

# BUS Cables

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Source: *Modern electrical installation technology makes living more comfortable, safer and cheaper* [www.gira.com](http://www.gira.com)

**A bus network topology is a network architecture in which a set of clients are connected via a shared communications line.**

Some of the advantages are as below,

- 1. Easy to implement and extend.**
- 2. Well-suited for temporary or small networks not requiring high speeds (quick setup), resulting in faster networks.**
- 3. Cost effective; only a single cable is used.**
- 4. Easy identification of cable faults.**

**Caleb Cable provides a whole package of bus cables for various bus types, including ASI Bus, CAN Bus, Interbus, EIB/KNX Bus, CC-Link Bus, Profibus, DeviceNet, and Foundation Fieldbus, etc.**

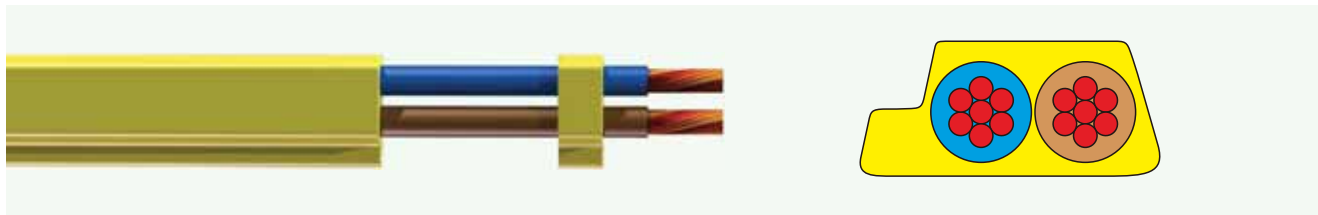
Sources: *Wikipedia, <en.wikipedia.org/wiki/Bus\_network>*

# BUS Cables

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## ASI Bus Cable



### Technical data

- **Peak working voltage (not for power applications)** 32 V
- **Conductor resistance**  
max. 13.7 Ohm/km
- **Minimum bending radius**  
Fixed installation: 3 x cable diameter  
Flexing: 6 x cable diameter
- **Test voltage (core/core)** 1500 V
- **Temperature range**  
TPE: -40 °C to 105 °C;  
PUR: -40°C to 85 °C;  
PVC: -30°C to 105 °C

### Cable structure

- Conductor: finely stranded bare or Tinned copper, 1.5 mm<sup>2</sup>
- Core insulation: blue and brown
- Sheath: PVC, TPE or PUR
- Sheath color: yellow or black

### Standard:

- ASI is standardized Europe-wide in EN 50295 and internationally in IEC 62026-2.

### Application

ASI bus cable is used to connect Actuator-Sensor-Interface components, and it allows transmitting data and power at the same time. The TPE version and PUR version are with oil-resistant and abrasion-resistant feature.

AWG-no.	NO. Cores x Cross-sec. mm <sup>2</sup>	Sheath Material	Sheath Color	Copper Weight kg/km	Cable Weight kg/km
16	2 x 1.50	TPE	yellow	29	57
16	2 x 1.50	TPE	black	29	57
16	2 x 1.50	PUR	yellow	29	57
16	2 x 1.50	PUR	black	29	57
16	2 x 1.50	PVC	yellow	29	57
16	2 x 1.50	PVC	black	29	57

## CAN Bus Cable



### Technical data

- **Peak working voltage (not for power applications)** 30 V
- **Conductor resistance**  
max. 57.5 Ohm/km
- **Minimum bending radius**  
Fixed installation: 8 x cable diameter
- **Test voltage (core/core):** 2000 V
- **Temperature range:** -40°C to 75 °C

### Cable structure

- **Conductor:** stranded 7-wire bare copper conductor
- **Insulation:** PE, XLPE or FEP
- **Color coded in accordance with DIN 47100**  
White/brown (two cores)  
green/yellow and white/brown (four cores)
- **Braiding:** Tinned copper
- **Sheath:** PVC
- **Color:** violet (RAL 4001)

### Standard:

- CAN standard and customers requirements

### Application

CAN bus cable is used to connect controller area to network components. It secures transmission characteristics of 1 Mbit/s up to 40 m and 50 Kbit/s up to 1 km. The flexible feature makes it suitable to be used in industrial environments, machinery equipment and harsh environments.

NO. Pairs x Cross-sec. mm <sup>2</sup> per conductor	Outer Diameter mm	Copper Weight kg/km	Cable Weight kg/km
1 x 2 x 0.22	5.7	16.7	42
2 x 2 x 0.22	7.6	34.8	68
1 x 2 x 0.34	6.8	22.1	55
2 x 2 x 0.34	8.5	46.4	88
1 x 2 x 0.50	7.5	41.6	90
2 x 2 x 0.50	9.7	59.4	106
1 x 2 x 0.75	8.7	52.7	108
2 x 2 x 0.75	11.5	80.6	142

## Interbus Cable



### Technical data

- **Peak working voltage**
- **(not for power applications): 250 V**
- **Minimum bending radius**  
Flexing: 15 x cable diameter
- **Test voltage (core/core): 1500 V**
- **Temperature range: -30°C to +70°C**

### Cable structure

- **Conductor:** highly flexible bare copper conductor
- **Insulation:** Polyolefin
- **Color code:**  
Sec. 0.25 mm<sup>2</sup>: DIN 47100 (Data) white-brown; yellow-green; pink/grey  
Sec. 1 mm<sup>2</sup>: Blue-Red-Yellow/Green (Power)
- **Braiding:** Tinned copper (coverage: 80%)
- **Sheath:** PUR

### Properties

- For highly flexible applications
- Data and control in one cable
- Reliable signal transfer

### Application

Interbus cable is used for the application areas of material handling and process automation.

NO. Pairs x Cross-sec. mm <sup>2</sup> per conductor	Outer Diameter mm	Copper Weight kg/km	Cable Weight kg/km
3 x 2 x 0.25mm <sup>2</sup>	7.9	39	64
2 x 2 x 0.25mm <sup>2</sup> + 3 x 1.0mm <sup>2</sup>	7.9	62	92

## KNX/EIB Bus Cable



### Technical data

- **Peak working voltage**  
(not for power applications): 150 V
- **Minimum bending radius:**  
Fixed installation: 10 x cable diameter
- **Test voltage (core/core):** 250 V
- **Temperature range:** -30 °C to +70 °C

### Cable structure

- Conductor: solid bare copper 0.8 mm
- Insulation: PE/PVC
- Color code: black, yellow, white, red
- Assembly: 4 single-wired cores twisted to a star quad.  
COMBI version with additional power supply 3 x 1.5 mm<sup>2</sup>
- Shielding: Tinned copper drain wire and Al foil
- Sheath: PVC/LSZH
- Color: Green

### Properties

- Serial data transmission
- KNX/EIB bus cable has been tested with 4 kV (1 min) in a water bath

### Application

KNX/EIB bus cable is suitable to transmit bus signal for intelligent systems in buildings. It can also be used to control blinds, lighting, heating, indicator boards, ventilation, etc.

NO. Pairs x Cross-sec. mm <sup>2</sup> per conductor	Outer Diameter mm	Copper Weight kg/km	Cable Weight kg/km
3 x 2 x 0.8mm	6.1	21	54
2 x 2 x 0.8mm + 3 x 1.5mm <sup>2</sup>	14.7	64	128

## CC-Link Bus Cable



### Technical data

- **Peak working voltage**  
(not for power applications): 300 V
- **Conductor resistance:**  
max. 37.8 Ohm/km
- **Minimum bending radius:**  
15 x cable diameter
- **Test voltage (core/core):** 2000 V
- **Temperature range:** -40°C to +70°C
- **Characteristics impedance:**  
110 Ohms at 1 MHz

### Cable structure

- Conductor: stranded bare copper
- Insulation: foam PE
- Color code: blue, yellow, white
- Shielding: Al-foil and tinned copper braiding
- Sheath: PVC

### Standard

- CC-Link® standard and customers requirements

### Application

CC-Link bus cable is used to connect control and communication components for the process automation application.

NO. Pairs x Cross-sec. mm <sup>2</sup>	Outer Diameter mm	Copper Weight kg/km	Cable Weight kg/km
3 x 0.5mm <sup>2</sup>	7.7	40	77

## Profibus Indoor Cable



### Technical data

- **Cable weight:** 69.0 kg/km
- **Copper weight:** 24.0 kg/km
- **Minimum bending radius for laying:**  
120 mm
- **Temperature range:** -40 °C to +70 °C

### Cable structure

- **Conductor:** bare copper; 1 x 2 x 0.64 mm
- **Insulation:** foam skin PE
- **Color code:** red, green
- **Stranding element:** 2 cores + 2 fillers stranded together
- **Shielding 1:** Al-PET foil
- **Shielding 2:** tinned copper braiding
- **Outer sheath material:** PVC
- **Cable external diameter:** 7.8 mm +/- 0.2 mm

### Electrical data

- **Characteristic impedance:** 150 Ohm +/- 10%
- **Conductor resistance:** 55.0 Ohm/km
- **Insulation resistance:** 1.00 GOhm x km
- **Mutual capacitance:** 30.0 nF/km
- **Test voltage:** 1.5 KV
- **Attenuation**

9.6 kHz	<2.5	dB/km
38.4 kHz	<4.0	dB/km
4 MHz	<22.0	dB/km
16 MHz	<42.0	dB/km

### Standard:

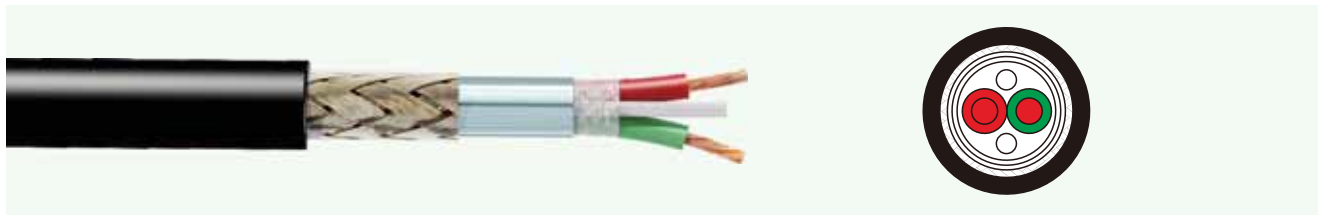
- Profibus acc. to DIN 19245 T3 and EN50170

### Application

The cable is used to exchange information between different automation systems and interconnect L2-BUS components. It is suitable for indoor use.



## Profibus Outdoor Cable



### Technical data

- **Cable weight:** 64.0 kg/km
- **Copper weight:** 24.0 kg/km
- **Minimum bending radius for laying:** 120 mm
- **Temperature Range:** -40 °C to +70 °C

### Cable structure

- **Conductor:** bare copper; 1 x 2 x 0.64 mm
- **Insulation:** foam-skin-PE
- **Core colors:** red, green
- **Stranding element:** 2 cores + 2 fillers stranded together
- **Shielding 1:** Al-PET foil
- **Shielding 2:** tinned copper braiding
- **Outer sheath material:** PE/PUR
- **Cable external diameter:** 7.8 mm +/- 0.2 mm

### Electrical data

- **Characteristic impedance:** 150 Ohm +/- 10%
- **Conductor resistance:** 55.0 Ohm/km
- **Insulation resistance:** 1.00 GOhm x km
- **Mutual capacitance:** 30.0 nF/km
- **Test voltage:** 1.5 KV
- **Attenuation**

9.6 kHz	<2.5	dB/km
38.4 kHz	<4.0	dB/km
4 MHz	<22.0	dB/km
16 MHz	<42.0	dB/km

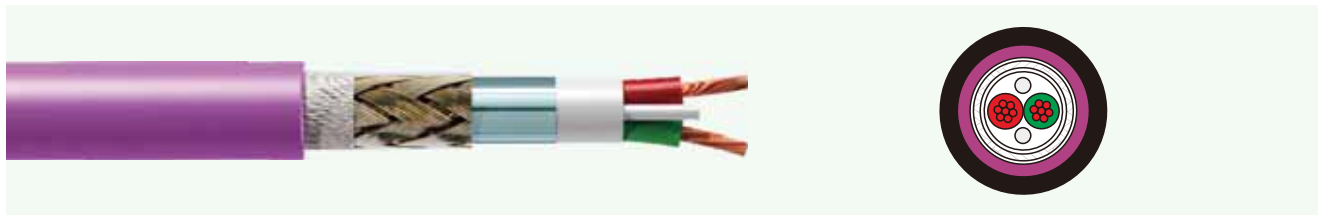
### Standard:

- Profibus acc. to DIN 19245 T3 and EN50170

### Application

The cable is used to exchange information between different automation systems and interconnect L2-BUS components. It is suitable for outdoor use with PE jacket and industry with PUR jacket.

## Profibus DP



### Technical data

- **Characteristic impedance:** 150 Ohm
- **Nominal voltage:** 100 V
- **Temperature range:** -40 °C to +70 °C
- **Capacitance at 1 kHz:** 28.5 nF/km
- **Velocity of propagation:** 78%

### Cable structure

- **Conductor:** copper, bare (AWG 22), 1 x 2 x 0.64 mm
- **Insulation:** foam-skin-PE
- **Core color:** red, green
- **Mylar spiral:** coverage >125%
- **Inner sheath:** PVC/LSZH, dia. 5.50 mm
- **Al-PET shield:** coverage >125%
- **Braiding:** tinned copper; coverage 60%
- **Outer sheath:** PVC/LSZH, dia. 8.00 mm

### Electrical data

- **Attenuation:**

9.6 kHz	2.5	dB/km
4 MHz	22.0	dB/km
16 MHz	42.0	dB/km

### Standard:

- Profibus acc. to IEC 61158 and EN50170

### Application

The single pair bus cable is mainly used for process and field communication in cell networks. It is widely adopted for process automation applications and production with transmission rates up to 12 Mbit/s.

## DeviceNet Trunk Cable



### Technical data

- **Cable weight:** 190.0 kg/km
- **Copper weight:** 85.0 kg/km
- **Minimum bending radius for laying:** 190.0 mm
- **Temperature Range:** -20 °C to +80 °C

### Electrical data

- **Characteristic impedance:** 120 Ohm +/- 10%
- **Conductor resistance:** 22.6 Ohm/km
- **Insulation resistance:** 0,20 GOhm x km
- **Mutual capacitance:** 39.8 nF/km
- **Test voltage:** 2.0 KV
- **Attenuation**

125 kHz	<0.42	dB/100m
500 kHz	<0.81	dB/100m

### Standard:

- ODVA DeviceNet

### Application

Incorporating a power and data pair, it is suitable for use in Allen Bradley DeviceNet™ system. Several sheathing options are available for different installation environments.

### Cable structure

- Fixed installation, indoor 1 x 2 x AWG 18 + 1 x 2 x AWG 15
- Data pair conductor: tinned copper (AWG 18)
- Power pair conductor: tinned copper (AWG 15)
- Data pair insulation: foam-skin-PE
- Power pair insulation: PVC/PE
- Data pair core color: blue, white
- Power pair core color: red, black
- Shielding for each pair: Al-PET
- Total shielding: tinned copper braiding and drain wire
- Outer sheath material: PVC/LSOH/PUR
- Cable external diameter: 12.2 mm

## DeviceNet Drop Cable



### Technical data

- **Cable weight:** 67.0 kg/km
- **Copper weight:** 35.0 kg/km
- **Minimum bending radius for laying:** 110.0 mm
- **Temperature range:** -20 °C to +80 °C

### Electrical data

- **Characteristic impedance:** 120 Ohm +/- 10%
- **Conductor resistance:** 90.0 Ohm/km
- **Insulation resistance:** 0.20 GOhm x km
- **Mutual capacitance:** 39.8 nF/km nom.
- **Test voltage:** 2.0 KV
- **Attenuation:**

125 kHz	<0.95	dB/100m
500 kHz	<1.64	dB/100m

### Standard:

- ODVA DeviceNet

### Application

The cable is designed to connect actuators, sensors, and switching to the DeviceNet™ on the Allen Bradley DeviceNet™ system. Several sheathing options are available for different installation environments.

### Cable structure

- Fixed installation, indoor 1 x 2 x AWG 24 + 1 x 2 x AWG 22
- Data pair conductor: tinned copper (AWG 24)
- Power pair conductor: tinned copper (AWG 22)
- Data pair insulation: foam-skin-PE
- Power pair insulation: PVC/PE
- Data pair core color: blue, white
- Power pair core color: red, black
- Shielding for each pair: Al-PET
- Total shielding: tinned copper braiding and drain wire
- Outer sheath material: PVC/LSOH/PUR
- Cable external diameter: 6.9 mm

## Foundation Fieldbus Type A



### Technical data

- **Cable weight:** 89.0 kg/km
- **Copper weight:** 42.0 kg/km
- **Minimum bending radius for laying:**  
60.0 mm
- **Temperature Range:** -40 °C to +105 °C

### Electrical data

- **Characteristic impedance:**  
100 Ohm +/- 10%
- **Conductor resistance:**  
24.0 Ohm/km max.
- **Insulation resistance:**  
2.0 GOhm x km min.
- **Mutual capacitance:** 65.0 nF/km nom.
- **Test voltage:** 1.5 KV
- **Attenuation:**  
39 kHz    3.4    dB/km

### Cable structure

- Inner conductor diameter: stranded bare copper (AWG 18/41)
- Core insulation: XLPE
- Core colors: blue, brown
- Stranding element: Double core
- Shielding: Al-PET+tinned copper braiding+drain wire
- Outer sheath material: PVC
- Cable external diameter: 7.9 mm
- Outer sheath color: yellow

### Standard:

- Foundation Fieldbus Spec. FF-813-1.4

### Application

The cable is designed for the Fieldbus cable for type A applications (31.25 Kbit/s).

## Foundation Fieldbus Type B



### Technical data

- **Rated temperature:** 75°C
- **Nominal voltage:** 300 V
- **Velocity of propagation:** 66%
- **Impedance:** 150 Ohm
- **Conductor resistance at 20°C:**  
56.0 Ohm/km
- **Attenuation:**

0.01 MHz	0.39	dB/km
0.10 MHz	0.66	dB/km
0.50 MHz	2.99	dB/km
1.00 MHz	4.53	dB/km

### Cable structure

- **Conductor:** tinned copper, 22(7)AWG 0,34 mm<sup>2</sup>
- **Core insulation:** polyolefin
- **Stranding element:** Double core
- **Shielding:** aluminium/polyester foil
- **Drain wire:** tinned copper
- **Optional armor:** SWA
- **Outer sheath material:** PVC/LSZH
- **Cable external diameter:** PVC/LSZH 4.9 mm

### Standard:

- Foundation Fieldbus Spec. FF-813-1.4

### Application

The cable is designed for the Fieldbus cable for type B applications (31.25 Kbit/s).