

1023370	<b>DATA SHEET</b>	
valid from: 19.07.2021	<b>ÖLFLEX® SERVO FD 70CS</b>	

## Application

ÖLFLEX® SERVO FD 70CS cables for one cable systems are highly flexible, screened, oil resistant, halogen free and low capacitive servo motor cables with polyurethane outer sheath for use on European and North American market. All of the motor's feedback signals are transmitted by integrated signal cores, pairs or star quads. Additional control pairs can be optionally used to connect e.g. the electromagnetic break.

They are designed for use in high-dynamic applications (Extended-Line performance class) in power chains or permanent machine parts as well as for fixed installation subject to medium mechanical load conditions. They are among others designed for use in dry, damp and wet conditions. They are suitable for outdoor use if the indicated temperature range is observed. The cables are increased oil resistant and at room temperature widely resistant to acids and alkaline solutions. The outer sheath is resistant to high mechanical load, particularly to abrasion and rubbing, is cut resistant, microbe-proof and hydrolysis resistant.

The maximum tensile load is 15 N/mm<sup>2</sup> of conductor cross-section during installation and operation. Compulsory guidance is not permitted. The screening braid protects against interference from electrical fields, the control or signal pairs, star quads or signal cores are individually screened.

### Application range:

Connecting cable between servo controller and motor, in power chains or moving machine parts, for use in assembling- & pick-and -place machines, machine tools and transfer lines, for assembly lines, production lines in all kind of machines.

Use acc. to UL: PUR sheathed cable for external interconnection of electronic equipment.  
 Use acc. to cRUus: PUR sheathed cable for external interconnection of electronic equipment with or mechanical load conditions.

## Design

Design	acc. to UL AWM 758, Style 21223, CSA C22.2 No. 210-15 and in compliance to EN 50525-2-51
Approvals	UL AWM 758, Style 21223 resp. 20233 (File No. E63634) cRUus AWM I A/B II A/B (File No. E63634)
Conductor	Details see below
Core insulation	Polypropylen-based compound
Core identification	Details see below
Pair-, quad-, element- resp. core screen	Details see below
Stranding	4 power cores stranded together with respective control pairs and signal pairs, cores, elements or star quads as well as filler cords
Screen	Braid of tinned copper wires, coverage = 85 % (nominal value)
Outer sheath	Polyurethane compound TPU acc. to EN 50363-10-2 UL AWM 758, CSA AWM C22.2 No. 210-15 colour: orange, similar RAL 2003

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### Electrical properties at 20 °C

Nominal voltage	Power cores and control pairs EN U <sub>0</sub> /U: Details see below UL/CSA: Details see below Signal pairs, elements, star quads or cores EN: Details see below UL/CSA: Details see below
Test voltage	Power cores and control pairs: Details see below Signal pairs, elements, star quads or cores: Details see below

### Mechanical, thermal and chemical properties

Temperature range	flexing (EN): -40 °C up to +80 °C max. conductor temp. flexing (UL/CSA): up to +80 °C max. conductor temp. fixed installation (EN): -50 °C up to +80 °C max. conductor temp. fixed installation (UL/CSA): up to +80 °C max. conductor temp.
Min. bending radius	flexing: up from 7,5 x cable diameter fixed installation: 5 x cable diameter
Max. torsion load	max. torsion angle: ± 30 °/m
Flammability	acc. to IEC 60332-1-2 resp. EN 60332-1-2 UL: Vertical flame test VW-1 CSA: FT1
Halogen-free	acc. to VDE 0472 part 815
UV resistance	acc. to ASTM-D-2565-16
Ozone resistance	acc. to EN 50396 method B
Oil resistance	acc. to EN 50363-10-2
Tests	acc. to IEC 60811 resp. EN 60811, EN 50395, EN 50396, UL 1581 and CSA C22.2
EU Directives	These cables are conform to the EU-Directive 2014/35/EU (Low Voltage Directive)
Environmental information	These cables meet the substance-specific requirements of the EU Directive 2011/65/EU (RoHS).

### Dynamic performance in power chains

Max. pulling force	≤ 15 N/mm <sup>2</sup>
Max. acceleration	50 m/s <sup>2</sup> (Version 1; 2; 3) 30 m/s <sup>2</sup> (Version 4)
Max. velocity	5 m/s
Max. travel (horizontal)	20 m
Bending cycles and power chain operation parameters	See selection table A2-1 in online catalogue appendix For use in power chains: Please comply with assembly guideline appendix T3

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### Details for ÖLFLEX® SERVO FD 70CS Version 1

**Art. 1023375 (4 G 1,5 + (2 x 0,75) + (4 x 24 AWG))**

Power cores	extra-fine wire strand of bare copper acc. to IEC 60228 resp. EN 60228, class 6 Core colours: black with numbers 1-3 + GN/YE
Pair 0,75 mm <sup>2</sup>	extra-fine wire strand of bare copper acc. to IEC 60228 resp. EN 60228, class 6 Core colours: black with numbers 5-6 Pair screen: Braid of tinned copper wires
	Nominal voltage: EN U <sub>0</sub> /U 600 V / 1000 V UL/CSA 1000 V
	Test voltage: C/C 4000 V AC C/S 2000 V AC
Quad 24 AWG	fine wire bare copper strand Core colours: white, yellow, blue, orange Bundle screen: Braid of tinned copper wires Aluminium metallized textile tape Sheath: Polyolefin, black
	Nominal voltage: EN U <sub>0</sub> /U 300 V / 300 V UL/CSA 1000 V
	Test voltage: C/C 3000 V AC C/S 1500 V AC
	Characteristic impedance: nom. 100 ± 15 Ω (@ 10MHz)

### Details for ÖLFLEX® SERVO FD 70CS Version 2

**Art. 1023378 (4 G 22 AWG + (2 x 22 AWG) + (4 x 26 AWG))**

**Art. 1023385 (4 G 22 AWG + (2 x 22 AWG) + (4 x 0,20))**

Power cores	extra-fine wire strand of tinned copper acc. to IEC 60228 resp. EN 60228, class 6 Core colours: brown U/L1/C/L+, black V/L2, grey W/L3/D/L/- and GN/YE
Pair 22 AWG	extra-fine wire strand of tinned copper acc. to IEC 60228 resp. EN 60228, class 6 Core colours: black, white Pair screen: Braid of tinned copper wires
	Nominal voltage: EN U <sub>0</sub> /U 300 V / 300 V UL/CSA 300 V
	Test voltage: C/C 2000 V AC C/S 1000 V AC
Quad 26 AWG and 0,20 mm <sup>2</sup>	fine wire bare copper strand Core colours: yellow, blue, green, pink Bundle screen: Aluminium metallized textile tape Braid of tinned copper wires Sheath: Polyolefin, black
	Nominal voltage: EN U <sub>0</sub> /U 300 V / 300 V UL/CSA 1000 V
	Test voltage C/C 3000 V AC C/S 1500 V AC
	Characteristic impedance: nom. 100 ± 15 Ω (@ 10MHz)

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**Art. 1023379 (4 G 19 AWG + (2 x 21 AWG) + (4 x 26 AWG))**

**Art. 1023386 (4 G 19 AWG + (2 x 21 AWG) + (4 x 0,20))**

Power cores extra-fine wire strand of tinned copper acc. to IEC 60228 resp. EN 60228, class 6  
Core colours: brown U/L1/C/L+, black V/L2, grey W/L3/D/L/- and GN/YE

Pair 21 AWG extra-fine wire strand of tinned copper acc. to IEC 60228 resp. EN 60228, class 6  
Core colours: black, white  
Pair screen: Braid of tinned copper wires

Nominal voltage: EN U<sub>0</sub>/U 300 V / 300 V  
UL/CSA 1000 V  
Test voltage: C/C 2000 V AC  
C/S 1000 V AC

Quad 26 AWG and 0,20 mm<sup>2</sup> fine wire bare copper strand  
Core colours: yellow, blue, green, pink  
Bundle screen: Aluminium metallized textile tape  
Braid of tinned copper wires  
Sheath: Polyolefin, black

Nominal voltage: EN U<sub>0</sub>/U 300 V / 300 V  
UL/CSA 1000 V  
Test voltage C/C 3000 V AC  
C/S 1500 V AC

Characteristic impedance: nom. 100 ± 15 Ω (@ 10MHz)

**Art. 1023380 (4 G 1,5 AWG + (2 x 1,5) + (4 x 0,20))**

**Art. 1023381 (4 G 2,5 AWG + (2 x 1,5) + (4 x 0,20))**

Power cores extra-fine wire strand of tinned copper acc. to IEC 60228 resp. EN 60228, class 6  
Core colours: brown U/L1/C/L+, black V/L2, grey W/L3/D/L/- and GN/YE

Pair 1,5 mm<sup>2</sup> extra-fine wire strand of tinned copper acc. to IEC 60228 resp. EN 60228, class 6  
Core colours: black/blue, white/blue  
Pair screen: Braid of tinned copper wires

Nominal voltage: EN U<sub>0</sub>/U 600 V / 1000 V  
UL/CSA 1000 V  
Test voltage: C/C 4000 V AC  
C/S 2000 V AC

Quad 0,20 mm<sup>2</sup> fine wire bare copper strand  
Core colours: yellow, blue, green, pink  
Bundle screen: Aluminium metallized textile tape  
Braid of tinned copper wires  
Sheath: Polyolefin, black

Nominal voltage: EN U<sub>0</sub>/U 300 V / 300 V  
UL/CSA 1000 V  
Test voltage C/C 3000 V AC  
C/S 1500 V AC

Characteristic impedance: nom. 100 ± 15 Ω (@ 10MHz)

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### Details for ÖLFLEX® SERVO FD 70CS Version 3

**Art. 1023371** (4 G 2,5 + (2 x 1,0) + (2 x 24 AWG + 2 x 2 x 26 AWG))

**Art. 1023373** (4 G 1,5 + (2 x 0,75) + (2 x 0,30 + 2 x 2 x 0,15))

**Art. 1023374** (4 G 2,5 + (2 x 1,0) + (2 x 0,30 + 2 x 2 x 0,15))

**Art. 1023376** (4 G 4 + (2 x 1,0) + (2 x 0,30 + 2 x 2 x 0,15))

Power cores           extra-fine wire strand of bare copper acc. to IEC 60228 resp. EN 60228, class 6  
Core colours: black, brown, blue + GN/YE

Pair 0,75 mm<sup>2</sup>       extra-fine wire strand of bare copper acc. to IEC 60228 resp. EN 60228, class 6  
or 1,0 mm<sup>2</sup>           Core colours: white/blue, white/green  
Pair screen: Braid of tinned copper wires

Nominal voltage: EN U<sub>0</sub>/U   600 V / 1000 V  
  UL/CSA   1000 V  
Test voltage:       C/C       4000 V AC  
  C/S       2000 V AC

#### Versions with signal element (2 x 24 AWG + 2 x 2 x 26 AWG)

Pair 24 AWG           fine wire tinned copper strand  
Core colours: brown/green, white/green

Pairs 26 AWG         fine wire tinned copper strand  
Core colours: pink-grey, yellow-purple  
Three pairs stranded together to a bundle,  
Bundle screen: Braid of tinned copper wires  
Sheath:               Polyolefin, black

Nominal voltage: EN U<sub>0</sub>/U   300 V / 300 V  
  UL/CSA   1000 V  
Test voltage       C/C       3000 V AC  
  C/S       1500 V AC

Characteristic impedance:   nom. 120 ± 12 Ω (@ 10MHz) for (2x2x26 AWG) pairs

#### Versions with signal element (2 x 0,30 + 2 x 2 x 0,15)

Pair 0,30 mm<sup>2</sup>       fine wire tinned copper strand  
Core colours: brown/green, white/green

Pairs 0,15 mm<sup>2</sup>     fine wire tinned copper strand  
Core colours: pink-grey, yellow-purple  
Three pairs stranded together to a bundle,  
Bundle screen: Aluminum/plastic tape wrapping,  
  Braid of tinned copper wires,  
  Plastic tape wrapping

Nominal voltage: EN U<sub>0</sub>/U   300 V / 300 V  
  UL/CSA   1000 V  
Test voltage       C/C       3000 V AC  
  C/S       1500 V AC

Characteristic impedance:   nom. 120 ± 12 Ω (@ 10MHz) for (2x2x0,15mm<sup>2</sup>) pairs

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### Details for ÖLFLEX® SERVO FD 70CS Version 4

- Art. 1023387** (4 G 1,5 + (1 x Z50) + 2 x (2 x 1,0))  
**Art. 1023388** (4 G 2,5 + (1 x Z50) + 2 x (2 x 1,0))  
**Art. 1023389** (4 G 4 + (1 x Z50) + 2 x (2 x 1,0))

Power cores      extra-fine wire strand of bare copper acc. to IEC 60228 resp. EN 60228, class 6  
 Core colours: black with white marking U/L1/C/L+; V/L2; W/L3/D/L- and GN/YE

Pairs 1,0 mm<sup>2</sup>    extra-fine wire strand of bare copper acc. to IEC 60228 resp. EN 60228, class 6  
 Pair colours: yellow/A – orange/B, pink/C – violet/D  
 Pair screen: Braid of tinned copper wires

Nominal voltage: EN U<sub>0</sub>/U    600 V / 1000 V  
    UL/CSA    1000 V  
 Test voltage:        C/C        4000 V AC  
    C/S        2000 V AC

Coax 21 AWG    Inner conductor:    fine wire tinned copper strand  
 (Z50)            Dielectric insulator: natural coloured  
                          Outer conductor:    Braid of tinned copper wires  
                          Sheath:                Polyolefin, purple

Nominal voltage: UL/CSA    1000 V  
 Test voltage        C/C        3000 V AC  
    C/S        1500 V AC  
 Characteristic impedance:    nom. 50 Ω

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