	1001
CF5.25.25	25 G 2.5	27.5	637	1100

*When using cables 7G1.5mm² and 7G2.5mm² minimum bending radius must be 17.5 x d for gliding applications



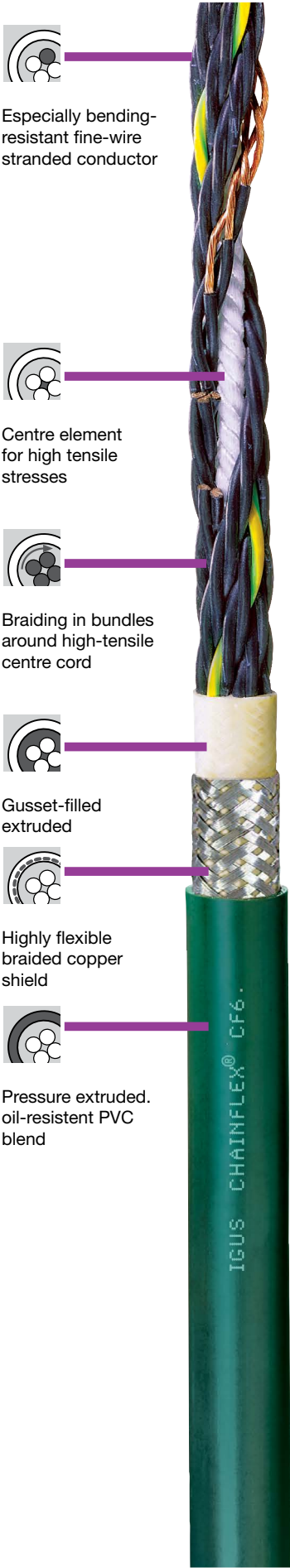
Chainflex® control cable

- Individual bundles with optimized pitch length and pitch direction
- Center element for high tensile stresses
- Single-wire diameter optimized for Energy Chains®
- Highly abrasion-resistant. gusset-filled extruded jacket

PVC Control Cable. Shielded

Chainflex® CF6

- For high load requirements
 - PVC outer jacket
 - Shielded
- Oil-resistant
 - Flame-retardant



	Bend Radius. moving	-5 °C to +70 °C. minimum bending radius 6.8 x d with < 10 m travel; minimum bending radius 7.5 x d with ≥ 10 m travel
	Bend Radius. fixed	-20 °C to +70 °C. minimum bending radius 4 x d
	V max.	Unsupported/gliding 10 m/s. 5 m/s
	a max.	80 m/s ²
	UV-resistant	Medium
	Nominal voltage	300/500 V (following DIN VDE 0245).
	Testing voltage	2000 V (following DIN VDE 0281-2).
	Oil	Oil-proof (following DIN EN 60811-2-1. DIN EN 50363-4-1).
	Flame-retardant	According to IEC 332-1. CEI 20-35. FT1.
	Silicon-free	Free from silicon which can affect paint adhesion (in compliance with PV 3.10.7 – status 1992).
	Conductor	Fine-wire stranded conductor consisting of bare copper wires (following EN 60228).
	Core insulation	Mechanically high-quality PVC mixture (following DIN VDE 0207 Part 4).
	Core stranding	Number of cores < 12: cores stranded in a layer with short pitch length. Number of cores ≥ 12: cores combined in bundles and stranded together around a centre for high tensile stresses with adapted short pitch lengths and pitch directions especially low-torsion structure.
	Core identification	Cores < 0.5 mm ² : color code in accordance with DIN 47100 Cores ≥ 0.5 mm ² : cores black with white numerals, one core green/yellow.
	Inner jacket	PVC mixture adapted to suit the requirements in Energy Chains®.
	Overall shield	Extremely bending-resistant, tinned braided copper shield. Coverage approx. 70% linear. Approx. 90% optical.
	Outer jacket	Low-adhesion. oil-resistant mixture on the basis of PVC, adapted to suit the requirements in Energy Chains® (following DIN VDE 0282 Part 10). Colour: green (similar to RAL 6005)
	UL/CSA	≤ 1.5 mm ² : Style 1007 and 2464. 300 V. 80 °C ≥ 2.5 mm ² : Style 1011 and 2570. 600 V. 80 °C
	CEI	Following CEI 20-35
	CE	Following 2006/95/EG
	Lead free	Following EU guideline (RoHS) 2002/95/EC
	Clean room	According to ISO Class 2. Outer sheath material complies with CF5.10.07. tested by IPA according to standard 14644-1

Double Strokes*	5 million		7.5 million		10 million	
Temperature, from/to [°C]	<10 m	≤10 m	<10 m	≤10 m	<10 m	≤10 m
	R min. (factor x d)	R min. (factor x d)	R min. (factor x d)	R min. (factor x d)	R min. (factor x d)	R min. (factor x d)
+5/+15	7.5	10	8.5	11	9.5	12
15/+60	6.8	7.5	7.8	8.5	8.8	9.5
+60/+70	7.5	10	8.5	11	9.5	12

*Higher number of double strokes required? Service life calculator online ► www.igus.eu/chainflexlife

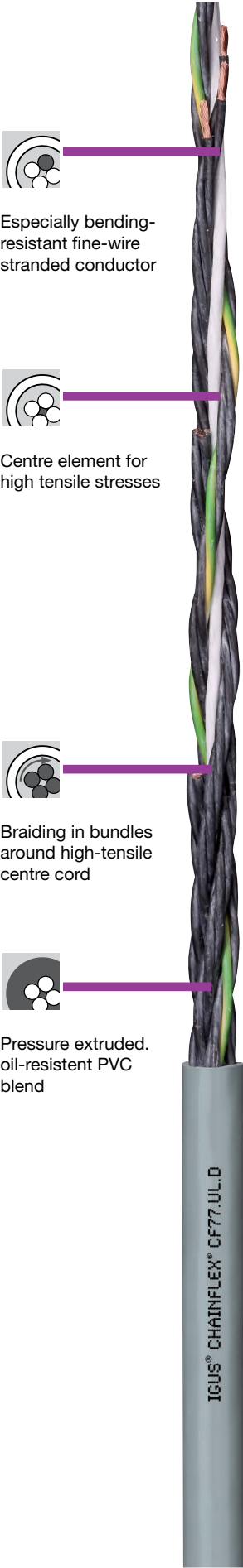
Typical application area

For high load requirements
Light oil influence
Preferably indoor applications. But also outdoor ones for temperatures > 5°C
Especially for freely suspended and gliding travel distances up to 100m
Storage and retrieval units for high-bay warehouses, machining units/package machines, quick handling and indoor cranes

Delivery program Part No.	Number of cores and conductor nominal cross section [mm²]	External diameter in mm approx.	Copper index [kg/km]	Weight [kg/km]
CF6.02.04	(4 x 0.25)C	7.0	28	75
CF6.02.25	(25 G 0.25)C	14.5	118	267
CF6.03.05	(5 x 0.34)C	7.5	38	96
CF6.05.02	(2 x 0.5)C	7.0	31	79
CF6.05.05	(5 G 0.5)C	9.0	48	114
CF6.05.07	(7 G 0.5)C	10.5	63	142
CF6.05.09	(9 G 0.5)C	11.5	77	180
CF6.05.12	(12 G 0.5)C	13.0	93	206
CF6.05.18	(18 G 0.5)C	15.0	120	276
CF6.05.25	(25 G 0.5)C	17.5	205	412
CF6.07.03	(3 G 0.75)C	8.5	52	110
CF6.07.04	(4 G 0.75)C	9.0	54	120
CF6.07.05	(5 G 0.75)C	10.0	73	150
CF6.07.07	(7 G 0.75)C	12.0	93	190
CF6.07.12	(12 G 0.75)C	14.0	138	264
CF6.07.18	(18 G 0.75)C	17.5	204	410
CF6.07.25	(25 G 0.75)C	19.5	283	554
CF6.10.03	(3 G 1.0)C	8.5	61	103
CF6.10.04	(4 G 1.0)C	9.0	75	115
CF6.10.05	(5 G 1.0)C	11.0	87	170
CF6.10.07	(7 G 1.0)C	13.0	113	217
CF6.10.12	(12 G 1.0)C	15.0	171	313
CF6.10.18	(18 G 1.0)C	19.0	261	470
CF6.10.25	(25 G 1.0)C	21.0	344	617
CF6.15.03	(3 G 1.5)C	10.0	81	155
CF6.15.04	(4 G 1.5)C	10.0	85	170
CF6.15.05	(5 G 1.5)C	11.0	106	190
CF6.15.07*	(7 G 1.5)C	14.0	153	270
CF6.15.12	(12 G 1.5)C	18.0	232	411
CF6.15.18	(18 G 1.5)C	22.0	367	637
CF6.15.25	(25 G 1.5)C	23.0	492	819
CF6.15.36	(36 G 1.5)C	30.0	728	1346
CF6.25.04	(4 G 2.5)C	12.5	135	275























*When using cables 7G1.5mm² minimum bending radius must be 17.5 x d for gliding applications

PUR Control Cable



Chainflex® CF77.UL.D

- For high load requirements
- PUR outer jacket
- Oil-resistant & coolant resistant
- Flame-retardant
- Notch resistant
- PVC free/Halogen free

	Conductor	Fine-wire stranded conductor consisting of bare copper wires (following EN 60228).
	Core insulation	Mechanically high-quality PVC mixture (following DIN VDE 0207 Part 4).
	Core stranding	Number of cores < 12: cores stranded in a layer with short pitch length. Number of cores ≥ 12: cores combined in bundles and stranded together around a centre for high tensile stresses with adapted, short pitch lengths and pitch directions, especially low-torsion structure.
	Core identification	Cores < 0.5 mm ² : color code in accordance with DIN 47100 Cores ≥ 0.5 mm ² : cores black with white numerals. one core green/yellow.
	Outer jacket	Low-adhesion, oil-resistant mixture on the basis of PVC, adapted to suit the requirements in Energy Chains® (following DIN VDE 0282 Part 10). Colour: green (similar to RAL 6005)
	Bend Radius. moving	<10m travel = 6.8 x outer diameter; ≥10m travel = 7.5 x outer diameter
	Temperature	Moved -35°C to +80°C. Fixed -40°C to +80°C.
	V max.	10 m/s. 5 m/s
	Unsupported/gliding	
	a max.	80 m/s ²
	Travel Distance	Freely suspended and gliding travel distances up to 100 m, Class 3
	Torsion	±180°, for 1 m cable length
	UV resistant	Medium
	Nominal voltage	Number of cores < 12: 300/500 V Number of cores < 12 (0,25-0,34): 300/300 V Number of cores ≥ 12: 300/300 V (according to DIN VDE 0245)
	Testing Voltage	2000 V (following DIN VDE 0281-2)
	Silicon-free	Free from silicon which can affect paint adhesion (in compliance with PV 3.10.7 – status 1992).
	UL/CSA	Inner jacket PVC mixture adapted to suit the requirements in Energy Chains®.
	CEI	≤ 1.5 mm ² : Style 1007 and 2464. 300 V. 80 °C ≥ 2.5 mm ² : Style 1011 and 2570. 600 V. 80 °C
	CE	Following CEI 20-35
	Clean Room	Following 2006/95/EG
	IPA	According to ISO Class 2. material/cable tested by IPA according to ISO standard 14644-1
	Lead Free	Following EU guideline (RoHS) 2002/95/EC

Double Strokes*	5 million		7.5 million		10 million	
Temperature, from/to [°C]	<10 m	≤10 m	<10 m	≤10 m	<10 m	≤10 m
	R min. (factor x d)	R min. (factor x d)	R min. (factor x d)	R min. (factor x d)	R min. (factor x d)	R min. (factor x d)
-25/-15	8.5	10	9.5	11	10.5	12
-15/+70	6.8	7.5	7.5	8.5	8.5	9.5
+70/+80	8.5	10	9.5	11	10.5	12

*Higher number of double strokes required? Service life calculator online ► www.igus.eu/chainflexlife

Typical application area

- For high load requirements
- Almost unlimited resistance to oil
- Indoor and outdoor applications. With average sun radiation
- Especially for freely suspended and gliding travel distances up to 100 m
- Machining units/machinetools, storage and retrieval units for high-bay warehouses, packaging industry, quick handling and refrigerator sector.






















Delivery program Part No.	Number of cores and conductor nominal cross section [mm ²]	External diameter in mm approx.	Copper index [kg/km]	Weight [kg/km]
CF77.UL.02.03.INI	3 x 0.25	5.0	8	29
CF77.UL.02.04.D	4 x 0.25	5.5	11	35
CF77.UL.02.12.D	12 x 0.25	9.0	30	77
CF77.UL.02.18.D	18 x 0.25	10.5	45	114
CF77.UL.03.04.INI	4 X 0.34	5.5	15	36
CF77.UL.05.04.D	4 G 0.5	6.0	22	50
CF77.UL.05.05.D	5 G 0.5	6.5	27	57
CF77.UL.05.07.D	7 G 0.5	7.5	37	79
CF77.UL.05.12.D	12 G 0.5	10.0	64	134
CF77.UL.05.18.D	18 G 0.5	12.0	95	197
CF77.UL.05.25.D	25 G 0.5	14.0	132	256
CF77.UL.05.30.D	30 G 0.5	15.0	159	311
CF77.UL.07.03.D	3 G 0.75	6.5	24	55
CF77.UL.07.04.D	4 G 0.75	7.0	32	64
CF77.UL.07.05.D	5 G 0.75	7.5	40	75
CF77.UL.07.07.D	7 G 0.75	8.5	56	106
CF77.UL.07.12.D	12 G 0.75	12.0	95	192
CF77.UL.07.18.D	18 G 0.75	13.5	143	260
CF77.UL.07.20.D	20 G 0.75	14.5	159	292
CF77.UL.07.25.D	25 G 0.75	16.0	198	368
CF77.UL.07.36.D	36 G 0.75	18.5	286	503
CF77.UL.07.42.D	42 G 0.75	21.0	333	546
CF77.UL.10.02.D	2 x 1.0	6.5	22	54
CF77.UL.10.03.D	3 G 1.0	6.35	32	64
CF77.UL.10.04.D	4 G 1.0	7.0	43	79
CF77.UL.10.05.D	5 G 1.0	8.0	53	97
CF77.UL.10.07.D	7 G 1.0	9.0	74	119
CF77.UL.10.12.D	12 G 1.0	12.5	127	233
CF77.UL.10.18.D	18 G 1.0	15.0	190	338
CF77.UL.10.25.D	25 G 1.0	17.0	264	430
CF77.UL.10.42.D	42 G 1.0	23.0	444	675
CF77.UL.15.03.D	3 G 1.5	7.5	48	74
CF77.UL.15.04.D	4 G 1.5	8.0	64	91
CF77.UL.15.05.D	4 G 1.5	8.5	80	110
CF77.UL.15.07.D	7 G 1.5	10.5	111	159
CF77.UL.15.12.D	12 G 1.5	14.0	190	309
CF77.UL.15.18.D	18 G 1.5	17.0	286	423
CF77.UL.15.25.D	25 G 1.5	19.5	396	591
CF77.UL.15.36.D	36 G 1.5	23.5	570	776
CF77.UL.15.42.D	42 G 1.5	26.5	666	912
CF77.UL.25.03.D	3 G 2.5	8.5	80	116
CF77.UL.25.04.D	4 G 2.5	9.5	106	148
CF77.UL.25.05.D	5 G 2.5	10.5	132	177
CF77.UL.25.07.D	7 G 2.5	12.5	185	257
CF77.UL.25.12.D	12 G 2.5	17.5	317	530
CF77.UL.40.04.D	4 G 4.0	11.5	169	258
CF77.UL.40.05.D	5 G 4.0	12.0	212	302
CF77.UL.60.05.D	5 G 6.0	14.0	317	428

*When using cables 7G1.5mm² and 7G2.5mm² minimum bending radius must be 17.5 x d for gliding applications

PUR Control Cable. Shielded

Chainflex® CF78.UL

- For high load requirements
 - PUR outer jacket
 - Shielded
 - Oil-resistant & coolant resistant
- Flame-retardant
 - Notch resistant
 - PVC free/Halogen Free

	Conductor	Fine-wire stranded conductor consisting of bare copper wires (following EN 60228).
	Core insulation	Mechanically high-quality TPE mixture.
	Core stranding	Number of cores < 12: cores stranded in a layer with short pitch length. Number of cores ≥ 12: cores combined in bundles and stranded together around a centre for high tensile stresses with adapted, short pitch lengths and pitch directions especially low-torsion structure.
	Core identification	Cores < 0.5 mm2: color code in accordance with DIN 47100 Cores ≥ 0.5 mm2: cores black with white numerals. one core green/yellow.
	Inner jacket	PUR mixture adapted to suit the requirements in Energy Chains®.
	Overall shield	Bending resistant braiding made of tinned copper wires. Coverage approximately 55% linear, 80% optical.
	Outer jacket	Low-adhesion, highly abrasion-resistant mixture on the basis of PUR. Adapted to suit the requirements in Energy Chains® (following DIN VDE 0282 Part 10). Colour: WindowGrey (similar to 0282 Part 10).
	Bend Radius. moving	< 10 m travel; minimum bending radius 6.8 x d ≥ 10 m travel moved minimum 7.5 x d
	Bend Radius. fixed	Minimum 4 x d
	Temperature	Moved -35°C to +80°C Fixed -40°C to +80°C
	V max.	Unsupported/gliding 10 m/s. 5 m/s
	a max.	80 m/s²
	Travel Distance	Freely suspended and gliding travel distances up to 100m Class 3
	UV-resistant	Medium
	Nominal voltage	Number of cores < 12: 300/500 V Number of cores < 12:(0.25-0.34): 300/300 V Number of cores ≥ 12: 300/500 V (following DIN VDE 0245). 2000 V (following DIN VDE 0281-2).
	Testing voltage	
	Oil	Oil-resistant (following DIN EN 50363-10-2). Class 3.
	Flame-retardant	According to IEC 60332-1-2. CEI 20-35. FT1. VW-1
	Silicon-free	Free from silicon which can affect paint adhesion (in compliance with PV 3.10.7 – status 1992).
	UL/CSA	≤ 1.5 mm2: Style 1007 and 2464. 300 V. 80 °C ≥ 2.5 mm2: Style 1011 and 2570. 600 V. 80 °C
	CEI	Following CEI 20-35



CE

Following 2006/95/EG



Lead free

Following EU guideline (RoHS) 2002/95/EC



Clean room

According to ISO Class 2. Outer sheath material complies with CF5.10.07. tested by IPA according to standard 14644-1

Double Strokes*	5 million		7.5 million		10 million	
Temperature, from/to [°C]	<10 m	≤10 m	<10 m	≤10 m	<10 m	≤10 m
	R min. (factor x d)	R min. (factor x d)	R min. (factor x d)	R min. (factor x d)	R min. (factor x d)	R min. (factor x d)
-25/-15	8.5	10	9.5	11	10.5	12
-15/+70	6.8	7.5	7.5	8.5	8.5	9.5
+70/+80	8.5	10	9.5	11	10.5	12

*Higher number of double strokes required? Service life calculator online ► www.igus.eu/chainflexlife

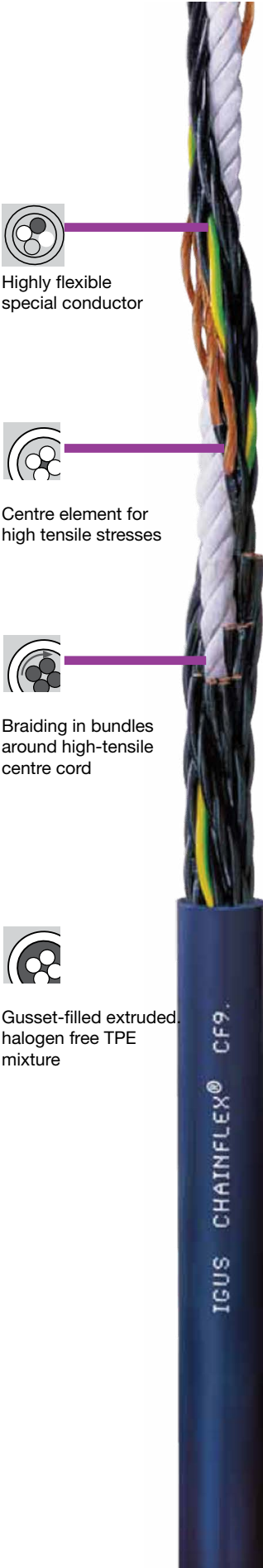
Typical application area

For high load requirements
Almost unlimited resistance to oil
Indoor and outdoor applications with average sun radiation
Especially for freely suspended and gliding travel distances up to 100 m
Machining units/machine tools, storage and retrieval units for high-bay warehouses, package industry, quick handling and reftidgerator sector cranes

Delivery program Part No.	Number of cores and conductor nominal cross section [mm²]	External diameter in mm approx.	Copper index [kg/km]	Weight [kg/km]
CF78.UL.05.04	(4 G 0.5)C	8.0	35	81
CF78.UL.05.05	(5 G 0.5)C	8.5	42	92
CF78.UL.05.07	(7 G 0.5)C	9.5	62	123
CF78.UL.05.09	(9 G 0.5)C	11.0	75	151
CF78.UL.05.12	(12 G 0.5)C	12.5	97	207
CF78.UL.05.18	(18 G 0.5)C	14.0	136	281
CF78.UL.05.25	(25 G 0.5)C	16.0	179	366
CF78.UL.07.03	(3 G 0.75)C	8.0	38	86
CF78.UL.07.04	(4 G 0.75)C	8.5	52	99
CF78.UL.07.05	(5 G 0.75)C	9.5	62	125
CF78.UL.07.07	(7 G 0.75)C	10.5	85	161
CF78.UL.07.12	(12 G 0.75)C	13.5	136	264
CF78.UL.07.18	(18 G 0.75)C	16.0	192	355
CF78.UL.07.36	(36 G 0.75)C	20.5	349	632
CF78.UL.07.42	(42 G 0.75)C	22.5	404	735
CF78.UL.10.03	(3 G 1.0)C	8.5	52	106
CF78.UL.10.04	(4 G 1.0)C	9.0	64	122
CF78.UL.10.05	(5 G 1.0)C	9.5	78	145
CF78.UL.10.07	(7 G 1.0)C	11.0	102	189
CF78.UL.10.12	(12 G 1.0)C	14.5	169	314
CF78.UL.10.18	(18 G 1.0)C	17.0	242	434
CF78.UL.10.25	(25 G 1.0)C	19.5	322	560
CF78.UL.15.03	(3 G 1.5)C	9.5	72	117
CF78.UL.15.04	(4 G 1.5)C	10.0	90	139
CF78.UL.15.05	(5 G 1.5)C	10.5	115	166
CF78.UL.15.07*	(7 G 1.5)C	12.5	153	226
CF78.UL.15.12	(12 G 1.5)C	16.5	249	403
CF78.UL.15.18	(18 G 1.5)C	19.0	368	564
CF78.UL.15.25	(25 x 1.5)C	22.5	495	755
CF78.UL.15.36	(36 x 1.5)C	26.5	683	1082
CF78.UL.15.42	(42 G 1.5)C	29.5	803	1279
CF78.UL.25.04	(4 G 2.5)C	11.5	148	212
CF78.UL.25.05	(5 G 2.5)C	12.5	117	246
CF78.UL.25.07*	(7 G 2.5)C	14.5	245	350
CF78.UL.40.04	(4 G 4.0)C	13.5	208	341

*When using cables 7G1.5mm² and 7G2.5mm² minimum bending radius must be 17.5 x d for gliding applications

TPE Control Cable



Chainflex® CF9

- For maximum load requirements
 - TPE outer jacket
 - Oil-resistant and bio oil resistant
 - PVC-free/halogen-free
- Low temperature-flexible
 - Hydrolysis resistant
 - Microbe resistant

	Bend Radius. moving	-35°C to +100°C. minimum bending radius 5 x d
	Bend Radius. fixed	-40°C to +100°C. minimum bending radius 3 x d
	V max.	10 m/s. 6 m/s
	Unsupported/gliding	
	a max.	100 m/s²
	UV-resistant	High
	Nominal voltage	300/500 V (following DIN VDE 0245).
	Testing voltage	2000 V (following DIN VDE 0281-2).
	Oil	Oil-resistant (following DIN EN 60811-2-1), bio-oil-resistant (following VDMA 24568).
	Silicon-free	Free from silicon which can affect paint adhesion (in compliance with PV 3.10.7 – status 1992).
	Halogen Free	Following EN 50267-2-1
	Conductor	Fine-wire stranded conductor in especially bending resistant version consisting of bare copper wires (following EN 60228).
	Core insulation	Mechanically high-quality TPE mixture.
	Core stranding	Number of cores < 12: cores stranded in a layer with short pitch length. Number of cores ≥ 12: cores combined in bundles and stranded together around a centre for high tensile stresses with adaptor, short pitch lengths and pitch directions, especially low-torsion structure.
	Core identification	Cores < 0.75 mm²: color code in accordance with DIN 47100 Cores ≥ 0.75 mm²: cores black with white numerals. one core green/ yellow.
	Outer jacket	Low-adhesion. oil-resistant mixture on the basis of TPE. adapted to suit the requirements in Energy Chains® Colour: Dark Blue green (similar to RAL 5011)
	CE	Following 2006/95/EG
	Lead Free	Following EU guideline (RoHS) 2002/95/EC.
	Clean room	According to ISO Class 2. Outer sheath material complies with CF5.10.07. tested by IPA according to standard 14644-1

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

*Higher number of double strokes required? Service life calculator online ► www.igus.eu/chainflexlife

Typical application area

For maximum load requirements
Almost unlimited resistance to oil, and bio-oils
Indoor and outdoor applications. UV-resistant
Especially for freely suspended and gliding travel distances up to 400 m and more
Storage and retrieval units for high-bay warehouses, machining units/machine tools, quick handling, clean room, semiconductor insertion, ship to shore, outdoor cranes and low-temperature applications

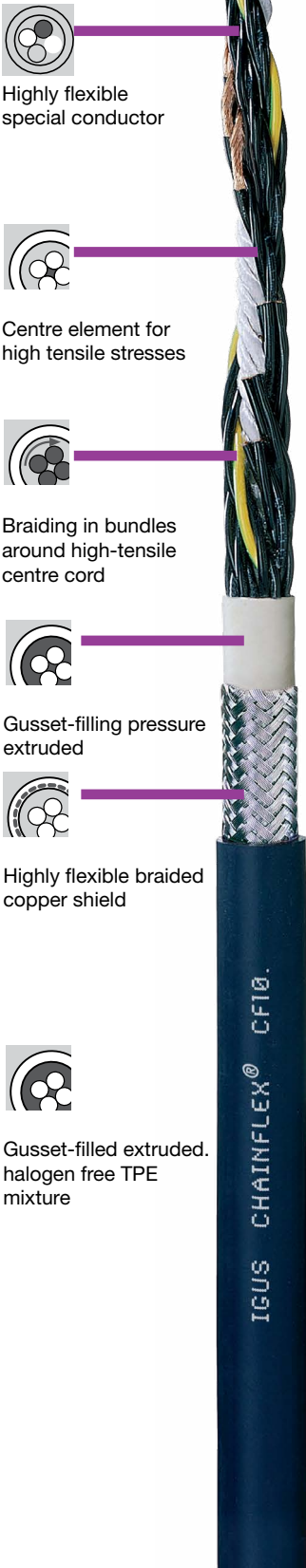
Delivery program Part No.	Number of cores and conductor nominal cross section [mm²]	External diameter in mm approx.	Copper index [kg/km]	Weight [kg/km]
CF9.02.02	2 x 0.25	4.0	5	1812.0
CF9.02.03.INI	3 x 0.25	4.5	8	20
CF9.02.07	7 x 0.25	6.0	17	42
CF9.02.06	6 x 0.25	5.5	15	35
CF9.02.08	8 x 0.25	6.5	20	46
CF9.02.12	12 x 0.25	8.0	29	70
CF9.02.20	20 x 0.25	9.5	53	104
CF9.02.25	25 x 0.25	11.0	63	141
CF9.03.04.INI	4 x 0.34	5.0	13	31
CF9.03.05.INI	5 x 0.34	5.5	17	37
CF9.03.06	6 x 0.34	6.0	20	43
CF9.03.08	8 x 0.34	7.0	26	55
CF9.03.16.07.03.INI	16 x 0.34+(3x0.75)	11.0	74	159
CF9.05.02	2 G 0.5	5.0	10	31
CF9.05.03	3 G 0.5	5.5	20	36
CF9.05.04	4 G 0.5	5.5	20	36
CF9.05.05	5 G 0.5	6.0	24	46
CF9.05.07	7 G 0.5	7.0	34	78
CF9.05.12	12 G 0.5	9.5	58	105
CF9.05.18	18 G 0.5	12.5	86	165
CF9.05.25	25 G 0.5	13.5	120	201
CF9.05.36	36 G 0.5	17.5	173	368
CF9.07.05	5 G 0.75	6.5	36	58
CF9.07.07	7 G 0.75	7.0	50	76
CF9.07.12	12 G 0.75	11.0	86	142
CF9.07.20	20 G 0.75	13.0	144	231
CF9.07.25	25 G 0.75	14.5	180	320
CF9.10.03	3 G 1.0	6.0	29	49
CF9.10.04	4 G 1.0	6.5	38	56
CF9.10.05	5 G 1.0	7.0	48	70
CF9.10.12	12 G 1.0	11.5	115	181
CF9.10.18	18 G 1.0	14.0	173	267
CF9.10.25	25 G 1.0	17.0	241	329
CF9.15.02	2 x 1.5	6.5	29	54
CF9.15.04	4 G 1.5	7.5	58	86
CF9.15.05	5 G 1.5	8.0	72	110
CF9.15.07*	7 G 1.5	9.5	101	140
CF9.15.12	12 G 1.5	14.0	173	265
CF9.15.18	18 G 1.5	17.0	260	400
CF9.15.25	25 G 1.5	20.0	360	602
CF9.15.36	36 G 1.5	23.0	519	840
CF9.25.04	4 G 2.5	9.0	96	128
CF9.25.05	5 G 2.5	10.0	120	174
CF9.25.07*	7 G 2.5	12.0	168	301
CF9.25.12	12 G 2.5	17.0	288	468
CF9.25.16	16 G 2.5	19.5	384	600
CF9.25.18	18 G 2.5	24.0	432	827
CF9.25.25	25 G 2.5	24.5	600	990
CF9.40.04	4 G 4.0	10.0	154	195
CF9.60.04	4 G 6.0	12.5	230	310
CF9.60.05	5 G 6.0	14.0	288	400
CF9.100.04	4 G 10.0	16.5	384	515
CF9.160.04	4 G 16.0	20.0	614	780

*When using cables 7G1.5mm² and 7G2.5mm² minimum bending radius must be 17.5 x d for gliding applications

TPE Control Cable

Chainflex® CF10

- For maximum load requirements
 - TPE outer jacket
 - Shielded
 - Oil-resistant and bio-oil-resistant
- PVC-free/halogen-free
 - Low temperature-flexible



	Bend Radius. moving	-35 °C to +100 °C. minimum bending radius 5 x d
	Bend Radius. fixed	-40 °C to +100 °C. minimum bending radius 3 x d
	V max.	10 m/s. 5 m/s
	Unsupported/gliding	
	a max.	100 m/s ²
	UV-resistant	High
	Nominal voltage	300/500 V (following DIN VDE 0245).
	Testing voltage	2000 V (following DIN VDE 0281-2).
	Oil	Oil-resistant (following DIN EN 60811-2-1). bio-oil-resistant (following VDMA 24568).
	Silicon-free	Free from silicon which can affect paint adhesion (in compliance with PV 3.10.7 – status 1992).
	Halogen Free	Following EN 50267-2-1
	Conductor	Fine-wire stranded conductor in especially bending resistant version consisting of bare copper wires (following EN 60228).
	Core insulation	Mechanically high-quality TPE mixture.
	Core stranding	Number of cores < 12: cores stranded in a layer with short pitch length. Number of cores ≥ 12: cores combined in bundles and stranded together around a centre for high tensile stresses with adapted. short pitch lengths and pitch directions, especially low-torsion structure.
	Core identification	Cores < 0.75 mm ² : color code in accordance with DIN 47100 Cores ≥ 0.75 mm ² : cores black with white numerals, one core green/yellow.
	Inner Jacket	TPE mixture adapted to suit the requirements in Energy Chains®
	Overall Shield	Extremely bending resistant. tinned braided copper shield.
	Outer jacket	Low-adhesion, oil-resistant mixture on the basis of TPE, adapted to suit the requirements in Energy Chains® Colour: Dark Blue green (similar to RAL 5011)
	CE	Following 2006/95/EG
	Clean room	According to ISO Class 2. Outer sheath material complies with CF5.10.07. tested by IPA according to standard 14644-1

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	5.0	6.0	7.0
+90/+100	6.8	7.5	8.5

*Higher number of double strokes required? Service life calculator online ► www.igus.eu/chainflexlife

Typical application area

For maximum load requirements
Almost unlimited resistance to oil. Also with bio-oils
Indoor and outdoor applications. UV-resistant
Especially for freely suspended and gliding travel distances up to 400m and more
Storage and retrieval units for high-bay warehouses, machining units/machine tools, quick handling, clean room, semiconductor insertion, ship to shore, outdoor cranes and low-temperature applications.























Delivery program Part No.	Number of cores and conductor nominal cross section [mm²]	External diameter in mm approx.	Copper index [kg/km]	Weight [kg/km]
CF10.01.12	(12 x 0.14)C	7.5	36	80
CF10.01.18	(18 x 0.14)C	10.0	67	110
CF10.02.04	(4 x 0.25)C	6.5	25	52
CF10.02.08	(8 x 0.25)C	7.5	40	75
CF10.02.12	(12 x 0.25)C	9.5	64	118
CF10.02.24	(24 x 0.25)C	13.0	109	212
CF10.03.05 INI	(5 x 0.34)C	7.0	32	62
CF10.05.04	(4 G 0.5)C	7.0	38	68
CF10.05.05	(5 G 0.5)C	7.5	55	91
CF10.05.07	(7 G 0.5)C	8.5	54	96
CF10.05.12	(12 G 0.5)C	11.5	102	192
CF10.05.18	(18 G 0.5)C	13.5	143	270
CF10.05.25	(25 G 0.5)C	14.5	167	280
CF10.07.04	(4 G 0.75)C	7.5	47	86
CF10.07.05	(5 G 0.75)C	7.5	57	95
CF10.07.07	(7 G 0.75)C	9.0	85	137
CF10.07.12	(12 G 0.75)C	12.5	138	244
CF10.07.20	(20 G 0.75)C	15.0	205	346
CF10.07.25	(25 G 0.75)C	16.5	253	433
CF10.10.02	(2 x 1.0)C	7.0	38	70
CF10.10.03	(3 x 1.0)C	7.5	57	95
CF10.10.04	(4 G 1.0)C	8.0	59	100
CF10.10.05	(5 G 1.0)C	8.5	71	101
CF10.10.07	(7 G 1.0)C	10.0	105	166
CF10.10.12	(12 G 1.0)C	13.5	169	293
CF10.10.18	(18 G 1.0)C	16.5	240	407
CF10.10.25	(25 G 1.0)C	18.0	322	528
CF10.15.04	(4 G 1.5)C	9.0	96	144
CF10.15.05	(5 G 1.5)C	9.5	108	163
CF10.15.07*	(7 G 1.5)C	11.5	155	225
CF10.15.12	(12 G 1.5)C	15.5	235	387
CF10.15.18	(18 G 1.5)C	20.0	361	585
CF10.25.04	(4 G 2.5)C	11.0	126	180
CF10.25.07*	(7 G 2.5)C	13.5	221	331
CF10.25.12	(12 G 2.5)C	19.0	373	624
CF10.40.04	(4 G 4.0)C	11.5	200	290
CF10.40.05	(5 G 4.0)C	13.5	246	353

*When using cables 7G1.5mm² and 7G2.5mm² minimum bending radius must be 17.5 x d for gliding applications

TPE Control Cable

Chainflex® CF98

- For maximum load requirements
 - Small radii up to 4xd
 - TPE outer jacket
 - Oil-resistant and bio oil resistant
- PVC-free/halogen-free
 - Low temperature-flexible
 - Hydrolysis resistant
 - Microbe resistant

	Conductor	Conductor consisting of a highly flexible special alloy.
	Core insulation	Mechanically high-quality TPE mixture.
	Core stranding	Cores stranded in one layer with especially short pitch length
	Core identification	Colour code in accordance with DIN 47100. CF98.02.03.INI: Brown, blue, black CF98.03.04.INI: Brown, blue, black, white
	Outer jacket	Low-adhesion, oil-resistant mixture on the basis of TPE especially Abrasion resistant and highly flexible, adapted to suit the requirements in Energy Chains®
	Bend Radius. moving	Minimum bending radius 4 x d
	Bend Radius. fixed	Minimum bending radius 3 x d
	Temperature	Moved -35 °C to + 90°C Fixed -40 °C to + 90°C
	V max.	10 m/s. 6 m/s
	Unsupported/gliding	
	a max.	100 m/s²
	Travel distance	Short very fast applications with small radii and tight design space Class 4
	Torsion	± 90°, with 1m cable length
	UV-resistant	High
	Nominal voltage	300/300 V (following DIN VDE 0245).
	Testing voltage	1500 V (following DIN VDE 0281-2).
	Oil	Oil-resistant (following DIN EN 60811-2-1). bio-oil-resistant (following VDMA 24568) with Plantocut 8 S-MB tested by DEA Class 4.
	Silicon-free	Free from silicon which can affect paint adhesion (in compliance with PV 3.10.7 – status 1992).
	Halogen Free	Following EN 50267-2-1
	CE	Following 2006/95/EG
	Lead Free	Following 2011/65 EC (RoHS II) 2002/95/EC.
	Clean room	According to ISO Class 1. Outer jacket material complies with CF9.15.07. tested by IPA according to standard 14644-1

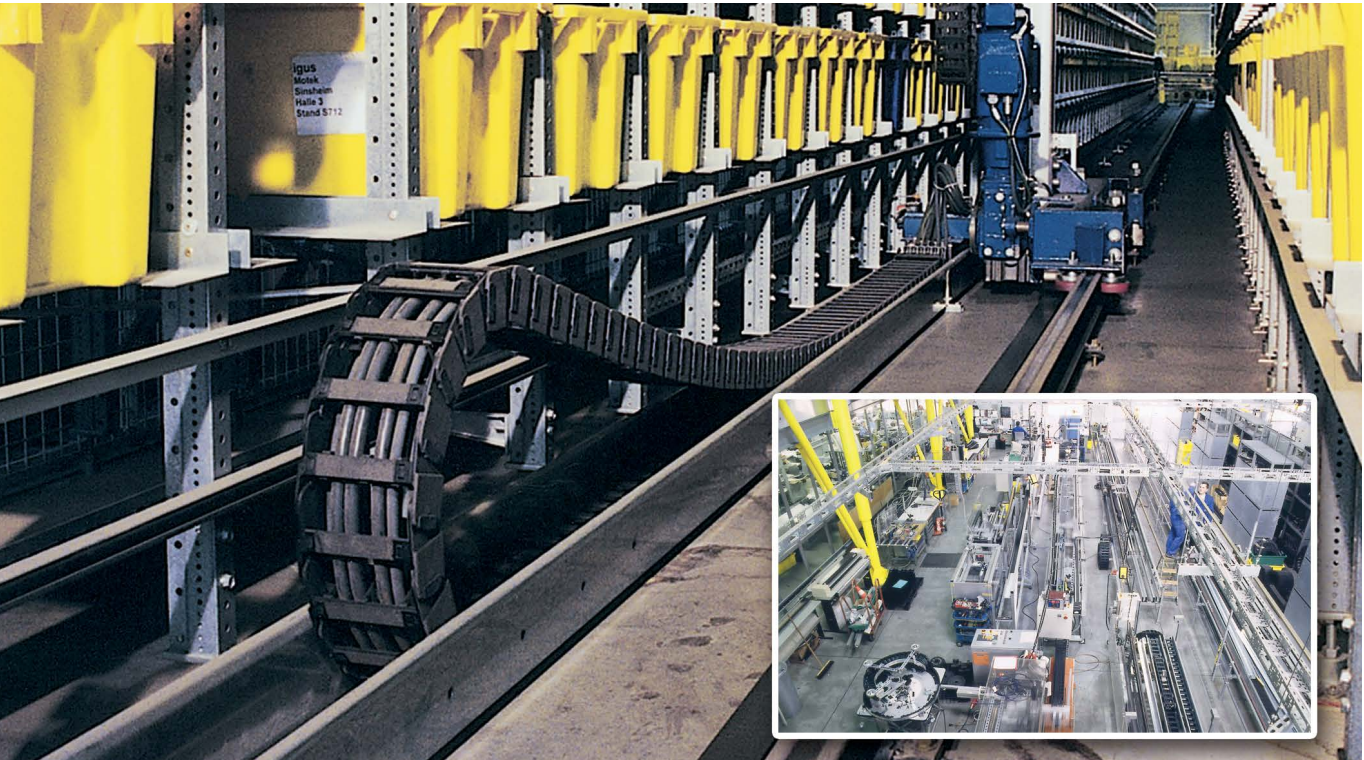
Double Strokes*	20 million	30 million	40 million
Temperature, from/to [°C]	R min. (factor x d)	R min. (factor x d)	R min. (factor x d)
-35/-25	5	6	7
-25/+80	4	5	6
+80/+90	5	6	7

*Higher number of double strokes required? Service life calculator online ► www.igus.eu/chainflexlife

Typical application area

For maximum load requirements
Almost unlimited resistance to oil and bio-oils
Indoor and outdoor applications. UV-resistant
Especially for freely suspended and gliding travel distances up to 400 m and more
Storage and retrieval units for high-bay warehouses, machining units/machine tools, quick handling, clean room,
semiconductor insertion, ship to shore, outdoor cranes and low-temperature applications























Delivery program Part No.	Number of cores and conductor nominal cross section [mm²]	External diameter in mm approx.	Copper index [kg/km]	Weight [kg/km]
CF98.01.02	2 x 0.14	4.0	4	11
CF98.01.03	3 x 0.14	4.5	6	14
CF98.01.04	4 x 0.14	5.0	9	16
CF98.01.07	7 x 0.14	6.0	14	21
CF98.01.08	8 x 0.14	6.5	16	24
CF98.02.03.INI	3 x 0.25	5.0	12	25
CF98.02.04	4 x 0.25	5.5	16	30
CF98.02.07	7 x 0.25	6.5	26	53
CF98.02.08	8 x 0.25	7.0	30	60
CF98.03.03	3 x 0.34	5.0	14	28
CF98.03.04.INI	4 x 0.34	5.5	19	35
CF98.03.07	7 x 0.34	7.0	32	55
CF98.03.08	8 x 0.34	7.5	38	63
CF98.05.04	4 x 0.5	6.0	31	40



TPE Control Cable

Chainflex® CF99

- For maximum load requirements
 - Small radii up to 4xd
 - Shielded
 - TPE outer jacket
 - Oil-resistant and bio oil resistant
- PVC-free/halogen-free
 - Low temperature-flexible
 - Hydrolysis resistant
 - Microbe resistant

	Conductor	Conductor consisting of a highly flexible special alloy.
	Core insulation	Mechanically high-quality TPE mixture.
	Core stranding	Cores stranded in one layer with especially short pitch length
	Core identification	Colour code in accordance with DIN 47100. CF98.02.03.INI: Brown, blue, black CF98.03.04.INI: Brown, blue, black, white
	Inner Jacket	TPE Mixture adapted to suit the requirements in energy chains®.
	Overall Shield	Highly flexible alloyed special shield. Coverage approx. 70% linear approx 90% optical
	Outer jacket	Low-adhesion mixture on the basis of TPE especially abrasion resistant and highly flexible, adapted to suit the requirements in Energy Chains® Colour: Steel Blue (similar to RAL 5011)
	Bend Radius. moving	Minimum bending radius 4 x d
	Bend Radius. fixed	Minimum bending radius 3 x d
	V max.	10 m/s. 6 m/s
	Unsupported/gliding	
	a max.	100 m/s²
	Travel Distance	Short very fast applications with small radii and tight design space, Class 4
	UV-resistant	High
	Nominal voltage	300/300 V (following DIN VDE 0245).
	Testing voltage	1500 V (following DIN VDE 0281-2).
	Oil	Oil-resistant (following DIN EN 60811-2-1) bio-oil-resistant (following VDMA 24568 with Planocut 8 S-MB tested by DEA), Class 4.
	Silicon-free	Free from silicon which can affect paint adhesion (in compliance with PV 3.10.7 – status 1992).
	Halogen Free	Following EN 50267-2-1
	CE	Following 2006/95/EG
	Lead Free	Following 2011/65/EC (RoHS-II)
	Clean room	According to ISO Class 2. Outer sheath material complies with CF5.10.07. tested by IPA according to standard 14644-1

Double Strokes*	20 million	30 million	40 million
Temperature, from/to [°C]	R min. (factor x d)	R min. (factor x d)	R min. (factor x d)
-35/-25	5	6	7
-25/+80	4	5	6
+80/+90	5	6	7

*Higher number of double strokes required? Service life calculator online ► www.igus.eu/chainflexlife

Typical application area

For maximum load requirements
Almost unlimited resistance to oil and bio-oils
Indoor and outdoor applications. UV-resistant
Especially for short, very fast applications with small radii and tight design space
Automatic insertion machine, automatic doors, clean room and very quick handling























Delivery program Part No.	Number of cores and conductor nominal cross section [mm²]	External diameter in mm approx.	Copper index [kg/km]	Weight [kg/km]
CF99.01.02	(2 x 0.14)C	5.5	14	33
CF99.01.03	(3 x 0.14)C	6.0	17	37
CF99.01.04	(4 x 0.14)C	6.0	21	43
CF99.01.07	(7 x 0.14)C	7.5	32	62
CF99.01.08	(8 x 0.14)C	8.0	36	69
CF99.02.03.INI	(3 x 0.25)C	6.5	25	48
CF99.02.04	(4 x 0.25)C	6.5	30	56
CF99.02.07	(7 x 0.25)C	8.0	48	85
CF99.02.08	(8 x 0.25)C	8.5	54	93
CF99.03.03	(3 x 0.34)C	6.5	27	51
CF99.03.04.INI	(4 x 0.34)C	7.0	35	62
CF99.03.08	(8 x 0.34)C	9.0	64	105



PUR Data Cable

Chainflex® CF240.PUR

- For high load requirements
 - PUR outer jacket
 - Shielded
 - Oil-resistant and coolant resistant
 - Notch resistant
- PVC-free/halogen-free
 - Flame retardant
 - Hydrolysis resistant
 - Microbe resistant

	Conductor	Very finely stranded special cores of particularly high-flex design made of bare copper wires.
	Core insulation	Mechanically high-quality PP mixture.
	Core stranding	Cores stranded in one layer with especially short pitch lengths.
	Core identification	Colour code in accordance with DIN 47100.
	Intermediate layer	Foil taping over the external layer.
	Overall Shield	Extremely bending-resistant braiding made of tinned copper wires. Coverage approx. 70% linear approx 90% optical.
	Outer jacket	Low-adhesion, highly abrasion resistant mixture on the basis of PUR, adapted to suit the requirements in Energy Chains® (following DIN VDE 0282 Part 10). Colour: Silver Grey (similar to RAL 7001)
	Bend Radius. moving	< 10 m travel moved minimum 10 x d ≥ 10 m travel moved minimum 12 x d
	Bend Radius. fixed	Minimum bending radius 5 x d
	V max.	3 m/s. 2 m/s
	Unsupported/gliding	
	a max.	20 m/s²
	Travel Distance	Freely suspended and gliding travel distances up to 50 m. Class 2
	UV-resistant	Medium
	Nominal voltage	300/300 V (following DIN VDE 0245).
	Testing voltage	1500 V
	Oil	Oil-resistant (following DIN EN 50363-10-2). Class 4.
	Off Shore	MUD-resistant following NEK 606-status 2099.
	Flame Retardant	According to IES 60332-1-2, CEI 20-35, FT1, VW-1
	Silicon-free	Free from silicon which can affect paint adhesion (in compliance with PV 3.10.7 – status 1992).
	Halogen Free	Following EN 50267-2-1
	UL/CSA	Style 10493 and 20233, 300 V, 80°C



NFPA

Following NFPA 7-2012 chapter 12.9 Starting from manufacturing date 9/2011



CEI

Following CEI 20-35



Lead Free

Following 2011/65/EC (RoHS-II)



CE

Following 2006/95/EG



Clean room

According to ISO Class 1. Outer sheath material complies with CF27.07.05.02.01.D. tested by IPA according to standard 14644-1

Double Strokes*	5 million		7.5 million		10 million	
	<10 m	≤10 m	<10 m	≤10 m	<10 m	≤10 m
Temperature, from/to [°C]	R min. (factor x d)	R min. (factor x d)	R min. (factor x d)	R min. (factor x d)	R min. (factor x d)	R min. (factor x d)
+5/+15	12.5	15	13.5	16	14.5	17
+15/+60	10	12.5	11	13.5	12	14.5
+60/+70	12.5	15	13.5	16	14.5	17

*Higher number of double strokes required? Service life calculator online ► www.igus.eu/chainflexlife

Typical application area

For high load requirements
Almost unlimited resistance to oil
Indoor and outdoor applications with average sun radiation
Especially for freely suspended and gliding travel distances up to 50 m
Machining units/machine tools, storage and retrieval units for high-bay warehouses, packaging industry, quick handling and refrigerating sector

Delivery program Part No.	Number of cores and conductor nominal cross section [mm²]	External diameter in mm approx.	Copper index [kg/km]	Weight [kg/km]
CF240.PUR.01.03	(3 x 0.14)C	5.5	14	37
CF240.PUR.01.04	(4 x 0.14)C	6.0	16	40
CF240.PUR.01.05	(5 x 0.14)C	6.0	18	45
CF240.PUR.01.07	(7 x 0.14)C	6.5	24	55
CF240.PUR.01.14	(14 x 0.14)C	8.0	42	81
CF240.PUR.01.18	(18 x 0.14)C	8.5	53	97
CF240.PUR.02.03	(3 x 0.25)C	5.5	18	42
CF240.PUR.02.04	(4 x 0.25)C	6.0	22	46
CF240.PUR.02.05	(5 x 0.25)C	6.0	25	52
CF240.PUR.02.07	(7 x 0.25)C	7.0	33	66
CF240.PUR.02.08	(8 x 0.25)C	7.5	37	73
CF240.PUR.02.14	(14 x 0.25)C	8.5	63	106
CF240.PUR.02.18	(18 x 0.25)C	9.0	75	126
CF240.PUR.03.03	(3 x 0.34)C	6.0	22	48
CF240.PUR.03.04	(4 x 0.34)C	6.5	26	55
CF240.PUR.03.05	(5 x 0.34)C	7.0	32	61
CF240.PUR.03.07	(7 x 0.34)C	8.0	46	87
CF240.PUR.03.14	(14 x 0.34)C	9.5	78	130
CF240.PUR.03.18	(18 x 0.34)C	10.5	97	161

PVC Data Cable. Paired



Chainflex® CF211

- For high load requirements
 - PVC outer jacket
 - Shielded
- Twisted pair
 - Oil-resistant
 - Flame-retardant

	Bend Radius. moving	-5 °C to +70 °C. minimum bending radius 10 x d
	Bend Radius. fixed	-20 °C to +70 °C. minimum bending radius 5 x d
	V max.	Unsupported/gliding 5 m/s. 3 m/s
	a max.	50 m/s2
	UV-resistant	Medium
	Nominal voltage	300/300 V (following DIN VDE 0245).
	Testing voltage	1500 V
	Oil	Oil-resistant (following DIN EN 60811-2-1. DIN EN 50363-4-1)
	Flame-retardant	According to IEC 332-1. CEI 20-35. FT1.
	Silicon-free	Free from silicon which can affect paint adhesion (in compliance with PV 3.10.7 – status 1992).
	Conductor	Very finely stranded special cores of particularly high-flex design made of bare copper wires.
	Core insulation	Mechanically high-quality PVC mixture (following DIN VDE 0207 Part 4).
	Core stranding	2 cores each stranded in pairs with short pitch lengths. core pairs also stranded with short pitch lengths.
	Core identification	Color code in accordance with DIN 47100.
	Intermediate sheath	Foil taping over the external layer.
	Overall shield	Extremely bending-resistant. tinned braided copper shield. Coverage approx. 70% linear. approx. 90% optical.
	Outer jacket	Low-adhesion. oil-resistant mixture on the basis of PVC. adapted to suit the requirements in Energy Chains® (following DIN VDE 0282 Part 10). Colour: gray (similar to RAL 7001)
	UL/CSA	< 0.5 mm2: Style 10467 and 2464. 300 V. 80 °C ≥ 0.5 mm2: Style 1729 and 2464. 300 V. 80 °C
	CEI	Following CEI 20-35
	CE	Following 2006/95/EG
	Lead free	Following EU guideline (RoHS) 2002/95/EC
	Clean room	According to ISO Class 2. Outer sheath material complies with CF5.10.07. tested by IPA according to standard 14644-1

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)
+5/+15	10	11	12
15/+60	7.5	8.5	8.8
+60/+70	10	11	12

*Higher number of double strokes required? Service life calculator online ► www.igus.eu/chainflexlife

Typical application area

For high load requirements
Light oil influence
Preferably indoor applications, but also outdoor ones at temperatures > 5 °c
Especially for freely suspended and gliding travel distances up to 100 m
Storage and retrieval units for high-bay warehouses, machining units/package machines, handling and indoor cranes

Delivery program Part No.	Number of cores and conductor nominal cross section [mm2]	External diameter in mm approx.	Copper index [kg/km]	Weight [kg/km]
CF211.02.01.02	(1 x 2 x 0.25)C	5.	16	35
CF211.02.02.02	(2 x 2 x 0.25)C	5.5	28	60
CF211.02.03.02	(3 x 2 x 0.25)C	7.0	37	73
CF211.02.04.02	(4 x 2 x 0.25)C	8.0	44	85
CF211.02.05.02	(5 x 2 x 0.25)C	8.5	51	97
CF211.02.06.02	(6 x 2 x 0.25)C	9.5	58	110
CF211.02.08.02	(8 x 2 x 0.25)C	11.5	75	160
CF211.02.10.02	(10 x 2 x 0.25)C	13.0	93	195
CF211.02.14.02	(14 x 2 x 0.25)C	13.5	109	205
CF211.03.03.02	(3 x (2 x 0.34))C	8.0	37	79
CF211.03.08.02	(8 x (2 x 0.34))C	12.0	96	160
CF211.03.10.02	(10 x (2 x 0.34))C	13.0	119	197
CF211.05.01.02	(1 x 2 x 0.5)C	5.5	23	50
CF211.05.02.02*	(2 x 2 x 0.5)C	8.5	44	80
CF211.05.03.02	(3 x 2 x 0.5)C	9.0	57	100
CF211.05.04.02	(4 x 2 x 0.5)C	9.5	68	120
CF211.05.05.02	(5 x 2 x 0.5)C	11.0	80	145
CF211.05.06.02	(6 x 2 x 0.5)C	12.5	99	185
CF211.05.08.02	(8 x 2 x 0.5)C	14.0	124	230
CF211.05.10.02	(10 x 2 x 0.5)C	16.0	175	320
CF211.05.14.02	(14 x 2 x 0.5)C	17.0	187	335

Note: The mentioned external diameters are maximum values and may tend toward lower tolerance limits.

Guide Lock


























Guide lock horizontal - upper run guide for long travels.
Travels unsupported up to 50 m are possible. Chips cannot get stuck between upper and lower run. Enormous increase of "self supporting" length of E-Chains®.

TPE Data Cable

Chainflex® CF11

- For maximum load requirements
 - Shielded
 - Twisted Pair
 - TPE outer jacket
 - Oil-resistant and bio oil resistant
- PVC-free/halogen-free
 - Hydrolysis resistant
 - Microbe resistant

	Conductor	Fine wire stranded conductor in especially bending resistant version consisting of bare copper wires. (following EN 60228).
	Core insulation	Mechanically high-quality TPE mixture.
	Core stranding	2 cores each stranded in pairs with short pitch lengths. Core pairs also stranded with short pitch lengths.
	Core identification	Colour code in accordance with DIN 47100. Cores < 1.0 mm2: Cores ≥ 1.0 mm2:
	Inner jacket	TPA mixture adapted to suit requirements in energy chains®
	Overall Shield	Extremely bending-resistant braiding made of tinned copper wires. Coverage approx. 70% linear approx 90% optical.
	Outer jacket	Low-adhesion, highly abrasion resistant mixture on the basis of TPE, especially abrasion resistant and highly flexible adapted to suit the requirements in Energy Chains® Colour: Steel Blue (similar to RAL 5011)
	Bend Radius. moving	minimum 6.8 x d
	Bend Radius. fixed	minimum 5 x d
	Temperature. moved fixed	-35°C TO + 100°C -40°C TO + 100°C
	V max.	10 m/s. 6 m/s
	Unsupported/gliding	
	A max.	100 m/s2
	Travel Distance	Freely suspended and gliding travel distances up to 400 m and more, Class 4
	UV-resistant	High
	Nominal voltage	300/300 V (following DIN VDE 0245).
	Testing voltage	1500 V
	Oil	Oil-resistant (following DIN EN 50363-10-2). 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 EN 50267-2-1.
	CE	Following 2006/95/EG
	Lead Free	Following 2011/65/EC (RoHS-II)
	Clean room	According to ISO Class 1. Outer jacket material complies with CF9.15.07. tested by IPA according to standard 14644-1

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	7.5	8.5	9.5
-25/+90	6.8	7.5	8.5
+90/+100	7.5	8.5	9.5

*Higher number of double strokes required? Service life calculator online ► www.igus.eu/chainflexlife

Typical application area

For maximum load requirements
Almost unlimited resistance to oil and bio-oils
Indoor and outdoor applications. UV-resistant
Especially for freely suspended and gliding travel distances up to 400m and more
Storage and retrieval units for high-bay warehouses, machining units/machine tools, quick handling, clean room, semiconductor insertion, ship to shore, outdoor cranes and low-temperature applications.


Delivery program Part No.	Number of cores and conductor nominal cross section [mm2]	External diameter in mm approx.	Copper index [kg/km]	Weight [kg/km]
CF11.01.04.02	(4 x(2x0.14))C	6.5	25	52
CF11.01.18.02	(18 x(2x0.14))C	9.5	64	118
CF11.02.01.02	(1 x(2x0.25))C	6.0	18	39
CF11.02.02.02	(2 x(2x0.25))C	6.5	28	51
CF11.02.03.02	(3 x(2x0.25))C	8.0	37	80
CF11.02.04.02	(4 x(2x0.25))C	8.5	44	91
CF11.02.05.02	(5 x(2x0.25))C	9.0	52	107
CF11.02.06.02	(6 x(2x0.25))C	10.0	73	134
CF11.02.09.02	(9 x(2x0.25))C	12.5	102	208
CF11.02.10.02	(10 x(2x0.25))C	13.0	109	223
CF11.02.14.02	(14 x(2x0.25))C	13.5	132	232
CF11.03.08.02	(8 x(2x0.25))C	13.0	103	227
CF11.05.04.02	(4 x(2x0.5))C	9.5	82	138
CF11.05.06.02	(6 x(2x0.5))C	12.0	110	205
CF11.05.08.02	(8 x(2x0.5))C	14.0	145	271
CF11.07.03.02	(3 x(2x0.275))C	10.0	87	159
CF11.10.04.02	(4 x(2x1.0))C	12.0	134	237
CF11.15.06.02	(6 x(2x1.5))C	17.0	263	427
CF11.25.03.02	(3 x(2x2.5))C	15.5	226	393



TPE Data Cable

Chainflex® CF12

- For maximum load requirements
 - Double Shielded
 - TPE outer jacket
 - Bio oil resistant
- PVC-free/halogen-free
 - Hydrolysis resistant
 - Microbe resistant



Conductor

Fine wire stranded conductor in especially bending resistant version consisting of bare copper wires. (following EN 60228).

Core insulation

Mechanically high-quality TPE mixture.

Core stranding

2 cores each stranded in pairs with short pitch lengths. Core pairs also stranded with short pitch lengths.

Core identification

Cores < 0.5 mm²: Colour code in accordance with DIN 47100
Cores ≥ 1.0 mm²: Cores black with white numerals

Element Shield

Extremely bending-resistant braiding made of tinned copper wires. Coverage approx 70% linear, approx 90% optical.

Element jacket

TPE mixture adapted to suit the requirements in energy chains over pair shield.

Inner jacket

TPA mixture adapted to suit requirements in energy chains®

Overall Shield

Highly flexible shield consisting of galvanised steel wire braid. Coverage approx. 70% linear approx 90% optical.

Outer jacket

Low-adhesion, highly abrasion resistant mixture on the basis of TPE, especially abrasion resistant and highly flexible adapted to suit the requirements in Energy Chains®
Colour: Steel Blue (similar to RAL 5011)

Bend Radius. moving

minimum 10 x d
minimum 5 x d

Bend Radius. fixed

Temperature. moved

-35°C to + 100°C
-40°C to + 100°C

fixed

V max.

10 m/s. 6 m/s

Unsupported/gliding

a max.

100 m/s²

Travel Distance

Freely suspended and gliding travel distances up to 400 m and more, Class 4

UV-resistant

High

Nominal voltage

300/300 V (following DIN VDE 0245).

Testing voltage

1500 V

Halogen Free

Following EN 50267-2-1.

Oil

Oil-resistant (following DIN EN 50363-10-2). 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).

CE

Following 2006/95/EG

Lead Free

Following 2011/65/EC (RoHS-II)

Clean room

According to ISO Class 1. Outer jacket material complies with CF9.15.07. tested by IPA according to standard 14644-1

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	12.5	13.5	14.5
-25/+90	10	11	12
+90/+100	12.5	13.5	14.5

*Higher number of double strokes required? Service life calculator online ► www.igus.eu/chainflexlife

Typical application area

For maximum load requirements
Almost unlimited resistance to oil. Also with bio-oils
Indoor and outdoor applications. UV-resistant
Especially for freely suspended and gliding travel distances up to 400m
Storage and retrieval units for high-bay warehouses, machining units/machine tools, quick handling, clean room, semiconductor insertion, outdoor cranes, low-temperature applications and for especially high emc safety.
























Delivery program Part No.	Number of cores and conductor nominal cross section [mm²]	External diameter in mm approx.	Copper index [kg/km]	Weight [kg/km]
CF12.02.02.02	(2 x(2x0.25)C)C	11.0	26	151
CF12.02.04.02	(4 x(2x0.25)C)C	11.0	51	174
CF12.05.03.02	(3 x(2x0.5)C)C	13.5	69	232
CF12.05.04.02	(4 x(2x0.5)C)C	14.5	87	270
CF12.05.05.02	(5 x(2x0.5)C)C	15.5	109	341
CF12.05.06.02	(6 x(2x0.5)C)C	17.0	137	397
CF12.05.08.02	(8 x(2x0.5)C)C	20.5	174	527
CF12.05.10.02	(10 x(2x0.5)C)C	23.0	217	614
CF12.05.14.02	(14 x(2x0.5)C)C	23.0	317	725
CF12.10.06.02	(6 x(2x1.0)C)C	20.0	212	551



TPE Coax Cable

Chainflex® CFCoax

- 50/75 Ω coax for maximum load requirements
 - TPE outer jacket
 - Oil-resistant and bio oil resistant
- UV resistant
 - Hydrolysis resistant
 - Microbe resistant

	Conductor	Multi-wire adapted single-wire diameter and pitch length to suit the requirements in energy chains®.
	Core insulation	Special FEP-isolating mixture.
	Core stranding	Cores stranded in one layer with especially short pitch lengths.
	Identification	Coaxial elements Schedule delivery program.
	Element Shield	Extremely bending-resistant braiding made of tinned copper wires. Coverage approx 70% linear, approx 90% optical.
	Element jacket	TPE mixture adapted to suit the requirements in energy chains.
	Outer jacket	Low-adhesion, highly abrasion resistant mixture on the basis of TPE, especially abrasion resistant and highly flexible adapted to suit the requirements in Energy Chains® Colour: Schedule delivery program
	Bend Radius. moving	Minimum 10 x d
	Bend Radius. fixed	Minimum 7.5 x d
	Temperature. moved fixed	-35°C to + 100°C -40°C to + 100°C
	V max.	10 m/s. 5 m/s
	Unsupported/gliding	
	a max.	100 m/s²
	Travel Distance	Freely suspended and gliding travel distances up to 400 m Class 4
	UV-resistant	High
	Nominal voltage	500 (following DIN VDE 0245).
	Testing voltage	1500 V
	Halogen Free	Following EN 50267-2-1.
	Oil	Oil-resistant (following DIN EN 60811-2-1). 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).
	CE	Following 2006/95/EG
	Lead Free	Following 2011/65/EC (RoHS-II)
	Clean room	According to ISO Class 1. Outer jacket material complies with CF9.15.07. tested by IPA according to standard 14644-1



Info

The coax elements used in cables of the CFKoax1 series are comparable with a HF75-03/1.6 according to MIL-C17/94-RG179 and thus fit in an RG179 plug!
The coax elements used in cables of the CFKoax2 series are comparable with a HF50-0,9/2 according to MIL-C17/28-G58 and thus fit in an RG58 plug!
The coax elements used in cables of the CFKoax3 series are comparable with a HF50-0,3/0,84 according to MIL-C-17/93-RG178 and thus fit in an RG58 plug!

Double Strokes*	5 million		7.5 million		10 million	
	<10 m	≤10 m	<10 m	≤10 m	<10 m	≤10 m
Temperature, from/to [°C]	R min. (factor x d)	R min. (factor x d)	R min. (factor x d)	R min. (factor x d)	R min. (factor x d)	R min. (factor x d)
+5/+15	7.5	10	8.5	11	9.5	12
15/+60	6.8	7.5	7.8	8.5	8.8	9.5
+60/+70	7.5	10	8.5	11	9.5	12

*Higher number of double strokes required? Service life calculator online ► www.igus.eu/chainflexlife

Typical application area

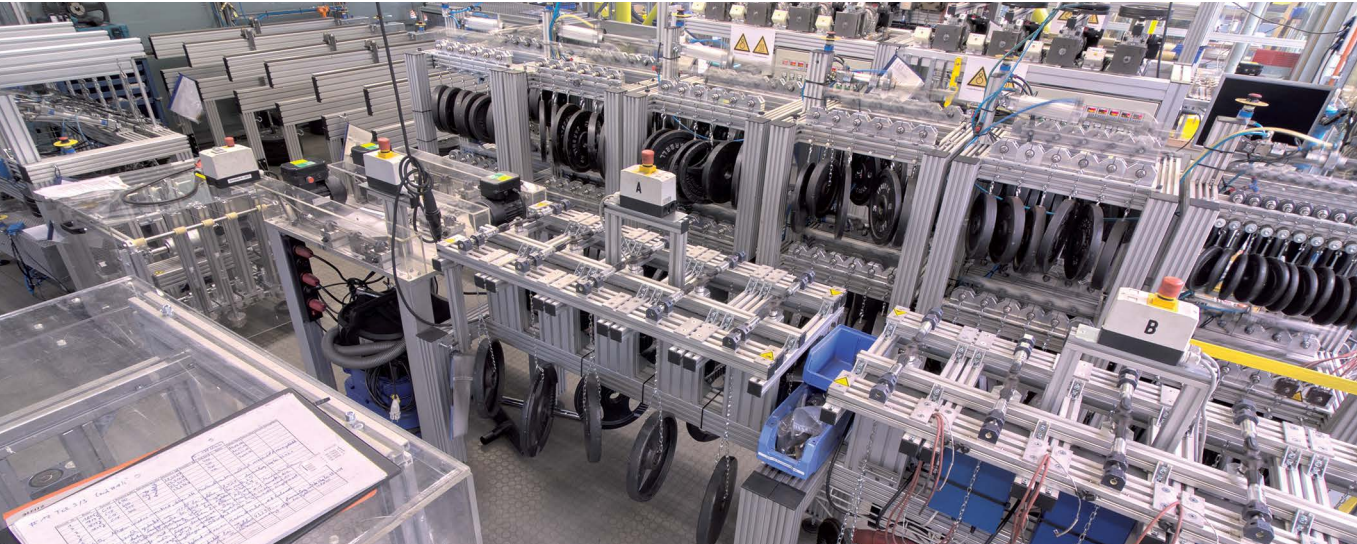
For maximum load requirements
Almost unlimited resistance to oil and bio-oils
Indoor and outdoor applications. UV-resistant
Especially for freely suspended and gliding travel distances up to 400m
Storage and retrieval units for high-bay warehouses, machining units/machine tools, quick handling, clean room, semiconductor insertion, indoor cranes and low-temperature applications.

Delivery program Part No.	Coaxial Elements	External diameter in mm approx.	Copper index [kg/km]	Weight [kg/km]
CFKoax 1.01	1	4.5	7	23
CFKoax 1.05	5	10.0	35	112
CFKoax 2.01	1	5.5	20	37
CFKoax 3.01	1	3.5	5	12

The mentioned external diameters are maximum values and may tend toward lower tolerance limits.

Delivery program Part No.	Characteristics wave impedance approx. [Ω]	Conductor Core diameter [mm]	Colour code	Colour Outer Jacket
CFKoax 1.01	75	0.3/1.6	red	Steel blue 5011
CFKoax 1.05	75	0.3/1.6	red, green, blue, white, black	Steel blue 5011
CFKoax 2.01	50	0.9/2.95	-	Jet Black 9005
CFKoax 2.01	50	0.3/0.84	-	Window grey 7040

The mentioned external diameters are maximum values and may tend toward lower tolerance limits.



Bus cable | PVC



Chainflex® CF888

For flexing applications

- PVC outer jacket
- Shielded
- Flame retardant

	Bend radius	e-chain® linear minimum 15 x d flexible minimum 12 x d fixed minimum 8 x d
	Temperature Range	e-chain® linear +5 °C up to +70 °C flexible -5 °C up to +70 °C (following DIN EN 60811-504) fixed -15 °C up to +70 °C (following DIN EN 50305)
	V Max. unsupported	3 m/s
	A Max	20 m/s²
	Travel distance	Unsupported travel distances up to 10 m, Class 1
	Conductor	Conductor consisting of bare copper wires (according to DIN EN 60228).
	Core Insulation	According to bus specification.
	Core Structure	According to bus specification.
	Core Identification	According to bus specification. ➤ Product range table
	Overall shield	Braiding made of tinned copper wires. Coverage approx. 60 % optical
	Outer Jacket	Low-adhesion PVC mixture, adapted to suit the requirements in e-chains®. Colour: Red lilac (similar to RAL 4001)
	Element shield	Extremely bending-resistant, tinned copper cover. Coverage approx. 90 % optical
	Element jacket	TPE mixture on pair shielding adapted to suit the requirements in e-chains®.
	Intermediate layer	Foil taping over the outer layer.
	Outer jacket	Low-adhesion, oil-resistant PVC mixture, adapted to suit the requirements in e-chains® (following DIN EN 50363-4-1). Colour: Yellow-green (similar to RAL 6018), Silver-grey (similar to RAL 7001)
	Nominal voltage	50 V
	Testing voltage	500 V
	Flame-retardant	According to IEC 60332-1-2, CEI 20-35, FT1, VW-1
	Silicon-free	Free from silicone which can affect paint adhesion (following PV 3.10.7 – status 1992)
	UL/CSA	CF888.001: Style 1589 and 2560, 30 V, 60 °C CF888.021-CF888.060: Style 1598 and 2571, 30 V, 80 °C

	NFPA	Following NFPA 79-2012, chapter 12.9
	EAC	Certificate No. RU C-DE.ME77.B.01559 (TR ZU)
	CTP	Certificate No. C-DE.PB49.B.00449 (Fire protection)
	CEI	Following CEI 20-35
	Lead free	Following 2011/65/EC (RoHS-II)
	CE	Following 2014/35/EU

Double stroke s*	1 million	3 million	5 million
+5/+15	17.5	18.5	19.5
+15/+60	15	16	17
+60/+70	17.5	18.5	19.5

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

Typical application areas

- For flexing applications, Class 3
- Especially for unsupported travels, Class 1
- Without influence of oil, Class 1
- No torsion, Class 1
- Preferably indoor applications
- Wood/stone processing, Packaging industry, supply systems, Handling, adjusting equipment

Part No.	Number of cores and conductor nominal cross section [mm²]	Outer diameter (d) max [mm]	Copper index [kg/km]	Weight [kg/km]	Characteristic wave impedance approx[Ω].	Core group	Colour code
Profibus (1x2x0.64 mm)							
CF888.001	(2x0.25)C	8.0	18	61	150	(2x0.25)C	red, green
CAN-Bus							
CF888.021	(2x0.5)C	8.5	24	80	120	(2x0.5)C	white, brown
Ethernet/CAT5e							
CF888.045	(4x(2x0.14))C	7.5	25	66	100	(4x(2x0.14))C	white-blue/blue, white-orange/orange, white- green/green, white-brown/brown
Profinet							
CF888.060 2) 13)	(4x0.34)C	7.0	25	56	100	(4x0.34)C	white, orange, blue, yellow (Star-quad)

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 different 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, there is a high degree of EMC reliability. It is also ensured that the electrical values remain stable over the long term in spite of constant 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 to take all these factors into account and, with its extensive tests, helps you to ensure the process reliability of your system from the very beginning.

TPE Bus Cable



Chainflex® CFBUS

- For maximum load requirement
 - TPE outer jacket
 - Shielded
- Oil-resistant
 - Bio-oil-resistant
 - Flame-retardant

	Bend Radius. moving	-35 °C to +70 °C. minimum bending radius 10-12.5 x d
	Bend Radius. fixed	-40 °C to +70 °C. minimum bending radius 5 x d
	V max.	Unsupported/gliding 10 m/s. 6 m/s
	a max.	100 m/s ²
	UV-resistant	Medium
	Nominal voltage	30 V
	Testing voltage	500 V
	Oil	Oil-resistant (following EN 60811-2-1). bio-oil-resistant (following VDMA 24568).
	Flame-retardant	According to IEC 332-1. CEI 20-35. FT1.
	Silicon-free	Free from silicon which can affect paint adhesion (in compliance with PV 3.10.7 – status 1992).
	Conductor	Fine-wire stranded conductor in especially bending-resistant version consisting of bare copper wires (following EN 60228).
	Core insulation	Following bus specification.
	Core stranding	Following bus specification.
	Core identification	Following bus specification Schedule delivery program
	Inner Jacket	TPE mixture adapted to suit the requirements in Energy Chains®.
	Overall shield	Extremely bending-resistant. tinned braided copper shield. Coverage approx. 70% linear. approx. 90% optical.
	Outer jacket	Low-adhesion mixture on the basis of TPE. especially abrasion-resistant and highly flexible. adapted to suit the requirements in Energy Chains®. Colour: violet (similar to RAL4001)
	UL/CSA	Style 1589 and 21371. 30 V. 80 °C
	CEI	Following CEI 20-35
	CE	Following 2006/95/EG
	DESINA	According to VDW. DESINA standardisation
	Lead free	Following EU guideline (RoHS) 2002/95/EC.
	Clean room	According to ISO Class 2. Outer sheath material complies with CF5.10.07. tested by IPA according to standard 14644-1

Double Strokes*	5 million		7.5 million		10 million	
Temperature, from/to [°C]	CFBUS .001-.049	CFBUS .050-.070	CFBUS .001-.049	CFBUS .050-.070	CFBUS .001-.049	CFBUS .050-.070
	R min. (factor x d)	R min. (factor x d)	R min. (factor x d)	R min. (factor x d)	R min. (factor x d)	R min. (factor x d)
-35/-25	12.5	15	13.5	16	14.5	17
-25/+60	10	12.5	11	13.5	12	14.5
+60/+70	12.5	15	13.5	16	14.5	17

*Higher number of double strokes required? Service life calculator online ► www.igus.eu/chainflexlife

Typical application area

For maximum load requirements
Almost unlimited resistance to oil and bio-oil
Indoor and outdoor applications without direct sun radiation
Especially for freely suspended and gliding travel distances up to 400 m
Bus connection cable for storage and retrieval units for high-bay warehouses, machining units/machine tools, quick handling, clean room, semiconductor insertion, indoor cranes and low-temperature applications

























Delivery program Part No.	Number of cores and conductor nominal cross section [mm ²]	External diameter in mm approx.	Copper index [kg/km]	Weight [kg/km]	Characteristic wave impedance in Ω approx.	Colour Code
Profibus (minimum bending radius 10 x d)						
CFBUS.001	(2x0.25)C	9.0	23	70	150	Red, Green
CFBUS.002	(2x0.25)C+4 x 1.5	12.5	96	175	150	Red/Green, Black with white numbers
CFBUS.003	(2x0.25)C+3 x 0.75	11.5	58	121	150	Red/Green, Black/blue/green/yellow
Interbus (minimum bending radius 10 x d)						
CFBUS.010	(3x(2x0.25))C	8.5	42	83	100	White/Brown, Green/Yellow Grey/Pink
CFBUS.011	(3x2x0.25+3 x 1.0)C	10.5	74	135	100	Red, blue, green, yellow white/brown, green/ yellow, grey/pink
CAN-BUS/Fieldbus (minimum bending radius 10 x d)						
CFBUS.020	(4x0.25)C	6.5	33	66	120	White, Green, Brown, Yellow (star quad stranding)
CFBUS.021	(2x0.05)C	8.0	33	77	120	White, Brown
CFBUS.022	(4x0.5)C	8.5	45	83	120	White, Green, Brown, Yellow (star quad stranding)
DeviceNet (minimum bending radius 10 x d)						
CFBUS.030 Drop	(1x2xAWG24+1x2xAWG22)C	7.5	33	65	120	White/Blue (AWG24) Red/Black (AWG22)
CFBUS.031 Trunk	(1x2xAWG18+1x2xAWG15)C	11.5	96	110	120	White/Blue (AWG18) Red/Black (AWG15)
Ethernet/CAT5 (minimum bending radius 12.5 x d)						
CFBUS.040	(2x(2x0.25))C	7.0	33	43	100	White, Green, Brown, Yellow
CFBUS.041	(4x(2x0.25))C	10.0	46	101	100	White/Brown, Green/Yellow Grey/Pink, Blue/Red
CFBUS.044	(4x(2x0.15))C	8.0	35	79	100	White/Brown, Green/Yellow Grey/Pink, Blue/Red
Ethernet/CAT6 (minimum bending radius 12.5 x d)						
CFBUS.050	(4x(2x0.14)C)C	10.0	77	131	100	White/Blue, White/Orange, White/Green, White/Brown
FireWire (minimum bending radius 12.5 x d)						
CFBUS.055	2x(2x0.15)C+2x(0.34)C	7.5	42	81	100	Orange/Blue, Green/Red, Black, White
Profinet (minimum bending radius 12.5 x d) Style 10138-21235, 300V, 80°C						
CFBUS.060	(4x0.38)C	7.5	37	71	100	White, Yellow, Blue, Orange, Star-quad stranding
USB (minimum bending radius 12.5 x d) Style 1589/21371, 30V, 80°C						
CFBUS.065	((2xAWG28)+2xAWG20)C	5.0	26	45	90	Red/Black, White/Green
Other types available on request. Note: The mentioned external diameters are maximum values and may tend toward lower tolerance limits.						












Measuring system cable | PVC



Chainflex® CF211

- For medium duty applications
- PVC outer jacket
- Shielded
- Oil-resistant
- Flame retardant

	Bend radius	e-chain® linear
	flexible	flexible minimum 8 x d
	fixed	fixed minimum 5 x d
	Temperature Range	e-chain® linear +5 °C up to +70 °C flexible
	flexible	-5 °C up to +70 °C (following DIN EN 60811-504)
	fixed	-15 °C up to +70 °C (following DIN EN 50305)
	V Max. unsupported	5 m/s
	gliding	3 m/s
	A Max	30 m/s²
	Travel distance	Unsupported travels and up to 10 m for gliding applications, Class 2
	Conductor	Very finely stranded special conductors of particularly bending resistant design made of tinned copper wires.
	Core Insulation	Mechanically high-quality TPE mixture.
	Core Structure	According to measuring system specification.
	Core Identification	According to measuring system specification. ► Product range table
	Element shield	Extremely bending-resistant, tinned copper cover. Coverage approx. 90 % optical
	Element jacket	TPE mixture on pair shielding adapted to suit the requirements in e-chains®.
	Intermediate layer	Foil taping over the outer layer.
	Outer Jacket	Low-adhesion, halogen-free, highly abrasion-resistant mixture on the basis of PUR, adapted to suit the requirements in Energy Chains® (following DIN VDE 0282 Part 10). Colour: Steel blue (similar to RAL 5011)
	Overall shield	Extremely bending-resistant braiding made of tinned copper wires. Coverage approx. 55 % linear, approx. 80 % optical
	Outer jacket	Low-adhesion, oil-resistant PVC mixture, adapted to suit the requirements in e-chains® (following DIN EN 50363-4-1). Colour: Yellow-green (similar to RAL 6018), Silver-grey (similar to RAL 7001)
	Nominal voltage	50 V
	Testing voltage	500 V
	Torsion	±180°, with 1 m cable length
	UV-resistant	High

	Oil resistance	Oil-resistant (following DIN EN 50363-4-1), Class 2
	Flame-retardant	According to IEC 60332-1-2, CEI 20-35, FT1, VW-1
	Silicon-free	Free from silicone which can abect paint adhesion (following PV 3.10.7 – status 1992)
	UL/CSA	Style 1589 and 2502, 30 V, 80 °C
	NFFPA	Following NFPA 79-2012, chapter 12.9
	EAC	Certificate No. RU C-DE.ME77.B.01559 (TR ZU)
	CTP	Certificate No. C-DE.PB49.B.00416 (Fire protection)
	CEI	Following CEI 20-35
	Lead free	Following 2011/65/EC (RoHS-II)
	Clean Room	According to ISO Class 2. The outer jacket material of this series complies with CF5.10.07 - tested by IPA according to standard DIN EN ISO 14644-1
	CE	Following 2014/35/EUs

Cycles*	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]
+5/+15	12.5	13.5	14.5
+15/+60	10	11	12
+60/+70	12.5	13.5	14.5

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

- Typical application areas**
- For medium duty applications, Class 4
 - Unsupported travel distances and up to 10 m for gliding applications, Class 2
 - Light oil influence, Class 2
 - No torsion, Class 1
 - Preferably indoor applications, but also outdoor ones at temperatures > 5 °C
 - Storage and retrieval units for high-bay warehouses, machining units/package machines, Handling, indoor cranes, Wood/stone processing

For cable part numbers and sizes, please refer to page 223

Measuring system cable | PVC



Chainflex® CF211

- For medium duty applications
- PVC outer jacket
- Shielded
- Oil-resistant
- Flame retardant

	Bend radius	e-chain® linear
	flexible	flexible minimum 8 x d
	fixed	fixed minimum 5 x d
	Temperature Range	e-chain® linear +5 °C up to +70 °C flexible
	flexible	-5 °C up to +70 °C (following DIN EN 60811-504)
	fixed	-15 °C up to +70 °C (following DIN EN 50305)
	V Max. unsupported	5 m/s
	gliding	3 m/s
	A Max	30 m/s²
	Travel distance	Unsupported travels and up to 10 m for gliding applications, Class 2

Measuring system cable tested for 66 million strokes ...

Measuring system cables are the important communication link between the drive and the control system. Damage can occur if the electrical signals are not transmitted safely and in the correct time due to motion. Therefore measuring system cables have a special requirement for EMC protection. In the case of constant movement in e-chains®, the EMC shielding is subjected to very high mechanical loads. To ensure that this load does not lead to failures in the measuring system, a safe construction is very important, especially in the shielding and winding.

The special properties of the chainflex® measuring system cables are:

- Stranding elements specifically designed for the measuring system with the necessary element shields and optimised strand pitch lengths
 - Core colour code matched to the defined measuring system
 - Gusset-filled extruded inner jacket
 - Shield structures especially developed and tested by igus®
 - With pressure extruded outer jackets for securing the shield and core structure
- Every design has to be tested time and again under real-world conditions, in order to be able to calculate a binding guarantee, or the service life online.

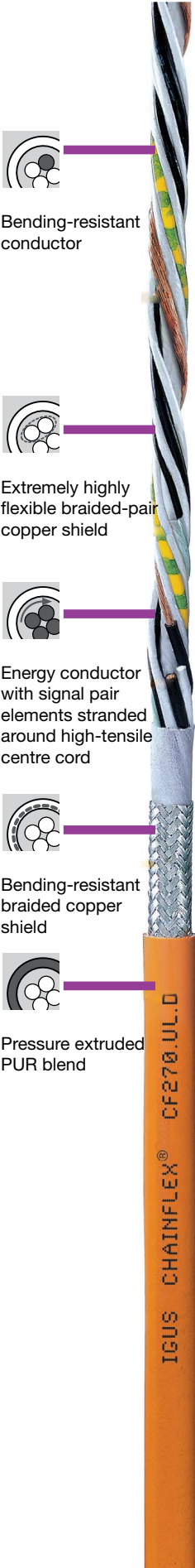
Calculate service life online: www.igus.eu/chainflexlife

Part No.	Number of cores and conductor nominal cross section [mm²]	Outer diameter (d) max. [mm]	Copper index [kg/km]	Weight [kg/km]	Core group	Colour code
CF211.001	(3x(2x0.14)C)+(4x0.14)+(2x0.5)C	9	59	99	3x(2x0.14)C	green/yellow, black/brown, red/orange
					(4x0.14)	grey/blue/white-yellow/white-black
					(2x0.5)	brown-red, brown-blue
CF211.002	(3x(2x0.14)C)+2x(0.5)C)C	9.5	62	105	3x(2x0.14)C	green/yellow, black/brown, red/orange
					2x(0.5)C	black, red
CF211.004	(2x(2x(2x0.14)))+(4x0.14)C+(4x0.5)C	10.0	70	118	2x(2x(2x0.14))	(brown/green)/(yellow/violet), (grey/pink)/(red/black)
					(4x0.14)C	yellow-black/red-black/green-black/blue-black
					(4x0.5)	brown-green/white-green/blue/white
CF211.006	(3x(2x0.14)C)+(4x0.14)+(4x 0.25)+(2x0.5)C	10.0	76	121	3x(2x0.14)C	green/yellow, black/brown, red/orange
					(4x0.14)	grey/blue/white-yellow/white-black
					(4x0.25)	brown-yellow/brown-grey/green-black/green-red
					(2x0.5)	brown-red, brown-blue
CF211.009	(4x(2x0.25))+2x0.5)C	8.0	48	78	4x(2x0.25)	brown/green, blue/violet, grey/pink, red/black
					2x0.5	white, brown
CF211.010	(4x(2x0.25))+2x1.0)C	8.5	60	92	4x(2x0.25)	brown/green, blue/violet, grey/pink, red/black
					2x1.0	white, brown
CF211.011	(4x(2x0.34))+4x0.5)C	9.0	68	103	4x(2x0.34)	black/brown, red/orange, green/yellow, blue/violet
					4x0.5	black-white, red-white, yellow-white, blue-white
CF211.014	(4x(2x0.25)C)+(2x0.5)C	10.0	74	120	4x(2x0.25)C	white/brown, green/yellow, grey/pink, blue/red
					(2x0.5)	black no. 1/black no. 2
CF211.015	(4x(2x0.14))+4x0.5)C	8.0	51	85	4x(2x0.14)	brown/green, yellow/violet, grey/pink, red/black
					4x0.5	blue, white, brown-green, white-green
CF211.016	(3x(2x0.25)C)C	9.0	49	86	3x(2x0.25)C	white/brown, green/yellow, grey/pink
CF211.017	(4x(2x0.14)+(4x0.14)C+4x1.0)C	10.0	94	141	4x(2x0.14)	red/black, brown/green, yellow/violet, grey/pink
					(4x0.14)C	blue-black/yellow-black/red-black/green-black
					4x1.0	white-green, brown-green, blue, white
CF211.018	(2x(2x0.25))+2x0.5)C	6.5	33	56	2x(2x0.25)	red/black, grey/pink
					2x0.5	white, brown
CF211.019	(3x(2x0.25)C)+(3x0.25)+2x1.0)C	10.0	80	125	3x(2x0.25)C	brown/green, grey/pink, red/black
					(3x0.25)	blue/violet/yellow
					2x1.0	white, brown
CF211.022	((2x0.25)+5x0.5)C	7.0	44	71	(2x0.25)	white/brown
					5x0.5	green, yellow, grey, pink, blue
CF211.024	((4x0.14)+2x(2x0.34))C	7.0	35	61	(4x0.14)	yellow/grey/violet/pink
					2x(2x0.34)	white-green/white, brown-green/blue
CF211.027	(5x(2x0.14))+2x0.5)C	8.0	43	75	5x(2x0.14)	brown/green, yellow/grey, white/violet, red/black, pink/blue
					2x0.5	white-green, white-red
CF211.028	(2x(2x0.15)+(2x0.38))C	7.5	35	77	2x(2x0.15)	green/yellow, pink/blue
					(2x0.38)	red/black
CF211.032	3x(2x0.14)C+(3x0.14)C	8.0	31	70	3x(2x0.14)C	green/black, yellow/black, red/black
					(3x0.14)C	grey/pink/black
CF211.033	4x(2x0.14)C+2x(1.0)C	9.5	58	110	4x(2x0.14)C	yellow/black, red/black, blue/black, green/black
					2x(1.0)C	white, brown
CF211.036	(5x(2x0.25))C	8.0	42	72	5x(2x0.25)	white/brown, green/yellow, grey/pink, blue/red, black/violet
CF211.037	(6x(2x0.25))C	8.5	49	83	6x(2x0.25)	white/brown, green/yellow, grey/pink, blue/ red, black/violet, grey-pink/red-blue
CF211.038	(3x(2x0.14)+(2x0.34))C	7.5	32	64	3x(2x0.14)	white/brown, green/yellow, grey/pink
					(2x0.34)	blue/red
CF211.039	(4x(2x0.14)C)+2x(0.5)C)C	10.0	71	121	(4x(2x0.14)C	green/yellow, grey/pink, blue/red, black/violet
					2x(0.5)C)C	white, brown

PUR Servo Cable. Shielded

Chainflex® CF270.UL.D

- For medium load requirements
 - PUR outer jacket
 - Shielded
 - Oil-resistant/coolant resistant
- PVC-free/halogen-free
 - Notch resistant
 - Flame retardant
 - Hydrolysis resistant



	Bend Radius. moving	-20 °C to +80 °C. minimum bending radius 10 x d
	Bend Radius. fixed	-40 °C to +80 °C. minimum bending radius 5 x d
	V max.	unsupported/gliding 10 m/s
	A max.	50 m/s ²
	UV-resistant	Medium
	Nominal voltage	600/1000 V (following DIN VDE 0250).
	Testing voltage	4000 V (following DIN VDE 0281-2).
	Oil	Oil-resistant (following DIN EN 60811-2-1. DIN EN 50363-10-2)
	Offshore	MUD-resistant following NEK 606
	Silicon-free	Free from silicon which can affect paint adhesion (in compliance with PV 3.10.7 – status 1992).
	Halogen-Free	Following EN 50267-2-1.
	Conductor	Fine-wire stranded conductor in especially bending-resistant version consisting of bare copper wires (following EN 60228).
	Core insulation	Mechanically high-quality, especially low-capacitance PE mixture.
	Core stranding	Energy conductor with signal pair elements stranded around high tensile center cord.
	Core identification	Energy conductor: cores black with white numerals, one core green/yellow. 1 control pair: cores black with white numerals. 2 control pairs: cores black with white numerals.
	Element shield	Bending-resistant, tinned braided copper shield.Coverage approx. 55% linear. approx. 80% optical.
	Intermediate sheath	Foil taping over the external layer.
	Overall shield	Bending-resistant, tinned braided copper shield. Coverage approx. 55% linear. approx. 80% optical.
	Outer jacket	Low-adhesion mixture on the basis of PUR. adapted to suit the requirements in Energy Chains® (following DIN VDE 0282 Part 10). Colour: orange (similar to RAL 2003)
	CE	Following 2006/95/EG
	DESINA	According to VDW. DESINA standardisation
	Lead free	Following EU guideline (RoHS) 2002/95/EC.

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)
-25/-15	12.5	13.5	14.5
-15/+70	10	11	12
+70/+80	12.5	13.5	14.5

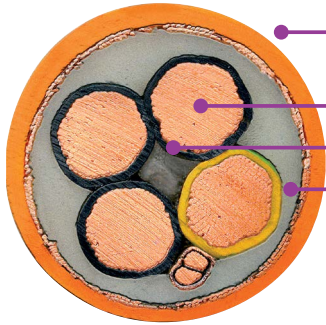
*Higher number of double strokes required? Service life calculator online ► www.igus.eu/chainflexlife

Typical application area

For medium load requirements
Almost unlimited resistance to oil
Indoor and outdoor applications without direct sun radiation
Especially for freely suspended travel distances
Machining units/machine tools and low temperature applications

Delivery program Part No.	Number of cores and conductor nominal cross section [mm2]	External diameter in mm approx.	Copper index [kg/km]	Weight [kg/km]
1 control pair shielded				
CF270.UL.15.15.02.01.D	(4 G 1.5+(2x1.5)C)C	11.0	12.0	149
CF270.UL.25.15.02.01.D	(4 G 2.5+(2x1.5)C)C	13.5	203	317
CF270.UL.40.15.02.01.D	(4 G 4.0+(2x1.5)C)C	15.0	272	408
CF270.UL.60.15.02.01.D	(4 G 6.0+(2x1.5)C)C	16.5	364	521
CF270.UL.100.15.02.01.D	(4 G 10.0+(2x1.5)C)C	20.5	582	841
CF270.UL.160.15.02.01.D	(4 G 16.0+(2x1.5)C)C	24.0	855	1225
2 control pair shielded				
CF270.UL.07.03.02.02.D	(4 G 0.75+2x(2x0.34)C)C	11.5	107	197
CF270.UL.10.07.02.02.D	(4 G 1.0+2x(2x0.75)C)C	13.0	143	251
CF270.UL.15.07.02.02.D	(4 G 1.5+2x(2x0.75)C)C	13.5	169	290
CF270.UL.25.15.02.02.D	(4 G 2.5+2x(2x1.5)C)C	15.5	260	408
CF270.UL.40.15.02.02.D	(4 G 4.0+2x(2x1.5)C)C	17.0	330	506
CF270.UL.60.15.02.02.D	(4 G 6.0+2x(2x1.5)C)C	18.5	425	633
CF270.UL.100.15.02.02.D	(4 G 10.0+2x(2x1.5)C)C	22.0	632	940
CF270.UL.160.15.02.02.D	(4 G 16.0+2x(2x1.5)C)C	26.0	901	1315
CF270.UL.250.15.02.02.D	(4 G 25.0+2x(2x1.5)C)C	28.0	1365	1847
CF270.UL.350.15.02.02.D	(4 G 35.0+2x(2x1.5)C)C	35.0	1804	2516
1 Control Triple				
CF270.UL.15.10.03.01.D	(4 G 1.5+(3x1.0)C)C	14.0	160	288
CF270.UL.25.10.03.01.D	(4 G 2.5+(3x1.0)C)C	14.0	203	327
1 Star Quad Shielded				
CF270.UL.60.05.04.D	(4 G 6.0+(4x0.5)C)C	16.5	350	512
Without signal pair				
CF270.UL.15.04.D	(4 G 1.5)C	9.0	82	147
CF270.UL.25.04.D	(4 G 2.5)C	11.0	141	224
CF270.UL.40.04.D	(4 G 4.0)C	12.5	211	309
CF270.UL.60.04.D	(4 G 6.0)C	14.5	306	434
CF270.UL.100.04.D	(4 G 10.0)C	18.0	496	698
CF270.UL.160.04.D	(4 G 16.0)c	21.5	782	1052
CF270.UL.250.04.D	(4 G 25.0)C	25.5	1197	1572
CF270.UL.350.04.D	(4 G 35.0)C	33.0	1695	2312

Note: The mentioned external diameters are maximum values and may tend toward lower tolerance limits.



Chainflex® servo cable. shielded

- Total shield with optimized braiding angle (covering approx. 70% linear. approx. 90% optical)
- Optimized single-wire diameter
- Center element for high tensile stresses
- Gusset-filled extruded inner jacket
- Stranding with optimized pitch length and pitch direction
- Pair braid shield over optimized stranded core pair
- Highly abrasion-resistant pressure extruded jacket

PVC Power Cable



Chainflex® CF30

- For high load requirement
- PVC outer jacket
- Oil-resistant
- Flame-retardant

	Bend Radius.moving	-5 °C to +70 °C. minimum bending radius 7.5 x d
	Bend Radius. fixed	-20 °C to +70 °C. minimum bending radius 4 x d
	V max.	Unsupported/gliding 10 m/s. 5 m/s
	a max.	80 m/s ²
	UV-resistant	Medium
	Nominal voltage	600/1000 V (following DIN VDE 0250).
	Testing voltage	4000 V (following DIN VDE 0281-2).
	Oil	Oil-resistant (following DIN EN 60811-2-1. DIN EN 50363-10-2)
	Flame Retardant	According to IEC 332-1. CEI 20-35. FT1.
	Silicon-free	Free from silicon which can affect paint adhesion (in compliance with PV 3.10.7 – status 1992).
	Halogen-Free	Following EN 50267-2-1.
	Conductor	< 10 mm ² : Fine-wire stranded conductor in especially bending resistant version consisting of bare copper wires (following EN 60228). > 10 mm ² : conductor cable consisting of pre-leads (following EN 60228).
	Core insulation	Mechanically high-quality. especially low-capacitance TPE mixture.
	Core stranding	Cores stranded in short pitch lengths over a centre for high tensile stresses.
	Core identification	Energy conductor: cores black with white numerals. one core green/yellow.1. core: U / L1 / C / L+ 2. core: V / L2 3. core W/ L3 / D / L-4. core: 4 / N
	Outer Jacket	Low-adhesion. oil-resistant mixture on the basis of PVC. adapted to suit the requirements in Energy Chains® (following DIN VDE 0282 Part 10). Colour: black (similar to RAL 9005)
	UL/CSA	Style 10492 and 2570. 1000 V. 80 °C
	CEI	Following CEI 20-35
	CE	Following 2006/95/EG
	DESINA	According to VDW. DESINA standardisation
	Lead free	Following EU guideline (RoHS) 2002/95/EC.

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)
+5/+15	10	11	12
+15/+60	7.5	8.5	9.5
+60/+70	10	11	12

*Higher number of double strokes required? Service life calculator online ► www.igus.eu/chainflexlife

Typical application area

For high load requirements
Light oil influence
Preferably indoor applications, but also outdoor ones at temperatures > 5 °c
Especially for freely suspended and gliding travel distances up to 100 m
Storage and retrieval units for high-bay warehouses, machining units/packages machines, quick handling and indoor cranes

Delivery program Part No.	Number of cores and conductor nominal cross section [mm²]	External diameter in mm approx.	Copper index [kg/km]	Weight [kg/km]
CF30.15.04	4 G 1.5	8.5	55	101
CF30.25.04	4 G 2.5	10.5	95	164
CF30.25.05*	5 G 2.5	11.5	119	196
CF30.40.04	4 G 4.0	12.0	152	237
CF30.40.05	5 G 4.0	13.0	191	286
CF30.60.04	4 G 6.0	14.0	235	344
CF30.60.05	5 G 6.0	15.0	293	417
CF30.100.04	4 G 10.0	17.5	391	555
CF30.100.05	5 G 10.0	19.5	489	698
CF30.160.04	4 G 16.0	20.5	610	834
CF30.160.05	5 G 16.0	23.5	763	1062
CF30.250.04	4 G 25.0	25.5	944	1345
CF30.350.04	4 G 35.0	28.5	1339	1731
CF30.500.04	4 G 50.0	34.0	1898	2596

Note: The mentioned external diameters are maximum values and may tend toward lower tolerance limits.

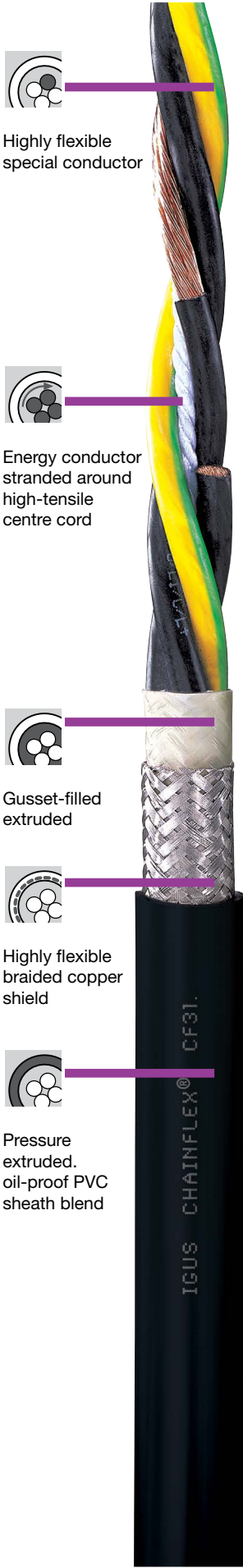
Other Types of Energy Chains: Systems E3 & E6 Extremely Low Noise

- Extremely Low Noise operation - 37dB (A)
- For high Speed and high accelerations
- Minimum vibrations
- Easy lengthening and shortening
- Various interior separations available

PVC Power Cable. Shielded

Chainflex® CF31

- For high load requirement
 - PVC outer jacket
 - Shielded
- Oil-resistant
 - Flame-retardant



	Bend Radius. moving	-5 °C to +70 °C. minimum bending radius 7.5 x d
	Bend Radius. fixed	-20 °C to +70 °C. minimum bending radius 4 x d
	V max.	Unsupported/gliding 10 m/s. 5 m/s
	a max.	80 m/s²
	UV-resistant	Medium
	Nominal voltage	600/1000 V (following DIN VDE 0250).
	Testing voltage	4000 V (following DIN VDE 0281-2).
	Oil	Oil-resistant (following DIN EN 60811-2-1. DIN EN 50363-10-2)
	Flame Retardant	According to IEC 332-1. CEI 20-35. FT1.
	Silicon-free	Free from silicon which can affect paint adhesion (in compliance with PV 3.10.7 – status 1992).
	Conductor	< 10 mm²: Fine-wire stranded conductor in especially bending resistant version consisting of bare copper wires (following EN 60228). ≥ 10 mm²: conductor cable consisting of pre-leads (following EN 60228).
	Core insulation	Mechanically high-quality, especially low-capacitance TPE mixture.
	Core stranding	Cores stranded in short pitch lengths over a centre for high tensile stresses.
	Core identification	Energy conductor: cores black with white numerals. one core green/yellow. 1. core: U / L1 / C / L+ 2. core: V / L2 3. core: W / L3 / D / L- 4. core: 4 / N
	Inner Jacket	PVC mixture adapted to suit the requirements in Energy Chains®.
	Overall shield	Extremely bending-resistant. tinned braided copper shield. Coverage approx. 70% linear. approx. 90% optical.
	Outer Jacket	Low-adhesion, oil-resistant mixture on the basis of PVC. adapted to suit the requirements in Energy Chains® (following DIN VDE 0282 Part 10). Colour: black (similar to RAL 9005)
	CEI	Following CEI 20-35
	UL/CSA	Style 10492 and 2570. 1000 V. 80 °C
	CEI	Following CEI 20-35
	CE	Following 2006/95/EG

	DESINA	According to VDW. DESINA standardisation
	Lead free	Following EU guideline (RoHS) 2002/95/EC.
	Clean room	According to ISO Class 2. Outer sheath material complies with CF5.10.07. tested by IPA according to standard 14644-1

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)
+5/-15	10	11	12
+15/+60	7.5	8.5	9.5
+60/+70	10	11	12

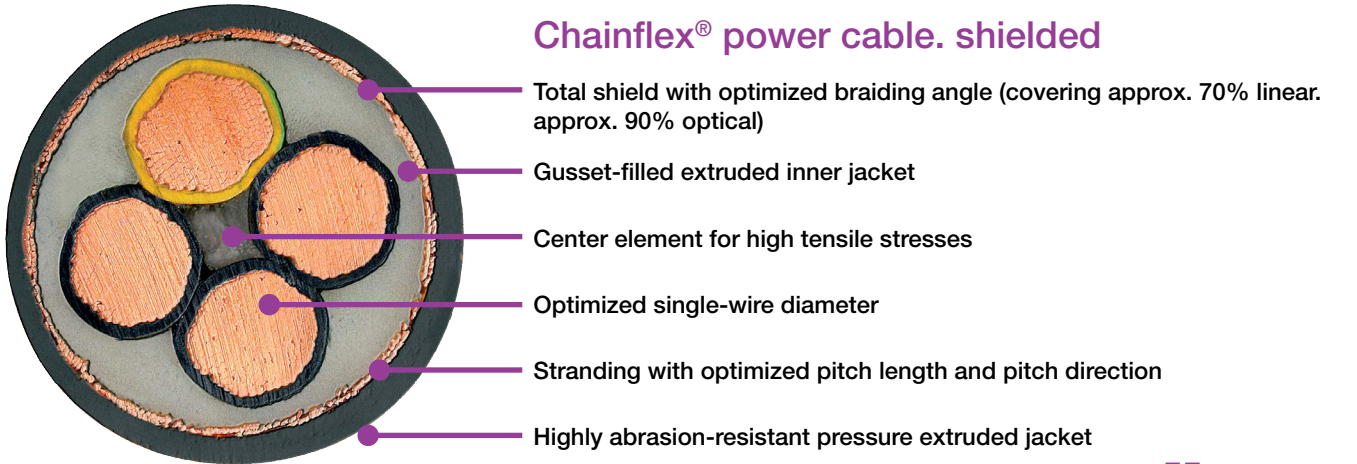
*Higher number of double strokes required? Service life calculator online ► www.igus.eu/chainflexlife

Typical application area

For high load requirements
Light oil influence
Preferably indoor applications, but also outdoor ones at temperatures > 5 °c
Especially for freely suspended and gliding travel distances up to 100 m
Storage and retrieval units for high-bay warehouses, machining units/packages machines, quick handling and indoor cranes

Delivery program Part No.	Number of cores and conductor nominal cross section [mm²]	External diameter in mm approx.	Copper index [kg/km]	Weight [kg/km]
CF31.15.04	(4 G 1.5)C	10.5	82	168
CF31.25.04	(4 G 2.5)C	12.5	128	236
CF31.25.05	(5 G 2.5)C	13.5	156	277
CF31.40.04	(4 G 4.0)C	14.0	192	320
CF31.40.05	(5 G 4.0)C	15.0	246	390
CF31.60.04	(4 G 6.0)C	16.0	297	470
CF31.60.05	(5 G 6.0)C	18.5	358	565
CF31.100.04	(4 G 10.0)C	20.5	484	754
CF31.100.05	(5 G 10.0)C	22.0	598	903
CF31.160.04	(4 G 16.0)C	23.0	737	1046
CF31.250.04	(4 G 25.0)C	28.5	1081	1605
CF31.350.04	(4 G 35.0)C	32.0	1493	2088
CF31.500.04	(4 G 50.0)C	37.5	2081	3011
CF31.700.04*	(4 G 70.0)C	47.0	2961	4650


Note: The mentioned external diameters are maximum values and may tend toward lower tolerance limits.




TPE Power Cable

Chainflex® CF37.D


- For high load requirement
- TPE outer jacket
- Oil-resistant
- Flame-retardant




Conductor




Core insulation




Core Stranding




Core identification




Outer jacket




CFRIP




Bend Radius. moving




Bend Radius. fixed




Temperature. moved




fixed




V max.




Unsupported/gliding




a max.




Travel Distance




Torsion




UV-resistant




Nominal voltage




Testing voltage



Oil



Silicone Free



Halogen Free

CE

DESINA

Lead free

Clean Room

<10mm²: Fine-wire stranded conductor in especially bending resistant version consisting of bare copper wires (following EN 60228). **≥ 10mm²:** Conductor cable consisting of pre leads (following EN 60228). Mechanically high-quality, especially low capacitance TPE mixture.

Cores stranded in short pitch lengths over a centre for high tensile stresses.

Energy Conductor: Core black with white numerals, one core green-yellow.

1. core: U / L1 / C / L+ 2. core: V / L2
3. core: W / L3 / D / L- 4. core: V / N

Low-adhesion, mixture on the basis of TPE, especially abrasion resistant and highly flexible, adapted to suit the requirements in Energy Chains® Colour: Jet black (similar to RAL 9005)

Strip Cables 50% faster! The tear strip is in the outer jacket

Minimum 7.5 x d
Minimum 4 x d

-35°C to + 90°C
-40°C to + 90°C

10 m/s. 6 m/s

80 m/s²

Freely suspended and gliding travel distances up to 400 m and more. Class 4

± 90°, with 1 m cable length

High

600/1000 V (following DIN VDE 0250).

4000 V (following DIN VDE 0281-2).

Oil-resistant (following DIN EN 60811-2-1). bio-oil resistant (following VDMA 24568 with Plantocut 8 S-MB tested by DEA Class 4.

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

Following EN 50267-2-1.

Following 2006/95/EG

According to VDW. DESINA standardisation

Following EU guideline (RoHS) 2002/95/EC.

According to ISO Class 1. Outer jacket material complies with CF9.

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	10	11	12
-25/+80	7.5	8.5	9.5
+80/+90	10	11	12

*Higher number of double strokes required? Service life calculator online ► www.igus.eu/chainflexlife

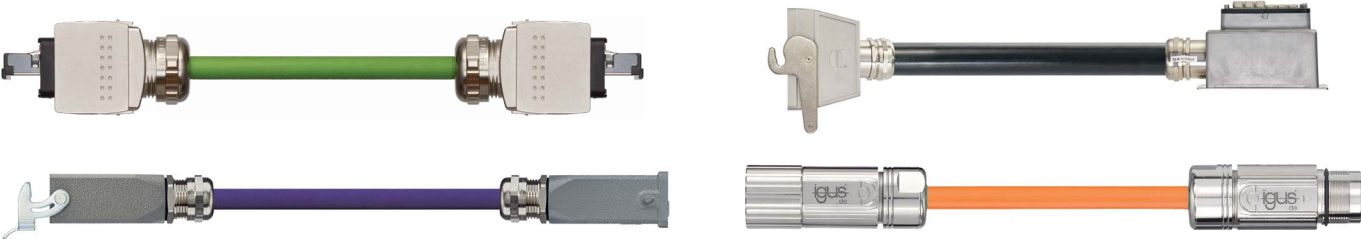
Typical application area

For high load requirements
Almost unlimited resistance to oil and bio-oil
Indoor applications outdoor applications, UV resistant
Especially for freely suspended and gliding travel distances up to 400 m and more
Storage and retrieval units for high-bay warehouses. Machining units/machine tools, quick handling, clean room, semiconductor insertion, ship to shore, outdoor cranes and low temperature applications.

Delivery program Part No.	Number of cores and conductor nominal cross section [mm²]	External diameter in mm approx.	Copper index [kg/km]	Weight [kg/km]
CF37.15.04.D	4 G 1.5	8.5	58	109
CF37.25.04.D	4 G 2.5	10.5	96	162
CF37.40.04.D	4 G 4.0	12.0	158	239
CF37.60.04.D	4 G 6.0	14.0	239	351
CF37.60.05.D	5 G 6.0	15.5	285	420
CF37.100.04.D	4 G 10.0	17.0	411	549
CF37.100.05.D	5 G 10.0	19.5	517	687
CF37.160.04.D	4 G 16.0	20.5	633	817
CF37.160.05.D	5 G 16.0	23.0	800	1072
CF37.250.04.D	4 G 25.0	25.0	994	1266
CF37.60.04.0.PE.D(1)	4 x 6.0	14.0	239	351
CF37.100.04.0.PE.D(1)	4 x 10.0	17.0	411	549
CF37.160.04.0.PE.D(1)	4 x 16.0	20.5	633	817
CF37.500.03.0.PE.D	3 x 50.0	31.0	1490	2028

Note: The mentioned external diameters are maximum values and may tend toward lower tolerance limits.

Treotham can offer a complete range of fully harnessed cables



Please contact your nearest Treotham office or go to www.treotham.com.au

TPE Power Cable. Shielded

Chainflex® CF38

- For maximum load requirement
- TPE outer jacket
- Shielded

- Oil-resistant bio-oil resistant
- PVC-free/halogen-free
- UV resistant
- Hydrolisis & microbe resistant

Conductor

Core insulation

Core Stranding

Core identification

Inner jacket

Overall shield

Outer jacket

CFRIP

Bend Radius. moving

Bend Radius. fixed

Temperature. moved
fixed

V max.

Unsupported/gliding

a max.

Travel Distance

UV-resistant

Nominal voltage

Testing voltage

Oil

Silicone Free

Halogen Free

CE

Lead free

Clean room

<10mm²: Fine-wire stranded conductor in especially bending resistant version consisting of bare copper wires (following EN 60228). ≥ 10mm²: Conductor cable consisting of pre-leads (following EN 60228). Mechanically high-quality, especially low capacitance TPE mixture.

Cores stranded in short pitch lengths over a centre for high tensile stresses.

Energy Conductor: Core black with white numerals, one core green-yellow.
1. core: U / L1 / C / L+ 2. core: V / L2
3. core: W / L3 / D / L- 4. core: V / N
TPE mixture adapted to suit the requirements in energy chains®

Extremely bending resistant braiding made of tinned copper wires. Coverage approximately 70% linear, approx 90% optical.

Low-adhesion, mixture on the basis of TPE, especially abrasion resistant and highly flexible, adapted to suit the requirements in Energy Chains® Colour: Jet black (similar to RAL 9005)
Strip Cables 50% faster! The tear strip is in the inner jacket

Minimum 7.5 x d
Minimum 4 x d

-35°C to +90°C
-40°C to +90°C

10 m/s. 6 m/s

80 m/s2

Freely suspended and gliding travel distances up to 400 m and more.Class 4

High

600/1000 V (following DIN VDE 0250).

4000 V (following DIN VDE 0281-2).

Oil-resistant (following DIN EN 60811-2-1). bio-oil resistant (following VDMA 24568 with Plantocut 8 S-MB tested by DEA) Class 4.

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

Following EN 50267-2-1.

Following 2006/95/EG

Following EU guideline (RoHS) 2002/95/EC.

According to ISO Class 2. Outer sheath material complies with CF5.10.07. tested by IPA according to standard 14644-1

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	10	11	12
-25/+80	7.5	8.5	9.5
+80/+90	10	11	12

*Higher number of double strokes required? Service life calculator online ► www.igus.eu/chainflexlife

Typical application area

For maximum load requirements

Almost unlimited resistance to oil and bio-oils

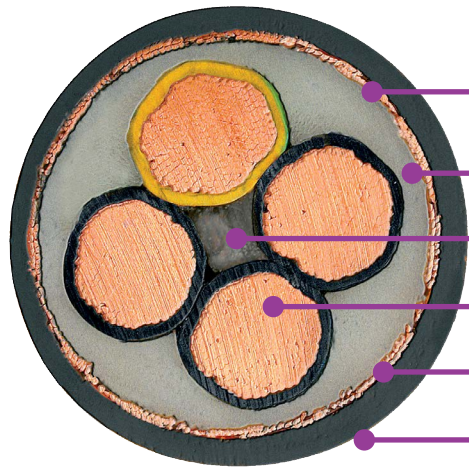
Indoor and outdoor applications. UV resistant

Especially for freely suspended and gliding travel distances up to 400 m and more

Storage and retrieval units for high-bay warehouses, machining units/machine tools, quick handling, clean room, semiconductor insertion, ship to shore outdoor cranes and low temperature applications.

Delivery program Part No.	Number of cores and conductor nominal cross section [mm²]	External diameter in mm approx.	Copper index [kg/km]	Weight [kg/km]
CF38.05.04 ⁽¹⁾	(4 G 0.5)C	8.0	39	81
CF38.25.04 ⁽¹⁾	(4 G 0.75)C	8.5	52	104
CF38.15.04	(4 G 1.5)C	9.5	85	149
CF38.25.04 ⁽¹⁾	(4 G 2.5)C	11.5	128	207
CF38.40.04	(4 G 4.0)C	13.5	201	326
CF38.60.04 ⁽¹⁾	(4 G 6.0)C	16.0	298	450
CF38.100.04	(4 G 10.0)C	19.5	454	682
CF38.160.04	(4 G 16.0)C	23.0	723	1003
CF38.250.04	(4 G 25.0)C	27.5	1160	1524
CF38.60.03.0.PE ⁽¹⁾	(3 x 6.0)C	14.5	231	367
CF38.100.03.0.PE ⁽¹⁾	(3x 10.0)C	17.5	356	568
CF38.160.03.0.PE ⁽¹⁾	(3 x 16.0)C	21.0	553	789
CF38.250.03.0.PE ⁽¹⁾	(3 x 25.0)C	24.5	884	1208
CF38.350.03.0.PE ⁽¹⁾	(3 x 35.0)C	28.5	1200	1675
CF38.500.03.0.PE ⁽¹⁾	(3 x 50.0)C	33.5	1660	2283

Note: The mentioned external diameters are maximum values and may tend toward lower tolerance limits.



Chainflex® power cable. shielded




















- Total shield with optimized braiding angle (covering approx. 70% linear. approx. 90% optical)
- Gusset-filled extruded inner jacket
- Center element for high tensile stresses
- Optimized single-wire diameter
- Stranding with optimized pitch length and pitch direction
- Highly abrasion-resistant pressure extruded jacket

TPE Power Cable/TPE Shielded Power Cable

Chainflex®
CF300.UL.D/CF 310.UL.D

- For maximum load requirement
- TPE outer jacket
- Oil-resistant
- Bio-oil-resistant
- Flame-retardant
- UV-resistant

Highly flexible
special conductor

	Bend Radius. moving	-35 °C to +70 °C. minimum bending radius 7.5 x d
	Bend Radius. fixed	-40 °C to +100 °C. minimum bending radius 4 x d
	V max.	Unsupported/gliding 10 m/s. 6 m/s
	a max.	100 m/s²
	UV-resistant	High
	Nominal voltage	600/1000 V (following DIN VDE 0250).
	Testing voltage	4000 V (following DIN VDE 0281-2).
	Oil	Oil-resistant (following EN 60811-2-1) bio-oil-resistant (following VDMA 24568).
	Flame Retardant	According to IEC 332-1. CEI 20-35. FT1.
	Silicon-free	Free from silicon which can affect paint adhesion (in compliance with PV 3.10.7 – status 1992).
	Conductor	Conductor cable consisting of pre-leads (following EN 60228).
	Core insulation	Mechanically high-quality TPE mixture.
	Outer Jacket	Low-adhesion mixture on the basis of TPE, especially abrasion-resistant and highly flexible, adapted to suit the requirements in Energy Chains®. Colour: black (similar to RAL 9005)
	DESINA	According to VDW. DESINA standardisation
	CE	Following 2006/95/EG
	UL/CSA	Style 10492 and 21218. 1000 V. 80 °C
	CEI	Following CEI 20-35
	Lead free	Following EU guideline (RoHS) 2002/95/EC.
	Clean room	According to ISO Class 1. Outer sheath material complies with CF34.25.04. tested by IPA according to standard 14644-1

Pressure
extruded
TPE blend

Highly flexible
braided copper
shield

Pressure
extruded,
halogen-free
TPE blend

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	10	11	12
-25/+80	7.5	8.5	9.5
+80/+90	10	11	12

*Higher number of double strokes required? Service life calculator online ► www.igus.eu/chainflexlife

Typical application area

For maximum load requirements
Almost unlimited resistance to oil and bio-oils
Indoor and outdoor applications, UV-resistant
Especially for freely suspended and gliding travel distances up to 400 m and more
Storage and retrieval units for high-bay warehouses, machining units/machine tools, quick handling, clean room, semiconductor insertion, ship to shore, outdoor cranes and low-temperature applications

CF300 TPE Power Cable

Delivery program Part No.	Number of cores and conductor nominal cross section [mm²]	External diameter in mm approx.	Copper index [kg/km]	Weight [kg/km]
CF300.UL.40.01.D	1x4.0	6.5	38	61
CF300.UL.60.01.D	1x6.0	7.0	56	77
CF300.UL.100.01.D	1x10.0	8.0	96	119
CF300.UL.160.01.D	1x16.0	9.5	151	183
CF300.UL.250.01.D	1x25.0	11.5	239	281
CF300.UL.350.01.D	1x35.0	12.5	333	377
CF300.UL.500.01.D	1x50.0	14.5	479	525
CF300.UL.700.01.D	1x70.0	16.0	623	676
CF300.UL.950.01.D	1x95.0	19.0	848	927
CF300.UL.1200.01.D	1x120.0	21.5	1059	1145
CF300.UL.1500.01.D	1x150.0	23.0	1318	1411
CF300.UL.1850.01.D	1x185.0	27.0	1890	2014

Note: The mentioned external diameters are maximum values and may tend toward lower tolerance limits.

CF310 TPE Shielded Power Cable



















Delivery program Part No.	Number of cores and conductor nominal cross section [mm²]	External diameter in mm approx.	Copper index [kg/km]	Weight [kg/km]
CF310.UL.25.01	(1x2.5)C	6.5	39	61
CF310.UL.40.01	(1x4.0)C	7.0	60	80
CF310.UL.60.01	(1x6.0)C	7.5	83	105
CF310.UL.100.01	(1x10.0)C	8.5	129	155
CF310.UL.160.01	(1x16.0)C	10.0	196	227
CF310.UL.250.01	(1x25.0)C	11.5	299	337
CF310.UL.350.01	(1x35.0)C	13.5	422	459
CF310.UL.500.01	(1x50.0)C	15.0	578	620
CF310.UL.700.01	(1x70.0)C	17.5	840	893
CF310.UL.950.01	(1x95.0)C	20.5	1095	1172
CF310.UL.1200.01	(1x120.0)C	22.0	1364	1439
CF310.UL.1500.01	(1x150.0)C	24.0	1595	1678
CF310.UL.1850.01	(1x185.0)C	28.0	2228	2313

Note: The mentioned external diameters are maximum values and may tend toward lower tolerance limits.

Igupren Power Cable

CF Crane

- For maximum voltages and outputs
- Igupren outer jacket
- Oil-resistant
- Flame-retardent
- UV-resistant

	Conductor	Highly flexible cable consisting of tinned copper wires (following VDE 0295).
	Core insulation	Inner and outer semiconducting layer made of conductive rubber. Insulating sheath made of high-quality, heat-resistant and ozone-proof ethylene propylene rubber(EPR).
	Overall shield	Extremely bending-resistant, tinned copper shield.
	Outer jacket	Low-adhesion, mixture on the basis of iguprene, especially abrasion resistant and highly flexible adapted to suit the requirements in Energy Chains® (following VDE 0207 Part 21). Colour: Red
	Bend Radius. moving	Minimum 10 x d
	Bend Radius. fixed	Minimum 7.5 x d
	Temperature. moved	-20°C to + 80°C
	fixed	-30°C to + 80°C
	V max.	10 m/s. 6 m/s
	Unsupported/gliding	
	a max.	50 m/s2
	Travel Distance	Freely suspended and gliding travel distances up to 500 m and more. Class 4
	UV-resistant	High
	Nominal voltage	6/10kV (following DIN VDE 0250). Other voltages upon enquiry.
	Testing voltage	17 kV/1500 V (following DIN VDE 0250 Part 813).
	Oil	Oil-resistant (following DIN EN 60811-2-1). 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).
	CE	Following 2006/95/EG
	Lead free	Following 2011/65/EC (RoHS-II).

Double Strokes*	5 million	7.5 million	10 million
Temperature, from/to [°C]	<10 m	<10 m	<10 m
	R min. (factor x d)	R min. (factor x d)	R min. (factor x d)
-20/-10	12.5	8.5	9.5
-10/+70	10	11	12
+70/+80	12.5	13.5	14.5

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

Typical application area

For maximum load requirements
Almost unlimited resistance to oil influence
Indoor and outdoor applications, UV resistant
Especially for freely suspended and gliding travel distances up to 500 m and more
Outdoor ship to shore, crane applications and conveyor technology

Delivery program Part No.	Number of cores and conductor nominal cross section [mm²]	External diameter in mm approx.	Copper index [kg/km]	Weight [kg/km]
CFCRANE.1x25/16-6/10kV.04	(1x25/16)C	27.0	468	940
CFCRANE.1x35/16-6/10kV.04	(1x35/16)C	29.0	576	1110
CFCRANE.1x50/16-6/10kV.04	(1x50/16)C	30.0	712	1350
CFCRANE.1x70/16-6/10kV.04	(1x70/16)C	32.0	912	1550
CFCRANE.1x95/16-6/10kV.04	(1x95/16)C	34.0	1145	1820
CFCRANE.1x120/16-6/10kV.04	(1x120/16)C	35.0	1306	2100

Note: The mentioned external diameters are maximum values and may tend toward lower tolerance limits.



Chainflex® cables for robots

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.

3 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 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

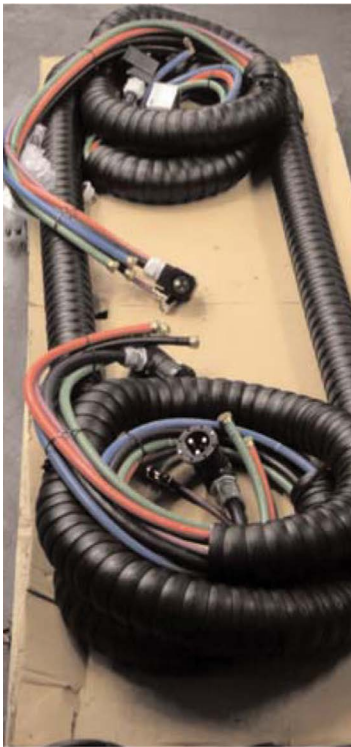
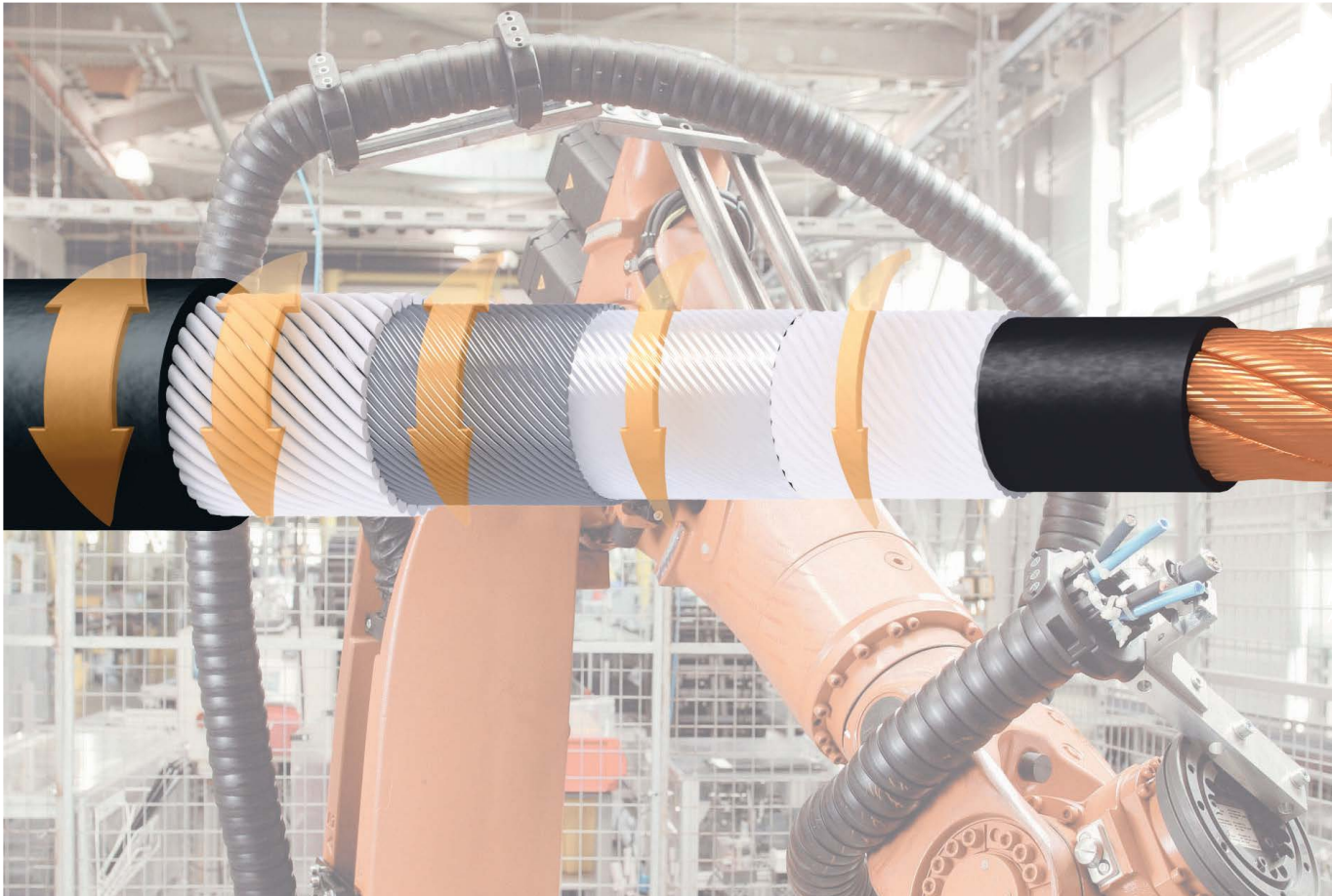
on a test bench with a chain length of approx. 2500 mm with 270° torsion with an extreme load through centrifugal forces and heavy blows such as those that can occur with an industrial robot.

All the non-shielded, gusset-filled extruded standard Chainflex® control cables of the series CF5, CF77.UL.D and CF 9 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:

- Hybrid/control cables
- Motor/servo cables
- Bus/data cables
- FOC cables

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



Control cable | PUR |

Chainflex® CFROBOT 2

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

	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 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
	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 50363-10-2). Colour: Steel-blue (similar to RAL 5011)
	Nominal voltage	300/500 V (following DIN VDE 0298-3)
	Testing voltage	2000 V (following DIN EN 50395)
	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 10493 and 20317, 300 V, 80 °C
	NFPA	Following NFPA 79-2012, chapter 12.9

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

Guaranteed service life (details see page 200-201)

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

* 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	(4G0.75)C	8.5	42	81
CFROBOT2.07.05.C	(5G0.75)C	8.5	51	91
CFROBOT2.07.07.C	(7G0.75)C	10.0	71	126
CFROBOT2.07.12.C	(12G0.75)C	14.0	122	208
CFROBOT2.07.18.C	(18G0.75)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

Double Strokes*	5 million		7.5 million		10 million	
Temperature, from/to [°C]	<10 m	≤10 m	<10 m	≤10 m	<10 m	≤10 m
	R min. (factor x d)	R min. (factor x d)	R min. (factor x d)	R min. (factor x d)	R min. (factor x d)	R min. (factor x d)
+5/+15	7.5	10	8.5	11	9.5	12
15/+60	6.8	7.5	7.8	8.5	8.8	9.5
+60/+70	7.5	10	8.5	11	9.5	12

Higher number of double strokes? Service life calculation online

Data cable | PUR |



Chainflex® CFROBOT 3

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

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

	NFPA	Following NFPA 79-2012, chapter 12.9
	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
	Lead-free	Following 2011/65/EC (RoHS-II)
	Clean room	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

Guaranteed service life (details see page 200-201)

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

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

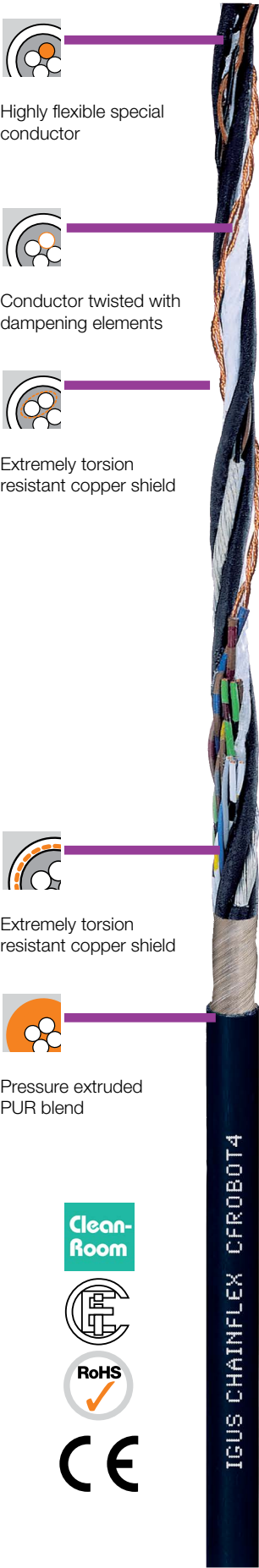
Typical application areas

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]
CFROBOT3.02.03.02	(3x(2x0.25))C	9.0	32	83
CFROBOT3.02.04.02	(4x(2x0.25))C	10.5	38	100
CFROBOT3.02.06.02	(6x(2x0.25))C	11.5	52	136
CFROBOT3.02.08.02	(8x(2x0.25))C	14.0	66	153
CFROBOT3.05.05.02	(5x(2x0.5))C	12.5	75	159

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

PUR Measuring System Cable, Twistable



Chainflex® CF ROBOT 4

- For twistable loads
- PUR outer jacket
- Shielded
- Oil-resistant and coolant-resistant
- Notch-resistant
- Flame-retardant
- Hydrolysis-resistant and microbe-resistant

	Temperature Range moved	-25°C to +80°C, minimum bending radius twisted 10 x d
	Temperature Range fixed	-40°C to +80°C, minimum bending radius 4 x d
	V Max. twisted	10 m/s
	A Max	10 m/s²
	Travel distance	Robots and movements in the 3D range, Class 1
	Torsion	±180°, with 1 m cable length
	UV-resistant	High
	Nominal voltage	30 V
	Testing voltage	500 V
	Oil-resistant (following DIN EN 60811-2-1, DIN EN 50363 -10-2), Class 3.	
	Flame-retardant	According to IEC 60332-1-2, CEI 20-34, FT1, VW-1.
	Silicon-free	Free from silicon which can affect paint adhesion (following PV 3.10.7 – status 1992).
	Conductor	Extremely bend-resistant cable
	Core insulation	Mechanically high-quality TPE mixture.
	Element shield	Extremely torsion resistant tinned braided copper shield. Coverage approx. 85% optical.
	Outer jacket	Low-adhesion, halogen-free, highly abrasion resistant mixture on the basis of PUR, adapted to suit the requirements in Energy Chains® (following DIN VDE 0282 Part 10). Colour: Steel blue (similar to RAL 5011)

	CEI	Following CEI 20-35
	CE	Following 2006/95/EG
	Lead free	Following EC (RoHS) 2002/95/EC
	Clean Room	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 service life (details see page 200-201)

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

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

Typical application area

For maximum load requirements with torsion movements
Almost unlimited resistance to oil
Indoor and outdoor applications, UV-resistant
Especially for robots and movements in the 3d range
Robots, handling and spindle drives

Class 6.1.3

Delivery program Part No.	Number of cores and conductor nominal cross section [mm²]	External diameter in mm approx.	Copper index [kg/km]	Weight [kg/km]
CFROBOT4.001	(3x(2x0,14)C+(4x0,14) + (2x0,5))C	11,0	65	166
CFROBOT4.002(1)	(3x(2x0,14)C + 2x(0,5)C)C	10,5	67	128
CFROBOT4.009(1)	(4x(2x0,25) + (2x0,5))C	9,0	53	102
CFROBOT4.015(1)	(4x(2x0,14) + 4x0,5)C	9,0	54	106
CFROBOT4.028(1)	(2x(2x0,15) + (2x0,38))C	7,5	42	72

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

Delivery program Part No.	Number of cores and conductor nominal cross section [mm²]	Core Group	Colour Code
CFROBOT4.001	(3x(2x0,14)C + (4x0,14) + (2x0,5))C	3x(2x0,14)C4x0,142x0,5	yellow/green, black/brown, red/orange gray, blue, white-yellow, white-black brown-red, brown-blue
CFROBOT4.002	(3x(2x0,14)C + 2x(0,5)C)C	3x(2x0,14)C2x(0,5)C	green/yellow, black/brown, red/orange black, red
CFROBOT4.009	(4x(2x0,25) + (2x0,5))C	4x(2x0,25)2x0,5	brown/green, blue/violet, gray/pink, red/black, white, brown
CFROBOT4.015	(4x(2x0,14) + 4x0,5)C	4x(2x0,14)4x0,5	brown/green, violet/yellow, gray/pink, red/black, blue, white, brown-green, white-green
CFROBOT4.028	(2x(2x0,15) + (2x0,38))C	2x(2x0,15)(2x0,38)	green/yellow, pink/blue, red, black

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

TPE-Fibre optic cable, twistable



Chainflex® CFROBOT 5

- For twistable loads
- TPE outer jacket
- Oil-resistant
- Bio-oil-resistant
- UV-resistant
- Low-temperature-flexible
- Hydrolysis-resistant and microbe-resistant

	Temperature Range moved	-20°C to +60°C, minimum bending radius twisted 12,5 x d
	Temperature Range fixed	-25°C to +60°C, minimum bending radius 7,5 x d
	V Max. twisted	10 m/s
	A Max	10 m/s ²
	Travel distance	Robots and movements in the 3D range, Class 1
	Torsion	±180°, with 1 m cable length
	UV-resistant	High
	Oil-resistant	(following DIN EN 60811-2-1), bio-oil-resistant (following VDMA 24568 with Plantocut 8 S-MB), Class 4.
	Silicon-free	Free from silicon which can affect paint adhesion (following PV 3.10.7 – status 192).
	Fibre Optic Cable	50/125 µm, 62.5/125 µm special fixed wire elements with aramide strain relief.
	Core Stranding	FOC wires stranded with high-tensile aramide dampers around the GRP central element.
	Outer Jacket	Low-adhesion mixture on the basis of TPE, especially abrasion-resistant and highly flexible, adapted to suit the requirements in Energy Chains®. Colour: Steel blue (similar to RAL 5011)
	CE	Following 2006/95/EG
	Lead Free	Following EC (RoHS) 2002/95/EC.
	Clean Room	According to ISO Class 1. Outer jacket material complies with CF9.15.07, tested by IPA according to standard 14644-1

Guaranteed service life (details see page 200-201)

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

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

Typical application area

For maximum load requirements with torsion movements
Almost unlimited resistance to oil and bio-oils
Indoor and outdoor applications, UV-resistant
Especially for robots and movements in the 3d range
Robots and handling

Class 7.1.4

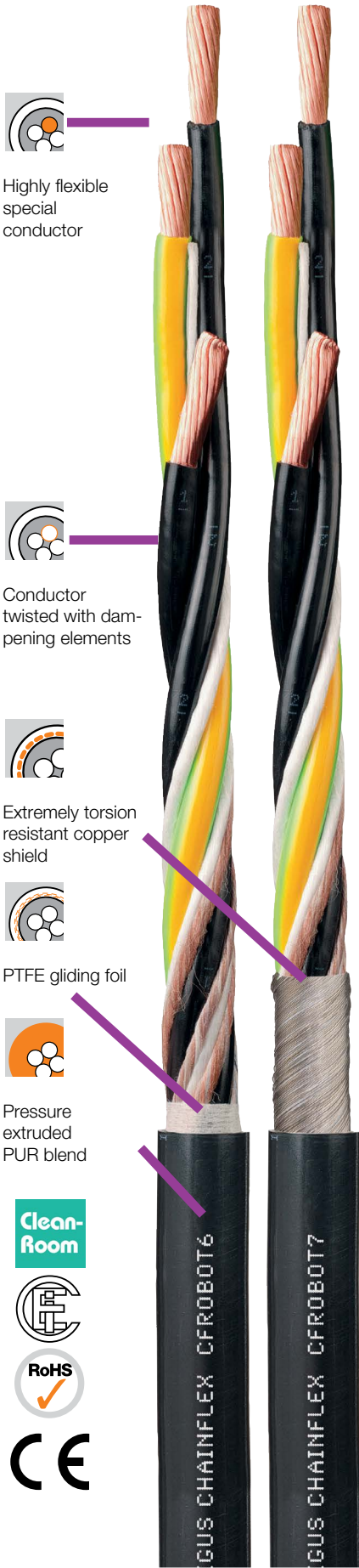
Delivery program Part No.	Number of fibres	Fibre diameter approx. [µm]	External Diameter Approx [mm]	Weight [kg/km]
CFROBOT5.500	2	62.5/125	8.5	87
CFROBOT5.501	2	50/125	8.5	87

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

Delivery program Part No.	Bandwidth with 850nm [MHz x km]	Attenuation with 850 nm [dB/km]	Bandwidth with 1300 nm [MHz x km]	Attenuation with 1300 nm [dB/km]	Colour Code
CFROBOT5.500	160 - 200	3.2	200 - 500	0.9	blue with white numbers
CFROBOT5.501	200 - 600	2.5 - 3.5	600 - 1200	0.7 - 1.5	blue with white numbers



PUR Motor cable, twistable



Chainflex® CFROBOT 6/7

- For twistable loads
- PUR outer jacket
- Unshielded/shielded
- Oil-resistant and coolant-resistant
- Notch-resistant
- Flame-retardant
- Hydrolysis-resistant and microbe-resistant

	Temperature Range moved	-25 °C to +80 °C, minimum bending radius twisted 10 x d
	Temperature Range fixed	-40 °C to +80 °C, minimum bending radius 4 x d
	V Max. twisted	10 m/s
	A Max	10 m/s²
	Travel distance	Robots and movements in the 3D range, Class 1
	Torsion	±180°, with 1 m cable length
	UV-resistant	High
	Nominal voltage	600/1000 V (following DIN VDE 0250).
	Testing voltage	4000 V (following DIN VDE 0281-2).
	Oil	Oil-resistant (following DIN EN 60811-2-1, DIN EN 50363 -10-2), Class 3.
	Flame-retardant	According to IEC 60332-1-2, CEI 20-34, FT1, VW-1
	Silicon-free	Free from silicon which can affect paint adhesion (following PV 3.10.7 – status 192).
	Conductor	50/125 µm, 62.5/125 µm special fixed wire elements with aramide strain relief.
	Core Insulation	Mechanically high-quality TPE mixture.
	Core identification	Energy conductor: cores black with white numerals, one core green/yellow 2 control pairs: cores black 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 mixture on the basis of TPE, especially abrasion-resistant and highly flexible, adapted to suit the requirements in Energy Chains®. Colour: Steel blue (similar to RAL 5011)

	CEI	Following CEI 20-35
	CE	Following 2006/95/EG
	Lead free	Following EC (RoHS) 2002/95/EC
	Clean Room	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 service life (details see page 200-201)

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

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

Typical application area
For maximum load requirements with torsion movements
Almost unlimited resistance to oil
Indoor and outdoor applications, UV-resistant
Especially for robots and movements in the 3d range
Robots, handling and spindle drives

Class 6.1.3

Delivery program Part No.	Number of cores and conductor nominal cross section [mm²]	External diameter in mm approx.	Copper index [kg/km]	Weight [kg/km]
CF ROBOT6 Unshielded				
CFROBOT6.100.03 ⁽¹²⁾	3 G 10	16.5	287	404
CFROBOT6.160.03 ⁽¹²⁾	3 G 16	19.0	459	601
CFROBOT6.250.03 ⁽¹²⁾	3 G 25	23.5	722	926
CFROBOT6.350.03 ⁽¹²⁾	3 G 25	26.0	1020	1233
CF ROBOT7 Shielded				
CFROBOT7.15.03 ⁽¹²⁾	(3 G 1.5)C	8.0	58	95
CFROBOT7.25.03 ⁽¹²⁾	(3 G 2.5)C	9.5	89	137
CFROBOT7.15.04 ⁽¹²⁾	(4 G 1.5)C	8.5	74	121
CFROBOT7.25.04 ⁽¹²⁾	(4 G 2.5)C	10.5	115	171
2 control pairs shielded				
CFROBOT7.15.15.02.02.C ⁽¹⁴⁾	(4 G 1,5 + 2x(2x1,5)C)C	16.5	190	380
CFROBOT7.25.15.02.02.C ⁽¹⁴⁾	(4 G 2,5 + 2x(2x1,5)C)C	18.5	230	450
4 control pairs shielded				
CFROBOT7.40.02.02.04.C ⁽¹⁴⁾	(4 G 4 + 4x(2x0,25)C)C	16.5	240	340

(1) Delivery time upon inquiry
(12) Core identification energy conductor: 1. Core: 1 2. Core: 2
(13) Core identification energy conductor: 1. Core: 1 2. Core: 2 3. Core: 3
(14) Core identification energy conductor: 1. Core: U / L1 / C / L+ 2. Core: V / L2 3. Core: W / L3 / D / L-
Note: The mentioned external diameters are maximum values and may tend toward lower tolerance limits.
G = with green-yellow earth core x = without earth core

PUR Bus cable, twistable

Chainflex® CFROBOT 8



- for twistable loads
 - PUR outer jacket
 - shielded
 - oil-resistant
 - notch-resistant
 - flame-retardant
 - hydrolysis-resistant and microbe-resistant
- | | | |
|--|-------------------------|---|
| | Temperature Range moved | -20 °C to +70 °C, minimum bending radius twisted 10 x d |
| | Temperature Range fixed | -25 °C to +70 °C, minimum bending radius 7,5 x d |
| | V Max. twisted | 10 m/s |
| | A Max | 10 m/s² |
| | Travel distance | Robots and movements in the 3D range, Class 1 |
| | Torsion | ±180°, with 1 m cable length |
| | UV-resistant | High |
| | Nominal voltage | 30 V |
| | Testing voltage | 500 V |
| | Oil-resistant | (following DIN EN 60811-2-1, DIN EN 50363 -10-2), Class 3. |
| | Flame-retardant | According to IEC 60332-1-2, CEI 20-34, FT1, VW-1. |
| | Silicon-free | Free from silicon which can affect paint adhesion (following PV 3.10.7 – status 192). |
| | Conductor | Fine-wire stranded conductor in especially bending-resistant version consisting of bare copper wires (following EN 60228). |
| | Core insulation | According to bus specification |
| | Core stranding | According to bus specification |
| | Core identification | According to bus specification |
| | Intermediate jacket | Foil taping over the external layer. |
| | Overall shield | Extremely torsion resistant tinned braided |
| | Outer jacket | Low-adhesion, highly abrasion-resistant mixture on the basis of PUR, adapted to suit the requirements in Energy Chains®. Colour: Steel blue (similar to RAL 5011) |

	UL/CSA	Style 10258 and 21387, 1000 V, 90 °C
	CEI	Following CEI 20-35
	CE	Following 2006/95/EG
	Lead free	Following EC (RoHS) 2002/95/EC.
	Clean room	According to ISO Class 1. material/cable tested by IPA according to ISO standard 14644-1

Guaranteed service life (details see page 200-201)

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/+60	±180	±120	±60
+60/+70	±150	±90	±30

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

Typical application area
For maximum load requirements with torsion movements
Almost unlimited resistance to oil and with bio-oil
Indoor and outdoor applications, UV-resistant
Especially for robots and movements in the 3d range
Robots, handling and spindle drives

Class 6.1.3



Delivery program Part No.	Number of cores and conductor nominal cross section [mm²]	External diameter in mm approx.	Copper index [kg/km]	Weight [kg/km]
CFROBOT8.001 (Profibus)	(2x0,35)C	8,0	22	57
CFROBOT8.022 (Can-Bus)	(4x0,5)C	7,0	39	65
CFROBOT8.045 (GigE)	(4x(2x0,14)C)	8,5	35	65

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

Delivery program Part No.	Characteristic wave impedance approx. [Ω]	Number of cores and conductor nominal cross section [mm²]	Colour Code
CFROBOT8.001	150	(2x0,35)C	red, green
CFROBOT8.022	120	(4x0,5)C	white, green, brown, yellow (star-quad stranding)
CFROBOT8.045	100	(4x(2x0,14)C)	white-blue/blue, white-orange/orange, white-green/green, white-brown/brown

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

PUR Hybrid cable, twistable



Chainflex® CFROBOT 9

- For twistable loads
- PUR outer jacket
- Unsheilded/Sheilded
- Oil-resistant and coolant resistant
- Notch-resistant
- Flame-retardant
- Hydrolysis-resistant and microbe-resistant

	Temperature Range moved	-35 °C to +80 °C, minimum bending radius twisted 10 x d
	Temperature Range fixed	-40 °C to +80 °C, minimum bending radius 4 x d
	V Max. twisted	10 m/s
	A Max	10 m/s ²
	Travel distance	Robots and movements in the 3D range, Class 1
	Torsion	±180°, with 1 m cable length
	UV-resistant	High
	Nominal voltage	300/500 V (following DIN VDE 0245).
	Testing voltage	2000 V (following DIN VDE 0281-2).
	Oil	Oil-resistant (following DIN EN 60811-2-1, DIN EN 50363 -10-2), Class 3.
	Flame-retardant	According to IEC 60332-1-2, CEI 20-34, FT1, VW-1
	Silicon-free	Free from silicon which can affect paint adhesion (following PV 3.10.7 – status 192).
	Conductor	Extremely bend-resistant cable.
	Core Insulation	Mechanically high-quality TPE mixture.
	Element shield	Extremely torsion resistant, tinned braided copper shield. Coverage approx. 85% optical.
	Outer Jacket	Low-adhesion, halogen-free, highly abrasion-resistant mixture on the basis of PUR, adapted to suit the requirements in Energy Chains® (following DIN VDE 0282 Part 10). Colour: Steel blue (similar to RAL 5011)
	CEI	Following CEI 20-35
	CE	Following 2006/95/EG
	Lead free	Following EC (RoHS) 2002/95/EC.
	Clean Room	According to ISO Class 1. Outer jacket material complies with CF34.25.04, tested by IPA according to standard 14644-1

Guaranteed service life (details see page 200-201)

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

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

Typical application area

For maximum load requirements with torsion movements
Almost unlimited resistance to oil and bio-oils
Indoor and outdoor applications, UV-resistant
Especially for robots and movements in the 3d range
Robots, handling and spindle drives

Class 6.1.3

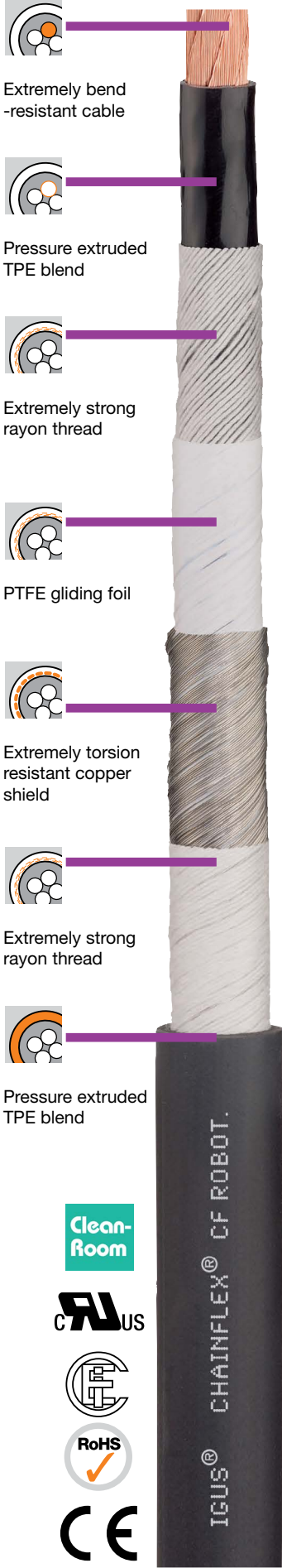
Delivery program Part No.	Number of cores and conductor nominal cross section [mm2]	External diameter in mm approx.	Copper index [kg/km]	Weight [kg/km]
CFROBOT9.001	5 G 1,0 + (2x1,0)C	9.5	75	129
CFROBOT9.002	6 G 0,75 + (3x0,75)C	12.0	76	143
CFROBOT9.003	2 G 0,5 + (2 x 0,5)C	10.0	27	75
CFROBOT9.004	16 G 1,0 + (2x1,0)C	18.5	177	326
CFROBOT9.005	23 G 1,0 + (2x1,0)C	19.5	241	478
CFROBOT9.006	24 G 1,0 + (2x1,0)C	20.0	251	484
CFROBOT9.007	(15x(2x0,25)C + (4x0,25)C)C	18.0	217	330

(1) Delivery time upon inquiry
Note: The mentioned external diameters are maximum values and may tend toward lower tolerance limits.
G = with green-yellow earth core x = without earth core

Delivery program Part No.	Number of cores and conductor nominal cross section [mm2]	Core Group	Colour Code
CFROBOT9.001	5 G 1,0 + (2x1,0)C	5G1,0 (2x1,0)C	Cores black with white numerals 1-4, one core green-yellow Cores black with white numerals 5-6
CFROBOT9.002	6 G 0,75 + (3x0,75)C	6G0,75 (3x0,75)C	Cores black with white numerals 1-5, one core green-yellow Cores black with white numerals 6-8
CFROBOT9.003	2 G 0,5 + (2 x 0,5)C	2x0,5 (2x0,5)C	Cores black with white numerals 1-2 Cores black with white numerals 3-4
CFROBOT9.004	16 G 1,0 + (2x1,0)C	16G1,0 (2x1,0)C	Cores black with white numerals 1-4, 7-17, one core green-yellow, Cores black with white numerals 5-6
CFROBOT9.005	23 G 1,0 + (2x1,0)C	23G1,0 (2x1,0)C	Cores black with white numerals 1-4, 7-24, one core green-yellow, Cores black with white numerals 5-6
CFROBOT9.006	24 G 1,0 + (2x1,0)C	24G1,0 (2x1,0)C	Cores black with white numerals 1-4, 7-25, one core green-yellow, Cores black with white numerals 5-6
CFROBOT9.007	(15x(2x0,25)C + (4x0,25)C)C	15x(2x0,25)C (4x0,25)C	Colour code in accordance with DIN 47100 white, green, brown, yellow (CAN-Bus)

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

TPE-Robot Cable



Chainflex® CF ROBOT

- For twistable loads
- TPE outer jacket, shielded
- Oil-resistant
- Bio-oil-resistant
- PVC-free
- UV-resistant
- Flame-retardant
- Hydrolysis-resistant and microbe-resistant

	Temperature Range moved	-35 °C to +100 °C, minimum bending radius twisted 10 x d
	Temperature Range fixed	-40 °C to +100 °C, minimum bending radius 4 x d
	V Max. twisted	10 m/s
	A Max	10 m/s
	Travel distance	Robots and movements in the 3D range, Class 1
	Torsion	± 180 °, with 1 m cable length
	UV-resistant	High
	Nominal voltage	600/1000 V (following DIN VDE 0250).
	Testing voltage	4000 V (following DIN VDE 0281-2).
	Oil-resistant	(following DIN EN 60811-2-1), bio-oil-resistant (following VDMA 24568 with Plantocut 8 S-MB), Class 4.
	Flame-retardant	According to IEC 60332-1-2, CEI 20-34, FT1, VW-1.
	Silicon-free	Free from silicon which can affect paint adhesion (following PV 3.10.7 – status 192).
	Conductor	Extremely bend-resistant cable
	Core insulation	Mechanically high-quality TPE mixture.
	Overall shield	Extremely torsion resistant tinned braided
	Outer jacket	Low-adhesion mixture on the basis of TPE, especially abrasion-resistant and highly flexible, adapted to suit the requirements in Energy Chains®. Colour: Jet black (similar to RAL 9005)
	UL/CSA	Style 10258 and 21387, 1000 V, 90 °C
	CEI	Following CEI 20-35

Guaranteed service life (details see page 200-201)

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

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

Typical application area

- For maximum load requirements with torsion movements
- Almost unlimited resistance to oil and bio-oils
- Indoor and outdoor applications, UV-resistant
- Especially for robots and movements in the 3d range
- Robots, handling and spindle drives

Class 6.1.4



Delivery program Part No.	Number of cores and conductor nominal cross section [mm²]	External diameter in mm approx.	Copper index [kg/km]	Weight [kg/km]
CFROBOT.035(1)	(1x10.0)C	10.5	121	197
CFROBOT.036	(1x16.0)C	12.0	183	274
CFROBOT.037	(1x25.0)C	14.5	289	425
CFROBOT.038(1)	(1x35.0)C	15.5	391	534
CFROBOT.039	(1x50.0)C	17.5	546	726

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



igus® Chainflex® cables in application of a multi-dimensional moving energy chain Triflex® R for production robots.