

## Title: Cable Comparison of B7EV-xx(A)-E and B7EV-xx(B)-E

**Product(s):** Sigma-5 and Sigma-7 cables B7EV-xx(A)-E and B7EV-xx(B)-E

**Doc. No.** PN.Sigma.01

### Reason for the Change

The product is changing because the raw cable in B7EV-xx(A)-E was recently transitioned to a non-standard cable. This means the raw cable is no longer produced nor stocked as a readily available cable.

The B7EV-xx(B)-E contains a raw cable that is a standard cable and is readily available from a wide range of distributors.

### Nature of the Change

Raw cable change from CCI 22471 to Lapp 8904044.

Specifications of CCI (now Southwire) 22471, used in B7EV-xx(A)-E:

<b>PART NUMBER:</b>	22471
<b>DESCRIPTION:</b>	4/4 STRANDED TYPE SEOOOW FLEXIBLE POWER CABLE
<b>CONSTRUCTION:</b>	This cable consists of four bare copper insulated conductors cabled with fillers and an overall jacket.
<b>APPROVALS:</b>	UL Standard 62, CSA 22.2 No. 49, NEC Article 400., MSHA
<b>APPLICATION:</b>	600V Portable Oil and Water Resistant Submersible Outdoor Flexible Power Cable


#### Construction Parameters:

Conductor	4 AWG Bare Copper
Stranding	7x19/.0177"
Insulation Material	TPE
Insulation Thickness	0.062" Nom.
Insulated Conductor Diameter	0.383" Nom.
Number of Conductors	4
Lay Length	8.00" Nom.
Filler Type	Polypropylene
Separator/Wrap	Paper Tissue
Jacket Material	TPE
Jacket Thickness	0.169" Nom.
Overall Cable Diameter	1.270" Nom.
Approximate Cable Weight	1144.7 Lbs/1M' Nom.
Flame Rating	UL/CSA Horizontal Flame Test

#### Electrical Properties:

Temperature Rating	-50°C to 105°C
Operating Voltage	600 V RMS Max.
Ampacity	60 Amps Per Conductor (Assume three current carrying conductors) (Based on NEC Table 400-5(a))
DC Resistance per Conductor @ 20°C	0.25 Ohms/1M' Nom.

Insulation Colors	Black White Red Green
Jacket Color	Black

Legend	 CCI SEOPRENE 105 4 AWG (21.15mm <sup>2</sup> ) 4/C SEOOOW E54864 (UL) 600V -50C TO 105C CSA LL39753 STOOOW(TPE) -50C TO 105C FT2 WATER RESISTANT (White Surface Ink Print - P-241-3-MSHA in indent)
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*This product complies with European directive 2002/95/EC (RoHS)*

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Specifications of Lapp 8904044, used in B7EV-xx(B)-E:



## Approvals



## Unshielded construction

**Conductors:** finely stranded bare copper

**Insulation:** specially formulated PVC; dry lubricant; non-woven wrapping over outer layer

**Jacket:** specially formulated PVC; black

## Application advantage

- Meets Oil Res I/II, resistant to harsh environments for long service life
- Pressure-extruded jacket for precision connectorization
- Passes UL 1277 impact and crush tests

Cable attributes		page 648	
OIL	OR-04	FLAME	FR-02
MOTION	CF-03	MECH.	MP-02

**OR-04** UL AWM 21098  
In oil for 60 days @ 80° C  
65% Unaged Tensile Strength  
65% Unaged Elongation

**FR-02** UL VW-1 (UL 1581): Vertical Flame test with Bunsen burner  
Five 15 second flame applications  
Must not emit flame or glowing particles

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Level	Description	Definition	Cycle Life Range*
CF-03	Continuous High Flexing	Designed for High Cycle Continuous Flexing and Long Cable Track Applications - Chain length up to 300 ft.	8-20 million

Test Conditions for Continuous Flex Cables	
Minimum Bend Radius Range Factor	5.0 - 15.0 x Cable Diameter
Bending Radius Range Factor During Testing	4.0 - 12.0 x Cable Diameter
Travel Distance Under Test Conditions	18 Feet
Acceleration Under Test Conditions	Varies up to 26 Feet per second
Temperature Range During Test	10°C to 22°C
Speed of Travel During Test	Varies from 6.5 to 13 Feet per second

Level	Description	Impact	Crush	Cold Impact	Tensile	Elongation	Standard
MP-02	Good - Independent lab tested for crush & impact.	10/50 Lbs.	1000/2000 Lbf.	n/a	1700 Psi	175%	UL 1277 ASTM D-412

### Technical data

 <b>Minimum bend radius:</b> - for continuous flexing: 7.5 x cable diameter - shielded: 10 x cable diameter	 <b>Color code:</b> black with white numbers, plus green/yellow ground
 <b>Temperature range:</b> - for continuous flexing: -5°C to +90°C - for stationary use: -25°C to +90°C	 <b>Approvals:</b> UL: AWM 2587 AWM 21098 (Oil) Attributes: UL Oil Res I/II sunlight resistant NFPA 79 UL 758 80°C Oil Test Canada: CSA AWM I/II A/B FT1 CSA C22.2, 210.2 Additional: CE & RoHS
 <b>Nominal voltage:</b> 600V	
 <b>Test voltage:</b> 2000V	
 <b>Conductor stranding:</b> better than Class 6 super fine wire	

Part number	Number of conductors incl. ground*	Nominal outer diameter in mm	Copper weight lbs/mft	Approx. weight lbs/mft	SKINTOP® SL PG thread
<b>4 AWG (25 mm<sup>2</sup>)</b>					
8904044	4	1.059	26.9	646	1005 S2136

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## Comparison to Published Data

### 1. Technical Supplement

In the Sigma-5 Technical Supplement (Yaskawa doc number YEA-KAEPS80000042), properties of B7EV-xx(A)-E are described:

Rotary Cables with Model Numbers NOT Beginning with "JZSP"

#### ● Standard Cables

Standard servomotor main circuit cables, encoder cables, and relay cables cannot be used in cases where high flexibility is needed, as when the cables themselves move or are twisted or turned. Use flexible cables for flexible applications.

For bend radius, refer to the following chart.

Model	B1EV	B2EV	B3EV	B4EV	B5EV	B6EV	B7EV	B6EP	B7EP	BABEV	BCBEV	BDBEV	BBEV	BFEV
Recommended Bend Radius (mm)	72	82	119.5	89.5	191.8	226.1	151.2	201.6	87.65	94.6	107.3	35.2	47.24	
Outer Diameter (mm)	14.4	16.4	23.9	17.9	27.4	32.3	25.2	33.6	17.53	18.92	21.46	8.8	11.81	

Note: All models in the chart refer to the first set of characters of the cable's model number.

The properties for B7EV-xx(B)-E are as follows:

- Recommended bend radius = 7.5x cable diameter = **201.75 mm**
- Outer Diameter = **26.9 mm**

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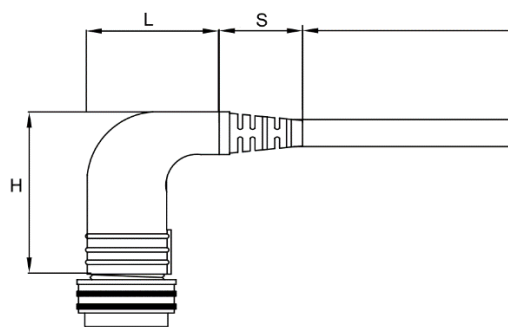
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## 2. Outline Drawing

The outline drawing (Yaskawa doc number UDA00629) indicates properties of B7EV-xx(A)-E:

ITEM NUMBER	X = CABLE LENGTH	OVERMOLDING DIMENSIONS		
		H = HEIGHT	L = LENGTH	S = STRAIN RELIEF
B7EV-03(A)-E	3000	73.7	88.4	0
B7EV-05(A)-E	5000			
B7EV-10(A)-E	10000			
B7EV-15(A)-E	15000			
B7EV-20(A)-E	20000			



The properties for B7EV-xx(B)-E are as follows:

- Overmolding Dimensions
  - Height = 73.72 mm
  - Length = 88.75 mm
  - Strain relief = 0 mm

### Impact on the Product

The cable jacket changes from SEOOW (Features: High Degree of Flexibility, Premium Oil Resistance, Sunlight, Water Resistance and Flame Retardant) to PVC with the attributes described in the **Nature of the Change** section above.

SEOOW and PVC are not superior to one another in all aspects.

Carefully review the cable specifications of B7EV-xx(B)-E and determine if B7EV-xx(B)-E can be used for your application before purchasing B7EV-xx(B)-E.

If B7EV-xx(B)-E is not usable in your application, consider contacting your Yaskawa Sales Representative for a solution.

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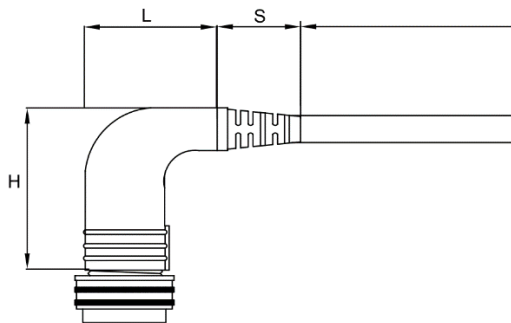
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## Compatibility

B7EV-xx(B)-E is physically installed the same way as B7EV-xx(A)-E (e.g. the keyway directions are identical in both products) because there is no connector change nor assembly process change.

However, the length (L) of the overmold increases by 0.35mm. Check that the installation site has sufficient space for this increase.



Additionally, the raw cable properties differ as described in previous sections.

Therefore, B7EV-xx(B)-E may not necessarily be used in the same applications as B7EV-xx(A)-E.

Carefully review the contents of this document to determine if B7EV-xx(B)-E can be used for your application before purchasing B7EV-xx(B)-E.

If B7EV-xx(B)-E is not usable in your application, consider contacting your Yaskawa Sales Representative for a solution.