

# Data sheet

## chainflex® CF220.UL.H



Hybrid servo cable (Class 4.2.2.1) ● For medium duty applications ● PVC outer jacket  
 ● Shielded ● Oil-resistant ● Flame retardant



Sick (Hiperface DSL)	SEW-EURODRIVE	Siemens (SINAMICS S210)
CF220.UL.H100.07.04- CF220.UL.H102.40.04	CF220.UL.H203.15.04	CF220.UL.H300.03.04- CF220.UL.H301.07.04
B&R		
CF220.UL.H501.15.04		



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



Example image

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### Cable structure

-  **Conductor** Stranded conductor in bending-resistant version consisting of bare copper wires (following DIN EN 60228).
-  **Core insulation** Mechanically high-quality, especially low-capacitance XLPE mixture.  
**CF220.UL.H3xx:** Mechanically high-quality, especially low-capacitance TPE mixture.
-  **Core structure** Power cores and control pair elements wound with a short pitch length around a high tensile strength centre element.
-  **Core identification** According to Servo-Hybrid specification.
-  **Element shield** Bending-resistant braiding made of tinned copper wires.
-  **Intermediate layer** Foil taping over the outer layer.
-  **Overall shield** 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:** Pastel orange (similar to RAL 2003)  
**Printing:** black

„00000 m\*\* igus chainflex CF220.UL.-.-.-① ---② 600/1000V E310776

cRUus AWM Style ③ VW-1 AWM I/II A/B 80°C ④ FT1 EAC/CTP CE UKCA

RoHS-II conform www.igus.eu +++ chainflex cable works +++

\* **Length printing:** Not calibrated. Only intended as an orientation aid.  
 ① / ② Cable identification according to Part No. (see technical table).  
 ③ / ④ Printing of the UL Style / Voltage (see related chapter).  
 Example: ... chainflex CF220.UL.H101.10.04 (4G1.0+(2x0.75)C+(2xAWG22)C)C 600/1000V ...



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### Dynamic information

	<b>Bend radius</b>	e-chain® linear flexible fixed	min. 10 x d min. 8 x d min. 5 x d
	<b>Temperature</b>	e-chain® linear flexible fixed	+5 °C up to +70 °C -5 °C up to +70 °C (following DIN EN 60811-504) -15 °C up to +70 °C (following DIN EN 50305)
	<b>v max.</b>	unsupported gliding	10 m/s 2 m/s
	<b>a max.</b>		50 m/s <sup>2</sup>
	<b>Travel distance</b>		Unsupported travels and up to 10 m for gliding applications, Class 2

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

### Garantierte Lebensdauer gemäß Garantie-Bedingungen

Double strokes	5 million	7.5 million	10 million
<b>Temperature, from/to [°C]</b>	<b>R min. [factor x d]</b>	<b>R min. [factor x d]</b>	<b>R min. [factor x d]</b>
+5/+15	12,5	13,5	14,5
+15/+60	10	11	12
+60/+70	12,5	13,5	14,5

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



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### Eigenschaften und Zulassungen

-  **UV resistance** medium
-  **Oil resistance** Oil-resistant (following DIN EN 50363-4-1), Class 2
-  **Flame retardant** According to IEC 60332-1-2, Cable Flame, VW-1, FT1, FT2 / Horizontal Flame
-  **Silicone-free** Free from silicone which can affect paint adhesion (following PV 3.10.7 – status 1992)
-  **UL verified** Certificate No. B129699: „igus 36-month chainflex cable guarantee and service life calculator based on 2 billion test cycles per year“
-  **UL/CSA AWM** See table UL/CSA AWM for details
-  **NFPA** Following NFPA 79-2018, chapter 12.9
-  **EAC** Certificate No. RU C-DE.ME77.B.00863/20
-  **REACH** In accordance with regulation (EC) No. 1907/2006 (REACH)
-  **Bleifrei** Following 2011/65/EC (RoHS-II/RoHS-III)
-  **RoHS**
-  **Reinraum** 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/EU
-  **UKCA** In accordance with the valid regulations of the United Kingdom (as at 08/2021)



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### Properties and approvals

UL/CSA AWM Details

Part No.	UL style core insulation	UL style outer jacket	UL Voltage Rating [V]	UL Temperature Rating [°C]
CF220.UL.H10x.xx.xx	3646 11807 (AWG22)	2570	1000	80
CF220.UL.H203.15.04	3646 11117 (HF50-0,9/2,95)	2570	1000	80
CF220.UL.H300.03.04 CF220.UL.H301.07.04	10467 11602 (AWG26)	2464	300	80
CF220.UL.H501.15.04	3646 10867 (0.14/0.25/0.75 mm²)	2570	1000	80

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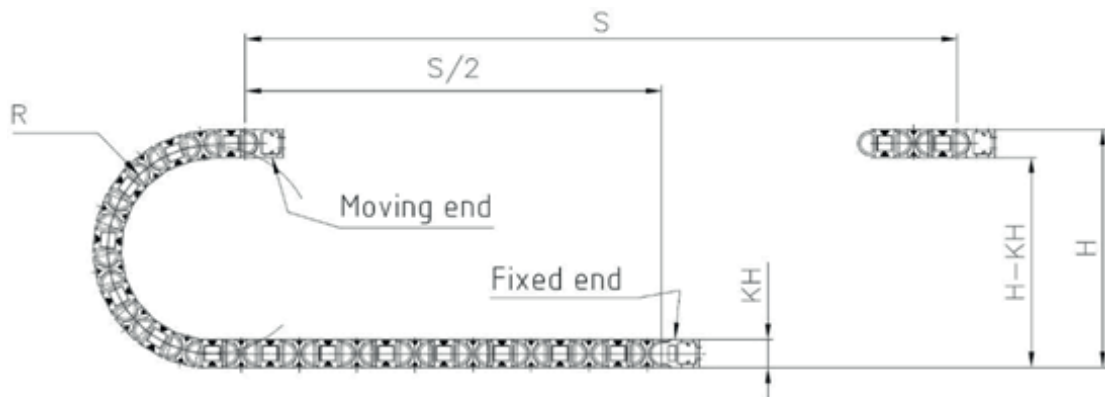


Example image

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### Typical lab test setup for this cable series

Test bend radius R	approx. 125 - 175 mm
Test travel S/S <sub>2</sub>	approx. 1 - 15 m
Test duration	minimum 2 - 4 million double strokes
Test speed	approx. 0.5 - 2 m / s
Test acceleration	approx. 0.5 - 1.5 m / s <sup>2</sup>



### 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
- Wood/stone processing, Packaging industry, supply systems, Handling, adjusting equipment



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### Technical tables:

#### Mechanical information

Art.-Nr.	Number of cores and conductor nominal cross section [mm <sup>2</sup> ]	Outer diameter (d) max. [mm]	Copper index [kg/km]	Weight [kg/km]
<b>Sick (Hiperface DSL)</b>				
CF220.UL.H100.07.04	(4G0.75+(2x0.34)C)+(2xAWG22)C)C	12.0	110	214
CF220.UL.H101.10.04	(4G1.0+(2x0.75)C)+(2xAWG22)C)C	12.0	133	202
CF220.UL.H101.15.04	(4G1.5+(2x0.75)C)+(2xAWG22)C)C	13.0	156	230
CF220.UL.H102.25.04	(4G2.5+(2x1.0)C)+(2xAWG22)C)C	14.5	203	348
CF220.UL.H102.40.04 <sup>11)</sup>	(4G4.0+(2x1.0)C)+(2xAWG22)C)C	16.5	281	434
<b>SEW-EURODRIVE</b>				
CF220.UL.H203.15.04	(4G1.5+(3x1.0)C)C	11.5	133	219
<b>SINAMICS S210</b>				
CF220.UL.H300.03.04 <sup>7)</sup>	(4Gx0.34+(2x0.34)C)+(4xAWG26)C)C	10.0	78	139
CF220.UL.H301.07.04 <sup>7)</sup>	(4Gx0.75+(2x0.5)C)+(4xAWG26)C)C	11.0	100	168
<b>Heidenhain</b>				
CF220.UL.H501.15.04	(4G1.5+(2x0.75)C)+(2x2x0.14+2x0.25)C)C	13.5	170	239

<sup>7)</sup> Nominal voltage 300/500 V (following DIN VDE 0298-3), 300 V (following UL)

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

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

#### Electrical information

Conductor nominal cross section	Maximum conductor resistance at 20 °C (following DIN EN 50289-1-2) [Ω/km]	Maximum current rating at 30 °C (following DIN VDE 0298-4) [A]
0.34 (AWG22)	59.0	7
0.75	26.0	13
1	19.5	15
1.5	13.3	19
2.5	8.0	27
4	4.95	34

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



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### Capacities

Part No.	Control cores		Power cores	
	Core/Core Capacity [approx. pF / m]	Core/Shield Capacity [approx. pF / m]	Core/Core Capacity [approx. pF / m]	Core/Shield Capacity [approx. pF / m]
<b>Sick (Hiperface DSL)</b>				
CF220.UL.H100.07.04	60	105	75	130
CF220.UL.H101.10.04	95	155	100	175
CF220.UL.H101.15.04	80	140	100	175
CF220.UL.H102.25.04	105	185	120	210
CF2d0.UL.H102.40.04	125	220	115	205
<b>SEW-EURODRIVE</b>				
CF220.UL.H203.15.04	80	140	100	175
<b>Siemens (SINAMICS S210)</b>				
CF220.UL.H300.03.04	60	105	85	155
CF220.UL.H301.07.04	70	130	85	155
<b>B&amp;R</b>				
CF220.UL.H501.15.04	85	150	105	185



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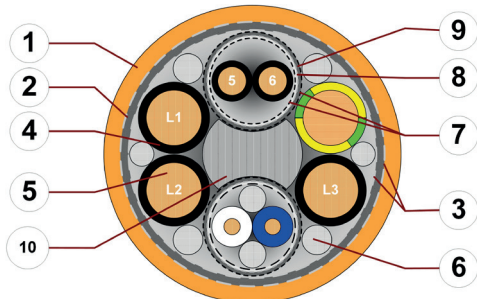
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### Sick (Hiperface DSL)

CF220.UL.H100.07.04-CF220.UL.H102.40.04



1. Outer jacket: Pressure extruded PVC mixture
2. Overall shield: Extremely bending-stable braid made of tinned copper wires
3. Banding: Plastic fleece
4. Core insulation: Mechanically high-quality, especially low-capacitance XLPE mixture
5. Conductor: Especially bending-resistant version consisting of bare copper wires
6. Filling: Plastic yarns
7. Element banding: Plastic foil
8. Shield foil: Aluminium-coated polyester foil
9. Element shield: Bending-resistant braiding made of tinned copper wires
10. Strain relief: Tensile stress-resistant centre element

#### Example image

For detailed overview please see design table

### Electrical information

Bus element	Hiperface DSL
Characteristic wave impedance (following DIN EN 50289-1-11)	110 ± 10 Ω (10 MHz)
Operating capacity	45 pF/m

Nominal voltage	600/1000 V (following DIN VDE 0298-3) 1000 (following UL)
Testing voltage	4000 V (following DIN EN 50395)



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### Sick (Hiperface DSL)

CF220.UL.H100.07.04-CF220.UL.H102.40.04

### Design table

Part No.	Core group	Colour code	Core design
CF220.UL.H100.07.04	4G0.75	3 black cores with white printing: <b>1. Core:</b> U/L1/C/L+ <b>2. Core:</b> V/L2 <b>3. Core:</b> W/L3/D/L- followed by one green-yellow core	
	(2x0.34)C	2 black cores with white numbers 5 & 6	
	(2xAWG22)C	one core each in white and blue	
CF220.UL.H101.10.04	4G1.0	3 black cores with white printing: <b>1. Core:</b> U/L1/C/L+ <b>2. Core:</b> V/L2 <b>3. Core:</b> W/L3/D/L- followed by one green-yellow core	
	(2x0.75)C	2 black cores with white numbers 5 & 6	
	(2xAWG22)C	one core each in white and blue	
CF220.UL.H101.15.04	4G1.5	3 black cores with white printing: <b>1. Core:</b> U/L1/C/L+ <b>2. Core:</b> V/L2 <b>3. Core:</b> W/L3/D/L- followed by one green-yellow core	
	(2x0.75)C	2 black cores with white numbers 5 & 6	
	(2xAWG22)C	one core each in white and blue	
CF220.UL.H102.25.04	4G2.5	3 black cores with white printing: <b>1. Core:</b> U/L1/C/L+ <b>2. Core:</b> V/L2 <b>3. Core:</b> W/L3/D/L- followed by one green-yellow core	
	(2x1.0)C	2 black cores with white numbers 5 & 6	
	(2xAWG22)C	one core each in white and blue	
CF220.UL.H102.40.04	4G4.0	3 black cores with white printing: <b>1. Core:</b> U/L1/C/L+ <b>2. Core:</b> V/L2 <b>3. Core:</b> W/L3/D/L- followed by one green-yellow core	
	(2x1.0)C	2 black cores with white numbers 5 & 6	
	(2xAWG22)C	one core each in white and blue	



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Example image

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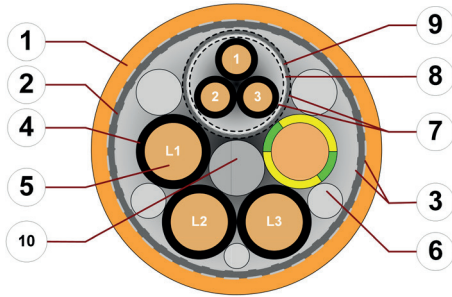
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### SEW-EURODRIVE

CF220.UL.H203.15.04



1. Outer jacket: Pressure extruded PUR mixture
2. Overall shield: Extremely bending-stable braid made of tinned copper wires
3. Banding: Plastic fleece
4. Core insulation: Mechanically high-quality, especially low-capacitance XLPE mixture
5. Conductor: Especially bending-resistant version consisting of bare copper wires
6. Filling: Plastic yarns
7. Element banding: Plastic foil
8. Shield foil: Aluminium-coated polyester foil
9. Element shield: Bending-resistant braiding made of tinned copper wires
10. Strain relief: Tensile stress-resistant centre element

#### Example image

For detailed overview please see design table

### Electrical information

Coaxial element	SEW-EURODRIVE MOVILINK® DDI
Characteristic wave impedance (following DIN EN 50289-1-11)	50 ± 5 Ω (200 MHz)
Operating capacity	100 pF/m (800 kHz)

Nominal voltage	600/1000 V (following DIN VDE 0298-3) 1000 V (following UL)
Testing voltage	4000 V (following DIN EN 50395)

### Design table

Part No.	Core group	Colour code	Core design
CF220.UL.H203.15.04 (SEW-EURODRIVE Kabeltyp E/1,5)	4G1.5	3 black cores with white printing: <b>1. Core:</b> U/L1/C/L+ <b>2. Core:</b> V/L2 <b>3. Core:</b> W/L3/D/L- followed by one green-yellow core	
	(3x1.0)C	3 black cores with white numbers 1 - 3	



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Example image

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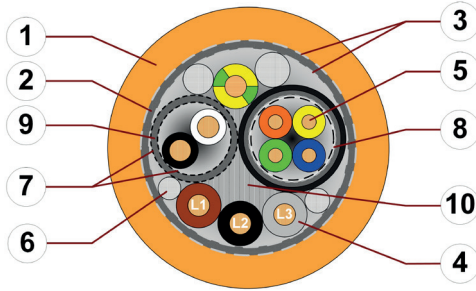
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### Siemens (SINAMICS S210)

CF220.UL.H300.03.04-CF220.UL.H301.07.04



1. Outer jacket: Pressure extruded PUR mixture
2. Overall shield: Extremely bending-stable braid made of tinned copper wires
3. Banding: Plastic fleece
4. Core insulation: Mechanically high-quality, especially low-capacitance TPE mixture
5. Conductor: Especially bending-resistant version consisting of bare copper wires
6. Filling: Plastic yarns
7. Element banding: Plastic foil
8. Shield foil: Aluminium-coated polyester foil
9. Element shield: Bending-resistant braiding made of tinned copper wires
10. Strain relief: Tensile stress-resistant centre element

#### Example image

For detailed overview please see design table

### Electrical information

Bus element	SINAMICS S210
Characteristic wave impedance (following DIN EN 50289-1-11)	100 ± 15 Ω (1-10 MHz)
Operating capacity	50 pF/m

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

### Design table

Part No.	Core group	Colour code	Core design
CF220.UL.H300.03.04	4G0.34	one core each in grey, black and brown: <b>1. Core:</b> U/L1/C/L+ <b>2. Core:</b> V/L2 <b>3. Core:</b> W/L3/D/L- followed by one green-yellow core	
	(2x0.34)C	one core each in black and white	
	(4xAWG26)C	one core each in yellow, blue, green and orange	
CF220.UL.H301.07.04	4G0.75	one core each in grey, black and brown: <b>1. Core:</b> U/L1/C/L+ <b>2. Core:</b> V/L2 <b>3. Core:</b> W/L3/D/L- followed by one green-yellow core	
	(2x0.5)C	one core each in black and white	
	(4xAWG26)C	one core each in yellow, blue, green and orange	



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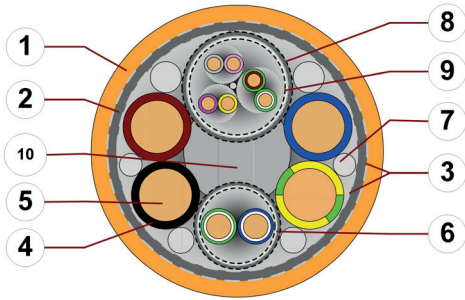


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### B&R

CF220.UL.H501.15.04



1. Outer jacket: Pressure extruded PUR mixture
2. Overall shield: Extremely bending-stable braid made of tinned copper wires
3. Banding: Plastic fleece
4. Core insulation: Mechanically high-quality, especially low-capacitance XLPE mixture
5. Conductor: Especially bending-resistant version consisting of bare copper wires
6. Filling: Plastic yarns
7. Element banding: Plastic foil
8. Shield foil: Aluminium-coated polyester foil
9. Element shield: Bending-resistant braiding made of tinned copper wires
10. Strain relief: Tensile stress-resistant centre element

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For detailed overview please see design table

### Electrical information



**Nominal voltage** 600/1000 V (following DIN VDE 0298-3)  
1000 V (following UL)



**Testing voltage** 4000 V (following DIN EN 50395)

### Design table

Part No.	Core group	Colour code	Core design
CF220.UL.H501.15.04	4G1.5	one core each in black, brown, blue, followed by one green-yellow core	
	(2x0.75)C	one core each in white-blue and white-green	
	2x2x0.14	2 pairs in pink/grey and yellow/violet	
	2x0.25	one core each in brown-green and white-green	

Example image

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