

# Robbot

Torsion cables



chainflex® cable	Jacket	Shield	Bending radius min., E-Chain® [factor x d]	Temperature, E-Chain® from/to [°F]	Approvals and standards	Oil-resistant	Torsion resistant	v max. twisted [°/s]	a max. twisted [°/s²]	Page
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### Torsion cables

#### Information Torsion cables

368

#### Control cables

CF77-UL-D	PUR		6.8	-13/ +176										✓	✓	180	60	372
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CFROBOT2	PUR	✓	10	-13/ +176										✓	✓	180	60	376
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#### Data cable

CFROBOT3	PUR	✓	10	-13/ +176										✓	✓	180	60	378
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#### Measuring system cable

CFROBOT4	PUR	✓	10	-13/ +176										✓	✓	180	60	380
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#### Fiber optic cable

CFROBOT5	TPE		10	-31/ +176										✓	✓	180	60	384
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#### Motor cables

CFROBOT6	PUR		10	-13/ +176										✓	✓	180	60	386
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CFROBOT7	PUR	✓	10	-13/ +176										✓	✓	180	60	388 <span style="color: orange;">New</span>
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#### Spindle cables/Single conductors

CFROBOT	TPE	✓	10	-31/ +194										✓	✓	180	60	392
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#### Bus cable

CFROBOT8	PUR	✓	10	-13/ +158										✓	✓	180	60	394
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CFROBOT8-PLUS	PUR	✓	10	-13/ +158										✓	✓	360	60	398
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#### Hybrid cable

CFROBOT9	PUR	✓	10	-13/ +176										✓	✓	180	60	402
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### 36 months chainflex® guarantee

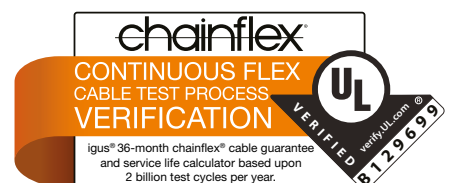
Guaranteed lifetime for predictable reliability

► Selection table page 370

With the help of the chainflex® service life calculator, you can quickly and easily calculate the expected service life of chainflex® cables specifically for your application:



[www.igus.com/chainflexlife](http://www.igus.com/chainflexlife)



## chainflex® cables for robots

In the industrial applications of today, robots have introduced ever more complex sequences of movements that demand torsional and/or three-dimensional flexible cables with a long service life similar to the chainflex® cables for use in linear Energy Chain Systems®.

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® CFROBOT cables.

Special demands are made on the braided shielding in torsion cables. Optimized shield structures with PTFE gliding films are used to absorb the forces caused by torsion movements.

To use an example of torsional Bus cables, 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 special insulating materials and mechanical 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 core elements from possible damage.

The CFROBOT cable line utilizes two jacket materials PUR and TPE. These materials were carefully chosen to protect the core elements like power conductors, high-speed data pairs and fiber optic components from possible damage. PUR jacket is highly abrasion resistant, halogen free and flame resistant. TPE jacket is highly abrasion resistant and halogen-free.

The special design logic behind CFROBOT cables was developed in theory and needed to be validated through testing. igus® set out to develop a test that would simulate the torsion stress cables will endure in the field. We do this by utilizing the Triflex® R Energy Chain® which can be twisted to various degrees at very high frequencies. This test is referred to as the igus® Torsion Test Standard.

According to this standard, all chainflex® ROBOT cables in a Triflex® R Energy Chain® are twisted with a fixed-point distance of one meter and a torsion of +/- 180° at least 3 million times. In addition, a test is carried out on a test bench with a Triflex® R length of approx. 2500 mm with 270° torsion. This test duplicated the forces and impacts that cables are exposed to in industrial robotic applications.



We have also found that all the non-shielded, gusset-filled extruded standard chainflex® control cables of the series CF130, CF5, CF77-UL-D, CF9 and CF9-UL correspond to the above mentioned igus® standard and have been approved for use in torsion applications

The following CFROBOT torsion cable types are currently available:

- Control Cable (shielded and unshielded)
- Data and Measuring System Cables
- Fiber Optic Cables
- Motor and Servo Cables
- Bus Cables
- Hybrid Cables












We can also offer you chainflex® ROBOT cables terminated with the connectors of your choice as ReadyCable®, or as a ready-to-install ReadyChain® cable assembly.



Test data ► Page 45

# chainflex<sup>®</sup> guarantee



chainflex <sup>®</sup> cable		Temperature, from/to [°F]	v max. [ft/s] twisted	a max. [ft/s <sup>2</sup> ] twisted
<b>Torsion cables</b>				
<b>Control cables</b>				
	CF77-UL-D	-13 / -5 -5 / +158 +158 / +176	180	60
	CFROBOT2	-13 / -5 -5 / +158 +158 / +176	180	60
<b>Data cable</b>				
	CFROBOT3	-13 / -5 -5 / +158 +158 / +176	180	60
<b>Measuring system cable</b>				
	CFROBOT4	-13 / -5 -5 / +158 +158 / +176	180	60
<b>Fiber optic cable</b>				
	CFROBOT5	-13 / -5 -5 / +158 +158 / +176	180	60
<b>Motor cables</b>				
	CFROBOT6	-13 / -5 -5 / +158 +158 / +176	180	60
	CFROBOT7 <b>New!</b>	-13 / -5 -5 / +158 +158 / +176	180	60
<b>Spindle cables/Single conductors</b>				
	CFROBOT	-31 / -5 -13 / +158 +158 / +176	180	60
<b>Bus cable</b>				
	CFROBOT8	-13 / -5 -5 / +158 +158 / +176	180	60
	CFROBOT8-PLUS	-13 / -5 -5 / +158 +158 / +176	360	60
<b>Hybrid cable</b>				
	CFROBOT9	-13 / -5 -5 / +158 +158 / +176	180	60

# Guaranteed lifetime <sup>(1)</sup>

Bending radius min. [factor x d]			Bending radius min. [factor x d]			Bending radius min. [factor x d]			Page
5 million cycles *			7.5 million cycles *			10 million cycles *			
±150			±90			±30			372
±180			±120			±60			
±150			±90			±30			
±150			±90			±30			376
±180			±120			±60			
±150			±90			±30			
±150			±90			±30			378
±180			±120			±60			
±150			±90			±30			
±150			±90			±30			380
±180			±120			±60			
±150			±90			±30			
±150			±90			±30			384
±180			±120			±60			
±150			±90			±30			
±150			±90			±30			386
±180			±120			±60			
±150			±90			±30			
±150			±90			±30			388
±180			±120			±60			
±150			±90			±30			
±150			±90			±30			392
±180			±120			±60			
±150			±90			±30			
±150			±90			±30			394
±180			±120			±60			
±150			±90			±30			
±330			±240			±150			398
±360			±270			±180			
±330			±240			±150			
±150			±90			±30			402
±180			±120			±60			
±150			±90			±30			

\* Higher number of cycles? Online lifetime calculation ► [www.igus.com/chainflexlife](http://www.igus.com/chainflexlife)

# Control cable | PUR | chainflex® CF77-UL-D







**36** 10,000,000  
Cycles guaranteed

**10 x d**  
Bend radius E-Chain®






**±180°/3.281 ft**  
Torsion angle

- For high mechanical load requirements
- PUR outer jacket
- Oil-resistant and coolant-resistant
- Flame-retardant
- PVC and halogen-free
- Notch-resistant
- Hydrolysis and microbe-resistant



## Dynamic Information

 <b>Bend radius</b>	<b>E-Chain® linear</b>	min. 6.8 x d
	<b>flexible</b>	min. 5 x d
	<b>fixed</b>	min. 4 x d
 <b>Temperature</b>	<b>E-Chain® linear</b>	-13 °F to +176 °F (-25 °C to +80 °C)
	<b>flexible</b>	-40 °F to +176 °F (-40 °C to +80 °C)
	<b>fixed</b>	-58 °F to +176 °F (-50 °C to +80 °C)
 <b>v max.</b>	<b>unsupported</b>	32.81 ft/s (10 m/s)
	<b>gliding</b>	16.41 ft/s (5 m/s)
 <b>a max.</b>		262.5 ft/s <sup>2</sup> (80 m/s <sup>2</sup> )
 <b>Travel distance</b>		Unsupported travel distances and for gliding applications up to 328.1 ft (100 m), Class 5
 <b>Torsion</b>		Torsion ±180°, with 3.281ft (1m) cable length, Class 3 (except for 5-core types ≥ 4.0 mm <sup>2</sup> ► Product range table)

## Cable structure

 <b>Conductor</b>	Conductor consisting of bare copper wires (according to DIN EN 60228).
 <b>Conductor insulation</b>	Mechanically high-quality TPE mixture.
 <b>Conductor construction</b>	<b>Number of conductors &lt; 12:</b> Conductors cabled in a layer with short pitch length. <b>Number of conductors ≥ 12:</b> Conductors combined in bundles and stranded together around a high-tensile strength core, using short pitch directions for a low-torsion cable structure.
 <b>Color code</b>	<b>24-22 AWG</b> Color code in accordance with DIN 47100. <b>20-4 AWG</b> Black with white numbers, one conductor green-yellow. <b>CF77-UL-03-04-INI:</b> brown, blue, black, white
 <b>Outer jacket</b>	Low-adhesion, halogen-free, highly abrasion-resistant mixture on the basis of PUR, adapted to suit the requirements in E-Chains® (following DIN EN 50363-10-2). Color: Gray (similar to RAL 7040) Variants ► See P/N Table

## Electrical Information

 <b>Nominal voltage</b>	<b>Number of conductors &lt; 12:</b> <b>Cores &gt; 20 AWG:</b> 300 V <b>Cores ≤ 20 AWG:</b> 1000 V
 <b>Test voltage</b>	<b>Number of conductors ≥ 12:</b> 1000 V 2000 V (following DIN EN 50395)

Configurators ► [www.igus.com/CF77-UL-D](http://www.igus.com/CF77-UL-D)

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



















Example image

Basic requirements  
Travel distance  
Oil resistance  
Torsion

low	1	2	3	4	5	6	7	highest
unsupported	1	2	3	4	5	6	≥ 1312 ft	
none	1	2	3	4	highest			
none	1	2	3	4	±360°			

## Class 5.5.3.3

### Properties and approvals

	<b>UV resistance</b>	Medium
	<b>Oil resistance</b>	Oil-resistant (following DIN EN 50363-10-2), Class 3
	<b>Offshore</b>	MUD-resistant following NEK 606 - status 2009
	<b>Flame resistance</b>	According to IEC 60332-1-2, FT1, VW-1
	<b>Silicone-free</b>	Free from silicone which can affect paint adhesion (following PV 3.10.7 – status 1992)
	<b>Halogen-free</b>	Following DIN EN 60754
	<b>UL verified</b>	Certificate No. B129699: igus 36-month chainflex cable guarantee and service life calculator based on 2 billion test cycles per year
	<b>UL/CSA AWM</b>	See data sheet for details ► <a href="http://www.igus.com/CF77-UL-D">www.igus.com/CF77-UL-D</a>
	<b>NFPA 79</b>	Complies to Electrical Standard for Industrial Machinery NFPA 79 Section 12.9
	<b>DNV-GL</b>	Type approval certificate No. TAE00003X1
	<b>EAC</b>	Certificate No. RU C-DE.ME77.B.00300/19 (TR ZU)
	<b>REACH</b>	In accordance with regulation (EC) No. 1907/2006 (REACH)
	<b>Lead-free</b>	Following 2011/65/EC (RoHS-II/RoHS-III)
	<b>Cleanroom</b>	According to ISO Class 1, material/cable tested by IPA according to DIN EN ISO standard 14644-1
	<b>DESINA</b>	According to VDW, DESINA standardization.
	<b>CE</b>	Following 2014/35/EU

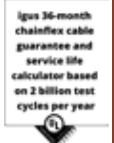
### Guaranteed service life (details see page 26-27)

Cycles*	5 million	7.5 million	10 million
Temperature, from/to [°F]	Torsion max. [°/m]	Torsion max. [°/m]	Torsion max. [°/m]
-13/+5	±150	±90	±30
+5/+158	±180	±120	±60
+158/+176	±150	±90	±30

\* Higher number of cycles? Online lifetime calculation ► [www.chainflex.com/chainflexlife](http://www.chainflex.com/chainflexlife)

### Typical application areas

- For high mechanical load requirements, Class 5
- Unsupported travel distances and for gliding applications up to 328 ft (100 m), Class 5
- Almost unlimited resistance to oil, Class 3
- Torsion ±180°, with 3.281ft (1m) cable length, Class 3
- Indoor and outdoor applications with average sun radiation
- Machining units/machine tools, Storage and retrieval units for high-bay warehouses, Packaging industry, quick handling, refrigerating sector





# Control cable | PUR | chainflex® CF77-UL-D

igus® chainflex® CF77.UL.D

Example image

Part No.	AWG	Number of Conductors and rated cross section	Outer diameter max.		Copper index		Weight	
			[mm <sup>2</sup> ]	[in.]	[mm]	[lbs/mft]	[kg/km]	[lbs/mft]
CF77-UL-02-03-INI <sup>12)</sup>	24	3 x 0.25	0.20	5.0	6.0	9	19.5	29
CF77-UL-02-04-D	24	4 G 0.25	0.22	5.5	7.4	11	23.5	35
CF77-UL-02-05-D	24	5 x 0.25	0.24	6.0	8.7	13	26.2	39
CF77-UL-02-07-D	24	7 x 0.25	0.26	6.5	12.1	18	34.3	51
CF77-UL-02-12-D	24	12 x 0.25	0.35	9.0	21.5	32	52.4	78
CF77-UL-02-18-D	24	18 x 0.25	0.41	10.5	31.6	47	85.3	127
CF77-UL-02-25-D	24	25 x 0.25	0.45	11.5	42.3	63	104.2	155
CF77-UL-03-04-INI <sup>12)</sup>	22	4 G 0.34	0.24	6.0	9.4	14	24.9	37
CF77-UL-05-04-D	20	4 G 0.5	0.24	6.0	14.1	21	30.9	46
CF77-UL-05-05-D	20	5 G 0.5	0.26	6.5	17.5	26	35.6	53
CF77-UL-05-07-D	20	7 G 0.5	0.30	7.5	26.2	39	52.4	78
CF77-UL-05-12-D	20	12 G 0.5	0.39	10.0	42.3	63	87.4	130
CF77-UL-05-18-D	20	18 G 0.5	0.47	12.0	63.2	94	123.6	184
CF77-UL-05-25-D	20	25 G 0.5	0.55	14.0	86.7	129	163.3	243
CF77-UL-05-30-D	20	30 G 0.5	0.59	15.0	104.2	155	211.7	315
CF77-UL-07-03-D	18	3 G 0.75	0.26	6.5	15.5	23	34.9	52
CF77-UL-07-04-D	18	4 G 0.75	0.28	7.0	20.8	31	39.6	59
CF77-UL-07-05-D	18	5 G 0.75	0.30	7.5	25.5	38	47.7	71
CF77-UL-07-07-D	18	7 G 0.75	0.33	8.5	36.3	54	67.2	100
CF77-UL-07-12-D	18	12 G 0.75	0.47	12.0	61.1	91	121.0	180
CF77-UL-07-18-D	18	18 G 0.75	0.53	13.5	90.0	134	160.6	239
CF77-UL-07-20-D	18	20 G 0.75	0.57	14.5	100.1	149	180.8	269
CF77-UL-07-25-D	18	25 G 0.75	0.63	16.0	125.0	186	225.8	336
CF77-UL-07-36-D	18	36 G 0.75	0.75	19.0	187.5	279	340.0	506
CF77-UL-07-42-D	18	42 G 0.75	0.83	21.0	229.1	341	389.7	580
CF77-UL-10-02-D	17	2 G 1.0	0.26	6.5	14.1	21	34.3	51
CF77-UL-10-03-D	17	3 G 1.0	0.26	6.5	20.8	31	39.0	58
CF77-UL-10-04-D	17	4 G 1.0	0.28	7.0	27.6	41	49.1	73
CF77-UL-10-05-D	17	5 G 1.0	0.31	8.0	33.6	50	60.5	90
CF77-UL-10-07-D	17	7 G 1.0	0.35	9.0	47.7	71	80.6	120
CF77-UL-10-12-D	17	12 G 1.0	0.49	12.5	80.6	120	147.8	220
CF77-UL-10-18-D	17	18 G 1.0	0.59	15.0	120.3	179	211.0	314
CF77-UL-10-25-D	17	25 G 1.0	0.69	17.5	166.6	248	289.6	431
CF77-UL-10-42-D	17	42 G 1.0	0.89	22.5	291.0	433	469.7	699

<sup>12)</sup> Color outer jacket: Yellow (RAL 1021)

Note: The given outer diameters are maximum values.

G = with green-yellow earth core x = without earth core

# Class 5.5.3.3

Basic requirements  
Travel distance  
Oil resistance  
Torsion

low	1	2	3	4	5	6	7	highest
unsupported	1	2	3	4	5	6	≥ 1312 ft	
none	1	2	3	4	highest			
none	1	2	3	4	±360°			

CF77-UL-D  
PUR  
6.8 x d



Guarantee  
igus chainflex  
**36**  
up to 36 months guarantee

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

Part No.	AWG	Number of Conductors and rated cross section	Outer diameter max.		Copper index		Weight		
			[mm <sup>2</sup> ]	[in.]	[mm]	[lbs/mft]	[kg/km]	[lbs/mft]	[kg/km]
CF77-UL-15-03-D	16	3 G 1.5		0.28	7.0	30.9	46	47.7	71
CF77-UL-15-04-D	16	4 G 1.5		0.30	7.5	41.0	61	59.1	88
CF77-UL-15-05-D	16	5 G 1.5		0.31	8.0	50.4	75	70.6	105
<b>CF77-UL-15-07-D<sup>17)</sup></b>	16	7 G 1.5		0.37	9.5	70.6	105	102.1	152
CF77-UL-15-12-D	16	12 G 1.5		0.51	13.0	120.3	179	199.6	297
CF77-UL-15-18-D	16	18 G 1.5		0.67	17.0	180.1	268	272.1	405
CF77-UL-15-25-D	16	25 G 1.5		0.77	19.5	199.6	297	379.0	564
CF77-UL-15-36-D	16	36 G 1.5		0.93	23.5	370.3	551	569.8	848
CF77-UL-25-03-D	14	3 G 2.5		0.33	8.5	50.4	75	88.7	132
CF77-UL-25-04-D	14	4 G 2.5		0.37	9.5	63.8	95	112.2	167
CF77-UL-25-05-D	14	5 G 2.5		0.39	10.0	83.3	124	131.7	196
<b>CF77-UL-25-07-D<sup>17)</sup></b>	14	7 G 2.5		0.47	12.0	116.9	174	181.4	270
CF77-UL-25-12-D	14	12 G 2.5		0.67	17.0	199.6	297	321.9	479
CF77-UL-40-04-D <sup>90)</sup>	12	4 G 4.0		0.45	11.5	110.9	165	164.6	245
CF77-UL-40-05-D <sup>90)</sup>	12	5 G 4.0		0.47	12.0	133.0	198	190.8	284
CF77-UL-60-05-D <sup>90)</sup>	10	5 G 6.0		0.53	13.5	199.6	297	276.9	412

<sup>17)</sup> When using the cables with "7G1.5mm<sup>2</sup>" and "G2.5mm<sup>2</sup>" minimum bend radius must be 17.5xd with gliding travel distance ≥ 5m.  
<sup>90)</sup> Torsion ±90°  
**Note:** The given outer diameters are maximum values.  
G = with green-yellow earth core x = without earth core

CFRIP

UL US LISTED

RUUS

NFPA

CIPA

DNV-GL

EAC

REACH

RoHS

Clean-Room

DESINA

- Order example: CF77-UL-02-04-D – To your desired length**  
CF77-UL-D chainflex® series -02 Code nominal cross section -04 Number of conductors
- Online order ► [www.chainflex.com/CF77-UL-D](http://www.chainflex.com/CF77-UL-D)
- Delivery time 24hrs or today.  
Delivery time means time until goods are shipped.

Guarantee  
igus chainflex  
**36**  
up to 36 months guarantee

chainflex  
CONTINUOUS FLEX  
CABLE TEST PROCESS  
VERIFICATION

UL  
verified  
B129699

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

# Control cable | PUR | chainflex® CFROBOT2







**36** 10,000,000  
Cycles guaranteed

**10 x d**  
Bend radius E-Chain®






**±180°/3.281 ft**  
Torsion angle

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

## Dynamic Information

 Bend radius	<b>E-Chain® twisted flexible</b>	min. 10 x d
	<b>fixed</b>	min. 8 x d
	<b>fixed</b>	min. 5 x d
 Temperature	<b>E-Chain® twisted flexible</b>	-13 °F to +176 °F (-25 °C to +80 °C)
	<b>fixed</b>	-40 °F to +176 °F (-40 °C to +80 °C)
	<b>fixed</b>	-58 °F to +176 °F (-50 °C to +80 °C)
 v max.	<b>twisted</b>	180 °/s
 a max.	<b>twisted</b>	60 °/s <sup>2</sup>
 Travel distance	Especially for robots and 3D movements	
 Torsion	Torsion ±180°, with 3.281ft (1m) cable length, Class 3	

## Cable structure

 Conductor	Conductor consisting of bare copper wires (according to DIN EN 60228).
 Conductor insulation	Mechanically high-quality TPE mixture.
 Color code	Black with white numbers, one conductor green-yellow.
 Overall shield	Extremely torsion-resistant tinned braided copper shield. 85 % optical coverage
 Outer jacket	Low-adhesion, halogen-free, highly abrasion-resistant mixture on the basis of PUR, adapted to suit the requirements in E-Chains® (following DIN EN 50363-10-2). Color: Dark blue (similar to RAL 5011)

## Electrical Information

 Nominal voltage	300 V
 Test voltage	2000 V (following DIN EN 50395)

## Properties and approvals

 UV resistance	High
 Oil resistance	Oil-resistant (following DIN EN 50363-10-2), Class 3
 Flame resistance	According to IEC 60332-1-2, FT1, VW-1

Configurators ► [www.igus.com/CFROBOT2](http://www.igus.com/CFROBOT2)











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

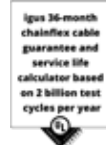


Basic requirements  
Travel distance  
Oil resistance  
Torsion

low	1	2	3	4	5	6	7	highest
unsupported	1	2	3	4	5	6	≥ 1312 ft	
none	1	2	3	4	highest			
none	1	2	3	4	±360°			

## Class 6.1.3.3

-  **Silicone-free** Free from silicone which can affect paint adhesion (following PV 3.10.7 – status 1992)
-  **Halogen-free** Following DIN EN 60754
-  **UL verified** Certificate No. B129699: igus 36-month chainflex cable guarantee and service life calculator based on 2 billion test cycles per year
-  **UL/CSA AWM** See data sheet for details ► [www.igus.com/CFROBOT2](http://www.igus.com/CFROBOT2)
-  **NFPA 79** Complies to Electrical Standard for Industrial Machinery NFPA 79 Section 12.9
-  **EAC** Certificate No. RU C-DE.ME77.B.00300/19 (TR ZU)
-  **REACH** In accordance with regulation (EC) No. 1907/2006 (REACH)
-  **Lead-free** Following 2011/65/EC (RoHS-II/RoHS-III)
-  **Cleanroom** According to ISO Class 1. The outer jacket material of this series complies with 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 26-27)

Cycles*	5 million	7.5 million	10 million
Temperature, from/to [°F]	Torsion max. [°/m]	Torsion max. [°/m]	Torsion max. [°/m]
-13/+5	±150	±90	±30
+5/+158	±180	±120	±60
+158/+176	±150	±90	±30

\* Higher number of cycles? Online lifetime calculation ► [www.chainflex.com/chainflexlife](http://www.chainflex.com/chainflexlife)

### Typical application areas

- For maximum mechanical load requirements with torsional movements, Class 6
- Especially for robots and 3D movements, Class 1
- Almost unlimited resistance to oil, Class 3
- Torsion ±180°, with 3.281ft (1m) cable length, Class 3
- Indoor and outdoor applications, UV-resistant
- Robots, Handling, spindle drives

Part No.	AWG	Number of Conductors and rated cross section	Outer diameter		Copper index		Weight	
			[in.]	[mm]	[lbs/mft]	[kg/km]	[lbs/mft]	[kg/km]
CFROBOT2-07-04-C	18	4 G 0.75	0.31	8.0	28.9	43	52.4	78
CFROBOT2-07-05-C	18	5 G 0.75	0.33	8.5	34.3	51	60.5	90
CFROBOT2-07-07-C	18	7 G 0.75	0.39	10.0	47.7	71	80.6	120
CFROBOT2-07-12-C	18	12 G 0.75	0.55	14.0	82.0	122	143.8	214
CFROBOT2-07-18-C	18	18 G 0.75	0.65	16.5	124.3	185	202.3	301

**Note:** The given outer diameters are maximum values.  
G = with green-yellow earth core x = without earth core

# Data cable | PUR | chainflex® CFROBOT3







**36** 10,000,000  
Cycles guaranteed

**10 x d**  
Bend radius E-Chain®







**±180°/3.281 ft**  
Torsion angle

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

## Dynamic Information

 Bend radius	<b>E-Chain® twisted flexible</b>	min. 10 x d min. 8 x d
	<b>fixed</b>	min. 5 x d
 Temperature	<b>E-Chain® twisted flexible</b>	-13 °F to +176 °F (-25 °C to +80 °C)
	<b>fixed</b>	-40 °F to +176 °F (-40 °C to +80 °C)
	<b>twisted</b>	-58 °F to +176 °F (-50 °C to +80 °C)
 v max.	<b>twisted</b>	180 °/s
 a max.	<b>twisted</b>	60 °/s <sup>2</sup>
 Travel distance	Especially for robots and 3D movements	
 Torsion	Torsion ±180°, with 3.281ft (1m) cable length, Class 3	



## Cable structure

 Conductor	Conductor consisting of bare copper wires (according to DIN EN 60228).
 Conductor insulation	Mechanically high-quality TPE mixture.
 Conductor construction	Twisted Pairs cabled together with short pitch lengths.
 Color code	Color code in accordance with DIN 47100.
 Overall shield	Extremely torsion-resistant tinned braided copper shield. 85 % optical coverage
 Outer jacket	Low-adhesion, halogen-free, highly abrasion-resistant mixture on the basis of PUR, adapted to suit the requirements in E-Chains® (following DIN EN 50363-10-2). Color: Dark blue (similar to RAL 5011)

## Electrical Information

 Nominal voltage	300 V
 Test voltage	2000 V (following DIN EN 50395)

## Properties and approvals

 UV resistance	High
 Oil resistance	Oil-resistant (following DIN EN 50363-10-2), Class 3











Configurators ► [www.igus.com/CFROBOT3](http://www.igus.com/CFROBOT3)

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

Basic requirements  
Travel distance  
Oil resistance  
Torsion

low	1	2	3	4	5	6	7	highest
unsupported	1	2	3	4	5	6	≥ 1312 ft	
none	1	2	3	4	highest			
none	1	2	3	4	±360°			

## Class 6.1.3.3

	<b>Flame resistance</b>	According to IEC 60332-1-2, FT1, VW-1
	<b>Silicone-free</b>	Free from silicone which can affect paint adhesion (following PV 3.10.7 – status 1992)
	<b>UL verified</b>	Certificate No. B129699: igus 36-month chainflex cable guarantee and service life calculator based on 2 billion test cycles per year
	<b>UL/CSA AWM</b>	See data sheet for details ► <a href="http://www.igus.com/CFROBOT3">www.igus.com/CFROBOT3</a>
	<b>NFPA 79</b>	Complies to Electrical Standard for Industrial Machinery NFPA 79 Section 12.9
	<b>EAC</b>	Certificate No. RU C-DE.ME77.B.00300/19 (TR ZU)
	<b>REACH</b>	In accordance with regulation (EC) No. 1907/2006 (REACH)
	<b>Lead-free</b>	Following 2011/65/EC (RoHS-II/RoHS-III)
	<b>Cleanroom</b>	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
	<b>CE</b>	Following 2014/35/EU

Guarantee  
igus chainflex  
**36**  
up to 36 months guarantee

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

CFRIP

UL US LISTED

RU US

NFPA

CIPA

EAC

RoHS

Clean-Room

CE

### Guaranteed service life (details see page 26-27)

Cycles*	5 million	7.5 million	10 million
Temperature, from/to [°F]	Torsion max. [°/m]	Torsion max. [°/m]	Torsion max. [°/m]
-13/+5	±150	±90	±30
+5/+158	±180	±120	±60
+158/+176	±150	±90	±30

\* Higher number of cycles? Online lifetime calculation ► [www.chainflex.com/chainflexlife](http://www.chainflex.com/chainflexlife)

### Typical application areas

- For maximum mechanical load requirements with torsional movements, Class 6
- Especially for robots and 3D movements, Class 1
- Almost unlimited resistance to oil, Class 3
- Torsion ±180°, with 3.281ft (1m) cable length, Class 3
- Indoor and outdoor applications, UV-resistant
- Robots, Handling, spindle drives

Part No.	AWG	Number of Conductors and rated cross section	Outer diameter		Copper index		Weight	
			[in.]	[mm]	[lbs/mft]	[kg/km]	[lbs/mft]	[kg/km]
CFROBOT3-02-03-02	24	3 PR x 0.25	0.35	9.0	22.2	33	56.4	84
CFROBOT3-02-04-02	24	4 PR x 0.25	0.41	10.5	25.5	38	69.2	103
CFROBOT3-02-06-02	24	6 PR x 0.25	0.45	11.5	34.9	52	85.3	127
CFROBOT3-02-08-02	24	8 PR x 0.25	0.53	13.5	44.3	66	114.2	170
CFROBOT3-05-05-02	20	5 PR x 0.5	0.49	12.5	53.8	80	114.2	170

**Note:** The given outer diameters are maximum values.  
G = with green-yellow earth core x = without earth core

# Measuring system cable | PUR | chainflex® CFROBOT4







**36** 10,000,000  
Cycles guaranteed

**10 x d**  
Bend radius E-Chain®







**±180°/3.281 ft**  
Torsion angle

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



## Dynamic Information

 Bend radius	<b>E-Chain® twisted flexible</b>	min. 10 x d
	<b>fixed</b>	min. 8 x d
	<b>fixed</b>	min. 5 x d
 Temperature	<b>E-Chain® twisted flexible</b>	-13 °F to +176 °F (-25 °C to +80 °C)
	<b>fixed</b>	-40 °F to +176 °F (-40 °C to +80 °C)
	<b>fixed</b>	-58 °F to +176 °F (-50 °C to +80 °C)
 v max.	<b>twisted</b>	180 °/s
 a max.	<b>twisted</b>	60 °/s <sup>2</sup>
 Travel distance	Especially for robots and 3D movements	
 Torsion	Torsion ±180°, with 3.281ft (1m) cable length, Class 3	

## Cable structure

 Conductor	Stranded conductor in especially bending-resistant version consisting of tinned copper wires (following DIN EN 60228).
 Conductor insulation	Mechanically high-quality TPE mixture.
 Color code	According to measuring system specification. ▶ See P/N Table
 Element shield	Extremely torsion-resistant tinned braided copper shield. 80 % optical coverage
 Overall shield	Extremely torsion-resistant tinned braided copper shield. 85 % optical coverage
 Outer jacket	Low-adhesion, halogen-free, highly abrasion-resistant mixture on the basis of PUR, adapted to suit the requirements in E-Chains® (following DIN EN 50363-10-2). Color: Dark blue (similar to RAL 5011) Variants ▶ See P/N Table

## Electrical Information

 Nominal voltage	30 V
 Test voltage	500 V

Example image

Configurators ▶ [www.igus.com/CFROBOT4](http://www.igus.com/CFROBOT4)














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

Basic requirements  
Travel distance  
Oil resistance  
Torsion

low	1	2	3	4	5	6	7	highest
unsupported	1	2	3	4	5	6	≥ 1312 ft	
none	1	2	3	4	highest			
none	1	2	3	4	±360°			

## Class 6.1.3.3

### Properties and approvals

	<b>UV resistance</b>	High
	<b>Oil resistance</b>	Oil-resistant (following DIN EN 50363-10-2), Class 3
	<b>Flame resistance</b>	According to IEC 60332-1-2, FT1, VW-1
	<b>Silicone-free</b>	Free from silicone which can affect paint adhesion (following PV 3.10.7 – status 1992)
	<b>Halogen-free</b>	Following DIN EN 60754
	<b>UL verified</b>	Certificate No. B129699: igus 36-month chainflex cable guarantee and service life calculator based on 2 billion test cycles per year
	<b>UL/CSA AWM</b>	See data sheet for details ► <a href="http://www.igus.com/CFROBOT4">www.igus.com/CFROBOT4</a>
	<b>NFPA 79</b>	Complies to Electrical Standard for Industrial Machinery NFPA 79 Section 12.9
	<b>EAC</b>	Certificate No. RU C-DE.ME77.B.00295/19 (TR ZU)
	<b>REACH</b>	In accordance with regulation (EC) No. 1907/2006 (REACH)
	<b>Lead-free</b>	Following 2011/65/EC (RoHS-II/RoHS-III)
	<b>Cleanroom</b>	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
	<b>CE</b>	Following 2014/35/EU

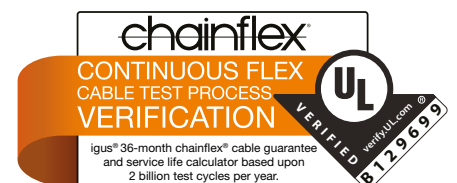
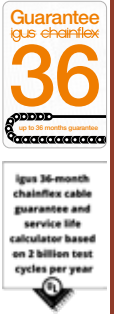
### Guaranteed service life (details see page 26-27)

Cycles*	5 million	7.5 million	10 million
Temperature, from/to [°F]	Torsion max. [°/m]	Torsion max. [°/m]	Torsion max. [°/m]
-13/+5	±150	±90	±30
+5/+158	±180	±120	±60
+158/+176	±150	±90	±30

\* Higher number of cycles? Online lifetime calculation ► [www.chainflex.com/chainflexlife](http://www.chainflex.com/chainflexlife)


### Typical application areas

- For maximum mechanical load requirements with torsional movements, Class 6
- Especially for robots and 3D movements, Class 1
- Almost unlimited resistance to oil, Class 3
- Torsion ±180°, with 3.281ft (1m) cable length, Class 3
- Indoor and outdoor applications, UV-resistant
- Robots, Handling, spindle drives





# Measuring system cable | PUR | chainflex® CFROBOT4



igus® chainflex® CFROBOT 4

Example image

Part No.	AWG	Number of Conductors and rated cross section	Outer diameter max.		Copper index		Weight	
			[in.]	[mm]	[lbs/mft]	[kg/km]	[lbs/mft]	[kg/km]
CFROBOT4-001	26	3 STP x 0.14	0.41	10.5	41.7	62	77.3	115
	26	4 x 0.14						
	20	2 x 0.5						
CFROBOT4-006	26	3 STP x 0.14	0.45	11.5	49.7	74	90.7	135
	26	4 x 0.14						
	24	4 x 0.22						
	20	2 C x 0.5						
CFROBOT4-009	24	4 PR x 0.25	0.35	9.0	32.3	48	60.5	90
	20	2 x 0.5						
CFROBOT4-015	26	4 PR x 0.14	0.35	9.0	32.9	49	61.1	91
	20	4 x 0.5						
CFROBOT4-028 <sup>13)</sup>	24	4 PR x 0.20	0.30	7.5	29.6	44	48.4	72
	22	2 x 0.38						

<sup>13)</sup> Color outer jacket: Yellow-green (similar to RAL 6018)

**Note:** The given outer diameters are maximum values.

**G** = with green-yellow earth core **x** = without earth core

# Class 6.1.3.3

Basic requirements  
Travel distance  
Oil resistance  
Torsion

low	1	2	3	4	5	6	7	highest
unsupported	1	2	3	4	5	6	≥ 1312 ft	
none	1	2	3	4	highest			
none	1	2	3	4	±360°			

**CFROBOT4**  
PUR  
10 x d



Guarantee  
igus chainflex  
**36**  
up to 36 months guarantee

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

Part No.	Core group	Color code
CFROBOT4-001	3x(2x0.14)C 4x0.14 2x0.5	green/yellow, black/brown, red/orange gray/blue/white-yellow/white-black brown-red/brown-blue
CFROBOT4-006	3x(2x0.14)C (4x0.14) (4x0.22) (2x0.5)	green/yellow, black/brown, red/orange gray/blue/white-yellow/white-black yellow-brown/gray-brown/green-black/green-red brown-red/brown-blue
CFROBOT4-009	4x(2x0.25) 2x0.5	brown/green, blue/violet, gray/pink, red/black white, brown
CFROBOT4-015	4x(2x0.14) 4x0.5	brown/green, yellow/violet, gray/pink, red/black blue, white, brown-green, white-green
CFROBOT4-028 <sup>13)</sup>	2x(2x0.20) (2x0.38)	green/yellow, pink/blue red/black

-  **Order example: CFROBOT4-009 – To your desired length**  
CFROBOT4 chainflex® series -009 Code measuring system type
-  Online order ► [www.chainflex.com/CFROBOT4](http://www.chainflex.com/CFROBOT4)
-  Delivery time 24hrs or today.  
Delivery time means time until goods are shipped.

CFRIP

UL LISTED

RUUS

NFPA

CIPA

UL

RoHS

Clean-Room

UL

CE



Guarantee  
igus chainflex  
**36**  
up to 36 months guarantee

chainflex  
CONTINUOUS FLEX  
CABLE TEST PROCESS  
VERIFICATION

UL  
www.igus.com ©  
B 129699

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

# Fiber optic cable | TPE | chainflex® CFROBOT5

**36** 10,000,000  
Cycles guaranteed







**10 x d**  
Bend radius E-Chain®

**±180°/3.281 ft**  
Torsion angle





- For torsion applications
- TPE outer jacket
- Oil and bio-oil-resistant
- UV-resistant

- Low-temperature-flexibility
- Hydrolysis and microbe-resistant
- PVC and halogen-free





## Dynamic Information

 <b>Bend radius</b>	<b>E-Chain® twisted flexible</b>	min. 10 x d min. 8 x d
	<b>fixed</b>	min. 5 x d
 <b>Temperature</b>	<b>E-Chain® twisted flexible</b>	-31 °F to +176 °F (-35 °C to +80 °C) -58 °F to +176 °F (-50 °C to +80 °C)
	<b>fixed</b>	-67 °F to +176 °F (-55 °C to +80 °C)
 <b>v max.</b>	<b>twisted</b>	180 °/s
 <b>a max.</b>	<b>twisted</b>	60 °/s <sup>2</sup>
 <b>Travel distance</b>	Especially for robots and 3D movements	
 <b>Torsion</b>	Torsion ±180°, with 3.281ft (1m) cable length, Class 3	

## Cable structure

 <b>Fibre Optic Cable</b>	50/125 µm, 62.5/125 µm special fixed fiber elements with aramid strain relief
 <b>Conductor construction</b>	Optical Fibers cabled with high-tensile aramid dampers around a central reinforced filler element.
 <b>Color code</b>	► See P/N Table
 <b>Outer jacket</b>	Low-adhesion mixture on the basis of TPE, especially abrasion-resistant and highly flexible, adapted to suit the requirements in E-Chains®. Color: Jet black (similar to RAL 9005)

## Properties and approvals

 <b>UV resistance</b>	High
 <b>Oil resistance</b>	Oil-resistant (following DIN EN 60811-404), bio-oil-resistant (following VDMA 24568 with Plantocut 8 S-MB tested by DEA), Class 4
 <b>Silicone-free</b>	Free from silicone which can affect paint adhesion (following PV 3.10.7 – status 1992)
 <b>Halogen-free</b>	Following DIN EN 60754

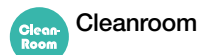
Configurators ► [www.igus.com/CFROBOT5](http://www.igus.com/CFROBOT5)

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

Basic requirements  
Travel distance  
Oil resistance  
Torsion

low	1	2	3	4	5	6	7	highest
unsupported	1	2	3	4	5	6	≥ 1312 ft	
none	1	2	3	4	highest			
none	1	2	3	4	±360°			

## Class 6.1.4.3



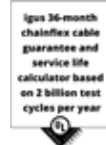
Certificate No. B129699: igus 36-month chainflex cable guarantee and service life calculator based on 2 billion test cycles per year

In accordance with regulation (EC) No. 1907/2006 (REACH)

Following 2011/65/EC (RoHS-II/RoHS-III)

According to ISO Class 1. The outer jacket material of this series complies with CF9.15.07 - tested by IPA according to standard DIN EN ISO 14644-1

Following 2014/35/EU



### Guaranteed service life (details see page 26-27)

Cycles*	5 million	7.5 million	10 million
Temperature, from/to [°F]	Torsion max. [°/m]	Torsion max. [°/m]	Torsion max. [°/m]
-31/-13	±150	±90	±30
-13/+158	±180	±120	±60
+158/+176	±150	±90	±30

\* Higher number of cycles? Online lifetime calculation ► [www.chainflex.com/chainflexlife](http://www.chainflex.com/chainflexlife)

### Typical application areas

- For maximum mechanical load requirements with torsional movements, Class 6
- Especially for robots and 3D movements, Class 1
- Almost unlimited resistance to oil, also with bio-oils, Class 4
- Torsion ±180°, with 3.281ft (1m) cable length, Class 3
- Indoor and outdoor applications, UV-resistant
- Robots, Handling

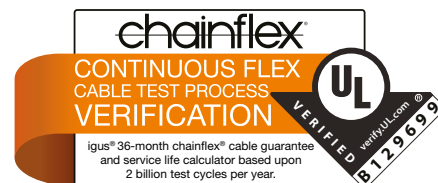
Part No.	Fiber Count	Fibre diameter	Outer diameter max.		Weight	
			[in.]	[mm]	[lbs/mft]	[kg/km]
CFROBOT5-500 <sup>11)</sup>	2	62,5/125	0.33	8.5	35.6	53
CFROBOT5-501 <sup>11)</sup>	2	50/125	0.33	8.5	35.6	53

Part No.	Bandwidth	Bandwidth	Attenuation	Attenuation	Fiber identification
	[MHz x km] @ 850 nm	[MHz x km] @ 1300 nm	[dB/km] @ 850 nm	[dB/km] @ 1300 nm	
CFROBOT5-500 <sup>11)</sup>	≥ 200	≥ 500	≤ 3.0	≤ 0.7	orange with white numbers
CFROBOT5-501 <sup>11)</sup>	≥ 500	≥ 500	≤ 2.5	≤ 0.7	blue with white numbers

<sup>11)</sup> Phase-out model

**Note:** The given outer diameters are maximum values.

**G** = with green-yellow earth core **x** = without earth core



# Motor cable | PUR | chainflex® CFROBOT6







**36** 10,000,000  
Cycles guaranteed

**10 x d**  
Bend radius E-Chain®





**±180°/3.281 ft**  
Torsion angle

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

## Dynamic Information

 <b>Bend radius</b>	<b>E-Chain® twisted flexible</b>	min. 10 x d min. 8 x d
	<b>fixed</b>	min. 5 x d
 <b>Temperature</b>	<b>E-Chain® twisted flexible</b>	-13 °F to +176 °F (-25 °C to +80 °C) -40 °F to +176 °F (-40 °C to +80 °C)
	<b>fixed</b>	-58 °F to +176 °F (-50 °C to +80 °C)
 <b>v max.</b>	<b>twisted</b>	180 °/s
 <b>a max.</b>	<b>twisted</b>	60 °/s <sup>2</sup>
 <b>Travel distance</b>	Especially for robots and 3D movements	
 <b>Torsion</b>	Torsion ±180°, with 3.281ft (1m) cable length, Class 3	





## Cable structure

 <b>Conductor</b>	Conductor consisting of bare copper wires (according to DIN EN 60228).
 <b>Conductor insulation</b>	Mechanically high-quality TPE mixture.
 <b>Color code</b>	Black with white numbers 1-2, one conductor green-yellow.
 <b>Outer jacket</b>	Low-adhesion, halogen-free, highly abrasion-resistant mixture on the basis of PUR, adapted to suit the requirements in E-Chains® (following DIN EN 50363-10-2). Color: Dark blue (similar to RAL 5011)

## Electrical Information

 <b>Nominal voltage</b>	1000 V
 <b>Test voltage</b>	4000 V (following DIN EN 50395)

## Properties and approvals

 <b>UV resistance</b>	High
 <b>Oil resistance</b>	Oil-resistant (following DIN EN 50363-10-2), Class 3
 <b>Flame resistance</b>	According to IEC 60332-1-2, FT1, VW-1
 <b>Silicone-free</b>	Free from silicone which can affect paint adhesion (following PV 3.10.7 – status 1992)











Configurators ► [www.igus.com/CFROBOT6](http://www.igus.com/CFROBOT6)

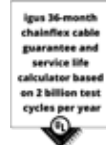
36 month guarantee ... 1,354 types from stock ... no cutting charges

Basic requirements  
Travel distance  
Oil resistance  
Torsion

low	1	2	3	4	5	6	7	highest
unsupported	1	2	3	4	5	6	≥ 1312 ft	
none	1	2	3	4	highest			
none	1	2	3	4	±360°			

## Class 6.1.3.3

	<b>Halogen-free</b>	Following DIN EN 60754
	<b>UL verified</b>	Certificate No. B129699: igus 36-month chainflex cable guarantee and service life calculator based on 2 billion test cycles per year
	<b>UL/CSA AWM</b>	See data sheet for details ► <a href="http://www.igus.com/CFROBOT6">www.igus.com/CFROBOT6</a>
	<b>NFPA 79</b>	Complies to Electrical Standard for Industrial Machinery NFPA 79 Section 12.9
	<b>EAC</b>	Certificate No. RU C-DE.ME77.B.02324 (TR ZU)
	<b>CTP</b>	Certificate No. C-DE.PB49.B.00420 (Fire protection)
	<b>REACH</b>	In accordance with regulation (EC) No. 1907/2006 (REACH)
	<b>Lead-free</b>	Following 2011/65/EC (RoHS-II/RoHS-III)
	<b>Cleanroom</b>	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
	<b>CE</b>	Following 2014/35/EU



### Guaranteed service life (details see page 26-27)

Cycles*	5 million	7.5 million	10 million
Temperature, from/to [°F]	Torsion max. [°/m]	Torsion max. [°/m]	Torsion max. [°/m]
-13/+5	±150	±90	±30
+5/+158	±180	±120	±60
+158/+176	±150	±90	±30

\* Higher number of cycles? Online lifetime calculation ► [www.chainflex.com/chainflexlife](http://www.chainflex.com/chainflexlife)

### Typical application areas

- For maximum mechanical load requirements with torsional movements, Class 6
- Especially for robots and 3D movements, Class 1
- Almost unlimited resistance to oil, Class 3
- Torsion ±180°, with 3.281ft (1m) cable length, Class 3
- Indoor and outdoor applications, UV-resistant
- Robots, Handling, spindle drives

Part No.	AWG	Number of Conductors and rated cross section	Outer diameter max.		Copper index		Weight	
			[in.]	[mm]	[lbs/mft]	[kg/km]	[lbs/mft]	[kg/km]
CFROBOT6-100-03 <sup>11)</sup>	8	3 G 10.0	0.59	15.0	199.6	297	260.7	388
CFROBOT6-160-03 <sup>11)</sup>	6	3 G 16.0	0.71	18.0	319.2	475	388.4	578
CFROBOT6-250-03	4	3 G 25.0	0.87	22.0	495.2	737	602.1	896

<sup>11)</sup> Phase-out model

**Note:** The given outer diameters are maximum values.

**G** = with green-yellow earth core **x** = without earth core

# Motor cable | PUR | chainflex® CFROBOT7







**36** 10,000,000  
Cycles guaranteed

**10 x d**  
Bend radius E-Chain®






**±180°/3.281 ft**  
Torsion angle

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



## Dynamic Information

 Bend radius	<b>E-Chain® twisted flexible</b>	min. 10 x d
	<b>fixed</b>	min. 8 x d
	<b>fixed</b>	min. 5 x d
 Temperature	<b>E-Chain® twisted flexible</b>	-13 °F to +176 °F (-25 °C to +80 °C)
	<b>flexible</b>	-40 °F to +176 °F (-40 °C to +80 °C)
	<b>fixed</b>	-58 °F to +176 °F (-50 °C to +80 °C)
 v max.	<b>twisted</b>	180 °/s
 a max.	<b>twisted</b>	60 °/s <sup>2</sup>
 Travel distance	Especially for robots and 3D movements	
 Torsion	Torsion ±180°, with 3.281ft (1m) cable length, Class 3	

## Cable structure

 Conductor	Conductor consisting of bare copper wires (according to DIN EN 60228).
 Conductor insulation	Mechanically high-quality TPE mixture.
 Color code	<b>Power conductors:</b> Black with white numbers, one conductor green-yellow. <b>2 Control pairs:</b> Black with white numbers. Control Pair 1: Printed 5 and 6 Control Pair 2: Printed 7 and 8 <b>4 Control pairs:</b> Color code in accordance with DIN 47100
 Overall shield	Extremely torsion-resistant tinned braided copper shield. 85 % optical coverage
 Outer jacket	Low-adhesion, halogen-free, highly abrasion-resistant mixture on the basis of PUR, adapted to suit the requirements in E-Chains® (following DIN EN 50363-10-2). Color: Dark blue (similar to RAL 5011)

## Electrical Information

 Nominal voltage	1000 V
 Test voltage	4000 V (following DIN EN 50395)

Example image

Configurators ► [www.igus.com/CFROBOT7](http://www.igus.com/CFROBOT7)















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

Basic requirements  
Travel distance  
Oil resistance  
Torsion

low	1	2	3	4	5	6	7	highest
unsupported	1	2	3	4	5	6	≥ 1312 ft	
none	1	2	3	4	highest			
none	1	2	3	4	±360°			

## Class 6.1.3.3

### Properties and approvals

	<b>UV resistance</b>	High
	<b>Oil resistance</b>	Oil-resistant (following DIN EN 50363-10-2), Class 3
	<b>Flame resistance</b>	According to IEC 60332-1-2, FT1, VW-1
	<b>Silicone-free</b>	Free from silicone which can affect paint adhesion (following PV 3.10.7 – status 1992)
	<b>Halogen-free</b>	Following DIN EN 60754
	<b>UL verified</b>	Certificate No. B129699: igus 36-month chainflex cable guarantee and service life calculator based on 2 billion test cycles per year
	<b>UL/CSA AWM</b>	See data sheet for details ► <a href="http://www.igus.com/CFROBOT7">www.igus.com/CFROBOT7</a>
	<b>NFPA 79</b>	Complies to Electrical Standard for Industrial Machinery NFPA 79 Section 12.9
	<b>EAC</b>	Certificate No. RU C-DE.ME77.B.02324 (TR ZU)
	<b>CTP</b>	Certificate No. C-DE.PB49.B.00420 (Fire protection)
	<b>REACH</b>	In accordance with regulation (EC) No. 1907/2006 (REACH)
	<b>Lead-free</b>	Following 2011/65/EC (RoHS-II/RoHS-III)
	<b>Cleanroom</b>	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
	<b>CE</b>	Following 2014/35/EU

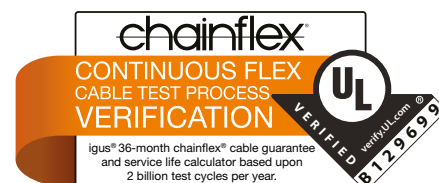
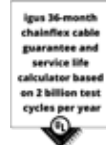
### Guaranteed service life (details see page 26-27)

Cycles*	5 million	7.5 million	10 million
Temperature, from/to [°F]	Torsion max. [°/m]	Torsion max. [°/m]	Torsion max. [°/m]
-13/+5	±150	±90	±30
+5/+158	±180	±120	±60
+158/+176	±150	±90	±30

\* Higher number of cycles? Online lifetime calculation ► [www.chainflex.com/chainflexlife](http://www.chainflex.com/chainflexlife)

### Typical application areas

- For maximum mechanical load requirements with torsional movements, Class 6
- Especially for robots and 3D movements, Class 1
- Almost unlimited resistance to oil, Class 3
- Torsion ±180°, with 3.281ft (1m) cable length, Class 3
- Indoor and outdoor applications, UV-resistant
- Robots, Handling, spindle drives





# Motor cable | PUR | chainflex® CFROBOT7



Example image

Part No.	AWG	Number of Conductors and rated cross section [mm²]	Outer diameter max.		Copper index		Weight	
			[in.]	[mm]	[lbs/ft]	[kg/km]	[lbs/ft]	[kg/km]
<b>without control pair</b>								
CFROBOT7-15-03-C	16	3 G 1.5	0.33	8.5	41.0	61	65.9	98
CFROBOT7-15-04-C	16	4 G 1.5	0.37	9.5	51.7	77	80.6	120
CFROBOT7-25-03-C	14	3 G 2.5	0.39	10.0	62.5	93	95.4	142
CFROBOT7-25-04-C	14	4 G 2.5	0.43	11.0	80.0	119	116.3	173
CFROBOT7-60-04-C	10	4 G 6.0	0.59	15.0	186.8	278	251.3	374
<b>2 Control pairs</b>								
New CFROBOT7-07-03-02-02-C	18	4 G 0.75	0.45	11.5	59.1	88	104.2	155
	22	2 PR x 0.34						
CFROBOT7-15-15-02-02-C	16	4 G 1.5	0.65	16.5	132.4	197	204.3	304
	16	2 PR x 1.5						
CFROBOT7-25-15-02-02-C	14	4 G 2.5	0.65	16.5	163.3	243	234.5	349
	16	2 PR x 1.5						
<b>4 Control pairs</b>								
CFROBOT7-40-02-02-04-C	12	4 G 4.0	0.67	17.0	170.0	253	245.9	366
	24	4 PR x 0.25						

**Note:** The given outer diameters are maximum values.  
G = with green-yellow earth core x = without earth core

# Class 6.1.3.3

Basic requirements  
 Travel distance  
 Oil resistance  
 Torsion

low	1	2	3	4	5	6	7	highest
unsupported	1	2	3	4	5	6	≥ 1312 ft	
none	1	2	3	4	highest			
none	1	2	3	4	±360°			

**CFROBOT7**  
**PUR**  
**10 x d**



Guarantee  
 igus chainflex  
**36**  
 up to 36 months guarantee

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



**Order example: CFROBOT7-15-03-C – To your desired length**  
 CFROBOT7 chainflex® series -15 Code nominal cross section -03 Number of conductors



Online order ► [www.chainflex.com/CFROBOT7](http://www.chainflex.com/CFROBOT7)



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



Guarantee  
 igus chainflex  
**36**  
 up to 36 months guarantee

**chainflex**  
 CONTINUOUS FLEX  
 CABLE TEST PROCESS  
 VERIFICATION  
 igus® 36-month chainflex® cable guarantee  
 and service life calculator based upon  
 2 billion test cycles per year.



# Spindle cable/Single core | TPE | chainflex® CFROBOT







**36** 10,000,000  
Cycles guaranteed

**10 x d**  
Bend radius E-Chain®





**±180°/3.281 ft**  
Torsion angle

- For torsion applications
- TPE outer jacket
- Shielded
- Oil and bio-oil-resistant
- PVC-free
- UV-resistant
- Flame-retardant
- Hydrolysis and microbe-resistant

## Dynamic Information

 Bend radius	<b>E-Chain® twisted flexible</b>	min. 10 x d
	<b>fixed</b>	min. 8 x d
	<b>fixed</b>	min. 5 x d
 Temperature	<b>E-Chain® twisted flexible</b>	-31 °F to +194 °F (-35 °C to +90 °C)
	<b>fixed</b>	-49 °F to +212 °F (-45 °C to +100 °C)
	<b>fixed</b>	-58 °F to +212 °F (-50 °C to +100 °C)
 v max.	<b>twisted</b>	180 °/s
 a max.	<b>twisted</b>	60 °/s <sup>2</sup>
 Travel distance	Especially for robots and 3D movements	
 Torsion	Torsion ±180°, with 3.281ft (1m) cable length, Class 3	





## Cable structure

 Conductor	Extremely bend-resistant cable.
 Conductor insulation	Mechanically high-quality TPE mixture.
 Overall shield	Extremely torsion-resistant tinned braided copper shield. 90 % optical coverage
 Outer jacket	Low-adhesion mixture on the basis of TPE, especially abrasion-resistant and highly flexible, adapted to suit the requirements in E-Chains®. Color: Jet black (similar to RAL 9005)

## Electrical Information

 Nominal voltage	1000 V
 Test voltage	4000 V (following DIN EN 50395)

## Properties and approvals

 UV resistance	High
 Oil resistance	Oil-resistant (following DIN EN 60811-404), bio-oil-resistant (following VDMA 24568 with Plantocut 8 S-MB tested by DEA), Class 4
 Flame resistance	According to IEC 60332-1-2, FT1, VW-1
 Silicone-free	Free from silicone which can affect paint adhesion (following PV 3.10.7 – status 1992)

Example image

Configurators ► [www.igus.com/CFROBOT](http://www.igus.com/CFROBOT)

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

Basic requirements  
Travel distance  
Oil resistance  
Torsion

low	1	2	3	4	5	6	7	highest
unsupported	1	2	3	4	5	6	≥ 1312 ft	
none	1	2	3	4	highest			
none	1	2	3	4	±360°			

## Class 6.1.4.3

-  **UL verified** Certificate No. B129699: igus 36-month chainflex cable guarantee and service life calculator based on 2 billion test cycles per year
-  **UL/CSA AWM** See data sheet for details ► [www.igus.com/CFROBOT](http://www.igus.com/CFROBOT)
-  **NFPA 79** Complies to Electrical Standard for Industrial Machinery NFPA 79 Section 12.9
-  **EAC** Certificate No. RU C-DE.ME77.B.02324 (TR ZU)
-  **CTP** Certificate No. C-DE.PB49.B.00420 (Fire protection)
-  **REACH** In accordance with regulation (EC) No. 1907/2006 (REACH)
-  **Lead-free** Following 2011/65/EC (RoHS-II/RoHS-III)
-  **Cleanroom** According to ISO Class 1. The outer jacket material of this series complies with CF34.UL.25.04.D - tested by IPA according to standard DIN EN ISO 14644-1
-  **CE** Following 2014/35/EU

Guarantee  
igus chainflex  
**36**  
up to 36 months guarantee

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



### Guaranteed service life (details see page 26-27)

Cycles*	5 million	7.5 million	10 million
Temperature, from/to [°F]	Torsion max. [°/m]	Torsion max. [°/m]	Torsion max. [°/m]
-31/-13	±150	±90	±30
-13/+158	±180	±120	±60
+158/+176	±150	±90	±30

\* Higher number of cycles? Online lifetime calculation ► [www.chainflex.com/chainflexlife](http://www.chainflex.com/chainflexlife)

### Typical application areas

- For maximum mechanical load requirements with torsional movements, Class 6
- Especially for robots and 3D movements, Class 1
- Almost unlimited resistance to oil, also with bio-oils, Class 4
- Torsion ±180°, with 3.281ft (1m) cable length, Class 3
- Indoor and outdoor applications, UV-resistant
- Robots, Handling, spindle drives

Part No.	AWG	Number of Conductors and rated cross section	Outer diameter max.		Copper index		Weight	
			[in.]	[mm]	[lbs/mft]	[kg/km]	[lbs/mft]	[kg/km]
<b>CFROBOT-035</b>	8	1 x 10.0	0.41	10.5	84.0	125	130.4	194
<b>CFROBOT-036</b>	6	1 x 16.0	0.47	12.0	127.0	189	180.8	269
<b>CFROBOT-037</b>	4	1 x 25.0	0.57	14.5	200.2	298	263.4	392
<b>CFROBOT-038</b>	2	1 x 35.0	0.61	15.5	270.8	403	354.8	528

Note: The given outer diameters are maximum values.  
G = with green-yellow earth core x = without earth core

Guarantee  
igus chainflex  
**36**  
up to 36 months guarantee

chainflex  
CONTINUOUS FLEX  
CABLE TEST PROCESS  
VERIFICATION

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

UL  
verified  
B129699

# Bus cable | PUR | chainflex® CFROBOT8







**36** 10,000,000  
Cycles guaranteed

**10 x d**  
Bend radius E-Chain®








**±180°/3.281 ft**  
Torsion angle

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



## Dynamic Information

 <b>Bend radius</b>	<b>E-Chain® twisted flexible</b>	min. 10 x d
	<b>fixed</b>	min. 8 x d
	<b>fixed</b>	min. 5 x d
 <b>Temperature</b>	<b>E-Chain® twisted flexible</b>	-13 °F to +158 °F (-25 °C to +70 °C)
	<b>flexible</b>	-40 °F to +158 °F (-40 °C to +70 °C)
	<b>fixed</b>	-58 °F to +158 °F (-50 °C to +70 °C)
 <b>v max.</b>	<b>twisted</b>	180 °/s
 <b>a max.</b>	<b>twisted</b>	60 °/s <sup>2</sup>
 <b>Travel distance</b>	Especially for robots and 3D movements	
 <b>Torsion</b>	Torsion ±180°, with 3.281ft (1m) cable length, Class 3	

## Cable structure

 <b>Conductor</b>	Stranded conductor in especially bending-resistant version consisting of tinned or bare copper wires (following DIN EN 60228).
 <b>Conductor insulation</b>	According to bus specification.
 <b>Conductor construction</b>	According to bus specification.
 <b>Color code</b>	According to bus specification. ▶ See P/N Table
 <b>Intermediate layer</b>	polyester tape over external layer
 <b>Overall shield</b>	Torsion resistant tinned braided copper shield. 80 % optical coverage
 <b>Outer jacket</b>	Low-adhesion, halogen-free, highly abrasion-resistant mixture on the basis of PUR, adapted to suit the requirements in E-Chains® (following DIN EN 50363-10-2). Color: Dark blue (similar to RAL 5011)

## Electrical Information

 <b>Nominal voltage</b>	30 V
 <b>Test voltage</b>	500 V

Example image

Configurators ▶ [www.igus.com/CFROBOT8](http://www.igus.com/CFROBOT8)












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

Basic requirements  
Travel distance  
Oil resistance  
Torsion

low	1	2	3	4	5	6	7	highest
unsupported	1	2	3	4	5	6	≥ 1312 ft	
none	1	2	3	4	highest			
none	1	2	3	4	±360°			

## Class 6.1.3.3

### Properties and approvals

 <b>UV resistance</b>	High
 <b>Oil resistance</b>	Oil-resistant (following DIN EN 50363-10-2), Class 3
 <b>Flame resistance</b>	According to IEC 60332-1-2, FT1
 <b>Silicone-free</b>	Free from silicone which can affect paint adhesion (following PV 3.10.7 – status 1992)
 <b>UL verified</b>	Certificate No. B129699: igus 36-month chainflex cable guarantee and service life calculator based on 2 billion test cycles per year
 <b>UL/CSA AWM</b>	See data sheet for details ► <a href="http://www.igus.com/CFROBOT8">www.igus.com/CFROBOT8</a>
 <b>EAC</b>	Certificate No. RU C-DE.ME77.B.00295/19 (TR ZU)
 <b>REACH</b>	In accordance with regulation (EC) No. 1907/2006 (REACH)
 <b>Lead-free</b>	Following 2011/65/EC (RoHS-II/RoHS-III)
 <b>Cleanroom</b>	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
 <b>CE</b>	Following 2014/35/EU

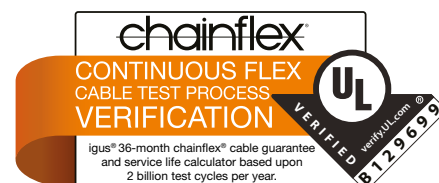
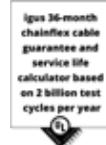
### Guaranteed service life (details see page 26-27)

Cycles*	5 million	7.5 million	10 million
Temperature, from/to [°F]	Torsion max. [°/m]	Torsion max. [°/m]	Torsion max. [°/m]
-13/+5	±150	±90	±30
+5/+140	±180	±120	±60
+140/+158	±150	±90	±30

\* Higher number of cycles? Online lifetime calculation ► [www.chainflex.com/chainflexlife](http://www.chainflex.com/chainflexlife)

### Typical application areas

- For maximum mechanical load requirements with torsional movements, Class 6
- Especially for robots and 3D movements, Class 1
- Almost unlimited resistance to oil, Class 3
- Torsion ±180°, with 3.281ft (1m) cable length, Class 3
- Indoor and outdoor applications, UV-resistant
- Robots, Handling, spindle drives



# Bus cable | PUR | chainflex® CFROBOT8

igus® chainflex® CFROBOT 8

Example image

Part No.	AWG	Number of Conductors and rated cross section	Outer diameter max.		Copper index		Weight	
			[in.]	[mm]	lbs/mft	[kg/km]	lbs/mft	[kg/km]
<b>Profibus (1x2x0.64 mm)</b>								
CFROBOT8-001	22	1 PR x 0.35	0.31	8.0	18.8	28	42.3	63
<b>CAN-Bus</b>								
CFROBOT8-022	20	2 PR x 0.5	0.30	7.5	27.6	41	52.4	78
<b>DeviceNet</b>								
CFROBOT8-030	24	1 PR x 24 AWG	0.37	9.5	20.8	31	51.7	77
	22	1 PR x 22 AWG						
<b>Ethernet/CAT5e/PoE</b>								
CFROBOT8-045	26	4 STP x 0.14	0.37	9.5	32.3	48	64.5	96
<b>Ethernet/CAT6/PoE</b>								
CFROBOT8-049	26	4 STP x 0.14	0.37	9.5	32.3	48	64.5	96
<b>Ethernet/CAT6A</b>								
CFROBOT8-050	26	4 STP x 0.15	0.41	10.5	34.3	51	90.0	134
<b>Ethernet/CAT7</b>								
CFROBOT8-052	26	4 STP x 0.15	0.41	10.5	34.3	51	90.0	134
<b>Profinet</b>								
CFROBOT8-060	22	2 PR x 0.34	0.33	8.5	22.8	34	49.7	74

**Note:** The given outer diameters are maximum values.  
G = with green-yellow earth core x = without earth core

### 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.

# Class 6.1.3.3

Basic requirements  
 Travel distance  
 Oil resistance  
 Torsion

low	1	2	3	4	5	6	7	highest
unsupported	1	2	3	4	5	6	≥ 1312 ft	
none	1	2	3	4	highest			
none	1	2	3	4	±360°			

**CFROBOT8**  
 PUR  
 10 x d



Guarantee  
 igus chainflex  
**36**  
 up to 36 months guarantee

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

Part No.	Characteristic Impedance [Ω]	Core group	Color code
CFROBOT8-001	150	(2x0.35)C	red, green
CFROBOT8-022	120	(4x0.5)C	white, green, brown, yellow (Star-quad)
CFROBOT8-030	120	(2xAWG24)C (2xAWG22)C	white/blue red/black
CFROBOT8-045	100	4x(2x0.15)C	white-green/green, white-orange/orange, white-blue/blue, white-brown/brown
CFROBOT8-049	100	4x(2x0.15)C	white-green/green, white-orange/orange, white-blue/blue, white-brown/brown
CFROBOT8-050	100	4x(2x0.15)C	white-green/green, white-orange/orange, white-blue/blue, white-brown/brown
CFROBOT8-052	100	4x(2x0.15)C	white-green/green, white-orange/orange, white-blue/blue, white-brown/brown
CFROBOT8-060	100	(2x(2x0.34))C	white/blue, yellow/orange

CFRIP

UL LISTED

RULUS

NFPA

CIPA

UL

EAC

RoHS

Clean-Room

UL

CE



CFROBOT® cables used in robots for the automated systems in fuel tank production. The cable packages are supplied as harnessed readychain® systems.

Guarantee  
 igus chainflex  
**36**  
 up to 36 months guarantee

chainflex  
 CONTINUOUS FLEX  
 CABLE TEST PROCESS  
 VERIFICATION

UL  
 www.igus.com  
 8129699

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



# Bus cable | PUR | chainflex® CFROBOT8-PLUS







**36** 10,000,000  
Cycles guaranteed

**10 x d**  
Bend radius E-Chain®








**±360°/3.281 ft**  
Torsion angle

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



## Dynamic Information

 Bend radius	<b>E-Chain® twisted flexible</b>	min. 10 x d
	<b>fixed</b>	min. 8 x d
		min. 5 x d
 Temperature	<b>E-Chain® twisted flexible</b>	-13 °F to +158 °F (-25 °C to +70 °C)
	<b>fixed</b>	-40 °F to +158 °F (-40 °C to +70 °C)
	<b>twisted</b>	-58 °F to +158 °F (-50 °C to +70 °C)
 v max.	<b>twisted</b>	360 °/s
 a max.	<b>twisted</b>	60 °/s <sup>2</sup>
 Travel distance	Especially for robots and 3D movements	
 Torsion	Torsion ±360°, with 3.281ft (1m) cable length, Class 4	

## Cable structure

 Conductor	Conductor consisting of bare copper wires (according to DIN EN 60228).
 Conductor insulation	According to bus specification.
 Conductor construction	According to bus specification.
 Color code	According to bus specification. ▶ See P/N Table
 Intermediate layer	polyester tape over external layer
 Overall shield	Torsion resistant tinned braided copper shield. 80 % optical coverage
 Outer jacket	Low-adhesion, halogen-free, highly abrasion-resistant mixture on the basis of PUR, adapted to suit the requirements in E-Chains® (following DIN EN 50363-10-2). Color: Dark blue (similar to RAL 5011)

## Electrical Information

 Nominal voltage	30 V
 Test voltage	500 V

Example image

Configurators ▶ [www.igus.com/CFROBOT8-PLUS](http://www.igus.com/CFROBOT8-PLUS)













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

Basic requirements  
Travel distance  
Oil resistance  
Torsion

low	1	2	3	4	5	6	7	highest
unsupported	1	2	3	4	5	6	≥ 1312 ft	
none	1	2	3	4	highest			
none	1	2	3	4	±360°			

## Class 6.1.3.4

### Properties and approvals

	<b>UV resistance</b>	High
	<b>Oil resistance</b>	Oil-resistant (following DIN EN 50363-10-2), Class 3
	<b>Flame resistance</b>	According to IEC 60332-1-2, FT1
	<b>Silicone-free</b>	Free from silicone which can affect paint adhesion (following PV 3.10.7 – status 1992)
	<b>Halogen-free</b>	Following DIN EN 60754
	<b>UL verified</b>	Certificate No. B129699: igus 36-month chainflex cable guarantee and service life calculator based on 2 billion test cycles per year
	<b>UL/CSA AWM</b>	See data sheet for details ► <a href="http://www.igus.com/CFROBOT8-PLUS">www.igus.com/CFROBOT8-PLUS</a>
	<b>EAC</b>	Certificate No. RU C-DE.ME77.B.00295/19 (TR ZU)
	<b>REACH</b>	In accordance with regulation (EC) No. 1907/2006 (REACH)
	<b>Lead-free</b>	Following 2011/65/EC (RoHS-II/RoHS-III)
	<b>Cleanroom</b>	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
	<b>CE</b>	Following 2014/35/EU

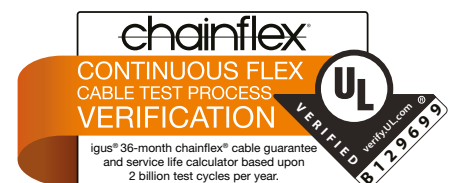
### Guaranteed service life (details see page 26-27)

Cycles*	5 million	7.5 million	10 million
Temperature, from/to [°F]	Torsion max. [°/m]	Torsion max. [°/m]	Torsion max. [°/m]
-13/+5	±330	±240	±150
+5/+140	±360	±270	±180
+140/+158	±330	±240	±150

\* Higher number of cycles? Online lifetime calculation ► [www.chainflex.com/chainflexlife](http://www.chainflex.com/chainflexlife)

### Typical application areas


- For maximum mechanical load requirements with torsional movements, Class 6
- Especially for robots and 3D movements, Class 1
- Almost unlimited resistance to oil, Class 3
- Torsion ±360°, with 3.281ft (1m) cable length, Class 4
- Indoor and outdoor applications, UV-resistant
- Robots, Handling, spindle drives



# Bus cable | PUR | chainflex® CFROBOT8-PLUS

igus® chainflex® CFROBOT8-PLUS

Example image

Part No.	AWG	Number of Conductors and rated cross section	Outer diameter max.		Copper index		Weight	
			[in.]	[mm]	lbs/mft	[kg/km]	lbs/mft	[kg/km]
<b>Profibus (1x2x0,64 mm)</b>								
CFROBOT8-PLUS-001	24	1 PR x 0.25	0.35	9.0	20.2	30	53.8	80
<b>Ethernet/CAT5e/PoE</b>								
CFROBOT8-PLUS-045	26	4 STP x 0.15	0.30	7.5	21.5	32	45.0	67
<b>Profinet</b>								
 CFROBOT8-PLUS-060 <sup>2)</sup>	22	2 PR x 0.34	0.28	7.0	21.5	32	43.0	64

The chainflex® types marked with <sup>2)</sup> are cables designed as a star-quad.

**Note:** The given outer diameters are maximum values.

**G** = with green-yellow earth core **x** = without earth core



**Order example: CFROBOT8-PLUS-060 – To your desired length**  
CFROBOT8-PLUS chainflex® series -060 Code Bus type



Online order ► [www.chainflex.com/CFROBOT8-PLUS](http://www.chainflex.com/CFROBOT8-PLUS)



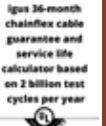
Delivery time 24hrs or today.  
Delivery time means time until goods are shipped.

# Class 6.1.3.4

Basic requirements  
Travel distance  
Oil resistance  
Torsion

low	1	2	3	4	5	6	7	highest
unsupported	1	2	3	4	5	6	≥ 1312 ft	
none	1	2	3	4	highest			
none	1	2	3	4	±360°			

**CFROBOT8-PLUS PUR**  
10 x d



Part No.	Characteristic Impedance [Ω]	Core group	Color code
CFROBOT8-PLUS-001	150	(2x0.25)C	red, green
CFROBOT8-PLUS-045	100	(4x(2x0.15))C	white-blue/blue, white-orange/orange, white-green/green, white-brown/brown
CFROBOT8-PLUS-060 <sup>2)</sup>	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.



# Hybrid cable | PUR | chainflex® CFROBOT9







**36** 10,000,000  
Cycles guaranteed

**10 x d**  
Bend radius E-Chain®






**±180°/3.281 ft**  
Torsion angle

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

## Dynamic Information

 Bend radius	<b>E-Chain® twisted flexible</b>	min. 10 x d
	<b>fixed</b>	min. 8 x d
		min. 5 x d
 Temperature	<b>E-Chain® twisted flexible</b>	-13 °F to +176 °F (-25 °C to +80 °C)
	<b>fixed</b>	-40 °F to +176 °F (-40 °C to +80 °C)
	<b>twisted</b>	-58 °F to +176 °F (-50 °C to +80 °C)
 v max.		180 °/s
 a max.	<b>twisted</b>	60 °/s <sup>2</sup>
 Travel distance	Especially for robots and 3D movements	
 Torsion	Torsion ±180°, with 3.281ft (1m) cable length, Class 3	

## Cable structure

 Conductor	Conductor consisting of bare copper wires (according to DIN EN 60228).
 Conductor insulation	Mechanically high-quality TPE mixture.
 Color code	► See P/N Table
 Element shield	Extremely torsion-resistant tinned braided copper shield.
 Outer jacket	Low-adhesion, halogen-free, highly abrasion-resistant mixture on the basis of PUR, adapted to suit the requirements in E-Chains® (following DIN EN 50363-10-2). Color: Dark blue (similar to RAL 5011)

## Electrical Information

 Nominal voltage	300 V
 Test voltage	2000 V (following DIN EN 50395)

Example image

Configurators ► [www.igus.com/CFROBOT9](http://www.igus.com/CFROBOT9)














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

Basic requirements  
Travel distance  
Oil resistance  
Torsion

low	1	2	3	4	5	6	7	highest
unsupported	1	2	3	4	5	6	≥ 1312 ft	
none	1	2	3	4	highest			
none	1	2	3	4	±360°			

## Class 6.1.3.3

### Properties and approvals

	<b>UV resistance</b>	High
	<b>Oil resistance</b>	Oil-resistant (following DIN EN 50363-10-2), Class 3
	<b>Flame resistance</b>	According to IEC 60332-1-2, FT1, VW-1
	<b>Silicone-free</b>	Free from silicone which can affect paint adhesion (following PV 3.10.7 – status 1992)
	<b>Halogen-free</b>	Following DIN EN 60754
	<b>UL verified</b>	Certificate No. B129699: igus 36-month chainflex cable guarantee and service life calculator based on 2 billion test cycles per year
	<b>UL/CSA AWM</b>	See data sheet for details ► <a href="http://www.igus.com/CFROBOT9">www.igus.com/CFROBOT9</a>
	<b>NFPA 79</b>	Complies to Electrical Standard for Industrial Machinery NFPA 79 Section 12.9
	<b>EAC</b>	Certificate No. RU C-DE.ME77.B.00300/19 (TR ZU)
	<b>REACH</b>	In accordance with regulation (EC) No. 1907/2006 (REACH)
	<b>Lead-free</b>	Following 2011/65/EC (RoHS-II/RoHS-III)
	<b>Cleanroom</b>	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
	<b>CE</b>	Following 2014/35/EU

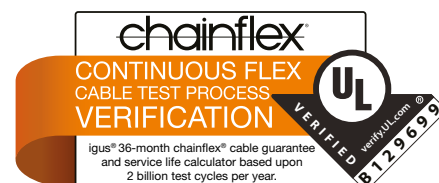
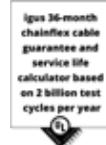
### Guaranteed service life (details see page 26-27)

Cycles*	5 million	7.5 million	10 million
Temperature, from/to [°F]	Torsion max. [°/m]	Torsion max. [°/m]	Torsion max. [°/m]
-13/+5	±150	±90	±30
+5/+158	±180	±120	±60
+158/+176	±150	±90	±30


\* Higher number of cycles? Online lifetime calculation ► [www.chainflex.com/chainflexlife](http://www.chainflex.com/chainflexlife)

### Typical application areas

- For maximum mechanical load requirements with torsional movements, Class 6
- Especially for robots and 3D movements, Class 1
- Almost unlimited resistance to oil, Class 3
- Torsion ±180°, with 3.281ft (1m) cable length, Class 3
- Indoor and outdoor applications, UV-resistant
- Robots, Handling, spindle drives



# Hybrid cable | PUR | chainflex® CFROBOT9



igus® chainflex® CFROBOT 9

Example image

Part No.	AWG	Number of Conductors and rated cross section	Outer diameter max.		Copper index		Weight	
			[in.]	[mm]	lbs/mft	[kg/km]	lbs/mft	[kg/km]
CFROBOT9-001	17	5 G 1.0	0.39	10.0	55.1	82	91.4	136
	17	2 x 1.0 SHLD						
CFROBOT9-004 <sup>11)</sup>	17	16 G 1.0	0.61	15.5	130.4	194	206.3	307
	17	2 x 1.0 SHLD						
CFROBOT9-006 <sup>11)</sup>	17	24 G 1.0	0.75	19.0	188.2	280	304.4	453
	17	2 x 1.0 SHLD						
CFROBOT9-007	24	15 STP x 0.25	0.73	18.5	153.9	229	248.0	369
	24	2 PR x 0.25 SHLD						
CFROBOT9-010	24	4 STP x 0.25	0.41	10.5	42.3	63	77.9	116

<sup>11)</sup> Phase-out model

**Note:** The given outer diameters are maximum values.

**G** = with green-yellow earth core **x** = without earth core

# Class 6.1.3.3

Basic requirements  
 Travel distance  
 Oil resistance  
 Torsion

low	1	2	3	4	5	6	7	highest
unsupported	1	2	3	4	5	6	≥ 1312 ft	
none	1	2	3	4	highest			
none	1	2	3	4	±360°			

**CFROBOT9**  
**PUR**  
**10 x d**



Guarantee  
 igus chainflex  
**36**  
 up to 36 months guarantee

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

Part No.	Core group	Color code
CFROBOT9-001	5G1.0 (2x1.0)C	white with black numbers 1-4, one conductor green-yellow white with black numbers 5-6
CFROBOT9-004 <sup>11)</sup>	16G1.0 (2x1.0)C	white with black numbers 1-4, 7-17, one conductor green-yellow white with black numbers 5-6
CFROBOT9-006 <sup>11)</sup>	24G1.0 (2x1.0)C	white with black numbers 1-4, 7-25, one conductor green-yellow white with black numbers 5-6
CFROBOT9-007	15x(2x0.25)C (4x0.25)C	Color code in accordance with DIN 47100. white/green/brown/yellow(CAN-Bus)
CFROBOT9-010	4x(2x0.25)C	white/brown, green/yellow, gray/pink, blue/red



igus® chainflex® cables in application of a multi-dimensional moving energy chain triflex® R for 6-axis robots

CFRIP

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RUS

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CIPA

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RoHS

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Guarantee  
 igus chainflex  
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 CABLE TEST PROCESS  
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igus® 36-month chainflex® cable guarantee and service life calculator based upon 2 billion test cycles per year.