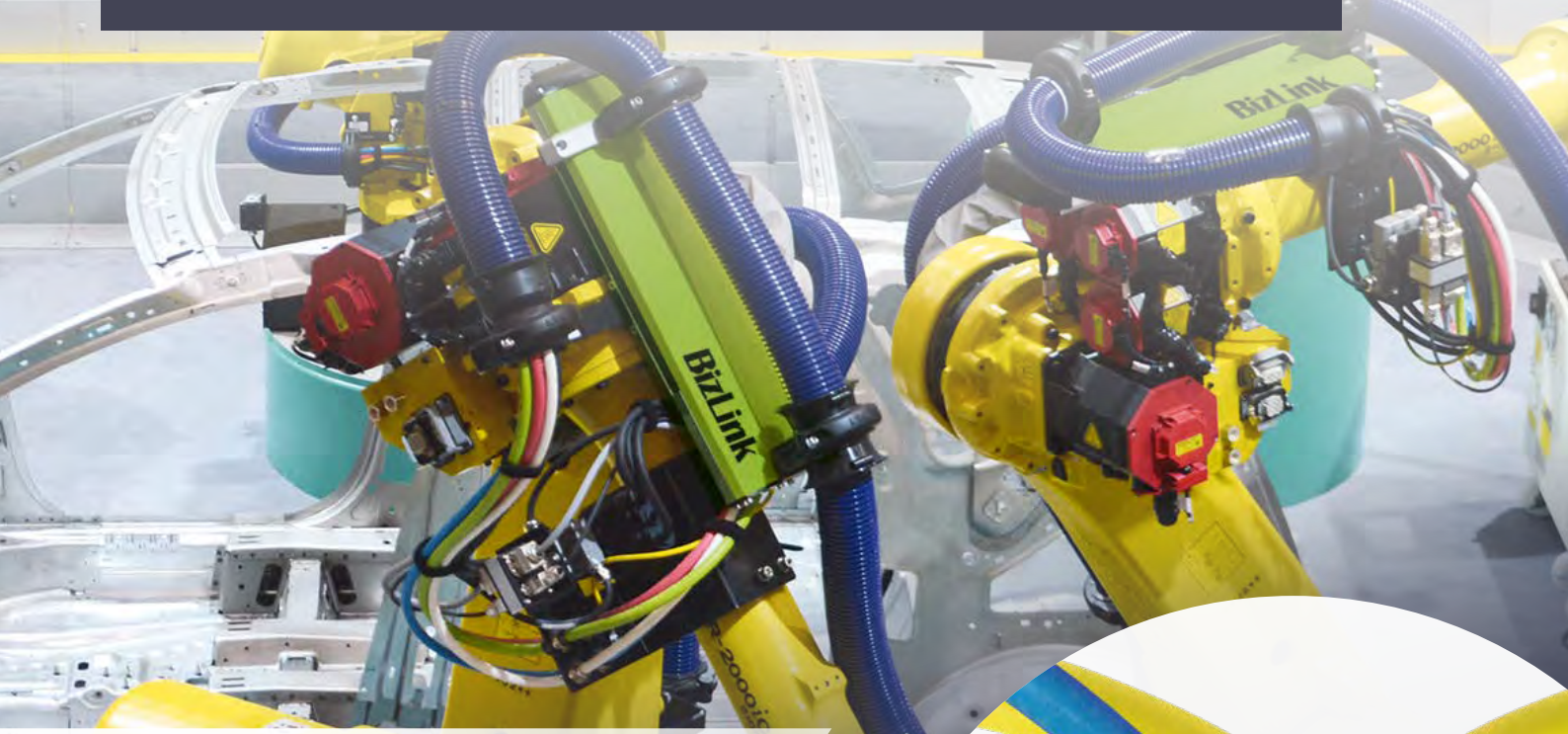


## Cables · Hoses · Tubes for Robotics 电缆 · 水管 · 气管 用于机器人



Factory Automation  
工厂自动化

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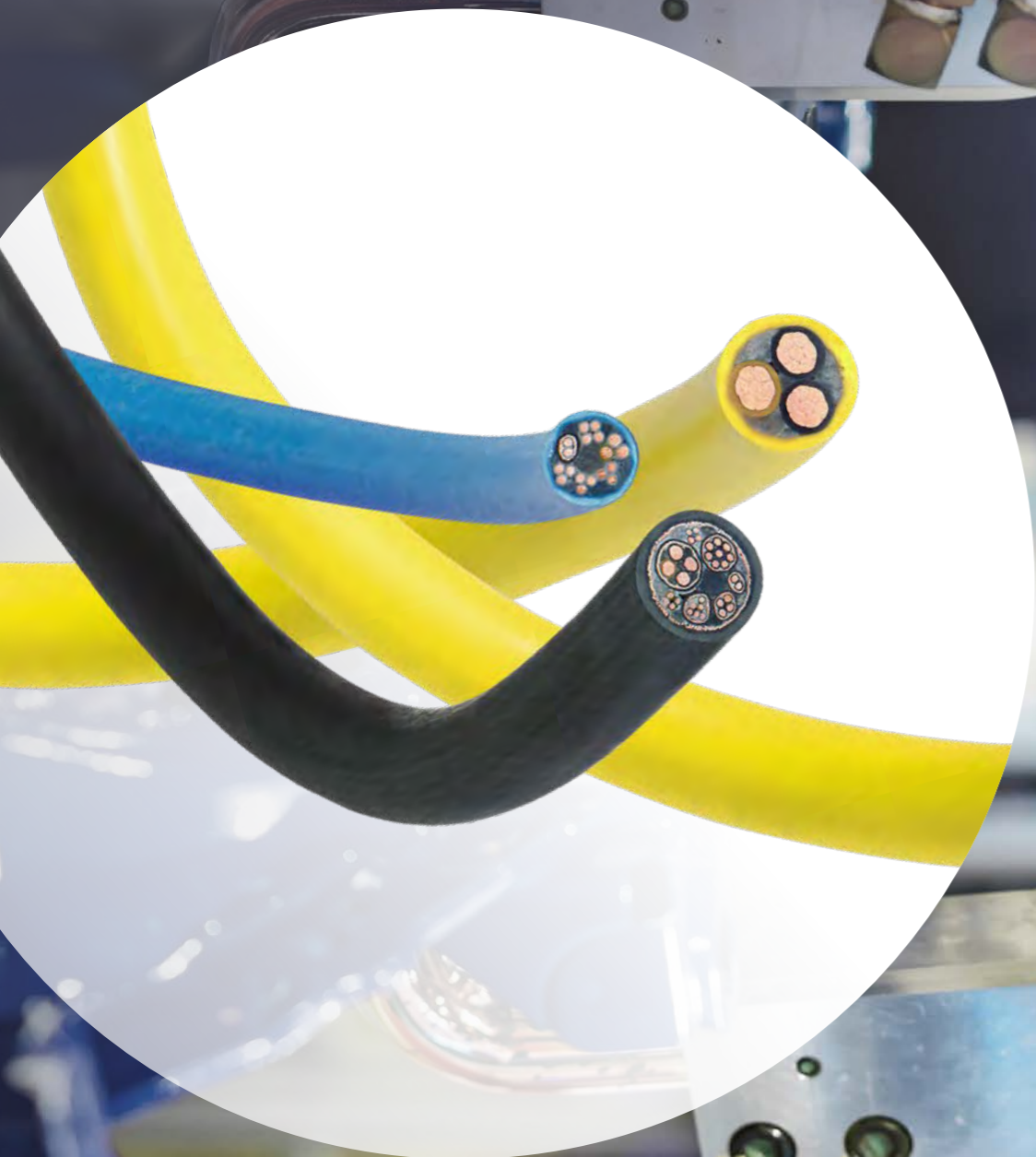
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## 我们的机器人解决方案

All our products are permanently enhanced for our customers. Therefore this catalog is subject to change and error. Updated information on BizLink Factory Automation products, developments, research projects and trade fairs can also be found on the website >  
[factory-automation.bizlinktech.com](http://factory-automation.bizlinktech.com)

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[factory-automation.bizlinktech.com](http://factory-automation.bizlinktech.com)

## Cables used for robots 电缆, 用于机器人



We offer you customised special cables with minimum order quantities, **starting at 100m** – including short delivery times.

**Standard cables, we often deliver from stock.**

我们为您提供定制的特种电缆, 最小订单量为100米, 交期短。  
基于标准电缆, 我们通常交付现货。

Cables used for robots have to meet the greatest requirements in terms of mechanical, chemical and thermal properties. They need to withstand rapid acceleration and deceleration, tensile, compressive and torsion stress as well as the millions of bending cycles. They also need to be resistant to high temperatures, welding spatters, oil and various other chemicals.

We use standard and special insulation material which makes our cables highly abrasion and media resistant, always keeping their high flexibility. Moreover, we offer an extensive range of cables for fixed applications.

Taking into account our long years of expert knowledge in the design, production, installation and service offers of robotic cables we truly are cable experts. In order to meet these rigorous requirements we use our own in-house testing facilities to test our cables for performance capacity and resilience.

*You can rely on us.*

We can also assemble special cables for you in the field of robotics, e.g. cable harnesses for drag chains or ground cable harnesses.

**It goes without saying that we provide our customers with individual consultation and make prototypes.**

机器人专用电缆必须满足机械、化学和热性能方面的最高要求。它们必须经受住快速的加速和减速、拉伸、压缩和扭转应力, 以及数百万次的周期性弯曲。它们同样必须耐高温、焊接飞溅、油类及其他化学品。

我们采用标准和特殊的绝缘材料, 使我们的电缆具有较高的耐磨性和介质抗性, 并始终保持高灵活性。此外, 我们为固定设备和应用提供多种电缆。

鉴于我们在机器人电缆设计、生产、安装、服务等方面拥有多年的专业技术, 我们是名副其实的电缆专家。为了满足这些严苛的要求, 我们试用自己内部的测试设备来检测电缆的性能和弹性——我们值得您的信赖。

*您可以信任我们。*

在机器人领域, 我们还能为您装配特种电缆, 如拖链用线束、地面线束。

**毫无疑问, 我们可为客户提供个性化的咨询服务并制作原型。**

## Cables used for robots

## 电缆, 用于机器人

Our cable solutions meet the highest requirements for mechanical, chemical and thermal product properties. They also need to be resistant to high temperatures, welding spatters, oil and various other chemicals.

我们的电缆解决方案满足对产品机械、化学和热性能的要求。同时, 它们还需要耐高温、耐焊接飞溅物、耐油及其他各种化学性能。

### Fields of application:

Aside from classical robotic applications we offer standardized and application specific cables, e.g. for

- Drive technology
- Factory Automation
- Image transmission
- Fastening systems
- Paint shop
- Crash test measuring systems
- Measuring and control technology
- Data transmission

### Material:

- Bare copper
- Tinned copper
- Silver-plated copper
- High-strength copper alloys
- POF optic fiber

### Wire insulations:

- TPE-E
- PE
- FEP
- PTFE
- Imprint: by DIN 47100 / IEC 60757 or with numeric imprint

### Jacket:

- PUR compounds:
  - Oil resistance
  - Silicone-free
  - Flame-retardant, halogen-free
  - UV resistant
- TPV (thermoplastic vulcanisate)
- Jacket colour: black or per customer request
- Imprint: BizLink standardized imprint or customized

### Banding + shielding:

- Fleece components
- PTFE foils
- Kevlar® supporting braids
- Braided shield made of tinned wires or high-strength copper alloy
- Served wire shield made of tinned wires or high-strength copper alloy
- Foil shields

### Cable design:

- Layered strands
- Paired strands
- Bunched strands

### Standards and approvals:

UL > Our cables fulfill the requirements of diverse standards. They can officially be certified on request.

### Further characteristics of our cables:

- High flexibility
- Torsion and bending resistant
- Diameter-optimised cables
- Bending radius to 5 x diameter
- Optimized for multi-million bending cycles

### 应用领域:

除了典型的机器人应用外, 我们还为以下项目提供标准电缆和定制电缆, 例如:

- 驱动技术
- 工厂自动化
- 图像传输
- 拧紧系统
- 油漆车间
- 碰撞试验测试系统
- 测试和监控技术
- 数据传输

### 材料:

- 裸铜
- 镀锡铜
- 镀银铜
- 高强度铜合金
- 塑料光纤

### 电线绝缘体:

- TPE-E
- PE
- FEP
- PTFE
- 喷字说明: DIN 47100 / IEC 60757 或数字编码

### 护套:

- PUR 化合物:
  - 抗油性
  - 不含硅
  - 阻燃性, 无卤
  - 防紫外线 (UV)
- TPV (热塑性硫化产品)
- 护套颜色: 黑色或者按客户需求制定
- 喷字说明: 贸联标准喷字或按顾客要求喷字

### 电缆内部填充加强带和屏蔽层, 含:

- 吸收应力成分
- PTFE箔片
- 卡夫拉纤维编织带
- 镀锡铜丝或高强度铜合金编织成的屏蔽
- 镀锡铜丝或高强度铜合金形成的屏蔽
- 金属箔屏蔽

### 电缆结构:

- 层绞线
- 对绞线
- 束绞线

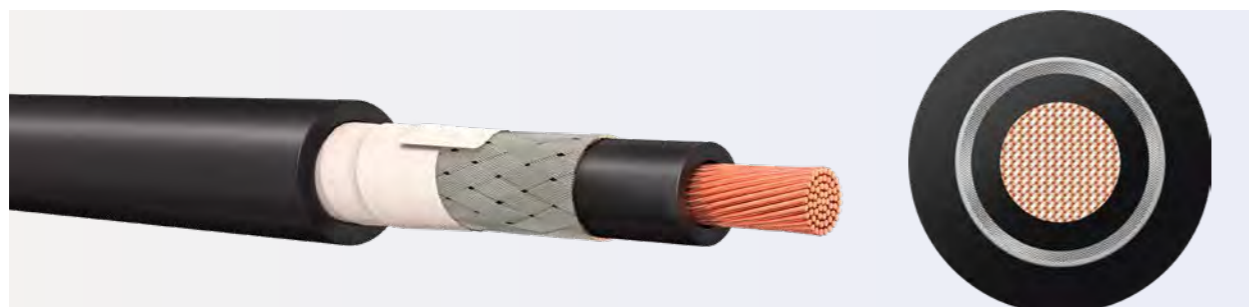
### 标准和认证:

UL —— 我们的电缆符合各种标准的要求。一经要求, 可获得正式的认证。

### 我们电缆的更多特点:

- 高柔性
- 抗扭转和抗弯曲
- 电缆外径优化
- 弯曲半径可至 5 x 外径
- 经过优化, 可弯曲几百万次

## Single core cables / 单芯电缆



Cable design / technical data	
<b>Conductor</b>	Extra-fine wire copper strand, bare, class 6 Core insulation TPE and/or PE
<b>Article-specific Version</b>	Power conductors without/with one/with two separately shielded control core pairs stranded together
<b>Shielding</b>	Copper braiding, tinned, degree of optical coverage >85% or copper screening, tinned, degree of optical coverage >95%
<b>Outer sheath</b>	Polyurethane, halogen-free acc. to IEC 60754, flame-retardant acc. to UL94 V0, abrasion-resistant and cut-resistant, low-adhesion, oil-resistant acc. to DIN VDE 0282 Part 10 / HD 22.10, UV resistant
<b>Operating voltage</b>	up to 0.34 mm <sup>2</sup> 450 V; from 0.5 mm <sup>2</sup> 600 V
<b>Test voltage</b>	up to 0.34 mm <sup>2</sup> 2000 V/DC; from 0.5 mm <sup>2</sup> 3000 V/DC
<b>Operating temperature</b>	-40°C to +80°C*
<b>Minimum bending radius</b>	once 2xD (permanently installed) flexible 5xD, optimum 10xD

电缆结构/技术参数	
导体	超细裸铜丝绞线, 6 级 TPE 和/或 PE 绝缘芯线
宣传册特定版本	电源线, 不带/带一根/两根绞合在一起的独立屏蔽控制芯线对
屏蔽	铜丝编织、镀锡、 覆盖率 >85% 或 铜丝编织、镀锡、 覆盖率 >95%
外护套	聚氨酯 无卤符合 IEC 60754 阻燃符合 UL94 V0 耐磨损、抗切割 低粘附力 耐油符合 DIN VDE 0282 第 10 部分 / HD 22.10 抗紫外线
工作电压	从 0.5 mm <sup>2</sup> 600 V 至 0.34 mm <sup>2</sup> 450 V
测试电压	从 0.5 mm <sup>2</sup> 3000 V/DC 至 0.34 mm <sup>2</sup> 2000 V/DC
工作温度	-40°C 至 +80°C*
最小弯曲半径	单次 2xD (固定安装) 柔性 5xD; 最佳 10xD

Dimensions 规格	Insulation material 绝缘材料	Nom. outer Ø 公称外径	Colour / 颜色		Article no. 订购号
			1 <sup>st</sup> Insulation 1 层绝缘	2 <sup>nd</sup> Insulation 2 层绝缘	
1x0.75 mm <sup>2</sup>	TPE/PUR	3.0 mm	● BU	● BU	BCA0108
1x0.75 mm <sup>2</sup>		3.0 mm	● RD	● BU	BCA0109
1x1.5 mm <sup>2</sup>	PUR	3.9 mm	● BK	● BK	BCA0029
1x10 mm <sup>2</sup>		7.0 mm	● GNYE		BCA0110
1x16 mm <sup>2</sup>	TPE/PUR	9.2 mm	● GNYE		BCA0111
1x25 mm <sup>2</sup>		10.7 mm	● BK		BCA0002
1x25 mm <sup>2</sup>	TPE/PUR	10.7 mm	● GNYE		BCA0063
1x25 mm <sup>2</sup>		10.7 mm	● BK	● BK	BCA0003
1x35 mm <sup>2</sup> 0.10 mm Strand	TPE/PUR	12.9 mm	● BK	● BK	BCA0004
1x35 mm <sup>2</sup> 0.20 mm Strand		12.9 mm	● BK		BCA0112
1x35 mm <sup>2</sup>	TPE/PUR	12.9 mm	● OG		BCA0113
1x35 mm <sup>2</sup>		12.9 mm	● GNYE		BCA0114
1x95 mm <sup>2</sup>	TPE/PUR	21.0 mm	● BK		BCA0007
1x2 mm <sup>2</sup>		2.8 mm	● BK		BCA0023
1x10 mm <sup>2</sup>	TPE	7.0 mm	● YE		BCA0115
1x16 mm <sup>2</sup>		8.4 mm	● BK		BCA0116
1x25 mm <sup>2</sup>	TPE	9.8 mm	● GNYE		BCA0024
1x35 mm <sup>2</sup>		11.5 mm	● GNYE		BCA0026

We also assemble special robotic cables for you. This is only a small extract of our cable competence. Different structures, dimensions and colours are available on request, as are data sheets.

\* Conversion to Fahrenheit compare page 41.

这里的电缆型号仅抽取了我们电缆产品的一小部分。我们可根据客户要求来订制不同应用、结构、尺寸和颜色的电缆。我们同样可以为您提供预装配的各种电缆线束和组件。

\* 华氏温度换算请对照第41页。

## Servo motor cables / 伺服机电缆



Cable design / technical data	
<b>Conductor</b>	Extra-fine wire copper strand, bare, class 6 core insulation TPE and/or PE
<b>Article-specific Version</b>	Power conductors without/with one/with two separately shielded control core pairs stranded together
<b>Shielding</b>	Copper braiding, tinned, degree of optical coverage >85% or copper screening, tinned, degree of optical coverage >95%
<b>Outer sheath</b>	Polyurethane halogen-free acc. to IEC 60754 flame-retardant acc. to UL94 V0 abrasion-resistant and cut-resistant low-adhesion oil-resistant acc. to DIN VDE 0282 Part 10 / HD 22.10, UV resistant
<b>Operating voltage</b>	up to 0.34 mm <sup>2</sup> 450 V; from 0.5 mm <sup>2</sup> 600 V
<b>Test voltage</b>	up to 0.34 mm <sup>2</sup> 2000 V/DC; from 0.5 mm <sup>2</sup> 3000 V/DC
<b>Operating temperature</b>	-40°C to +80°C*
<b>Minimum bending radius</b>	once 2xD (permanently installed) flexible 5xD, optimum 10xD

电缆结构/技术参数	
导体	超细裸铜丝绞线, 6 级 TPE 和/或 PE 绝缘芯线
宣传册特定版本	电源线, 不带/带一根/两根绞合在一起的独立屏蔽控制芯线对
屏蔽	铜丝编织、镀锡、 覆盖率 >85% 或 铜丝编织、镀锡、 覆盖率 >95%
外护套	聚氨酯 无卤符合 IEC 60754 阻燃符合 UL94 V0 耐磨损、抗切割 低粘附力 耐油符合 DIN VDE 0282 第 10 部分 / HD 22.10 抗紫外线
工作电压	从 0.5 mm <sup>2</sup> 600 V 至 0.34 mm <sup>2</sup> 450 V
测试电压	从 0.5 mm <sup>2</sup> 3000 V/DC 至 0.34 mm <sup>2</sup> 2000 V/DC
工作温度	-40°C 至 +80°C*
最小弯曲半径	单次 2xD (固定安装) 柔性 5xD; 最佳 10xD

Core no. and nom. conductor cross-section 芯数与导线标称截面积	Insulation material 绝缘材料	Outer Ø nom. 公称外径	Colour 颜色	Article no. 订购号	
4x1.0 mm <sup>2</sup>	TPE/PUR	6.0 mm	● BK	BCA0068	
4x1.5 mm <sup>2</sup>		7.2 mm		BCA0069	
4x2.5 mm <sup>2</sup> + 2x(2x1 mm <sup>2</sup> )		15.0 mm		BCA0070	
(4x1.0 mm <sup>2</sup> )		6.8 mm		BCA0071	
(4x1.5 mm <sup>2</sup> )		8.5 mm		BCA0072	
(4x2.5 mm <sup>2</sup> )		9.9 mm		BCA0053	
(4x4.0 mm <sup>2</sup> )		12.0 mm		BCA0073	
(4x1.0 mm <sup>2</sup> + 2x(2x0.75 mm <sup>2</sup> ))		12.0 mm		BCA0057	
(4x1.5 mm <sup>2</sup> + 2x(2x0.75 mm <sup>2</sup> )) UL 20669		12.7 mm		BCA0074	
(4x2.5 mm <sup>2</sup> + (2x0.5 mm <sup>2</sup> ))		11.2 mm		BCA0055	
(4x2.5 mm <sup>2</sup> + 2x(2x0.5 mm <sup>2</sup> ))		12.0 mm		BCA0075	
(4x2.5 mm <sup>2</sup> + 2x(2x0.75 mm <sup>2</sup> ))		13.3 mm		● OG	BCA0056
(4x2.5 mm <sup>2</sup> ) + (2x1 mm <sup>2</sup> )		13.0 mm		● BK	BCA0076
(4x2.5 mm <sup>2</sup> ) + 2x(2x1 mm <sup>2</sup> )		13.5 mm		● GY	BCA0077
(4x2.5 mm <sup>2</sup> + (2x1.5 mm <sup>2</sup> ))	PE/TPE/PUR	13.0 mm	● GY	BCA0054	
(4x4.0 mm <sup>2</sup> + (2x1.0 mm <sup>2</sup> ))	TPE/PUR	14.5 mm	● BK	BCA0078	

We also assemble special robotic cables for you. This is only a small extract of our cable competence. Different structures, dimensions and colours are available on request, as are data sheets.

\* Conversion to Fahrenheit compare page 41.

这里的电缆型号仅抽取了我们电缆产品的一小部分。我们可根据客户要求来订制不同应用、结构、尺寸和颜色的电缆。我们同样可以为您提供预装配的各种电缆线束和组件。

\* 华氏温度换算请对照第41页。

## Control cables / 控制电缆



Cable design / technical data	
Conductor	Extra-fine wire copper strand, bare, class 6 Core insulation TPE and/or PE
Article-specific Version	Power conductors without/with one/with two separately shielded control core pairs stranded together
Shielding	Copper braiding, tinned, degree of optical coverage >85% or copper screening, tinned, degree of optical coverage >95%
Outer sheath	Polyurethane halogen-free acc. to IEC 60754 flame-retardant acc. to UL94 V0 abrasion-resistant and cut-resistant low-adhesion oil-resistant acc. to DIN VDE 0282 Part 10 / HD 22.10 UV resistant
Operating voltage	up to 0.34 mm <sup>2</sup> 450 V; from 0.5 mm <sup>2</sup> 600 V
Test voltage	up to 0.34 mm <sup>2</sup> 2000 V/DC; from 0.5 mm <sup>2</sup> 3000 V/DC
Operating temperature	-40°C to +80°C*
Minimum bending radius	once 2xD (permanently installed) flexible 5xD, optimum 10xD

Core no. x nom. conductor cross-section 芯数与导线标称横截面积	Insulation material 绝缘材料	Colour 颜色	Article no. 订购号
5x0.75 mm <sup>2</sup>	TPE/PUR	● BK	BCA0140
3x1 mm <sup>2</sup>			BCA0042
5x1 mm <sup>2</sup>			BCA0141
4x1.5 mm <sup>2</sup>			BCA0069
5x1.5 mm <sup>2</sup>	PE/PUR		BCA0052
6x1.5 mm <sup>2</sup>	TPE/PUR		BCA0142
7x1.5 mm <sup>2</sup>	TPE/PUR VS	● OG	BCA0143
5x2.5 mm <sup>2</sup>	TPE/PUR	● BK	BCA0144
3x25 mm <sup>2</sup>		● BK	BCA0145
3x25 mm <sup>2</sup>		● YE	BCA0009
3x35 mm <sup>2</sup>		● BK	BCA0011
3x35 mm <sup>2</sup>		● OG	BCA0146
(4x0.5 mm <sup>2</sup> )		● BK	BCA0147

电缆结构/技术参数	
导体	超细裸铜丝绞线、6级 TPE 和/或 PE 绝缘芯线
宣传册特定版本	电源线, 不带/带一根/两根绞合在一起的独立屏蔽控制芯线对
屏蔽	铜丝编织、镀锡、覆盖率 >85% 或铜丝编织、镀锡、覆盖率 >95%
外护套	聚氨酯 无卤符合 IEC 60754 阻燃符合 UL94 V0 耐磨损、抗切割 低粘附力 耐油符合 DIN VDE 0282 第 10 部分 / HD 22.10 抗紫外线
工作电压	从 0.5 mm <sup>2</sup> 600 V 至 0.34 mm <sup>2</sup> 450 V
测试电压	从 0.5 mm <sup>2</sup> 3000 V/DC 至 0.34 mm <sup>2</sup> 2000 V/DC
工作温度	-40°C 至 +80°C*
最小弯曲半径	单次 2xD (固定安装) 柔性 5xD; 最佳 10xD

Core no. x nom. conductor cross-section 芯数与导线标称横截面积	Insulation material 绝缘材料	Colour 颜色	Article no. 订购号	
(5x0.5 mm <sup>2</sup> )	TPE/PUR	● BK	BCA0148	
(19x0.6 mm <sup>2</sup> )			BCA0149	
(4x0.75 mm <sup>2</sup> )			BCA0150	
(2x1 mm <sup>2</sup> )			BCA0151	
(5x1 mm <sup>2</sup> )			BCA0152	
(6x1.5 mm <sup>2</sup> )			BCA0153	
3x(2x0.5 mm <sup>2</sup> )			● OG	BCA0154
(4x2x0.5 mm <sup>2</sup> )			● BK	BCA0155
(5x(2x0.5 mm <sup>2</sup> ))			● BK	BCA0121
(6x2x0.5 mm <sup>2</sup> )			● BK	BCA0156
(6x2x0.5 mm <sup>2</sup> )	TPE/PUR UL 20233	● GY	BCA0156	
2x(2x0.75 mm <sup>2</sup> )	TPE/PUR	● OG	BCA0157	
(6x0.75 mm <sup>2</sup> )		● BK	BCA0158	

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\* Conversion to Fahrenheit compare page 41.

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## Data cables / 数据电缆



Cable design / technical data	
Conductor	Extra-fine wire copper strand, bare, class 6 core insulation TPE and/or PE
Article-specific Version	Power conductors without/with one/with two separately shielded control core pairs stranded together
Shielding	Copper braiding, tinned, degree of optical coverage >85% or copper screening, tinned, degree of optical coverage >95%
Outer sheath	Polyurethane, halogen-free acc. to IEC 60754 flame-retardant acc. to UL94 V0 abrasion-resistant and cut-resistant low-adhesion, oil-resistant acc. to DIN VDE 0282 Part 10 / HD 22.10, UV resistant
Operating voltage	up to 0.34 mm <sup>2</sup> 450 V; from 0.5 mm <sup>2</sup> 600 V
Test voltage	up to 0.34 mm <sup>2</sup> 2000 V/DC; from 0.5 mm <sup>2</sup> 3000 V/DC
Operating temperature	-40°C to +80°C*
Minimum bending radius	once 2xD (permanently installed) flexible 5xD, optimum 10xD

电缆结构/技术参数	
导体	超细裸铜丝绞线、6级 TPE 和/或 PE 绝缘芯线
宣传册特定版本	电源线, 不带/带一根/两根绞合在一起的独立屏蔽控制芯线对
屏蔽	铜丝编织、镀锡、覆盖率 >85% 或铜丝编织、镀锡、覆盖率 >95%
外护套	聚氨酯, 无卤符合 IEC 60754 阻燃符合 UL94 V0 耐磨损、抗切割 低粘附力, 耐油符合 DIN VDE 0282 第 10 部分 / HD 22.10, 抗紫外线
工作电压	从 0.5 mm <sup>2</sup> 600 V 至 0.34 mm <sup>2</sup> 450 V
测试电压	从 0.5 mm <sup>2</sup> 3000 V/DC 至 0.34 mm <sup>2</sup> 2000 V/DC
工作温度	-40°C 至 +80°C*
最小弯曲半径	单次 2xD (固定安装) 柔性 5xD; 最佳 10xD

Core no. and nom. conductor cross-section 芯数与导线标称横截面积	Insulation material 绝缘材料	Outer Ø 外径	Colour 颜色	Article no. 订购号
(12x0.15 mm <sup>2</sup> )	TPE/TPR	5.8 mm	● BK	BCA0067
(16x0.15 mm <sup>2</sup> )	TPE/TPE	7.4 mm		BCA0117
(7x0.25 mm <sup>2</sup> )	TPE/PUR	5.5 mm		BCA0118
(18x0.25 mm <sup>2</sup> )		7.4 mm	BCA0119	
(6x(2x0.15 mm <sup>2</sup> ) + 1x3x0.15 mm <sup>2</sup> )	TPE/PUR UL 20233	10.8 mm	● GN	BCA0120
(5x2x0.25 mm <sup>2</sup> )		8.5 mm	● BK	BCA0122
2x2x0.34 mm <sup>2</sup> + (2x0.34 mm <sup>2</sup> )	TPE/PUR	6.6 mm	● BK	BCA0032
(14x2x0.25 mm <sup>2</sup> )		10.5 mm	● OG	BCA0123
(7x(2x0.25 mm <sup>2</sup> ))		11.3 mm	● GY	BCA0124
8x(2x0.25 mm <sup>2</sup> )	TPE/PUR UL	12.3 mm	● BK	BCA0125
(4x(2x0.34 mm <sup>2</sup> ))	TPE/PUR	11.7 mm	● BK	BCA0126
(4x(2x0.34 mm <sup>2</sup> ))		9.3 mm	● GY	BCA0046
(6x(2x0.34 mm <sup>2</sup> ))		11.2 mm	● GY	BCA0045
2x2x0.34 mm <sup>2</sup> + (2x0.34 mm <sup>2</sup> )		6.6 mm	● BK	BCA0032
((2x0.38 mm <sup>2</sup> ) + (2x0.24 mm <sup>2</sup> ))	TPE/PUR	9.1 mm	● GY	BCA0014
2x(2x0.34 mm <sup>2</sup> ) + 3x4x0.34 mm <sup>2</sup> + 3x0.34 mm <sup>2</sup>		10.8 mm	● RD	BCA0033
(3x(2x0.24 mm <sup>2</sup> ))		7.4 mm	● BK	BCA0127
(2x0.61 mm <sup>2</sup> )		5.0 mm		BCA0129
(8x0.34 mm <sup>2</sup> )		6.2 mm		BCA0130
(3x2x0.25 mm <sup>2</sup> )		6.2 mm		BCA0131
(4x(2x0.25 mm <sup>2</sup> ))		9.5 mm		BCA0047
(4x2x0.34 mm <sup>2</sup> )		8.5 mm		BCA0132

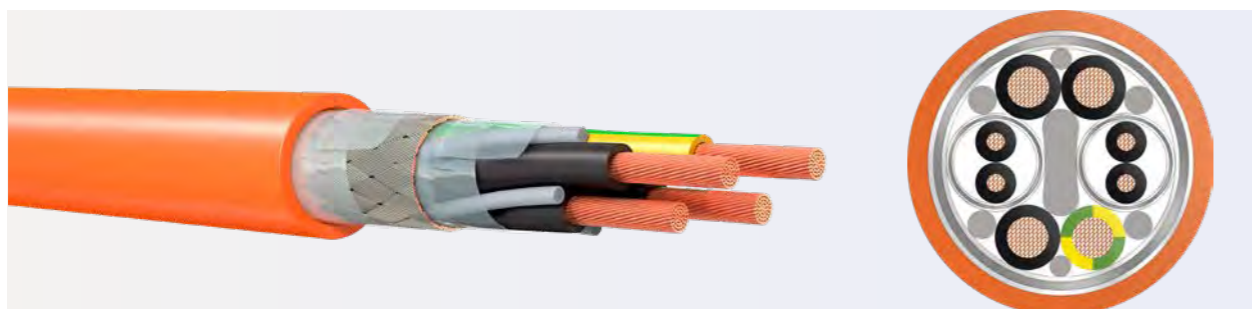
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# Combined cables / 组合电缆



Cable design / technical data	
<b>Conductor</b>	Extra-fine wire copper strand, bare, class 6 core insulation TPE and/or PE
<b>Article-specific Version</b>	Power conductors without/with one/with two separately shielded control core pairs stranded together
<b>Shielding</b>	Copper braiding, tinned, degree of optical coverage >85% or copper screening, tinned, degree of optical coverage >95%
<b>Outer sheath</b>	Polyurethane halogen-free acc. to IEC 60754 flame-retardant acc. to UL94 V0 abrasion-resistant and cut-resistant low-adhesion oil-resistant acc. to DIN VDE 0282 Part 10 / HD 22.10 UV resistant
<b>Operating voltage</b>	up to 0.34 mm <sup>2</sup> 450 V; from 0.5 mm <sup>2</sup> 600 V
<b>Test voltage</b>	up to 0.34 mm <sup>2</sup> 2000 V/DC; from 0.5 mm <sup>2</sup> 3000 V/DC
<b>Operating temperature</b>	-40°C to +80°C*
<b>Minimum bending radius</b>	once 2xD (permanently installed) flexible 5xD optimum 10xD

电缆结构/技术参数	
导体	超细裸铜丝绞线, 6 级 TPE 和/或 PE 绝缘芯线
宣传册特定版本	电源线, 不带/带一根/两根绞合在一起的独立屏蔽控制芯线对
屏蔽	铜丝编织、镀锡、覆盖率 >85% 或铜丝编织、镀锡、覆盖率 >95%
外护套	聚氨酯 无卤符合 IEC 60754 阻燃符合 UL94 V0 耐磨损、抗切割 低粘附力 耐油符合 DIN VDE 0282 第 10 部分 / HD 22.10 抗紫外线
工作电压	从 0.5 mm <sup>2</sup> 600 V 至 0.34 mm <sup>2</sup> 450 V
测试电压	从 0.5 mm <sup>2</sup> 3000 V/DC 至 0.34 mm <sup>2</sup> 2000 V/DC
工作温度	-40°C 至 +80°C*
最小弯曲半径	单次 2xD (固定安装) 柔性 5xD; 最佳 10xD

Core no. and nom. conductor cross-section 芯数与导线标称横截面积	Insulation material 绝缘材料	Outer -Ø 外径	Colour 颜色	Article no. 订购号
2x(2x0.75 mm <sup>2</sup> ) + (3x0.75 mm <sup>2</sup> )	TPE/PUR	10.0 mm	● OG	BCA0031
(2x(2x0.34 mm <sup>2</sup> ) + 2x1.5 mm <sup>2</sup> )	FEP/TPE/PUR	10.6 mm	● BK	BCA0080
6x(2x0.25 mm <sup>2</sup> ) + (4x1 mm <sup>2</sup> ) + 1x1 mm <sup>2</sup>	PE/TPE/PUR	13.7 mm	● VT	BCA0081
(3x2x0.24 mm <sup>2</sup> ) + 6x0.5 mm <sup>2</sup> )	TPE/PUR	9.7 mm		BCA0037
5x(2x0.25 mm <sup>2</sup> ) + (4x1 mm <sup>2</sup> ) + 1x1 mm <sup>2</sup>	PE/TPE/PUR	13.3 mm		BCA0082
7x1 mm <sup>2</sup> + (2x0.5 mm <sup>2</sup> )		8.5 mm		BCA0083
((3x2x1.5 mm <sup>2</sup> ) + 9x4 mm <sup>2</sup> + 1x6 mm <sup>2</sup> )		24.0 mm		BCA0084
((3x2x1.5 mm <sup>2</sup> ) + 10x10 mm <sup>2</sup> )		30.0 mm		BCA0061
(4x1.5 mm <sup>2</sup> + (4x0.75 mm <sup>2</sup> ))	TPE/PUR	15.0 mm		BCA0085
5x3x1 mm <sup>2</sup> + (2x1 mm <sup>2</sup> ) + 1x1 mm <sup>2</sup>		13.5 mm		BCA0086
(2x0.34 mm <sup>2</sup> ) + 3x(2x0.5 mm <sup>2</sup> ) + 1x0.5 mm <sup>2</sup>		12.5 mm		BCA0087
(2x2+(2x0.25 mm <sup>2</sup> )) + 2x(0.5 mm <sup>2</sup> + 2x(2x0.25 mm <sup>2</sup> )) + 2x5x0.25 mm <sup>2</sup>		19.0 mm		BCA0088
((3x2x0.25 mm <sup>2</sup> ) + 5x(2x0.25 mm <sup>2</sup> ) + 7x0.25 mm <sup>2</sup> + 1x0.5 mm <sup>2</sup> )		17.0 mm		BCA0049
((2x0.24 mm <sup>2</sup> ) + 2x0.75 mm <sup>2</sup> )	TPE/FEP/PUR	10.0 mm		BCA0019
5x(2x0.25 mm <sup>2</sup> ) + (4x1 mm <sup>2</sup> ) + 2x(2x1 mm <sup>2</sup> ) + 1x1 mm <sup>2</sup>	PE/TPE/PUR	14.5 mm	● BK	BCA0089
(2x1 mm <sup>2</sup> ) + 5x4x1 mm <sup>2</sup> + 3x1 mm <sup>2</sup>		14.0 mm		BCA0090
3x1 mm <sup>2</sup> + 4x4x0.5 mm <sup>2</sup>		11.6 mm		BCA0034
(6x(2x0.34 mm <sup>2</sup> ) + 4x2.5 mm <sup>2</sup> )		14.5 mm		BCA0058
(2x0.5 mm <sup>2</sup> + 4x2x0.25 mm <sup>2</sup> )		8.0 mm		BCA0091
((5x0.5 mm <sup>2</sup> ) + (4x2x0.25 mm <sup>2</sup> ) + (5x2.5 mm <sup>2</sup> ) + 2x(2x0.5 mm <sup>2</sup> ))		18.5 mm		BCA0050
(2x1 mm <sup>2</sup> ) + (3x1 mm <sup>2</sup> ) + 1x1 mm <sup>2</sup>		10.2 mm		BCA0051
(3x0.75 mm <sup>2</sup> ) + (6x0.75 mm <sup>2</sup> )		9.6 mm		BCA0092
2x0.5 mm <sup>2</sup> + (2x0.5 mm <sup>2</sup> )		8.1 mm		BCA0093
5x1 mm <sup>2</sup> + (2x1 mm <sup>2</sup> )		9.4 mm		BCA0094
3x1 mm <sup>2</sup> + 4x0.5 mm <sup>2</sup> + 4x5x0.5 mm <sup>2</sup>		14.1 mm		BCA0095
(3x2.5 mm <sup>2</sup> ) + 1x2.5 mm <sup>2</sup> + 3x(2x0.34 mm <sup>2</sup> ) + (2x0.34 mm <sup>2</sup> ) + 2x2x0.34 mm <sup>2</sup>	TPE/PUR	15.5 mm		BCA0059
5x3x0.5 mm <sup>2</sup> + (2x0.5 mm <sup>2</sup> ) + (2x0.75 mm <sup>2</sup> ) UL 20233		12.3 mm		BCA0096
(3x2x0.25 mm <sup>2</sup> + 3x1 mm <sup>2</sup> )		10.2 mm	● GY	BCA0016
3x3x0.5 mm <sup>2</sup> + 1x4x0.5 mm <sup>2</sup> + 1x(2x0.5 mm <sup>2</sup> ) + 1x3x1 mm <sup>2</sup>		11.7 mm	● BK	BCA0097
6x3x0.75 mm <sup>2</sup> + 1x0.75 mm <sup>2</sup>		12.4 mm	● GN	BCA0098
3x5x0.5 mm <sup>2</sup> + 2x(2x0.5 mm <sup>2</sup> )		12.5 mm		BCA0099
4x4x0.6 mm <sup>2</sup> + 3x3x0.6 mm <sup>2</sup>		12.8 mm		BCA0035
5x5x1 mm <sup>2</sup>		15.4 mm		BCA0100
23x1 mm <sup>2</sup> + (2x1 mm <sup>2</sup> )		13.3 mm	● BK	BCA0101
2x3x0.75 mm <sup>2</sup> + (3x0.75 mm <sup>2</sup> )		9.7 mm		BCA0102
13x0.5 mm <sup>2</sup> + (2x2x0.5 mm <sup>2</sup> )		10.0 mm		BCA0103
(7x7x0.75 mm <sup>2</sup> )		17.8 mm		BCA0104

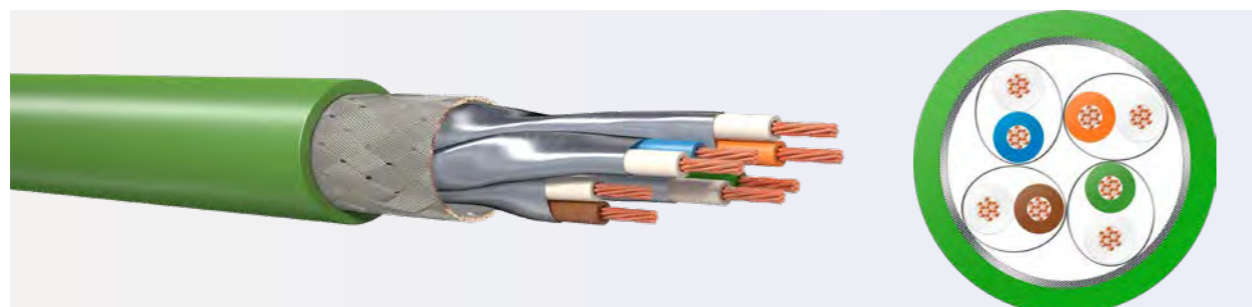
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\* Conversion to Fahrenheit compare page 41.

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## Bus cables / 总线电缆



Example structure BCA0012 cable design / technical data	
Conductor	Cu strand, bare, 19x0.10 mm
Core insulation	Polypropylene
Twisting	2 cores to each pair; overlapping plastic foil 4 pairs + filler stranded together aluminium-backed foil taping, overlapping copper screening, tinned; 0.10 mm, degree of optical coverage >90 % plastic foil, overlapping
Jacket	Polyurethane, green
Outer diameter	7.5 mm ± 0.2 mm
Marking	BizLink L TRAILING & TORSIONAL INDUSTRIAL ETHERNET CABLE 4x2x26 AWG AWM 20963 80°C* 30 V year and internal production number
Torsion stress	1 million cycles (± 180°/m)
Use in cable carrier	1 million bending cycles, minimum bending radius 7.5xD
Speed	180 m/min; acceleration 5 m/sec <sup>2</sup>

示例结构 BCA0012 的电缆设计/技术参数	
导体	裸铜绞线, 19 x 0.10 mm
绝缘芯线	聚丙烯
绞合	每对 2 芯; 塑料薄膜包覆 4 对 + 填充物绞合在一起 铝基箔带 包裹 铜丝编织、镀锡; 0.10 mm 覆盖率 >90 % 塑料薄膜包覆
外护套	聚氨酯、绿色
外径	7.5 mm ± 0.2 mm
喷码	BizLink L TRAILING & TORSIONAL INDUS- TRIAL ETHERNET CABLE 4x2x26 AWG AWM 20963 80°C* 30 V 年份与内部生产编号
扭转要求	1 万次循环 (± 180°/m)
用于电缆拖链	1 万次弯曲循环, 最小弯曲半径 7.5xD
拖链速度	180 m/min; 加速度 5 m/s <sup>2</sup>

Core no. and nom. conductor cross-section 芯数与导线标称横截面积	Insulation material 绝缘材料	Applications 应用	Outer Ø 外径	Colour 颜色	Article no. 订购号
(4x0.34 mm <sup>2</sup> ) CAT5e	PE/PUR	Ethernet	6.5 mm	● GN	BCA0133
(4x0.34 mm <sup>2</sup> ) CAT5e	FEP/PUR	Ethernet	6.5 mm	● BK	BCA0134
(4x2x26 AWG) CAT5	PP/PUR	Ethernet	7.5 mm	● GN	BCA0012
(4x2x24 AWG) CAT6a FC	PE/PUR	Ethernet	8.9 mm	● GN	BCA0135
(2x0.34 mm <sup>2</sup> )	FEP/PUR	ProfiBus	8.3 mm	● VT	BCA0128
5x(2x0.25 mm <sup>2</sup> ) + 2x(2x1 mm <sup>2</sup> ) + 1x1 mm <sup>2</sup>	PE/TPE/PUR	Interbus	12.9 mm	● VT	BCA0136
(9x1.5 mm <sup>2</sup> ) + (4x1.5 mm <sup>2</sup> ) + 2x(2x0.24 mm <sup>2</sup> ) + power supply	PE/TPE/PUR	CAN-Bus	19.5 mm	● BK	BCA0137
((2x0.38 mm <sup>2</sup> + (2x0.24 mm <sup>2</sup> ))	PE/TPE/PUR	DeviceNet	9.1 mm	● GY	BCA0014
(4x2x26AWG) CAT5	PP/PUR	Ethernet	8.5 mm	● GN	BCA0138

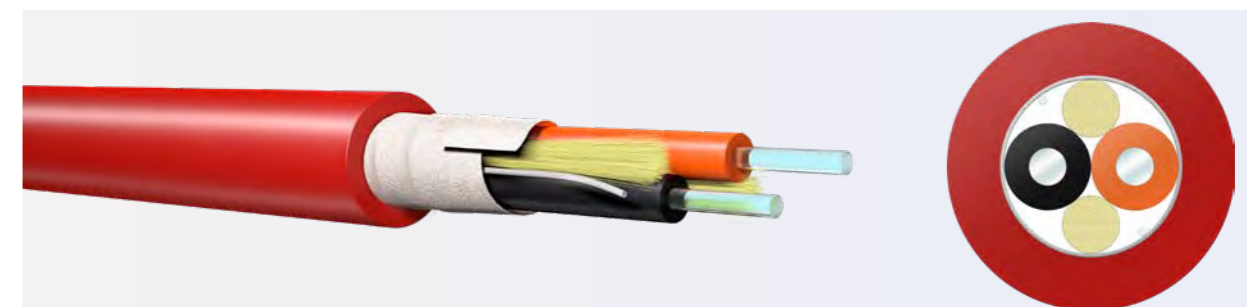
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## Fiber optic cables / 光缆



Cable design / technical data	
Fiber	Plastic FO S980/1000 made of PMMA with fluoropolymer cladding Ø 1 mm
Core	PA covering Ø 2.2 mm ± 0.07 mm colours: SW and OR
Twisting	2 FO elements and 2 strain relief elements Fleece taping
Jacket	Polyurethane 2 tearing threads (aramid) diametrically under the sheath
Service temperature	-40°C to +80°C* Flex

电缆结构/技术参数	
纤芯	FO S980/1000 塑料, 由 PMMA 制成带含氟聚合物包层, Ø 1 mm
芯线	PA 覆盖, Ø 2.2 mm +/- 0.07 mm 颜色: SW 和 OR
绞合	2 个光纤元件和 2 个应力消除元件 绒布带
外护套	聚氨酯 2 根撕裂线 (芳纶) 直接紧贴在护套下
工作温度	-40°C 至 +80°C* 柔性

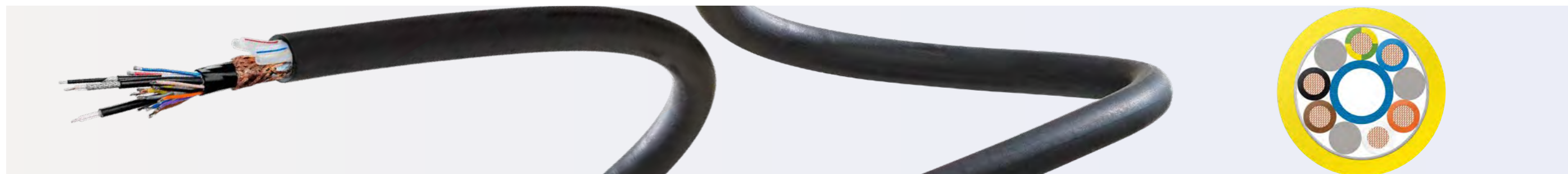
Dimensions 规格	Outer Ø 外径	Colour 颜色	Article no. 订购号
I-V4Y(ZN)11Y 2P980/1000 Rugged Flex Pro	8.0 mm ± 0.5 mm	● GN	BCA0139
I-V4Y(ZN)11Y 2P980/1000 Flex	8.0 mm ± 0.5 mm	● RD	BCA0021

\* Conversion to Fahrenheit compare page 41.

\* 华氏温度换算请对照第41页。



# Hybrid cables / 混合电缆



## Hybrid cable / 混合电缆 BCA0105

Cable design / technical data	
Conductor	Extra-fine wire copper strand, bare, Class 6
Structure	4 core pairs and filler together stranded via TPU tube, fleece taping
Shield	2 x copper screening, tinned, degree of optical coverage >90%
Jacket	PUR, black, halogen-free and flame-retardant acc. to UL V0
Outer diameter	8.9 mm ± 0.2 mm
Operating voltage	450 V
Core/core test voltage	2500 V/DC
Min. bending radius	once 2xD (permanently installed) flexible 5xD, optimum 10xD
Service temperature	-40°C to +80°C*

电缆结构/技术参数	
导体	超细裸铜丝绞线、6级
结构	4芯对和填充物通过TPU管绞合在一起，绒布带
屏蔽	2 x 铜丝编织、镀锡，覆盖率 >90%
外护套	PUR、黑色、无卤、阻燃符合UL V0
外径	8.9 mm ± 0.2 mm
工作电压	450 V
测试电压 芯线/芯线	2500 V/DC
最小弯曲半径	单次 2xD (固定安装) 柔性 5xD; 最佳 10xD
工作温度	-40°C 至 +80°C*

## Hybrid cable / 混合电缆 BCA0079

Cable design / technical data	
Conductor	Extra-fine wire copper strand, bare, Class 6
Structure	6 cores 2.5 mm <sup>2</sup> and fillers stranded together with TPU tube, fleece taping
Jacket	PUR, yellow, halogen-free, flame-retardant acc. to UL94 V0
Outer diameter	15.2 mm ± 0.3 mm
Operating voltage	600 V/DC
Core/core test voltage	3000 V/DC
Min. bending radius	once 2xD (permanently installed) flexible 5xD optimum 10xD
Service temperature	-40°C to +80°C*

电缆结构/技术参数	
导体	超细裸铜丝绞线、6级
结构	2.5 mm <sup>2</sup> 的 6 根芯线与填充物绞合在一起，带 TPU 软管、绒布带
外护套	PUR、黄色、无卤、阻燃符合 UL94 V0
外径	15.2 mm ± 0.3 mm
工作电压	600 V/DC
测试电压 芯线/芯线	3000 V/DC
最小弯曲半径	单次 2xD (固定安装) 柔性 5xD; 最佳 10xD
工作温度	-40°C 至 +80°C*

## Hybrid cable / 混合电缆 BCA0106

Cable design / technical data	
Conductor	Extra-fine wire copper strand, bare, Class 6
Structure	2 elements 12x0.5 mm <sup>2</sup> stranded with 12 PUR tube and fillers, fleece taping
Jacket	PUR, black, halogen-free and flame-retardant acc. to UL V0
Outer diameter	32 mm ± 0.4 mm
Operating voltage	600 V/DC
Core/core test voltage	3000 V/DC
Min. bending radius	once 2xD (permanently installed) flexible 5xD, optimum 10xD
Service temperature	-40°C to +80°C*

电缆结构/技术参数	
导体	超细裸铜丝绞线、6级
结构	2个元件 12 x 0.5 mm <sup>2</sup> 将 12 PUR 软管、填充物和绒布带绞合在一起
外护套	PUR、黑色、无卤、阻燃符合UL V0
外径	32 mm +/- 0.4 mm
工作电压	600 V/DC
测试电压 芯线/芯线	3000 V/DC
最小弯曲半径	单次 2xD (固定安装) 柔性 5xD; 最佳 10xD
工作温度	-40°C 至 +80°C*

## Hybrid cable / 混合电缆 BCA0107

Cable design / technical data	
Conductor	Feinstdrähtige Kupferlitze blank, Klasse 6
Structure	Elements 6x0.15 mm <sup>2</sup> 2x0.34 mm <sup>2</sup> and 4x0.34 mm <sup>2</sup> stranded together, fleece taping, cores and tubes stranded together, fleece taping
Jacket	PUR, black, halogen-free, flame-retardant acc. to UL94 V0
Outer diameter	17 mm +/- 0.4 mm
Operating voltage	600 V/DC
Core/core test voltage	3000 V/DC
Min. bending radius	once 2xD (permanently installed) flexible 5xD optimum 10xD
Service temperature	-40°C to +80°C*

电缆结构/技术参数	
导体	超细裸铜丝绞线、6级
结构	6 x 0.15 mm <sup>2</sup> 2 x 0.34 mm <sup>2</sup> 和 4 x 0.34 mm <sup>2</sup> 元件绞合在一起，绒布带、芯线和管子绞合在一起，绒布带
外护套	PUR、黑色无卤阻燃符合 UL94 V0
外径	17 mm +/- 0.4 mm
工作电压	600 V/DC
测试电压 芯线/芯线	3000 V/DC
最小弯曲半径	单次 2xD (固定安装) 柔性 5xD; 最佳 10xD
工作温度	-40°C 至 +80°C*

Core number, nominal conductor cross-section and tube dimensions 芯线芯数、导线标称横截面积和软管尺寸	Element hose 元件	Insulation material / 绝缘材料		Article no. 订购号
		Core / 芯线	Hose / 软管	
4x2x0.15 mm <sup>2</sup>	3.2x0.8 mm	TPE	TPU	BCA0105
2x12x0.5 mm <sup>2</sup>	12x6x4 mm	TPE	TPU	BCA0106

Dimensions 规格	Element hose 元件	Insulation material / 绝缘材料		Article no. 订购号
		Core / 芯线	Hose / 软管	
6x2.5 mm <sup>2</sup>	6x4 mm	TPE	TPU	BCA0079
1x6x0.15 mm <sup>2</sup> + 1x2x0.34 mm <sup>2</sup> + 1x4x0.34 mm <sup>2</sup>	6x4 mm + 4x2.5 mm	TPE	PUR	BCA0107

We also assemble special robotic cables for you. This is only a small extract of our cable competence. Different structures, dimensions and colours are available on request, as are data sheets.

\* Conversion to Fahrenheit compare page 41.

这里的电缆型号仅抽取了我们电缆产品的一小部分。我们可根据客户要求来订制不同应用、结构、尺寸和颜色的电缆。我们同样可以为您提供预装配的各种电缆线束和组件。

\* 华氏温度换算请对照第41页。

We also assemble special robotic cables for you. This is only a small extract of our cable competence. Different structures, dimensions and colours are available on request, as are data sheets.

\* Conversion to Fahrenheit compare page 41.

这里的电缆型号仅抽取了我们电缆产品的一小部分。我们可根据客户要求来订制不同应用、结构、尺寸和颜色的电缆。我们同样可以为您提供预装配的各种电缆线束和组件。

\* 华氏温度换算请对照第41页。

# Conductor lines

## 导线



# Conductor lines

# 导线

used for robots

用于机器人

### Structure/technical specifications

- Cu coverings Cu-DHP tube, annealed
- Dimensions 19x1x28 mm
- Surface bare
- Cu fabric tape Cu-ETP1 25 mm<sup>2</sup>
- Dimensions 22x2.5 mm single wire Ø 0.16 mm
- Surface bare
- based on DIN 7233 T. 3
- Material: Circular wires made of Cu-ETP1 annealed  
DIN EN 13602

### 电缆结构/技术参数

- 铜涂层 CuDHP 管, 退火
- 规格 19x1x28 mm
- 表面裸露
- 铜编织带 Cu-ETP1 25 mm<sup>2</sup>
- 规格 22x2.5 mm 单芯线 Ø 0.16 mm
- 表面裸露
- 基于 DIN 7233 T. 3
- 材质: 由退火 Cu-ETP1 制成的圆形导线
- DIN EN 13602

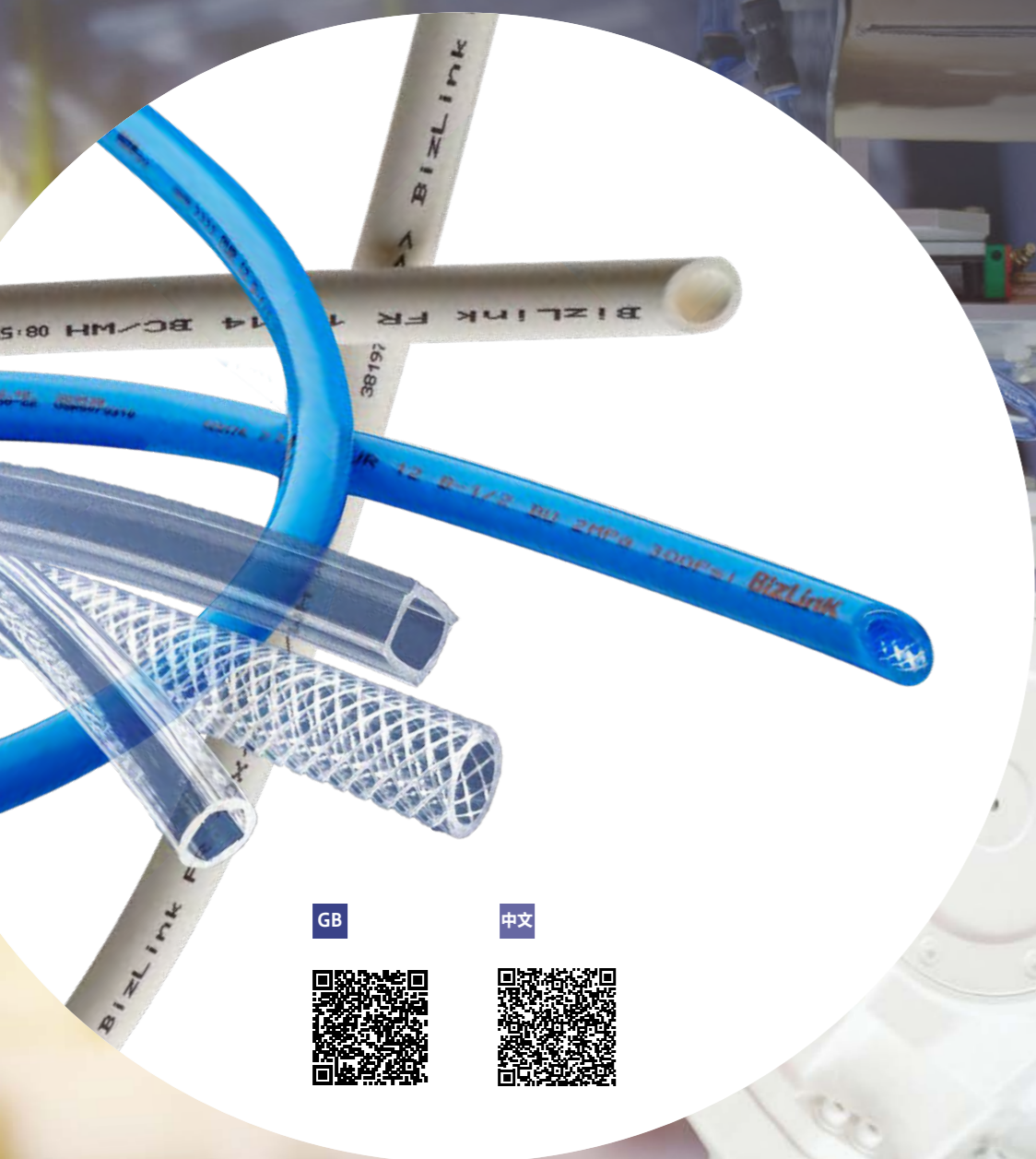
Dimensions 规格	Article no. 订购号
1x25 mm <sup>2</sup>	BCA0159

## Hoses

### 软管

We develop and produce all the polyurethane hoses for integration in umbilicals / dresspacks. Our polyurethane hoses are used in many industrial applications, e.g. on industrial robots. They are utilised to transmit air, water and gases, or also as tubes to convey and position solid states such as rivets, bolts etc.

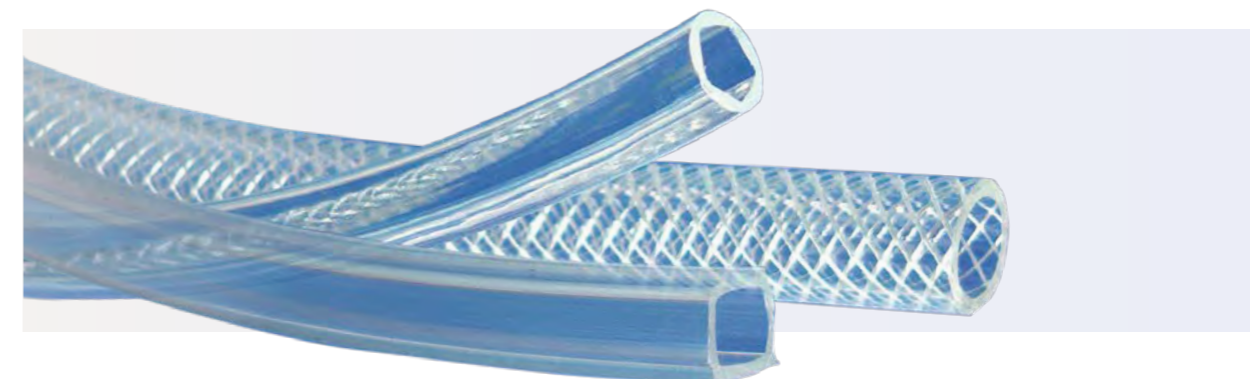
我们研制并生产所有集成于机器人管线包内的聚氨酯软管，应用于多项工业领域，如工业机器人。它们可用于传送水和气体，也可用作输送一些固态物体，例如铆钉和螺钉等等。



## BizLink tube *profile-line*

### Polyurethane hoses

### 聚氨酯软管



#### For industrial applications >

Polyurethane hoses with customised inner and outer profiles - particularly suitable for use in rivet and weld nut delivery systems in the automotive and aviation industries. Also excellent for other feeding applications. .

#### 工业应用 >

这些内外剖面定制的聚氨酯软管，用于汽车和航空业多个领域，如铆钉和焊接螺母传送系统。它们同样可用于其他馈入设备。

#### Mechanical and chemical properties

- Inner and outer layers are 100 % paint resistant
- Silicone free
- Halogen free
- Resistance to oils / mineral oils / oxygen / ozone / weak acids / diluted bases
- Abrasion and scratch resistant, resulting in a longer lifetime
- High cross sectional strength
- Standard temperature range: 0°C up to +50°C\*
- Colour: transparent to crystal clear
- Inside and outside profile: customized to specification
- Construction: reinforced if needed
- Technical characteristics for working pressure, burst pressure and vacuum can be modified in accordance with the application and the customer's needs.

#### 机械和化学性能

- 管内外层 100% 不含漆类污染物
- 无硅
- 无卤
- 耐油/矿物油/氧/臭氧/弱酸/稀碱
- 耐磨损和刮痕，使用寿命更长
- 高横截面强度
- 标准温度范围：0°C至 +50°C\*
- 颜色：可至水晶般透明
- 内外形剖面：根据您的要求而定
- 构造：如需要，可加固
- 作业压强、爆发压强和真空技术特征可按照设备和客户需求调整。

\* Conversion to Fahrenheit compare page 41.

\* 华氏温度换算请对照第41页。

# BizLink tube-fit FR-line

## Polyurethane media hoses

## 聚氨酯介质软管



### For industrial applications >

Halfstiff and flame-retardant polyurethane hoses – especially developed for robotic and welding equipment. Particularly well suited as a transmission medium for compressed air and (cooling) water.

### 工业应用 >

半刚性和耐燃的直插式 FR 软管, 专为机器人和焊接设备开发, 特别适用以传送压缩空气和 (冷却) 水等。

### Mechanical and chemical properties >

- Inner and outer layer free of paint wetting inhibitors substances
- Silicon free / Halogen free
- Flame resistant, acc. to UL 94-V0, self-extinguishing
- Resistance to oils / mineral oils / oxygen / ozone / weak acids / diluted bases
- UV resistant
- Abrasion resistant
- Working temperature range: -30 °C to +90 °C\*

### 机械和化学性能 >

- 管内外层不含涂料润湿抑制剂物质
- 无硅/无卤
- 根据 UL94-V0, 具有阻燃和自熄性
- 耐受油成分 / 矿物油 / 氧气 / 臭氧 / 弱酸 / 稀基
- 抗紫外线
- 耐磨
- 工作温度范围: -30 °C 到 +90 °C\*

### Note >

Female and male thread fittings (e.g. rotatable 90° angled) are available to match the polyurethan hoses.

[Please contact us for your individual quote.](#)

### 备注 >

内螺纹和外螺纹接头 (如可旋转的90°)。

[请联系我们获取独立报价。](#)



see page 24/25  
参见第24/25页

\*Conversion to Fahrenheit compare page 41.

\*华氏温度换算请对照第41页。

Colour code acc. to IEC 757 / 根据 IEC 757确定的色码				
Standard colours 标准颜色	x-xx → V-GN ●	x-xx → B-BU ●	x-xx → R-RD ●	x-xx → N-BK ●
Colours on request 需求的颜色	x-xx → G-GY ●	x-xx → J-YE ●	x-xx → M-BN ●	

Type 类型	Inner Ø 内径-Ø	Outer Ø 外径-Ø	Thickness 厚度	Max. working pressure 最大工作压力		Min. burst pressure 最小爆破压力		Vacuum 真空	Min. bending radius 最小弯曲半径		
				at 20 °C* 20 °C 时*	at 20 °C* 20 °C 时*	at 60 °C* 60 °C 时*	static 统计		for optimal flow 最优流	dynamic 动态	
	mm	mm	mm					0.09	mm	mm	mm
4x6	4	6 ±0.10	1.00	1.4		4.4	2.2		10	15	35
4x8	4	8 ±0.15	2.00	2		6.4	3.2		15	20	40
5.5x8	5.5	8 ±0.15	1.25	1.2		3.6	1.5		15	25	50
6x10	6	10 ±0.15	2.00	1.6		5	2.7		20	35	50
7x10	7	10 ±0.15	1.50	1.2		3.6	1.6		25	40	50
8x12	8	12 ±0.15	2.00	1.3		4	2		25	45	65
10x14	10	14 ±0.15	2.00	1.2		3.6	1.8		40	60	85
11x16	11	16 ±0.15	2.50	1.2		3.6	1.7		45	70	95

\*Conversion to Fahrenheit compare page 41.

\*华氏温度换算请对照第41页。

## BizLink tube-fit **FR-line**

**Fitting male thread straight with colour indication ring**

**外螺纹与颜色指示环匹配**



- **Operating pressure:**  
-0.98 to 18 bar
- **Equipment temperature:**  
-20°C to 80 °C\* (high temperature design on request)
- **Characteristics:**  
Applicable for gaseous and fluid media, optimized and improved flow characteristics for water
- **Material:**  
Nickel plated brass, indication ring silicium aluminum anodized in colours

- **工作压力:**  
-0.98 ~18 巴
- **设备温度:**  
-20°C ~80 °C\* (若有要求, 可以提供高温定制产品)
- **特性:**  
适用于气态和液态物质, 优化和改进流体特性
- **材料:**  
镀镍黄铜, 经硅铝阳极氧化处理的彩色指示环

**Note >**  
When ordering, please state the order no. and the colour code of the marking ring.

**备注 >**  
下单时请添加指示环的色码。

Description 描述	Ø mm Ø mm	Thread 螺纹	Colour code – indication ring 颜色指示码	Article no. + Colour code 订购号+色码
Fitting male thread 安装外螺纹	6	M5	Standard colours / 标准颜色	TFR0001
	6	1/8"		TFR0002
	6	1/4"		TFR0003
	6	3/8"		TFR0004
	8	1/8"		TFR0005
	8	1/4"		TFR0006
	8	3/8"		TFR0007
	8	1/2"		TFR0008
	10	1/8"		TFR0009
	10	1/4"		TFR0010
	10	3/8"		TFR0011
	10	1/2"		TFR0012
	12	1/4"	TFR0013	
	12	3/8"	TFR0014	
	12	1/2"	TFR0015	
	14	3/8"	TFR0016	
	14	1/2"	TFR0017	
	16	1/2"	TFR0018	

\*Conversion to Fahrenheit compare page 41.

\*华氏温度换算请对照第41页。

## BizLink tube-fit **FR-line**

**Bulkhead fitting with colour indication ring**

**有颜色指示环的通孔接头**



- **Operating pressure:**  
-0.98 to 18 bar
- **Equipment temperature:**  
-20°C to 80 °C\* (high temperature design on request)
- **Characteristics:**  
Applicable for gaseous and fluid media, optimized and improved flow characteristics for water
- **Material:**  
Nickel plated brass, indication ring silicium aluminum anodized in colours

- **工作压力:**  
-0.98 ~18 巴
- **设备温度:**  
-20°C ~80 °C\* (若有要求, 可以提供高温定制产品)
- **特性:**  
适用于气态和液态物质, 优化和改进流体特性
- **材料:**  
镀镍黄铜, 经硅铝阳极氧化处理的彩色指示环

下单时请添加指示环的色码。

Please add the colour code of the indication ring when you place your order.

**Note >**  
When ordering, please state the order no. and the colour code of the marking ring.

**备注 >**  
下单时请备注订购号和指示环的色码。

Description 描述	Ø mm Ø mm	Thread 螺纹	Colour code – indication ring 颜色指示码	Article no. + Colour code 订购号+色码
Bulk head fitting 通孔接头	6	M16	RD GN BU SR	TFR0019
	8	M20		TFR0020
	10	M26		TFR0021
	12	M26		TFR0022
	14	M24		TFR0023
	16	M28		TFR0024

\*Conversion to Fahrenheit compare page 41.

\*华氏温度换算请对照第41页。

# BizLink tube-fit PUR-line

## Polyurethane media hoses two layer reinforced, self-clamping

## 加强型双层聚氨酯软管——自锁式



### For industrial applications >

Polyurethane hoses especially developed for the equipment of robotics equipment and machine components. Particularly well suited as a transmission medium for water, air and various gases.

### Mechanical and chemical properties >

- Materials: PUR, PA and special compounds
- Single-layer construction
- Twin-layer construction with fiber braid reinforcement sealed between two extruded polyurethane layers
- High abrasion resistance
- Seven different standard colours (special colours optional)
- Cross sections from 1/4" to 1"
- Self extinguishing and resistant to welding spatter
- Resistant against hydrocarbons, bacteria, caustic solutions etc.
- Temperature range from -20°C to +80°C (continuous use)\*
- Limited elongation (1.5 % at 20°C and 150 psi)\*
- UV and ozone resistant
- 100 % silicone free

### Note >

Female and male thread fittings (e.g. rotatable 90° angled) are available to match the polyurethane hoses.

[Please contact us for your individual quote.](#)



see page 28  
参见第28页

### 工业应用 >

聚氨酯软管专为机器人设备和机械零部件的装备而开发, 特别适合传输水、空气和各种气体。

### 机械和化学性能 >

- 材料: 聚氨酯、聚酰胺、聚丙烯和特殊的化合物
- 结构紧凑
- 在两个聚氨酯层之间用密封的纤维编织层来加固
- 高耐磨性
- 七种不同的标准色 (特殊颜色可选)
- 1/4" 至 1" 的横截面
- 耐燃性和耐焊接飞溅
- 适应复杂工业环境, 耐苛性碱溶液等
- -20°C 到 +80°C 的温度 (连续使用) \*
- 有限的延伸率 (在 20°C 和 150 磅/平方英寸时为1.5%) \*
- 抗紫外线和臭氧
- 百分之百无硅

### 备注 >

内螺纹和外螺纹接头 (如可旋转的90°)。

[请联系我们获取独立报价。](#)

\* 华氏温度换算请对照第41页。

Colour code acc. to IEC 757 / 根据 IEC 757 确定的色码				
Standard colours 标准颜色	x-xx → V-GN	x-xx → B-BU	x-xx → R-RD	x-xx → N-BK
Colours on request 需求的颜色	x-xx → G-GY	x-xx → J-YE	x-xx → I-CL	x-xx → M-BN

Further colours on request

\*\* transparent

Inner-Ø 内径-Ø	Outer-Ø 外径		Max. recommended working pressure 最大推荐工作压力 at 20°C 时*		Min. burst pressure 最小爆破压力 at 20°C 时*		Article no. 订购号	
	mm	inch	Mpa	psi	Mpa	psi		
6.4	1/4	13	0.51	2.4	350	8.4	1200	TPU0001
9.5	3/8	16	0.63	2	300	7	1000	TPU0002
12.5	1/2	19	0.75	2	300	7	1000	TPU0003
16.5	5/8	23	0.9	1.7	250	7	1000	TPU0004
19.5	3/4	27	1.06	1.7	250	7	1000	TPU0005
25.4	1	35	1.38	1.5	220	6	900	TPU0006

Min. burst pressure 最小爆破压力 at 60°C 时*	Min. blow off pressure 最小放气压力		Min. bending radius 最小弯曲半径		Vacuum 真空		Article no. 订购号	
	Mpa	psi	Mpa	psi	mm	inch		Mpa
5.0	737	4.7	700	25	1	0.08	25	TPU0001
5.0	737	4.7	700	60	2.4	0.08	25	TPU0002
5.0	737	4	600	75	3	0.08	25	TPU0003
4.4	648	4	600	125	5	0.08	25	TPU0004
4.4	648	3.8	550	150	6	0.08	25	TPU0005
3.8	560	4	572	270	10.6	0.08	25	TPU0006

### Identification and traceability (example) / 标识与可追溯性 (示例)

<b>PUR 9V-3/8GR</b>	<b>2 Mpa 300 psi</b>	<b>31497 5 3137A</b>	<b>BizLink</b>	<b>321 02</b>	<b>13 35 980216</b>
	Working pressure 工作压力	Material batches 材料批次		Day year 天 年	Production hour Material batch 生产时间 材料批次

\* Conversion to Fahrenheit compare page 41.

\* 华氏温度换算请对照第41页。

# BizLink tube-fit PUR-line

## Fittings

## 配件



Corresponding to the polyurethane hoses BizLink tube-fit PUR-line we offer diverse fittings, such as brass fittings, straight, 45° or 90° angled.

[Please contact us for your individual quote.](#)

为了与贸联 PUR 软管良好匹配, 我们提供各式各样的配件, 如直形、45° 或 90° 角的黄铜接头。

[若需要其他材质或需求, 请联系我们。](#)

### 自锁式聚氨酯软管安装简易、快捷 >

- 我们的特定工具可确保在没有磨损的情况下简单安装
- 干式安装
- 在没有软管夹和压接工具的情况下能安装大部分标准配件

### The installation of self-locked polyurethane hose on fittings is simple and fast >

- Our specific hose tool guarantees an easy mount without deterioration
- Dry mount
- Installation without hose clamp and without crimping with most of the standard fittings

Description 描述	Type 类型	Ø mm	Thread 螺纹	Wrench 扳手	Screw nut 螺母	Screwnut-wrench 螺母扳手	Article no. 订购号
Bulkead fittings 接头	3/8"	9	3/8"	27	N0936-M22x1.5V	32	TPU0007
			M16x1.5		N0936-M22x1.5V		TPU0008
	1/2"	12	1/2"		N0431-1/2-MS		TPU0009
			M22x1.5		N0936-M22x1.5V		TPU0010
			1/2" - M22x1.5		N0936-M22x1.5V		TPU0011
	缩减	9	M22x1.5 - 3/8"		N0936-M22x1.5V		TPU0012
			M22x1.5 - M16x1.5		N0936-M22x1.5V		TPU0013
		12	1/2" - 3/8"		N0431-1/2-MS		TPU0014

\* Conversion to Fahrenheit compare page 41.

\* 华氏温度换算请对照第41页。

## Special Components and tools

## 特殊组件和工具



Pos.	Description 描述	Material 材料	Article no. 订购号
1, 2	BizLink connector for feed-hose BizLink 贸联送钉管连接器	AL	CSP0001



Pos.	Description 描述	Article no. 订购号	
1	Cutting knife Ø 48 mm 切割刀 Ø 48 mm	for crosscutting corrugated hoses 用于横切波纹软管	CSP0002
	Cutting knife Ø 70 mm 切割刀 Ø 70 mm	for crosscutting corrugated hoses 用于横切波纹软管	CSP0003
2	Hose fitting insertion tool 软管接头插入工具	CSP0004	

## Test center

### Ensuring long-lasting dynamic requirements

We are always investing in our device equipment to satisfy the needs of our customers. The long-lasting mobility of our cables is tested in various processes in order to prove their long service life.

我们不断进行设备器材的投入，以便满足客户的需求。为证实我们的电缆和电缆系统持久可移动的性能具备较长使用寿命，它们需经过各种程序测试。

## 测试中心

### 确保持久的动态需求

#### Drag chain tests

##### 拖链测试

Our test routes have different travel ranges, accelerations and travel speeds. Each test system can test up to 40 cables over the equivalent of several years. The longest traverse path measures 50 m.

行程、速度和加速度有几种不同的设置，一次可同时测试多达 40 根电缆，被测试电缆可以是近几年生产的同等规格、同等质量的电缆，最大行程可达 50 米。

#### Torsion tests

##### 扭转测试

In different torsion and torsional bending machines, the cables are tested for twisting and traction around themselves. They are subjected to a torsional movement of up to  $\pm 360^\circ$  in length from 0.3 to 1 meter.

使用各种扭力测试仪、扭转/弯曲试验机对电缆进行扭转和牵引力测试；试验时，电缆绕自身轴向一个方向扭转  $\pm 360^\circ$ ，电缆长度为 0.3 - 1 米。

#### Bending tests

##### 弯曲测试

In test systems with rolls for different bending radii, a test is performed to see whether the cable withstands frequent bending cycles. The rolls used have a diameter of 20 to 250 mm.

我们的产品经过数次在不同弯曲半径下的循环弯曲测试，测试设备的支辊直径为 20-250 mm。

#### S-shaped bending test

##### S形状摇摆测试

The cable is fed across two bobbins in an s-shaped flex movement. As an option and as required, weights can be fitted to both ends. The line generates up to 12 cycles per minute.

To pass the flex test, the cable may not present any power failure between the cores.

电缆样品穿过S形状的线架，来做摇摆测试，每分钟12次。如果有需要，在电缆两端还可以加上负载。



BizLink checks the quality of the cables in the in-house test centre. Discover the competence here.



贸联在其内部的测试中心监测其电缆质量。扫描这里，来发现我们的实力。



## Delivery spools / 电缆盘交付

Wire Ø / 电线-Ø Cable Ø / 电缆-Ø	Disposable spools, wood / 木质、一次性电缆盘			Shipping spools, wood / 木质、运输电缆盘	
	Ø VH400 400 x 200 x 230	Ø VH630 630 x 310 x 280	Ø VH750 750 x 310 x 400	Ø 800 800 x 600 x 500	Ø 1000 1000 x 470 x 500
[mm]	Amount [m] / 数量 [m]				
2	4,939	14,628	32,596	24,728	68,804
2.3	3,735	11,061	24,647	18,690	51,963
2.6	2,923	8,655	19,288	14,631	40,633
3	2,195	6,501	14,487	10,990	30,580
3.3	1,814	5,373	11,973	9,080	25,240
3.6	1,524	4,515	10,061	7,630	21,210
4	1,235	3,657	8,149	6,182	17,201
4.3	1,069	3,164	7,052	5,340	14,866
4.6	934	2,765	6,162	4,674	12,990
5	790	2,340	5,215	3,956	11,009
5.3	703	2,083	4,642	3,521	9,785
5.6	630	1,866	4,158	3,154	8,765
6	549	1,625	3,622	2,748	7,645
6.5	468	1,385	3,086	2,341	6,514
7	403	1,194	2,661	2,019	5,617
7.5	351	1,040	2,318	1,758	4,893
8	309	914	2,037	1,545	4,300
8.5	273	810	1,805	1,369	3,809
9	244	722	1,610	1,221	3,398
9.5	219	648	1,445	1,096	3,049
10	198	585	1,304	989	2,752
10.5	179	531	1,183	897	2,493
11	163	484	1,078	817	2,275
11.5	149	442	986	747	2,078
12	137	406	905	687	1,911
12.5	126	374	834	633	1,759
13	117	346	772	585	1,629
13.5	108	321	715	542	1,508
14	101	299	665	505	1,404
14.5	94	278	620	470	1,307
15	88	260	579	440	1,223
16	77	229	509	386	1,075
17	68	202	451	342	952
18	61	181	402	305	849

Wire Ø / 电线-Ø Cable Ø / 电缆-Ø	Disposable spools, wood / 木质、一次性电缆盘			Shipping spools, wood / 木质、运输电缆盘	
	Ø VH400 400 x 200 x 230	Ø VH630 630 x 310 x 280	Ø VH750 750 x 310 x 400	Ø 800 800 x 600 x 500	Ø 1000 1000 x 470 x 500
[mm]	Amount [m] / 数量 [m]				
19	55	162	361	274	762
20	49	146	326	247	688
21	45	133	296	224	624
22	41	121	269	204	569
23	37	111	246	187	520
24	34	102	226	172	478
25	32	94	209	158	440
26	29	87	193	146	407
27	27	80	179	136	378
28	25	75	166	126	351
29	23	70	155	118	327
30	22	65	145	110	306
31	21	61	136	103	286
32	19	57	127	97	269
33	18	54	120	91	253
34	17	51	113	86	238
35	16	48	106	81	225



# Spool calculation with constants 利用常量的电缆盘计算



Ø Spool size Ø 电缆盘尺寸 mm	Calculation constant 计算常量
250	3.946
355	10.124
400	19.190
500	30.179
630	53.149
800	126.171
1000	250.000
1200	518.005

The capacity (effective wrapping length) of the spools depends on the cable size (diameter). By means of the given constants, the effective wrapping length can be calculated.

电缆盘的容量 (有效包装长度) 取决于电缆尺寸 (直径)。通过给定的常量就能计算出有效的包装长度。

### Calculation formula / 计算公式:

$$\frac{\text{Effective wrapping length (in mm)}}{\text{常量有效的包装长度 (mm)}} = \frac{\text{Calculation constant / 计算常量}}{\text{Cable diameter squared / 电缆直径的平方}} = \frac{K}{d^2}$$

**Example:** 示例:  
Spool = 500 mm 电缆盘 = 500 mm  
Cable Ø = 12.8 mm 电缆直径 = 12.8 mm

$$\frac{\text{Effective wrapping length (in mm)}}{\text{常量有效的包装长度 (mm)}} = \frac{30179}{(12.8 \text{ mm})^2} = \frac{30179}{163.84} = 184.2$$

# Calculation of continuous duty current for secondary cables 二次电缆连续工作电流的计算

A welding process cycle consists of multiple welds with different welding parameters (variable currents and variable time periods of the welding cycle).

一个焊接工艺周期由多个具有不同焊接参数 (焊接周期的变量电流和变量时期) 的焊接组成。

In this example we explain our method to calculate the Continuous Duty Current.

我们在下述例子中解释我们计算连续工作电流的方法。

为了选择正确的二次电缆尺寸, 这是强制性的。

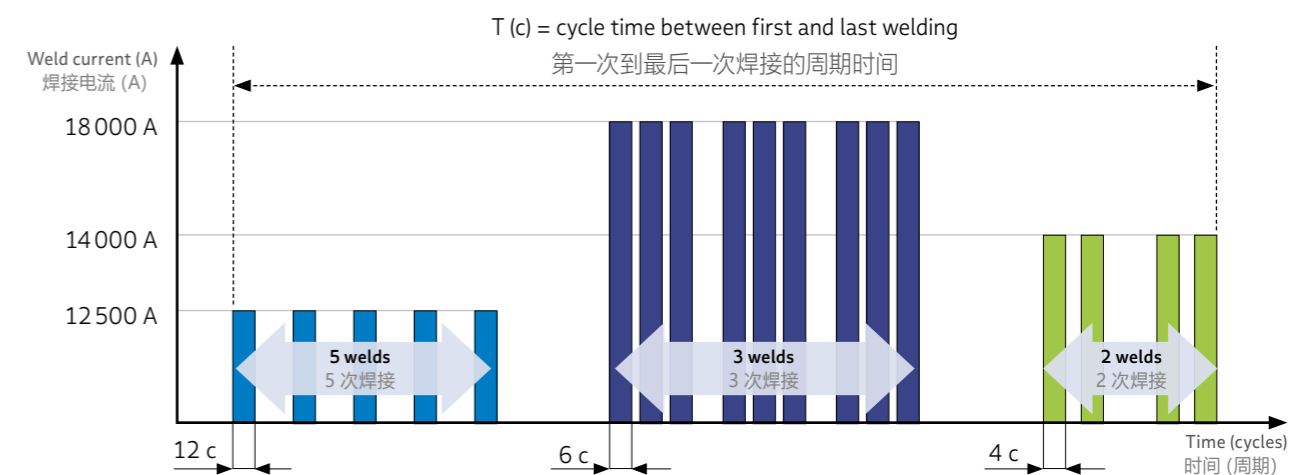
[若有任何问题, 请联系我们。](#)

This value is mandatory in order to choose the correct dimensions of secondary cables.

[If you have further questions, please contact us.](#)

$$I_p = I_s \times \sqrt{\frac{N}{60 \times f}}$$

<b>I<sub>p</sub> [A]</b>	= Permanent Duty Current	= 恒定工作电流
<b>I<sub>s</sub> [A]</b>	= Weighted average of secondary welding current	= 二次焊接电流的加权平均数
<b>f [Hz]</b>	= Current frequency	= 电流频率
<b>N [cycles/min]</b>	= Cycles of weld current or "On Time" per minute	= 焊接电流的周期或每分钟“按时”



$$I_s = \frac{(5 \text{ welds} \times 12 \text{ c} \times 1 \text{ puls} \times 12500 \text{ A}) + (3 \text{ welds} \times 6 \text{ c} \times 3 \text{ puls} \times 18000 \text{ A}) + (2 \text{ welds} \times 4 \text{ c} \times 1 \text{ puls} \times 14000 \text{ A})}{(5 \text{ 焊接} \times 12 \text{ c} \times 1 \text{ 脉冲}) + (3 \text{ 焊接} \times 6 \text{ c} \times 3 \text{ 脉冲}) + (2 \text{ 焊接} \times 4 \text{ c} \times 1 \text{ 脉冲})}$$

$$N = \left[ \frac{(5 \text{ welds} \times 12 \text{ c} \times 1 \text{ puls}) + (3 \text{ welds} \times 6 \text{ c} \times 3 \text{ puls}) + (2 \text{ welds} \times 4 \text{ c} \times 1 \text{ puls})}{T} \right] \times 60$$

$$I_p = I_s \times \sqrt{\frac{N}{60 \times f}}$$

## Safety information 安全信息



Our products are manufactured according to factory standards / international standards.

我们的产品根据工厂标准/国际标准制造。

BizLink ensures safety by means of adherence to statutory requirements, standards and safety guidelines. The relevant DIN VDE specifications apply. Installation and processing may only be carried out by qualified electricians.

### Tensile stress

Do not exceed the figures below for tensile stress per conductor. This applies up to a maximum of 1,000 Newton for tensile stress applied to all conductors.

- › 50 Newton/mm<sup>2</sup> for the permanent installation of cables
- › 15 Newton/mm<sup>2</sup> static tensile stress for flexible cables

### Bending stress

In order to avoid damage to the cables, never go below the stipulated minimum bending radius. Avoid damaging the conductors when removing insulation, otherwise bending response is drastically impaired. The specified bending radiuses apply to ambient temperatures in the range of 20°C ± 10 °C\*.

### Transportation and storage

Cables are to be stored in a dry, indoor place and protected from exposure to direct sunlight. If stored outdoors, the cable ends must be closed so as to avoid penetration of humidity (especially in the case of shielded cables!). The ambient temperature for transportation and storage should be in the range of -25 °C to +55 °C. Mechanical stress should be avoided at low temperatures in particular. The guideline maximum storage period prior to use without prior testing is approx. 2 years in the case of indoor storage.

### Thermal influences

Cables should be selected, laid and installed in such a way that the anticipated resistance loss is prevented and there is no risk of adjacent material being set on fire.

贸联通过遵守法定要求、标准和安全准则来确保安全性, 适用于相关的 DIN VDE 规范。

### 拉伸应力

每根导线的拉伸应力不能超过如下所述。对于施加到所有导体上的拉伸应力, 最多为 1,000 N。

- › 对于固定安装电缆, 应力为 50 N/mm<sup>2</sup>
- › 对于柔性电缆, 静态拉伸应力为 15 N/mm<sup>2</sup>

### 弯曲应力

为避免损坏电缆, 切勿小于规定的最小弯曲半径。在剥除绝缘层时避免损坏导体, 否则会严重损害弯曲响应。规定的弯曲半径适用于 20°C ± 10 °C \* 范围内的环境温度。\*

### 运输与储存

电缆应存放在干燥的室内, 并避免阳光直射。如果存放在室外, 必须封闭电缆末端, 以避免湿气侵入 (特别是在使用屏蔽电缆的情况下!)。运输和储存环境温度应在 -25°C 至 +55°C 的范围内。在低温下应特别避免机械应力。在没有事先测试的情况下使用, 如果存放在室内, 建议的最长存放周期大约为 2 年。

### 热影响

在选择、铺设和安装电缆时, 应避免可能造成耐受性损失的情况, 并避免相邻材料被引燃的风险。

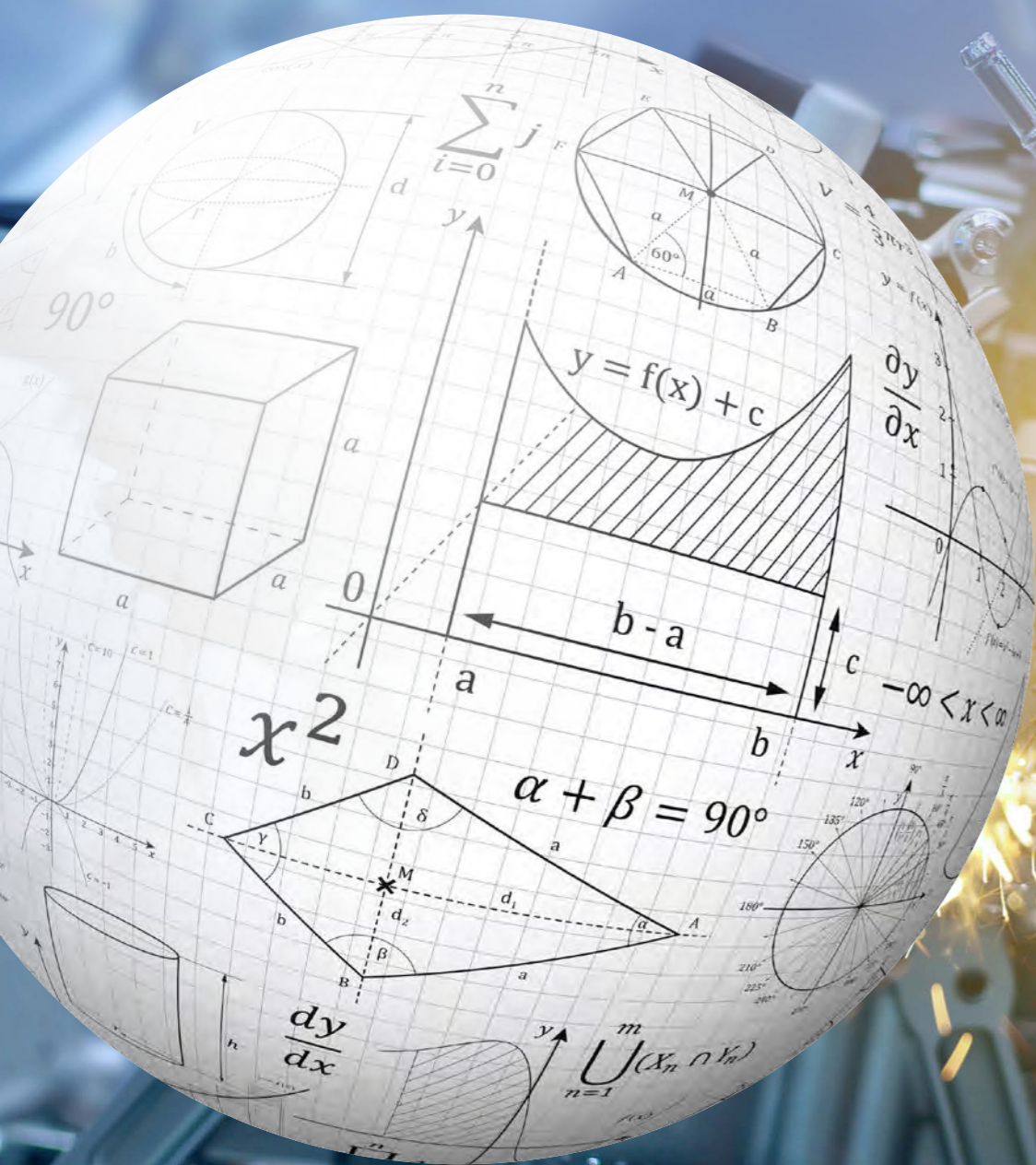
# Toolbox 工具箱

Here you will find useful general information such as

- > Symbols and units of measure
- > Conversion tables
- > Colour codes
- > Specific information (e. g. referring to the catalog chapters like the calculation of continuous duty current for secondary cables)

在以下几页中您将找到有用的基本信息, 如

- > 符号和计量单位
- > 换算表
- > 色码
- > 涉及目录章节的详细信息, 如对次级电缆连续工作电流的计算



## Symbols and units of measure

Symbols / units of measure	Definition
$a$	attenuation in decibels
$a'$	attenuation in neper
$a_{12}/a_{21}$	levels in a backscatter diagram in decibels

$B$	bandwidth in GHz
BLP	bandwidth-length product in MHz km

CR	coupling ratio
----	----------------

$d$	radial misalignment in $\mu\text{m}$
$D$	directivity: cross-talk attenuation in decibels
$D$	chromatic dispersion in ps/nm
$D_{CD}$	coefficient of chromatic dispersion in ps/(nm·km)
$D_{MAT}$	coefficient of material dispersion in ps/(nm·km)
$D_{WAV}$	coefficient of wavelength dispersion in ps/(nm·km)
dB	decibel
$\text{dBm}$	unit of logarithmic power based on a milliwatt
$\text{dB/km}$	unit of attenuation coefficient

EL	excess loss in decibels
----	-------------------------

$f$	frequency in hertz
-----	--------------------

$g$	profile exponent
Gbit	gigabit
GHz	gigahertz

HWB	full width at half maximum
Hz	hertz

$I$	isolation in decibels
IL	insertion loss in decibels

km	kilometre
----	-----------

$L$	length in kilometres
-----	----------------------

$m$	metre
mW	milliwatt

$n$	refractive index
$n_o$	refractive index of the medium between the end faces
$n_K$	core refractive index
$n_M$	cladding refractive index
NA	numerical aperture
nm	nanometre

$P$	power in mW
$P_o$	injected power
$PMD_1$	first-order PMD coefficient
ps	picoseconds

$r_K$	core radius in $\mu\text{m}$
$R$	bit rate in Gbit/s
$R$	reflection
RL	return loss: reflection attenuation in decibels

$s$	axial misalignment in $\mu\text{m}$
$S$	increase in the coefficient of chromatic dispersion in ps/nm <sup>2</sup> ·km)
$S_o$	increase in the coefficient of chromatic dispersion at the zero-dispersion wavelength
$S_{Omax}$	maximum increase in the coefficient of chromatic dispersion at the zero-dispersion wavelength

$T$	pulse width
$T$	transmission

$U$	uniformity in decibels
-----	------------------------

$v$	propagation velocity in km/s
$V$	V number
$V_c$	normalised critical frequency

$w$	mode-field radius
-----	-------------------

$Z$	number of modes that can be propagated
-----	--

$\alpha$	attenuation coefficient in dB/km
$\alpha$	angle between incident ray and perpendicular
$\alpha_{critical}$	critical angle of total internal reflection
$\gamma$	tilt angle
$\eta$	coupling efficiency
$\lambda$	wavelength in nm
$\lambda_o$	zero-dispersion wavelength in nm
$\lambda_{Omax}$	maximum zero-dispersion wavelength
$\lambda_{Omin}$	minimum zero-dispersion wavelength
$\lambda_c$	cut-off wavelength in nm
$\Delta\lambda$	spacing between adjacent wavelengths
$\mu\text{m}$	micrometre
$\theta_{critical}$	maximum allowable angle of inclination to the optical axis
$\tau$	group delay per unit of length in ps/km
$\Delta\tau_{CD}$	pulse spreading due to chromatic dispersion in ps
$[\Delta\tau]$	PMD delay in ps

# 符号及计量单位

# Conversion tables / 换算表

符号/计量单位	定义
$a$	衰减, 单位: 分贝
$a'$	衰减, 单位: 奈培
$a_{12}/a_{21}$	反向散射图水平, 单位: 分贝
$B$	带宽, 单位: 千兆赫
BLP	带宽/长度乘积, 单位: 兆赫兹/千米
CR	耦合比
$d$	径向偏差, 单位: 亚微米
$D$	指向性: 串音衰减, 单位: 分贝
$D$	色散, 单位: 一兆分之一秒/纳米
$D_{CD}$	色散系数, 单位: 一兆分之一秒/(纳米·千米)
$D_{MAT}$	材料色散系数, 单位: 一兆分之一秒/(纳米·千米)
$D_{WEL}$	波长色散系数, 单位: 一兆分之一秒/(纳米·千米)
dB	分贝
dBm	基于毫瓦特的对数功率单位
dB/km	衰减系数单位
EL	附加分贝损耗
$f$	频率, 单位: 赫兹
$g$	折射率分布指数
Gbit	千兆比特
GHz	千兆赫
HWB	半极大处全宽度
Hz	赫兹
$l$	隔离度, 单位: 分贝
IL	插入损耗, 单位: 分贝
km	千米
$L$	长度, 单位: 千米
$m$	米
mW	毫瓦特
$n$	折射率
$n_o$	端面间介质的折射率
$n_K$	纤芯折射率
$n_M$	包层折射率
NA	数值孔径
nm	毫微米
P	功率, 单位: 毫瓦特

$P_o$	注入功率
$PMD_1$	一阶偏振模色散系数
$p_s$	一兆分之一秒
$r_K$	线芯半径, 单位: 亚微米
R	比特率, 单位: 千兆比特/秒
R	反射
RL	回波损耗: 反射衰减 单位: 分贝
$s$	轴向偏差, 单位: 亚微米
S	色散系数增加, 单位: 一兆分之一秒/平方纳米·千米
$S_o$	零散波长处色散系数增加
$S_{Omax}$	零散波长处色散系数最大增加
T	脉宽
T	传输
U	均匀性, 单位: 分贝
$u$	传播速度, 单位: 千米/秒
V	阿贝数
$V_c$	正常化临界频率
$w$	模场半径
Z	能够传播的模数量
$\alpha$	衰减系数, 单位: 分贝/千米
$\alpha$	入射线和垂线之间的角度
$\alpha_{Grenz}$	全内反射临界角
$\gamma$	倾斜角
$\eta$	耦合效率
$\lambda$	波长, 单位: 纳米
$\lambda_o$	零散波长, 单位: 纳米
$\lambda_{Omax}$	最大零散波长
$\lambda_{Omin}$	最小零散波长
$\lambda_c$	截止波长, 单位: 纳米
$\Delta\lambda$	相邻波长间距
$\mu m$	微米
$\vartheta_{Grenz}$	最大允许光轴倾斜角
$\tau$	每单位长度的群延迟, 单位: 一兆分之一秒/千米
$\Delta\tau_{CD}$	色散引发的脉冲展宽, 单位: 一兆分之一秒
$[\Delta\tau]$	偏振模色散延时, 单位: 一兆分之一秒

Conversion inch - centimeter / 英寸-厘米		
1 inch/英寸	=	2.54 cm
2 inch/英寸	=	5.08 cm
3 inch/英寸	=	7.62 cm
4 inch/英寸	=	10.16 cm
5 inch/英寸	=	12.70 cm
6 inch/英寸	=	15.24 cm
7 inch/英寸	=	17.78 cm
8 inch/英寸	=	20.32 cm
9 inch/英寸	=	22.86 cm
10 inch/英寸	=	25.40 cm
20 inch/英寸	=	50.80 cm
30 inch/英寸	=	76.20 cm
40 inch/英寸	=	101.60 cm
50 inch/英寸	=	127.00 cm
60 inch/英寸	=	152.40 cm
70 inch/英寸	=	177.80 cm
80 inch/英寸	=	203.20 cm
90 inch/英寸	=	228.60 cm
100 inch/英寸	=	254.00 cm
1000 inch/英寸	=	2540.00 cm

Conversion centimeter - inch / 厘米-英寸		
1 cm	=	0.3937 inch/英寸
2 cm	=	0.7874 inch/英寸
3 cm	=	1.1811 inch/英寸
4 cm	=	1.5748 inch/英寸
5 cm	=	1.9685 inch/英寸
6 cm	=	2.3622 inch/英寸
7 cm	=	2.7559 inch/英寸
8 cm	=	3.1496 inch/英寸
9 cm	=	3.5433 inch/英寸
10 cm	=	3.9370 inch/英寸
20 cm	=	7.8740 inch/英寸
30 cm	=	11.8110 inch/英寸
40 cm	=	15.7480 inch/英寸
50 cm	=	19.6850 inch/英寸
60 cm	=	23.6220 inch/英寸
70 cm	=	27.5591 inch/英寸
80 cm	=	31.4961 inch/英寸
90 cm	=	35.4331 inch/英寸
100 cm	=	39.3701 inch/英寸
1000 cm	=	393.7008 inch/英寸

Conversion Fahrenheit to Celsius / 华氏温度换算为 °C			
Conversion Celsius to Fahrenheit / °C 换算为华氏温度			
°C	F	°C	F
-18	0	1	34
-17	1	2	36
-16	3	3	37
-15	5	4	39
-14	7	5	41
-13	9	6	43
-12	10	7	45
-11	12	8	46
-10	14	9	48
-9	16	10	50
-8	18	11	52
-7	19	12	54
-6	21	13	55
-5	23	14	57
-4	25	15	59
-3	27	16	61
-2	28	17	63
-1	30	18	64
0	32	19	66

F - 32 * 5/9 = C			
(°C * 9/5) + 32 = F			
°C	F	°C	F
20	68	39	102
21	70	40	104
22	72	41	106
23	73	42	108
24	75	43	109
25	77	44	111
26	79	45	113
27	81	46	115
28	82	47	117
29	84	48	118
30	86	49	120
31	88	50	122
32	90	51	124
33	91	52	126
34	93	53	127
35	95	54	129
36	97	55	131
37	99	56	133
38	100	57	135

# Colour code acc. to DIN 47100

# 根据 DIN 47100 而定的色码

Colour code acc. to DIN 47100 with colour repetition from core no. 45 and above.

The insulation of the conductor gives the first basic colour. The codes of the multi-coloured identification are combined with a basic colour and colour rings. The second and third colour is printed on the basic colour as a form of ring. The ring width is 2 – 3 mm. A less unsharpness on the edge of the identification colour and a minor pledging of both half-rings are permitted. The cores are to be counted continuously through all layers at the same direction, beginning with the outer layer towards inside.

Electronic control and computer cable  
 > single cores stranding.

根据 DIN 47100 而定的色码, 从第 45 号芯线及以上无颜色重复。

颜色环形涂在基本色上。环形宽度为2-3mm。允许识别色边缘存在少量模糊以及两个半环的低级保证。芯线应在同一方向通过所有层连续计数, 由外层开始到内层。

电子控制与计算机电缆:

> 单芯线绞合

导体绝缘提供第一种基本色。彩色识别码与基本色和色环结合。第二和第三种

No.	Basic-Ring-colours	No.	Basic-Ring-colours	No.	Basic-Ring-colours	No.	Basic-Ring-colours	Colour code adapted* to DIN 47100 without colour repetition
No.	Basic-Ring-colours	No.	Basic-Ring-colours	No.	Basic-Ring-colours	No.	Basic-Ring-colours	Basic-Ring-colours
1	white	17	white-grey	33	green-red	45	white	white-brown-black
2	brown	18	grey-brown	34	yellow-red	46	brown	yellow-green-black
3	green	19	white-pink	35	green-black	47	green	grey-pink-black
4	yellow	20	pink-brown	36	yellow-black	48	yellow	red-blue-black
5	grey	21	white-blue	37	grey-blue	49	grey	white-green-black
6	pink	22	brown-blue	38	pink-blue	50	pink	brown-green-black
7	blue	23	white-red	39	grey-red	51	blue	white-yellow-black
8	red	24	brown-red	40	pink-red	52	red	yellow-brown-black
9	black	25	white-black	41	grey-black	53	black	white-grey-black
10	violet	26	brown-black	42	pink-black	54	violet	grey-brown-black
11	grey-pink	27	grey-green	43	blue-black	55	grey-pink	white-pink-black
12	red-blue	28	yellow-grey	44	red-black	56	red-blue	pink-brown-black
13	white-green	29	pink-green			57	white-green	white-blue-black
14	brown-green	30	yellow-pink			58	brown-green	brown-blue-black
15	white-yellow	31	green-blue			59	white-yellow	white-red-black
16	yellow-brown	32	yellow-blue			60	yellow-brown	brown-red-black
						61	white-grey	black-white

\* deviation to DIN, without colour repetition, from core no. 45 and above

编号	基础环颜色	编号	基础环颜色	编号	基础环颜色	编号	基础环颜色	适合于*DIN47100的色码, 无颜色重复
编号	基础环颜色	编号	基础环颜色	编号	基础环颜色	编号	基础环颜色	基础环颜色
1	白色	17	白灰色	33	绿红色	45	白色	白-棕-黑
2	棕色	18	灰棕色	34	黄红色	46	棕色	黄-绿-黑
3	绿色	19	白粉色	35	绿黑色	47	绿色	灰-粉-黑
4	黄色	20	粉棕色	36	黄黑色	48	黄色	红-蓝-黑
5	灰色	21	白蓝色	37	灰蓝色	49	灰色	白-绿-黑
6	粉色	22	棕蓝色	38	粉蓝色	50	粉色	棕-绿-黑
7	蓝色	23	白红色	39	灰红色	51	蓝色	白-黄-黑
8	红色	24	棕红色	40	粉红色	52	红色	黄-棕-黑
9	黑色	25	白黑色	41	灰黑色	53	黑色	白-灰-黑
10	紫色	26	棕黑色	42	粉黑色	54	紫色	灰-棕-黑
11	灰粉色	27	灰绿色	43	蓝黑色	55	灰粉色	白-粉-黑
12	红蓝色	28	黄灰色	44	红黑色	56	红蓝色	粉-棕-黑
13	白绿色	29	粉绿色			57	白绿色	白-蓝-黑
14	棕绿色	30	黄粉色			58	棕绿色	棕-蓝-黑
15	白黄色	31	绿蓝色			59	白黄色	白-红-黑
16	黄棕色	32	黄蓝色			60	黄棕色	棕-红-黑
						61	白灰色	黑-白

\* 表示与德国标准存在偏差, 从第 45 号芯线及以上无颜色重复。

# International protection classes / 国际防护等级标准

acc. to / 依据 **DIN EN 60529:2014-09 (VDE 0470-1:2014-09)**

# AWG-Wires and AWG-stranded conductors

AWG 电线及AWG 绞合导体

Code letters 代码字母 (国际防护)	First index figure 第一位指数 (外来物防护)	Second index figure 第二位指数 (防水)	
IP	6	8	
Index 指数	Degree of protection 防护等级	Index 指数	Degree of protection 防护等级
0	No protection against accidental contact, no protection against solid foreign bodies 无意外接触防护, 无固体异物防护	0	No protection against water 无水防护
1	Protection against contact with any large area by hand and against solid foreign bodies with Ø >50 mm 大面积手接触防护及 Ø >50 mm 的固体异物防护	1	Protection against vertical water drips 垂直水滴防护
2	Protection against contact with the fingers, protection against solid foreign bodies with Ø >12 mm 手指接触防护及 Ø >12 mm 的固体异物防护	2	Protection against diagonal water drips (up to a 15° angle) 斜流水滴防护 (高达15°角)
3	Protection against tools, wires or similar objects with Ø >2.5 mm, protection against solid foreign bodies with Ø >2.5 mm 工具、电线及 Ø >2.5 mm 的类似物品防护; Ø >2.5 mm 的固体异物防护	3	Protection against diagonal water drips (up to a 60° angle) 斜流水滴防护 (高达60°角)
4	As 3, however Ø >1 mm 同3, 但 Ø >1 mm	4	Protection against splashed water from all directions 全方位的溅水防护
5	Full protection against contact, protection against interior injurious dust deposits 全面接触防护, 室内有害粉尘沉积防护	5	Protection against water (out of a nozzle) from all directions 全方位防水 (从喷嘴流出)
6	Total protection against contact, protection against penetration of dust 全接触防护, 尘埃渗透防护	6	Protection against ingress of water in case of temporary flooding 如果发生临时洪水, 防止水侵入
		7	Protection against ingress of water in case of temporary immersion 如果发生短时间浸泡, 防止水侵入
		8	Protection against ingress of water in case of continuous immersion, requirements under agreement of user and manufacturer 根据用户与制造商达成的一致要求, 在连续浸泡的情况下防止水侵入

Diagram in accordance with / 图标符合  
DIN VDE 470, DIN EN 60529, IEC 529

Source / 来源: ZVEI – 电子技术工业中央联盟

Conductor make-up, cross-section, resistance and weight / 导体构成、横截面积、电阻和重量

AWG no. AWG编号	AWG-make-up AWG-构成	Conductor make-up 导体构成 n x wire Ø	Cross section 横截面积	Conductor outer Ø 导体外径	Conductor resistance 导体电阻	Conductor weight 导体重量
	n x AWG	mm	mm²	mm	Ω/km	kg/km
36	solid / 实心 7/44	solid / 实心 7x0.05	0.013	0.127	1460.0	0.116
			0.014	0.152	1271	0.125
34	solid / 实心 7/42	solid / 实心 7x0.064	0.020	0.160	918	0.178
			0.022	0.192	777	0.196
32	solid / 实心 7/40	solid / 实心 7x0.078	0.032	0.203	571	0.284
			0.034	0.203	538	0.302
30	solid / 实心 7/38	solid / 实心 7x0.12	0.051	0.254	365	0.45
			0.057	0.305	339	0.507
28	solid / 实心 7/36	solid / 实心 7x0.127	0.080	0.330	232	0.71
			0.087	0.381	213	0.774
27	7/35	7x0.142	0.091	0.406	186	0.81
			0.111	0.457	179	0.988
26	solid / 实心 10/36	solid / 实心 10x0.127	0.128	0.409	143	1.14
			0.127	0.533	137	1.13
24	solid / 实心 7/32	solid / 实心 7x0.203	0.155	0.508	113	1.38
			0.141	0.483	122	1.25
22	solid / 实心 7/30	solid / 实心 7x0.254	0.205	0.511	89.4	1.82
			0.227	0.610	76.4	2.02
20	solid / 实心 10/34	solid / 实心 10x0.160	0.201	0.582	85.6	1.79
			0.241	0.610	69.2	2.14
18	solid / 实心 19/36	solid / 实心 19x0.127	0.196	0.582	84.0	1.74
			0.324	0.643	55.3	2.88
16	solid / 实心 7/28	solid / 实心 7x0.320	0.355	0.762	48.4	3.16
			0.382	0.787	45.1	3.4
14	solid / 实心 19/34	solid / 实心 19x0.160	0.330	0.762	52.3	2.94
			0.519	0.813	34.6	4.61
12	solid / 实心 10/30	solid / 实心 10x0.254	0.562	0.965	33.8	5.0
			0.507	0.889	33.9	4.51
10	solid / 实心 19/32	solid / 实心 19x0.203	0.615	0.940	28.3	5.47
			0.523	0.914	33.0	4.65
8	solid / 实心 26/34	solid / 实心 26x0.160	0.520	0.914	32.9	4.63
			0.823	1.020	21.8	7.32
6	solid / 实心 7/26	solid / 实心 7x0.404	0.897	1.219	19.2	7.98
			0.811	1.194	21.3	7.22
4	solid / 实心 16/30	solid / 实心 16x0.254	0.963	1.245	17.9	8.57
			0.824	1.194	20.9	7.33
2	solid / 实心 41/34	solid / 实心 41x0.160	0.823	1.194	21.0	7.32
			1.310	1.290	13.7	11.66
0	solid / 实心 7/24	solid / 实心 7x0.511	1.440	1.524	12.0	12.81
			1.310	1.499	13.2	11.65
-	solid / 实心 65/34	solid / 实心 65x0.160	1.310	1.499	13.2	11.65
			1.317	1.499	13.1	11.72
-	solid / 实心 19/29	solid / 实心 19x0.287	1.229	1.473	14.0	10.94
			1.330	1.499	13.1	11.84

Continuation / 后续 >

Continuation/ 上续 >

## AWG-Wires and AWG-stranded conductors AWG 电线及AWG 绞合导体

## AWG-Wires (solid conductor) AWG 电线 (实心导体)

Conductor make-up, cross-section, resistance and weight / 导体构成、横截面积、电阻和重量

AWG no. AWG编号	AWG-make-up AWG-构成	Conductor make-up n x wire Ø 导体构成 n x Ø	Cross section 横截面积	Conductor outer Ø 导体外径	Conductor resistance 导体电阻	Conductor weight 导体重量
	n x AWG	mm	mm <sup>2</sup>	mm	Ω/km	kg/km
14	solid/实心 7/22	solid/实心 7x0.643	2.080	1.630	8.6	18.51
	19/27	19x0.361	2.238	1.854	7.6	19.92
	41/30	41x0.254	1.945	1.854	8.9	17.31
	105/34	105x0.160	2.078	1.854	8.3	18.49
			2.111	1.854	8.2	18.79
12	solid/实心 7/20	solid/实心 7x0.813	3.31	2.05	5.4	29.46
	19/25	19x0.455	3.63	2.438	4.8	32.30
	65/30	65x0.254	3.09	2.369	5.6	27.50
	165/34	165x0.160	3.292	2.413	5.7	29.20
			3.316	2.413	5.2	29.51
10	solid/实心 37/26	solid/实心 37x0.404	5.26	2.59	3.4	46.81
	49/27	49x0.363	4.74	2.921	3.6	42.18
	105/30	105x0.254	5.068	2.946	3.6	45.10
			5.317	2.946	3.2	47.32
8	49/25	49x0.455	7.963	3.734	2.2	70.87
	133/29	133x0.287	8.604	3.734	2.0	76.57
	655/36	655x0.127	8.297	3.734	2.0	73.84
6	133/27	133x0.363	13.764	4.676	1.5	122.49
	259/30	259x0.254	13.123	4.674	1.3	116.79
	1050/36	1050x0.127	13.316	4.674	1.3	118.51
4	133/25	133x0.455	21.625	5.898	0.80	192.46
	259/27	259x0.363	26.804	5.898	0.66	238.55
	1666/36	1666x0.127	21.104	5.898	0.82	187.82
2	133/23	133x0.574	34.416	7.417	0.5	306.3
	259/26	259x0.404	33.201	7.417	0.52	295.49
	665/30	665x0.254	33.696	7.417	0.52	299.89
	2646/36	2646x0.127	33.518	7.417	0.52	298.31
1	133/22	133x0.643	43.187	8.331	0.4	384.37
	259/25	259x0.455	42.112	8.331	0.41	374.08
	817/30	817x0.254	41.397	8.331	0.42	368.43
	2109/34	2109x0.160	42.403	8.331	0.41	377.39
1/0	133/21	133x0.724	54.75	9.347	0.31	487.28
	259/24	259x0.511	53.116	9.347	0.32	472.73
2/0	133/20	133x0.813	69.043	10.516	0.25	614.48
	259/23	259x0.574	67.021	10.516	0.25	596.49
3/0	259/22	259x0.643	84.102	11.786	0.2	748.51
	427/24	427x0.511	87.57	11.786	0.19	779.37
4/0	259/21	259x0.724	106.626	13.259	0.16	948.97
	427/23	427x0.574	110.494	13.259	0.15	983.39

AWG no. AWG编号	Wire Ø 线径-Ø
	mm
44	0.05
41	0.07
40	0.079
39	0.089
38	0.102
37	0.114
36	0.127
35	0.142
34	0.16
33	0.18
32	0.203
31	0.226
30	0.254
29	0.287
28	0.32
27	0.363
26	0.404
25	0.455
24	0.511
23	0.574
22	0.643
21	0.724
20	0.813

AWG no. AWG编号	Wire Ø 线径-Ø
	mm
19	0.912
18	1.024
17	1.151
16	1.29
15	1.45
14	1.628
13	1.829
12	2.052
11	2.304
10	2.588
9	2.906
8	3.268
7	3.665
6	4.115
5	4.62
4	5.189
3	5.827
2	6.543
1	7.348
1/0	8.252
2/0	9.266
3/0	10.404
4/0	11.684



# US-American and British units 美制和英制单位

# General measuring units 通用计量单位

## CONVERSION OF USUAL MEASURING UNITS

### Units for cables and wires

In the US the measurements are mainly used in AWG-numbers (AWG = American Wire Gauge).

The AWG-numbers conform the british B&S-numbers (B&S = Brown & Sharp)

AWG no. AWG编号	Cross section 横截面积	Diameter 直径	Conductor resistance 面积
	mm <sup>2</sup>	mm	Ω/km
1000 MCM*	507	25.4	0.035
750	380	22	0.047
600	304	19.7	0.059
500	254	20.7	0.07
400	203	18.9	0.09
350	178	17.3	0.1
300	152	16	0.12
250	127	14.6	0.14
4/0	107.2	11.68	0.18
3/0	85	10.4	0.23
2/0	67.5	9.27	0.29
0	53.4	8.25	0.37
1	42.4	7.35	0.47
2	33.6	6.54	0.57
3	26.7	5.83	0.71
4	21.2	5.19	0.91
5	16.8	4.62	1.12
6	13.3	4.11	1.44
7	10.6	3.67	1.78
8	8.366	3.26	2.36
9	6.63	2.91	2.77
10	5.26	2.59	3.64
11	4.15	2.3	4.44

## 常用测量单位的转换

### 电线与电缆单位

在美国, 计量主要用 AWG 数值表示 (AWG=美国线规)  
AWG 数值同英国 B&S 数值一致 (B&S=英国电线线径规范)

AWG no. AWG编号	Cross section 横截面积	Diameter 直径	Conductor resistance 面积
	mm <sup>2</sup>	mm	Ω/km
12	3.3	2.5	5.41
13	2.62	1.83	7.02
14	2.08	1.63	8.79
15	1.65	1.45	11.2
16	1.31	1.29	14.7
17	1.04	1.15	17.8
18	0.823	1.024	23
19	0.653	0.912	28.3
20	0.519	0.812	34.5
21	0.412	0.723	44
22	0.325	0.644	54.8
23	0.259	0.573	70.1
24	0.205	0.511	89.2
25	0.163	0.455	111
26	0.128	0.405	146
27	0.102	0.361	176
28	0.0804	0.321	232
29	0.0646	0.286	282
30	0.0503	0.255	350
31	0.04	0.227	446
32	0.032	0.202	578
33	0.0252	0.18	710
34	0.02	0.16	899
35	0.0161	0.143	1125
36	0.0123	0.127	1426
37	0.01	0.113	1800
38	0.00795	0.101	2255
39	0.00632	0.0897	2860

4/0 is also stated: 0000; 1 mil = 0.001 inch = 0.0254 mm  
\* for bigger cross-section the sizes in MCM (circular mils)

4/0 同样标为 0000; 1 密耳=0.001 英寸=0.0254 毫米  
\* 就较大横截面而言, 尺寸单位为 MCM (圆密耳)

1 CM = 1 Circ. mil. = 0.0005067 mm<sup>2</sup>  
1 MCM = 1000 Circ. mils = 0.5067 mm<sup>2</sup>

Length / 长度
1 mil = 0.0254 mm
1 in (inch) = 25.4 mm
1 ft (foot) = 0.3048 m
1 yd (yard) = 0.9144 m
1 ch (chain) = 20.1 m
1 mile (land mile) (Landmeile) = 1.609 km = 1760 yards
1 mile (nautic mile) (Seemeile) = 1.852 km
1 mm = 0.039370 inches
1 m = 39.370079 inches

Area / 面积
1 CM (circ. mil) = 0.507 · 10 <sup>-3</sup> mm <sup>2</sup>
1 MCM = 0.5067 mm <sup>2</sup>
1 sq. inch (sq. inch) = 645.16 mm <sup>2</sup>
1 sq. ft. (sq. foot) = 0.0929 m <sup>2</sup>
1 square yard = 0.836 m <sup>2</sup>
1 acre = 4047 m <sup>2</sup>
1 square mile = 2.59 km <sup>2</sup>

Density / 密度
1 cu. in. (cubic inch) = 16.39 cm <sup>3</sup>
1 cu. ft. (cubic foot) = 0.0283 m <sup>3</sup>
1 cu. yd. (cubic yard) = 0.7646 m <sup>3</sup>
1 gal. (US gallon) = 3.785 l
1 gal. (brit gallon) = 4.546 l
1 US pint = 0.473 l
1 US quart = 0.946 l
1 US barrel = 158.8 l

Temperature / 温度
F (Fahrenheit) = (1.8 · C) + 3°
°C (Celsius) = 0.5556 · (F-32°)

Weight / 重量
1 grain = 64.8 mg
1 dram = 1.77 g
1 oz (ounce) = 28.35 g
1 lb (pound) = 0.4536 Kp
1 stone = 6.35 Kp
1 qu (quarter) = 12.7 Kp
1 US-cwt (hundredweight) = 45.36 Kp
1 US ton (short ton) = 0.907 t
1 brit. ton (long ton) = 1.016 t

Force / 力
1 lb = 4.448 N
1 brit. ton = 9954 N
1 pdl (Poundal) = 0.1383 N
1 kp = 9.81 N
1 N = 0.102 kp

Velocity / 速度
1 mile/h = 1.609 km/h
1 Knoten = 1.852 km/h
1 ft/s = 0.305 m/s
1 ft/min = 5.08 · 10 <sup>-3</sup> m/s

Energy / 能量
1 lb/mile = 0.282 kg/m
1 lb/yard = 0.496 kg/m
1 lb/foot = 1.488 kg/m

Radiation absorbed dose / 辐射吸收量
1 Gray = 1 J/kg
1 rad = 10 <sup>-2</sup> J/kg = 1 Centi Gy = 0.01 Gy
1 Centi = 100 Joule
1 rad = cJ/kg = 0.01Gy
1 Mrad = 1 · 10 <sup>6</sup> cJ/kg

Pressure / 压力
1 psi (lb/sq.) = 68.95 mbar = 6.895 · 10 <sup>-3</sup> Nmm <sup>2</sup>
1 lb/sq. ft. = 0.478 mbar
1 pdl/sq. ft. = 1.489 N/m <sup>2</sup>
1 in Hg = 33.86 mbar
1 ft H <sub>2</sub> O = 29.89 mbar
1 in H <sub>2</sub> O = 2.491 mbar
1 N/mm <sup>2</sup> = 145 psi = 10 bar
1 kp/mm <sup>2</sup> = 1422 psi
1 at = 736 Torr = 1 kp/cm <sup>2</sup>
1 Torr = 1 mm Hg
1 bar = 0.1 H Pa
1 Pa = 1 N/m <sup>2</sup>

Density / 密度
1 lb/cu. ft. = 16.02 kg/m <sup>3</sup>
1 lb/cu. in. = 27.68 t/m <sup>3</sup>

Horse power / 马力
1 hp · h = 1.0139 PS · h = 2.684 · 10 <sup>6</sup> Joule = 746 W · h
1 BTU (brit. therm. unit) = 1055 Joule

Electrical units / 电单位
1 Ω/1000 yd = 1.0936 Ω/km
1 Ω/1000 ft = 3.28 Ω/km
1 μF/mile = 0.62 μF/km
1 megΩ/mile = 1.61 MΩ/km
1 μmf/foot = 3.28 pF/m
1 decibel/mile = 71.5 mN/m

Power rate / 功率比
1 PS = 0.736 kW
1 kW = 1.36 PS
1 hp = 0.7457 kW
1 kW = 1.31 hp

# Conductor materials – copper and copper alloys

## 导体材料 – 铜和铜合金

Most of our conductor material is copper (Cu). For the production of our wires we mainly use Cu-ETP1 (oxygenic copper) and Cu-OF 1 oxygen-free copper for special applications (e.g. hydrogen resistance). In addition to pure copper we also process a variety of copper alloys for special applications.

我们的绝大多数导体材料是铜 (Cu)。我们主要采用 Cu-ETP1 (含氧铜) 和 Cu-OF1 无氧铜来生产用于特殊应用 (例如: 阻氢) 的电缆。除了纯铜外, 我们也加工各种铜合金用于特殊应用。

### Extract from EN 13602 – copper and copper alloys – raw wire made of copper

摘自 EN 13602 —— 铜和铜合金 —— 裸铜线

Symbol 符号	Material no. 材料号	Composition in % by weight 合成物的重量百分比	Density g/m <sup>3</sup> 密度 g/m <sup>3</sup>	Melting point 熔点	% IACS min. 国际退火软铜标准最小百分比	Notes on properties and use 性能和用途说明
<b>Oxygenic copper</b> 含氧铜						
Cu-ETP1 (E-Cu)	CW 003 A	Cu ≥99.90 最大含氧量 0.040	8.9	1083 °C*	101	Oxygenic (tough-pitch) copper with an electrical conductivity in the soft state of ≥58.58 m/Ωmm <sup>2</sup> at 20 °C.  20°C 时, 在软状态下具有 ≥58.58 m/Ωmm <sup>2</sup> 导电性的含氧 (韧铜) 铜
<b>Oxygen-free copper, non-deoxidized</b> 无氧铜, 未脱氧						
Cu-OF1 (OF-Cu)	CW 007 A	Cu 99.95	8.9	1083 °C*	101	High-purity copper, largely free of elements that evaporate in vacuum, with an electrical conductivity in the soft state ≥58.58 m/Ωmm <sup>2</sup> at 20 °C.  Intermediate material meeting high requirements on hydrogen resistance; welding and hard soldering capability.  For vacuum systems and electronics.  高纯度铜, 几乎不含真空蒸发元素, 20°C 时, 在软状态下导电性 ≥58.58 m/Ωmm <sup>2</sup> .  满足较高阻氢要求; 焊接和硬焊能力的中间材料。  用于真空系统和电子产品。

\*For conversion in Fahrenheit, please check page 41.  
\*华氏温度换算对照第41页。

**International Annealed Copper Standard = IACS**  
Electrical conductivity of copper = min. 58 m/Ωmm<sup>2</sup> = 100% IACS  
国际退火软铜标准 = IACS  
铜的导电性 = 最小 58.58 m/Ωmm<sup>2</sup> = 100% 国际退火软铜标准

# Conductor materials – galvanic coatings

## 导体材料——电镀材料

Galvanic coatings: The metal materials used for galvanically refined copper wires are tin, silver or nickel, depending on the requirements.

电镀材料: 根据需要, 锡、银或镍这三种金属材料用于电镀精制铜线。

Tin / 锡		Silver / 银		Nickel / 镍	
Designation	Tin 99.90	Designation	Fine silver 99.97	Designation	Nickel 99.90
Density	7.29 g/cm <sup>3</sup>	Density	10.5 g/cm <sup>3</sup>	Density	8.9 g/cm <sup>3</sup>
Melting point	232 °C*	Melting point	960 °C*	Melting point	1450 °C*
Symbol	Sn	Symbol	Ag	Symbol	Ni
名称	锡 99.90	名称	银 99.97	名称	镍 99.90
密度	7.29 g/cm <sup>3</sup>	密度	10.5 g/cm <sup>3</sup>	密度	8.9 g/cm <sup>3</sup>
熔点	232 °C*	熔点	960 °C*	熔点	1450 °C*
符号	Sn	符号	Ag	符号	Ni

### Criteria for use / 使用标准

- Good solderability
- Effective protection against corrosion
- High temperature resistance
- Good surface conductivity (skin effect)
- High resistance to corrosion and temperature
- 良好的可焊性
- 有效的腐蚀防护
- 耐高温
- 良好的表面导电性 (集肤效应)
- 较高的耐腐蚀性和耐温性

### Temperature limits for the use of conductor materials.

Directive CSA-C22.2 No. 210.2 assigns conductor materials to the following temperature limits:

### 导体材料使用的温度限制

CSA-C22.2 第 210.2 号指令分配给导体材料下列温度限制:

Temperature range max. 最大温度范围	150 °C*	200 °C*	250 °C*
<ul style="list-style-type: none"> <li>• Bare and tin-plated copper with single wire Ø ≤0.38 mm</li> <li>• Copper-plated steel wire (e.g. Staku) with single wire Ø ≤0.38 mm</li> </ul>	<ul style="list-style-type: none"> <li>• Bare and tin-plated copper with single wire Ø ≥0.38 mm</li> <li>• Copper-plated steel wire (e.g. Staku) with single wire Ø ≥0.38 mm bare and tin-plated</li> <li>• Silver-plated copper</li> <li>• Copper alloy</li> </ul>	<ul style="list-style-type: none"> <li>• Nickel-plated copper</li> <li>• Silver-plated alloys of cadmium-chrome-copper</li> <li>• Nickel-plated steel wires</li> <li>• Pure nickel wires for flexible applications and nickel alloys</li> </ul>	
<ul style="list-style-type: none"> <li>• 单线 Ø ≤0.38 mm 的裸铜和镀锡铜</li> <li>• 单线 Ø ≤0.38 mm 的镀铜钢丝 (例如: Staku)</li> </ul>	<ul style="list-style-type: none"> <li>• 锡铜单线 Ø ≥0.38 mm 的裸铜或镀锡铜</li> <li>• 单线 Ø ≥0.38 mm 的镀铜钢丝 (例如: Staku)</li> <li>• 裸露和镀锡</li> <li>• 镀银铜</li> <li>• 铜合金</li> </ul>	<ul style="list-style-type: none"> <li>• 锡铜镀镍铜</li> <li>• 铜-铬-铜的镀银合金</li> <li>• 镀镍钢丝</li> <li>• 用于灵活应用的纯镍丝和镍合金</li> </ul>	

\*Conversion to Fahrenheit compare page 41.

\*华氏温度换算请对照第41页。

# Insulation material properties

## 绝缘性材料

Symbol 符号	Name 名称	Code e.g. 代码, 例如	Density 密度	Ignition residue 灼烧残渣	Extractable constituents 可提取成分	Halogen content approx. 卤素含量	Hardness Shore A/D 邵氏A/D硬度	Tensile strength 抗拉强度	Elongation at break 抗张强度	Service Temperatures 工作温度			Specific volume resistance spez. 比体积电阻	Dielectric strength 介电强度	Resistance to 阻抗									
										Temperature index** 温度指数**	Thermal overload capacity 热过载容量	Cold winding test 冷绕组测试			Abrasion 磨损	Flame retardation 阻燃性能	Oil 油	Fuels 燃料	Brake fluid 制动液	Acids/Alkalines 酸/碱	Organic agents 有机制剂			
																						DIN ISO 2578	ISO 6722	ISO 6722
	e.g. DIN ISO 1629 and 7728 例如: DIN ISO 1629 und 7728	DIN 76722	DIN 53479	DIN 53568 T1	DIN 53738		DIN 53505	DIN 53504	DIN 53504	DIN ISO 2578	ISO 6722	ISO 6722	DIN 53482	DIN 53481	ISO 6722		ISO 6722							
			g/cm <sup>3</sup>	%	%	%		MPa	%	°C/3000 hrs***	°C/48 hrs***	°C***	Ω · cm	kV/mm										
PVC-P	Polyvinyl chloride (plasticized) / 聚氯乙烯 (增塑)*	Y	1.30-1.45	10-30	20-30	35	85A-95A	>10	>150	105*	110/125*	-25/-40*	>1012	>10	+	+	+	+	-	+	-			
PVC-P	cold-resistant* / 抗寒*	YK	1.24-1.34	10-15	30-40	30	80A-95A	>10	>150	105	110	-50	>1012	>10	+	+	+	+	-	+	-			
PVC-P	hot-pressure resistant*, heat-resistant* / 抗热压*、抗热*	YW	1.24-1.34	8-15	20-30	35	92A-97A	>15	>150	125	140	-25/-40*	>1012	>10	+	+	+	+	-	+	-			
PE	Polyethylene / 聚乙烯	2Y	0.92-0.95	0	0	0	50D-62D	>15	>300	90	100	-40	>1016	>30	+	--	-	+/-*	--	+	-			
PA	Polyamide / 聚酰胺	4Y	1.01	0	0	0	-/72D	>40	>300	105	140	-50	>1012	>10	++	-	++	++	+	+	+			
FEP	Tetrafluoroethylene hexafluoropropylene / 四氟乙烯, 六氟丙烯	6Y	2.14	0	0	75	-/55D	>15	>200	210	260	-65	>1015	>30	++	++	++	++	++	++	++	++	++	++
ETFE	Ethylen tetrafluoroethylene / 乙烯-四氟乙烯	7Y	1.70	0	0	60	-/75D	>30	>200	180	230	-65	>1015	>30	++	++	++	++	++	++	++	++	++	++
PP	Polypropylene / 聚丙烯	9Y	0.91	0	0	0	-/70D	>15	>200	125	150	-40	>1016	>30	+	--	+	+	-	+	+			
PP-FR	Polypropylene, flame-retardant / 聚丙烯, 阻燃	9Y	1.05-1.3	0-10	0	10	-/70D	>15	>200	125	150	-40	>1014	>20	+	+	+	+	-	+	+			
PFA	Perfluoroalkoxy copolymer / 过氟烷氧基共聚物	51Y	2.15	0	0	75	-/55D	>20	>200	260	290	-80	>1015	>30	++	++	++	++	++	++	++	++	++	++
PVDF	Polyvinylidenfluorid / 聚偏氟乙烯	10Y	1.8	0	0	35	-/78D	>25	>100	150	160	-30	>1014	>30	++	++	++	++	++	++	++	++	++	++
			g/cm <sup>3</sup>	%	%	%		MPa	%	°C/3000 hrs***	°C/48 hrs***	°C***	Ω · cm	kV/mm										
TPE-U	Thermoplastic polyether polyurethane / 热塑性多醚聚氨基甲酸酯	11Y	1.12	0	0	0	85A-54D	>30	>400	125	150	-40	>109	>10	++	-	++	++	+	+	+			
TPE-E	Thermoplastic polyether ester elastomer / 热塑性聚醚酯弹性体	12Y	1.16-1.25	0	0	0	40D-72D	>25	>400	90	150	-40	>109	>10	++	-	++	++	+	-	+			
TPE-E	Thermoplastic polyester elastomer / 热塑性聚酯弹性体	13Y	1.25-1.28	0	0	0	-/55D	>30	>300	150	180	-40	>109	>10	++	+/-*	++	++	+	+	+			
TPE-S	Thermoplastic polystyrene block copolymer / 热塑性聚苯乙烯嵌段共聚物	31Y	1.10-1.30	0-10	0	0-10	55D-65D	>15	>200	125	150	-40	>1010	>10	-	+/-	+	+	-	+	-			
TPE-A	Thermoplastic polyamide elastomer / 聚酰胺热塑性弹性体	41Y	1.01-1.06	0	0	0	75A-70D	>25	>400	90	120	-50	>1010	>10	++	-	++	++	+	-	+			
TPE-O	Thermoplastic polyolefin elastomer / 聚烯烃类热塑性弹性体	91Y	0.95-1.25	0-10	0	0-10	87A/-	>10	>300	125	150	-40	>1014	>20	-	+/-*	-	-	-	+	-			
			g/cm <sup>3</sup>	%	%	%		MPa	%	°C/3000 hrs***	°C/48 hrs***	°C***	Ω · cm	kV/mm										
E/VA	Ethylene vinyl acetate / 乙烯醋酸乙烯酯	4G	1.30-1.40	40-50	0-10	0	80A-85A	>7	>150	140	180	-40	>1010	>10	-	-	-	-	-	-	-			
PVC-X	Polyvinyl chloride, crosslinked / 聚氯乙烯, 交联	X	1.35	15	30	30	95A/-	>10	>150	105	140	-40	>1012	>10	++	+	+	+	-	+	+			
PE-X	Polyethylene, crosslinked (XLPE) / 聚乙烯, 交联 (XLPE)	2X	1.1	0	0	10	95A/-	>10	>200	125	150	-40	>1014	>20	+	+	+	+	-	+	+			
PE-X	Polyethylene, crosslinked, halogen-free (XLPE) / 聚乙烯, 交联, 无卤素 (XLPE)	2X	1.4	20	0	0	-/42D	>10	>200	125	150	-40	>1014	>10	+	+	+	+	-	+	+			

\* depends on recipe, as required / 根据需要取决于配方

\*\* criterion: residual elongation at break >50 % / 配方标准: 断裂时残余伸长率>50 %

\*\*\* For conversion in Fahrenheit, please check page 41

\*\*\* 华氏温度换算对照第41页

++ Excellent / 优秀

+ Good / 良好

- Fair / 一般

-- Poor / 不合格

# Factory Automation

## Our market segment in all its diversity

## 我们多元化的细分市场

With innovative solutions for intelligent energy and data management in automated production processes, BizLink has been for years a preferred supplier of many automotive and factory automation OEMs.

BizLink 贸联致力于为自动化生产过程提供智慧能源与数据管理的创新解决方案，多年来深受众多汽车及工厂自动化OEM 厂商信赖。

BizLink products are already facing up to the key future trend of digitalisation with an extensive and innovative range of complementary products and services in the market segments Automation, Drives and Robotics.

BizLink 贸联积极面对数字化的未来，为自动化、驱动技术和机器人领域提供广泛且创新的配套产品和服务。

In several competence centres around the world BizLink develops and produces bus cables, Industrial Ethernet and Motion Control cables as well as cable systems and services. Connector development and production as well as assembled drag chains round off the product portfolio. Moreover, BizLink supplies a wide variety of solutions, including robotic cables and their assembly, hoses and tubes, dresspack systems, integration-ready robots, robot programming and automation systems training. In view of the increasing digitalization BizLink provides integrated and intelligent sensor-based measuring solutions. BizLink markets this product variety via a global sales organisation at nearly 50 locations.

在全球的多个技术中心，BizLink 贸联研发并生产总线电缆、工业以太网电缆和运动控制电缆以及电缆系统和服务。连接器的研发与生产以及拖链的预装配均围绕此产品组合展开。此外，BizLink 贸联可提供一系列解决方案，包括机器人电缆以及相关组件、水管、气管和软管、管线包系统、机器人预集成、机器人编程和自动化系统培训。随着数字化的不断发展，BizLink 贸联提供集成了传感器的智能测量解决方案，并通过近 50 处的销售网络服务全球市场。

对服务的高度重视和增加产品多样性是促进市场进一步发展的动力。依靠丰富的产品系列，BizLink 贸联与技术领导者和用户组织持续合作，共同应对市场挑战。面对未来数字化的持续发展，BizLink 贸联积极研发产品及服务。

**因此，BizLink 贸联正在以“智能”的方式朝着满足未来市场需求迈出重要的一步。**

Their sharp focus on service and increasing product diversification provides impetus for developing these markets further. With its product range BizLink confronts the market's challenges by way of ongoing collaboration with technology leaders and user organisations, and it actively develops products as well as services to meet the trends of the future, especially with respect to the increasing digitalisation.

**Thus, BizLink is taking an important step towards meeting future market requirements in a 'smart' way.**

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[factory-automation.bizlinktech.com](http://factory-automation.bizlinktech.com)

## About BizLink Group

## 关于 BizLink 贸联

# BizLink

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[www.bizlinktech.com](http://www.bizlinktech.com)

### About BizLink

**BizLink, founded in 1996, is headquartered in Fremont, in the heart of the Silicon Valley, USA. Our mission is to make interconnection easier and to become the leading global interconnect solution supplier.**

We support industries that are environmentally conscious and improve quality of life through providing essential components, wire harnesses, and cables to a wide variety of industries such as IT Infrastructure, Client Peripherals, Optical Fiber Communications, Telecom and Networking, Electrical Appliances, Healthcare, Factory Automation, Machinery and Sensors, Motor Vehicle, Rolling Stock, Marine, Industrial, and Solar.

In addition, with flexible production resources and global R&D teams in America, Europe, and Asia, BizLink always provides reliable interconnect solutions in close proximity to markets. BizLink also specializes in providing one-stop EMS and NPI services based on customer's requests.

At BizLink, we strive to keep collaborating closely with customers to turn their innovative ideas into reality.

**BizLink 贸联成立于 1996 年，总部位于美国硅谷。我们的使命是让互联更容易，成为全球领先的互联解决方案供应商。**

我们通过为 IT 基础设施、客户端外围设备、光纤通信、电信和网络、电器、医疗、工厂自动化、机械与传感、机动车辆、轨道交通、海事、工业和太阳能等各种行业提供必要的组件、线束和电缆来支持具有环保意识并提高生活质量的行业。

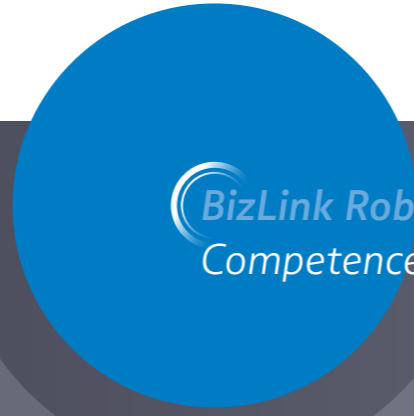
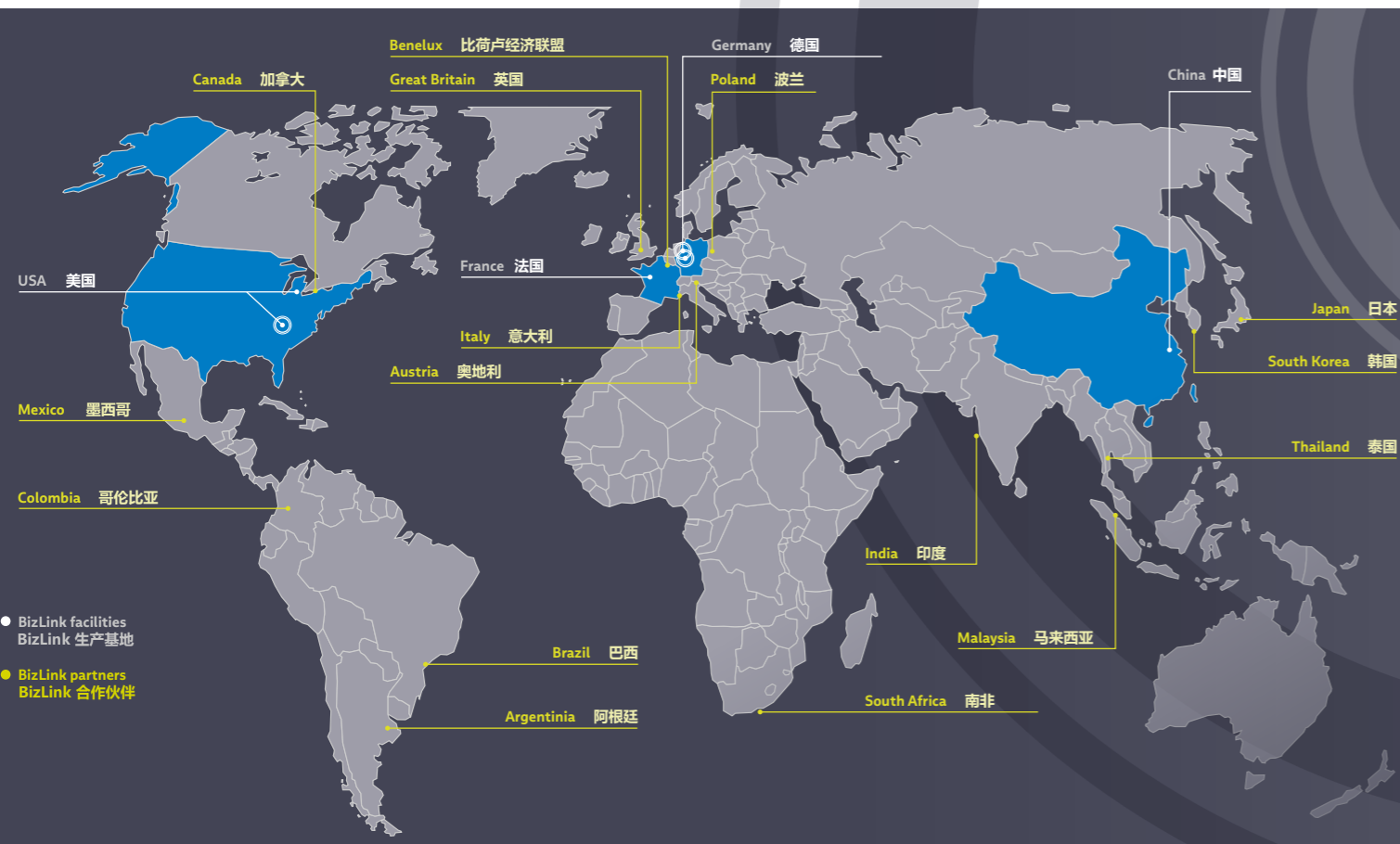
此外，凭借灵活移动的生产资源和遍布美洲、欧洲和亚洲的全球研发团队，BizLink 贸联始终提供贴近市场的可靠互联解决方案。BizLink 贸联还专门根据客户的要求提供一站式 EMS 和 NPI 服务。

BizLink 贸联努力与客户保持密切合作，将其创新想法变为现实。

Interconnect Made Easy.

# Sales network / 销售网络

# Your contact / 联系方式



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# Request sheet BizLink

# BizLink 需求表

Please fill out this request sheet, scan and send by email to **bde\_rs\_sales@bizlinktech.com**

Company stamp / contact information / contact person:

请填写此申请表, 并通过电子邮件将其扫描件发送至: **bcn\_robotics@bizlinktech.com**

公司印章/联系信息/联系人:

Phone:  
Fax:  
E-mail:  
  
Date:

电话:  
传真:  
邮件:  
  
日期:

Article no.: .....

Requirement: ..... m  once  multiple

Delivery date: .....

Dimensions: .....

Use:  Inside  Outside  
 Highly flexible (robots, cable carrier)  
 Permanently installed/sometimes moved

Anwendung:  Control conductor  Data/Bus cable  Robot cable  Welding cable  Drag chain  
 Sensor cable  Industrial Ethernet  Other  Combined cable  Hybrid cable  
 Profibus  
 CAN Bus

Length of traverse ..... m

Acceleration ..... m/s<sup>2</sup>

Traverse speed ..... m/s<sup>2</sup>

No. cycles/day/shift .....

Shielding:  Overall shielding  Shield section/element

Operating voltage: ..... V

Temperature range: minus ..... °C to plus ..... °C permanently installed  
minus ..... °C to plus ..... °C moved

Min. bending radius: ..... x D permanently installed  
..... x D moved

Exterior sheath colour: .....

Marking:  BizLink standard  Customer-specific

Other: .....

Technical data sheet included  Photo included  Sample available

产品型号: .....

要求: ..... m  一次  多次

交付日期: .....

规格: .....

使用情况:  内部  外部  
 高度灵活 (机器人、电缆托架)  
 永久安装/有时移动

应用:  导体  数据/总线电缆  机器人电缆  焊接电缆  拖链  
 传感器电缆  工业以太网  其他  组合电缆  混合电缆  
 Profibus  
 CAN 总线

行程长度 ..... m

加速度 ..... m/s<sup>2</sup>

拖链速度 ..... m/s<sup>2</sup>

周期数/天/班次 .....

屏蔽:  整体屏蔽  屏蔽段/元件

工作电压: ..... V

温度范围: 零下 ..... °C 零上 ..... °C 固定安装  
零下 ..... °C 零上 ..... °C 移动

最小弯曲半径: ..... x D 固定安装  
..... x D 移动

外护套颜色: .....

喷码:  BizLink-标准  客户定制

其他: .....

包含技术数据表  包含照片  可提供样品

## 工厂自动化

### 贸联特种电缆(常州)有限公司

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