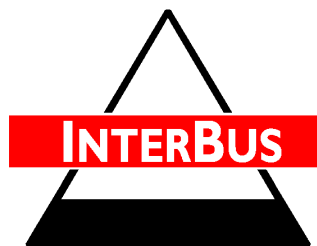# INTERBUS

The International Standard IEC 61158

Technical Guidelines

INTERBUS Data Cable
Manufacturer Declarations

V2.0
18.12.2002

Supplement to IEC 61158

Contents

1. General

This document is an Appendix to the "Technical Guidelines for INTERBUS Data Cable V2.0".

2. Reference Source

The technical guidelines for cable-based transmission technology in the INTERBUS system as well as the guidelines for optical transmission technology and the guidelines for INTERBUS can be ordered from the INTERBUS Staffoffice at the following address:

INTERBUS Staffoffice
Postfach 11 08

32817 Blomberg, Germany

Phone: +49 - 52 35 - 34 21 00
Fax: +49 - 52 35 - 34 12 34

3. Manufacturer Declarations

3.1. INTERBUS Remote Bus (2-Wire)

Applicant, address of the applicant, contact
Type(s), manufacturer designation(s), names of secondary manufacturers
Fields of application, special limitations during operation, etc.

Characteristic Size (20°C [68°F])	Setpoint	Actual Value
Number of wires	3 x 2, twisted pair, with common shielding	
Conductor cross section	0.2 mm² (25 AWG), minimum	
DC conductor resistance per 100 m (328.08 ft.)	9.6 Ω, maximum	
Characteristic impedance	120 Ω ±20% at f = 0.064 MHz 100 Ω ±15 Ω at f > 1 MHz	
Dielectric strength - Wire/wire - Wire/shield	 1000 V_{rms}, 1 minute 1000 V_{rms}, 1 minute	
Insulation resistance (after testing dielectric strength)	150 MΩ, minimum, for 1 km (0.62 mi.) cable	
Maximum transfer impedance (coupling resistance) - at 30 MHz	 250 mΩ/m	
Effective capacitance at 800 Hz	60 nF, maximum, for 1 km (0.62 mi.) cable	
Minimum near-end crosstalk attenuation (NEXT) for 100 m (328.08 ft.) cable - at 0.772 MHz - at 1 MHz - at 2 MHz - at 4 MHz - at 8 MHz - at 10 MHz - at 16 MHz - at 20 MHz	 61 dB 59 dB 55 dB 50 dB 46 dB 44 dB 41 dB 40 dB	

Maximum wave attenuation for 100 m (328.08 ft.) cable		
- at 0.256 MHz	1.5 dB	
- at 0.772 MHz	2.4 dB	
- at 1 MHz	2.7 dB	
- at 4 MHz	5.2 dB	
- at 10 MHz	8.4 dB	
- at 16 MHz	11.2 dB	
- at 20 MHz	11.9 dB	
Temperature range	-20°C to +70°C (-4°F to +158°F)	
Color coding of the wires	According to DIN 47100	
Sheath color	May green RAL 6017	
Maximum outside diameter	8 mm (0.315 in.)	
Minimum bending radius	64 mm (2.520 in.)	

Connection method	Suitable for:
	- 9-pos. D-SUB connectors
	  (DIN 41652)
	- 9-pos. IP 65 circular connectors
	  (Coninvers)
	- 5-pos. M12
	  (only for devices with automatic
	  interface recognition
	  [IBS SUPI 3 OPC])
	- Terminal blocks	

Please sign below to confirm that all of the above data for the manufacturer declaration is correct.

Manufacturer   Date, location

Name   Signature

3.2. INTERBUS Installation Remote Bus (2-Wire)

Applicant, address of the applicant, contact
Type(s), manufacturer designation(s), names of secondary manufacturers
Fields of application, special limitations during operation, etc.

Characteristic Size (20°C [68°F])	Setpoint	Actual Value
Number of wires	3 x 2 data lines, twisted pair, and 3 power supply lines, common or separate shielding	
Conductor cross section of data lines	0.2 mm² (25 AWG), minimum	
Conductor cross section of supply lines	1.0 mm² (17 AWG), minimum	
DC conductor resistance per 100 m (328.08 ft.) data line	9.6 Ω, maximum	
DC conductor resistance per 100 m (328.08 ft.) supply line	2.2 Ω, maximum	
Characteristic impedance of the wire pairs (data lines)	120 Ω $\pm$20% at f = 0.064 MHz 100 Ω $\pm$15 Ω at f > 1 MHz	
Dielectric strength - Wire/wire - Wire/shield	1000 V_{rms}, 1 minute 1000 V_{rms}, 1 minute	
Insulation resistance (after testing dielectric strength)	150 MΩ, minimum, for 1 km (0.62 mi.) cable	
Maximum transfer impedance (coupling resistance) - at 30 MHz	250 mΩ/m	
Effective capacitance of data lines at 800 Hz	60 nF, maximum, for 1 km (0.62 mi.) cable	

Minimum near-end crosstalk attenuation (NEXT) for 100 m (328.08 ft.) cable		
- at 0.772 MHz	61 dB	
- at 1 MHz	59 dB	
- at 2 MHz	55 dB	
- at 4 MHz	50 dB	
- at 8 MHz	46 dB	
- at 10 MHz	44 dB	
- at 16 MHz	41 dB	
- at 20 MHz	40 dB	
Maximum wave attenuation for 100 m (328.08 ft.) cable	3.0 dB	
- at 0.256 MHz	4.8 dB	
- at 0.772 MHz	5.2 dB	
- at 1 MHz	10.4 dB	
- at 4 MHz	16.8 dB	
- at 10 MHz	22.4 dB	
- at 16 MHz	23.8 dB	
- at 20 MHz		
Temperature range	-20°C to +70°C (-4°F to +158°F)	
Color coding of the data lines	According to DIN 47100	
Color coding of the supply lines	Red, blue, and yellow/green	
Sheath color	May green RAL 6017	
Maximum outside diameter	8 mm (0.315 in.)	
Minimum inside diameter of the sheath	5 mm (0.197 in.)	
Minimum bending radius	80 mm (3.150 in.)	
Connection method	Suitable for: - 9-pos. IP 65 circular connectors (Coninvers) - Terminal blocks	

Please sign below to confirm that all of the above data for the manufacturer declaration is correct.

_____
Manufacturer

_____
Date, location

_____
Name

_____
Signature

3.3. INTERBUS Loop 2 Cable

Applicant, address of the applicant, contact

Type(s), manufacturer designation(s), names of secondary manufacturers

Fields of application, special limitations during operation, etc.

Characteristic Size (20°C [68°F])	Setpoint	Actual Value
Number of wires	2, twisted	
Distance per twist	<= 52 mm (2.05 in.)	
Conductor cross section	1.5 mm² (16 AWG)	
Litz wire structure	Finely stranded	
Litz wire structure/maximum wire diameter	0.26 mm (0.010 in.)	
Litz wire structure/minimum wire diameter	0.2 mm (0.008 in.)	
DC conductor resistance per 1000 m (3280.84 ft.)	13.3 Ω, maximum for plain single wires 13.7 Ω, maximum for metal-clad single wires	
Characteristic impedance	75 Ω +/- 15% at f = 250 kHz to 10 MHz	
Dielectric strength wire/wire	1000 V_{rms}, 1 minute	
Wire insulation material	PVC/PE	
Insulation resistance (after testing dielectric strength)	20 MΩ, minimum, for 1 km (0.62 mi.) cable	
Temperature range	-5°C to +70°C (+23°F to +158°F)	
Color coding of the wires	Brown, blue	
Length marking	Meters marked on the cable: 1 m... 2 m...3 m... to 999 m (3.28 ft. …6.56 ft. …9.84 ft. to 3277.56 ft.) (no calibration)	
Labeling	INTERBUS Loop 2 2 x 1.5 mm² (16 AWG)	
Sheath color	May green RAL 6017	
Labeling color	Black	
Outside cable diameter (VDE 0281-5)	7.2 mm (0.283 in.), typical, (6.8 - 8.2 mm [0.268 - 0.323 in.])	

Outside wire diameter (including insulation)	2.5 mm (0.098 in.)	
Minimum bending radius	15 x cable diameter	
Environmental compatibility	Free from substances which would hinder coating with paint or varnish	
Connection method	Suitable for INTERBUS Loop 2 -Insulation displacement connection method -Terminal blocks	

Please sign below to confirm that all of the above data for the manufacturer declaration is correct.

_____   _____
            Manufacturer   Date, location

_____   _____
              Name   Signature

3.4.   INTERBUS S-Line Cable

Applicant, address of the applicant, contact
Type(s), manufacturer designation(s), names of secondary manufacturers
Fields of application, special limitations during operation, etc.

Characteristic Size (20°C [68°F])	Setpoint	Actual Value
Number of wires	2 x 2 twisted pair	
Distance per twist	<= 52 mm (2.05 in.)	
Conductor cross section	> 0.5 mm² (20 AWG)	
Litz wire structure	Finely stranded	
Litz wire structure/maximum wire diameter	0.26 mm (0.010 in.)	
Litz wire structure/minimum wire diameter	0.2 mm (0.008 in.)	
DC conductor resistance per 1000 m (3280.84 ft.)	39.2 Ω, maximum	
Characteristic impedance	79 Ω +/- 5 Ω at f = 250 kHz to 10 MHz	
Dielectric strength wire/wire	1000 V_{rms}, 1 minute	
Wire insulation material	PVC/PE	
Insulation resistance (after testing dielectric strength)	5 GΩ, minimum, for 1 km (0.62 mi.) cable	
Maximum transfer impedance (coupling resistance) - at 30 MHz	250 mΩ/m	
Effective capacitance of data lines at 800 Hz	110 nF, maximum, for 1 km (0.62 mi.) cable	
Minimum near-end crosstalk attenuation (NEXT) for 100 m (328.08 ft.) cable - at 0.772 MHz - at 1 MHz - at 2 MHz - at 4 MHz - at 8 MHz - at 10 MHz - at 16 MHz - at 20 MHz	84 dB 72 dB 67 dB 64 dB 62 dB 61 dB 59 dB 54 dB	

Maximum wave attenuation for 100 m (328.08 ft.) cable		
- at 0.256 MHz	0.8 dB	
- at 0.772 MHz	2 dB	
- at 1 MHz	2.5 dB	
- at 4 MHz	7.5 dB	
- at 10 MHz	13.5 dB	
- at 16 MHz	17.5 dB	
- at 20 MHz	22 dB	
Temperature range: Flexible	-5°C to +80°C (+23°F to +176°F)	
Fixed	-40°C to +80°C (-40°F to +176°F)	
Color coding of the wires	[white, brown], [green, yellow]	
Sheath color	May green RAL 6017	
Labeling color	Black	
Outside cable diameter (VDE 0281-5)	7.2 mm (0.283 in.), typical, (6.8 - 8.2 mm [0.268 - 0.323 in.])	
Outside wire diameter (including insulation)	2.5 mm (0.098 in.)	
Minimum bending radius	15 x cable diameter	
Environmental compatibility	Free from substances that would hinder coating with paint or varnish	
Connection method	Suitable for: - M12 connection method - Terminal blocks	

Please sign below to confirm that all of the above data for the manufacturer declaration is correct.

Manufacturer	Date, location

Name	Signature