

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	SINAMICS S210
CF220.UL.H100.07.04- CF220.UL.H102.25.04	CF220.UL.H203.15.04	CF220.UL.H300.03.04- CF220.UL.H304.15.04
ctrlX DRIVE	HEIDENHAIN	
CF220.UL.H402.15.04	CF220.UL.H501.15.04	



igus 4-year
chainflex cable
guarantee and
service life
calculator based
on 2 billion test
cycles per year



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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.
	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 linear approx. 55%, optical approx. 80%
	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 CE

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 ...



Data sheet






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Dynamic information

	Bend radius	e-chain® linear flexible fixed	minimum 10 x d minimum 8 x d minimum 5 x d
	Temperature	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)
	v max.	unsupported gliding	10m/s 2m/s
	a max.		50m/s ²
	Travel distance	Unsupported travels and up to 10m 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.

Guaranteed service life according to guarantee conditions

Double strokes	5 million	7.5 million	10 million
Temperature, from/to [°C]	R min. [x d]	R min. [x d]	R min. [x d]
+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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Properties and approvals

	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)
	PTFE-free	The design of these products does not contain PTFE
	UL-verified	Certificate No. V293650: „igus 4-year 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
	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 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

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	2570	1000	80
CF220.UL.H300.03.04	10467	2464	300	80
CF220.UL.H301.07.04	11602 (AWG26)			
CF220.UL.H304.15.04	10492 11807 (AWG26)	2570	1000	80
CF220.UL.H402.15.04	3646 11117 (AWG24)	2570	1000	80
CF220.UL.H501.15.04	3646 10867 (0.14/0.25/0.75 mm²)	2570	1000	80



Example image

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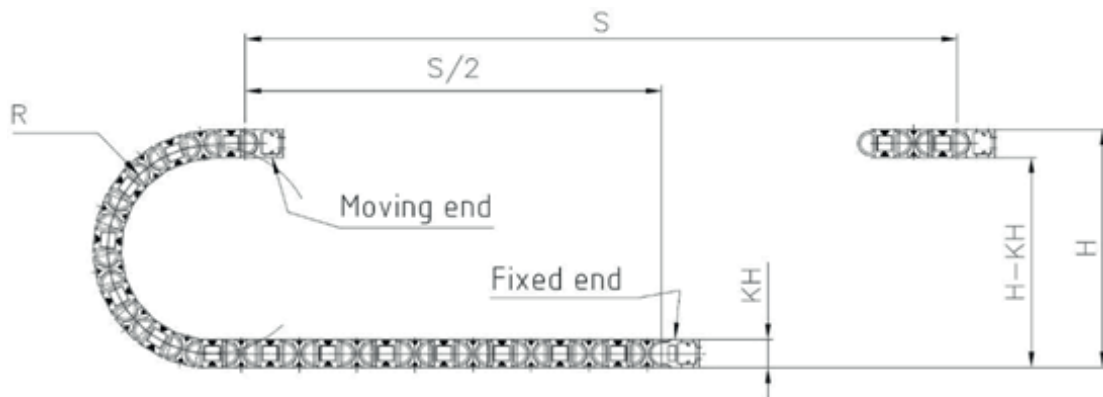
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Typical lab test setup for this cable series

Test bend radius R	approx. 125 - 175 mm
Test travel S/S_2	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 ²



Typical application areas

- For medium duty applications, Class 4
- Unsupported travels and up to 10m 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, feeding, handling, adjusting devices

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Technical tables:

Mechanical information

Art.-Nr.	Number of cores and conductor nominal cross section [mm²]	Outer diameter (d) max. [mm]	Copper index [kg/km]	Weight [kg/km]
SICK (HIPERFACE DSL)				
CF220.UL.H100.07.04	(4G0.75+(2x0.34)C)+(2xAWG22)C)C	11.5	106	166
CF220.UL.H101.10.04	(4G1.0+(2x0.75)C)+(2xAWG22)C)C	12.0	129	200
CF220.UL.H101.15.04	(4G1.5+(2x0.75)C)+(2xAWG22)C)C	13.0	151	226
CF220.UL.H102.25.04	(4G2.5+(2x1.0)C)+(2xAWG22)C)C	14.5	199	289
SEW cable type E/1.5				
CF220.UL.H203.15.04	(4G1.5+(3x1.0)C)C	11.5	133	201
SINAMICS S210				
CF220.UL.H300.03.04	(4Gx0.34+(2x0.34)C)+(4xAWG26)C)C	10.0	78	128
CF220.UL.H301.07.04	(4Gx0.75+(2x0.5)C)+(4xAWG26)C)C	11.0	99	149
CF220.UL.H304.15.04	(4G1.5+(2x1.5)C)+(4xAWG26)C)C	13.0	159	234
ctrlX DRIVE				
CF220.UL.H402.15.04	(4G1.5+(2x0.75)+(4xAWG24)C)C	13.0	147	236
HEIDENHAIN				
CF220.UL.H501.15.04	(4G1.5+(2x0.75)C)+(2x2x0.14+2x0.25)C)C	13.5	150	240

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]
SICK (HIPERFACE DSL)				
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
SEW cable type E/1.5				
CF220.UL.H203.15.04	80	140	100	175
Siemens (SINAMICS S210)				
CF220.UL.H300.03.04	60	105	85	155
CF220.UL.H301.07.04	70	130	85	155
CF220.UL.H304.15.04	90	155	135	245
Bosch Rexroth (ctrlX DRIVE)				
CF220.UL.H402.15.04	80	140	100	175
B&R (HEIDENHAIN)				
CF220.UL.H501.15.04	85	150	105	185



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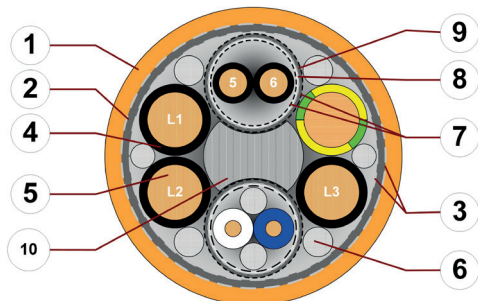
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Sick (Hiperface DSL)

CF220.UL.H100.07.04-CF220.UL.H102.25.04



Example image

For detailed overview please see design table

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

Electrical information

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

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



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Sick (Hiperface DSL)

CF220.UL.H100.07.04-CF220.UL.H102.25.04

Design table

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



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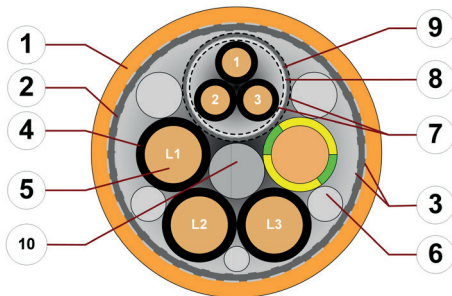
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SEW

CF220.UL.H203.15.04





Example image

For detailed overview please see design table

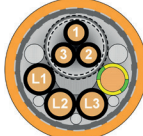
1. Outer jacket: Pressure extruded PVC mixture
2. Overall shield: Extremely bending-stable braid made of tinned copper wires
3. Banding: Plastic fleece
4. Core insulation: Mechanically high-quality, especially low-capacitance XLPE mixture
5. Conductor: Especially bending-resistant version consisting 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

Electrical information

Coaxial element	SEW 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 cable type E/1,,)	4G1.5	3 black cores with white printing: 1. Core: U/L1/C/L+ 2. Core: V/L2 3. Core: W/L3/D/L- followed by one green-yellow core	
	(3x1.0)C)C	3 black cores with white numbers 1 - 3	



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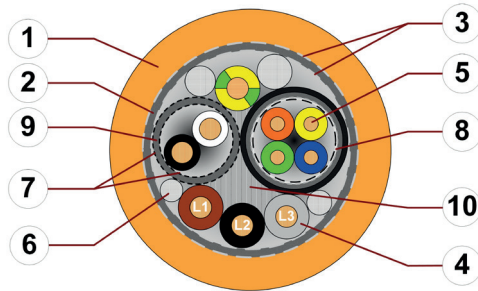
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Siemens (SINAMICS S210)

CF220.UL.H300.03.04-CF220.UL.H304.15.04



Example image

For detailed overview please see design table

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 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

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	300/500V (following DIN VDE 0298-3) 300V (following UL) CF220.UL.H304.15.04: 1000V (following UL)
 Testing voltage	2000V (following DIN EN 50395)



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Siemens (SINAMICS S210)

CF220.UL.H300.03.04-CF220.UL.H304.15.04

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: 1. Core: U/L1/C/L+ 2. Core: V/L2 3. Core: 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: 1. Core: U/L1/C/L+ 2. Core: V/L2 3. Core: 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	
CF220.UL.H304.15.04	4G1.5	one core each in grey, black and brown: 1. Core: U/L1/C/L+ 2. Core: V/L2 3. Core: W/L3/D/L- followed by one green-yellow core	
	(2x1.5)C	one core each in black and white	
	(4xAWG26)C	one core each in yellow, blue, green and orange	



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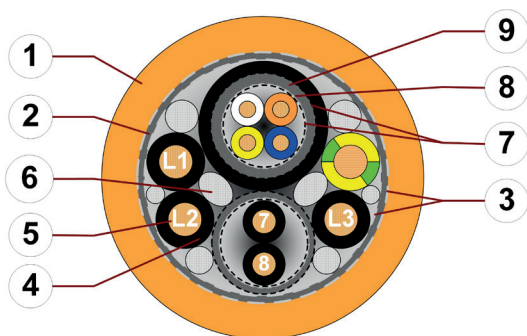
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ctrlX DRIVE

CF220.UL.H402.15.04



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

Example image

For detailed overview please see design table

Electrical information

Bus element	ctrlX DRIVE
Characteristic wave impedance (following DIN EN 50289-1-11)	100 ± 15 Ω (1-100 MHz)
Operating capacity	50 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.H402.15.04.D	4G1.5	3 black cores with white printing: 1. Core: U/L1/C/L+ 2. Core: V/L2 3. Core: W/L3/D/L- followed by one green-yellow core	
	(2x0.75)C	2 black cores with white numbers 7 & 8	
	(4xAWG24)C	one core each in white, orange, blue and yellow	



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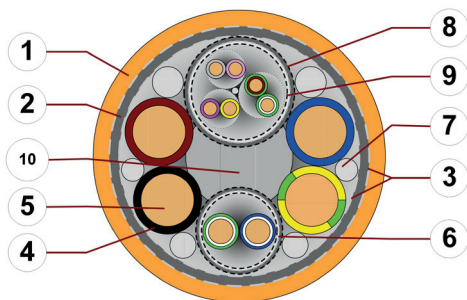
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B&R

CF220.UL.H501.15.04



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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

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	



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