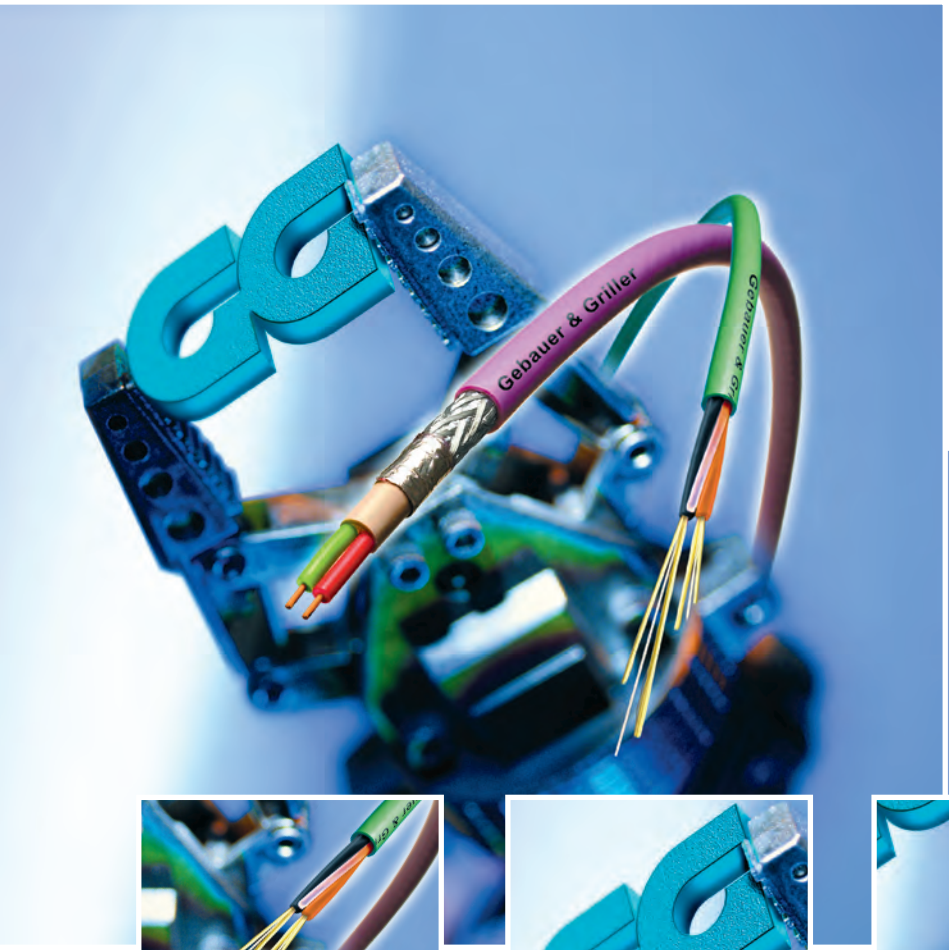
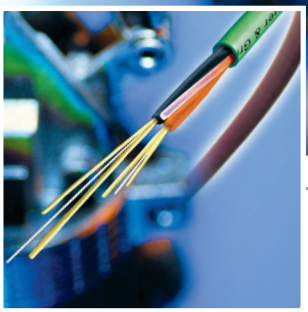
Gebauer & Griller





Bus Cables

www.griller.at

About Gebauer & Griller

Gebauer & Griller Kabelwerke GmbH was established in 1940 and since then has developed into one of the leading producers of cables and wires.

According to our strategic focus we offer – on a national and international level – a large variety of standard cables and wires as well as products tailor-made to customers' requirements and specifications.

This catalogue represents our standard programme in the field of bus cables for factory and process automation.

We also produce cables for other bus systems according to customer requirements such as e.g. CC-link, Sinec L1, Twinax for industrial purposes, and many more, including special solutions using copper conductors and optical fibres. Successful product development coupled with a permanent modernisation and expansion of our production plants has led to the result that Gebauer & Griller products are globally applied.

As a global player with worldwide locations our company is being certified by an independent testing institute once a year.

The Gebauer & Griller Management System (GMS) covers the qualification profile of ISO 9001 (standard quality management system, for all branches), ISO TS 16949 (requirements for the automotive industry, in addition to ISO 9001), ISO 14001 (standard environment management system, for all branches) and OHSAS 18001 (Occupational Health and Safety Assessment Series as standard management system for all branches).

Production Programme

- Automotive Cables
- Automotive Cable Harnesses
- Cables and Wires for elevators and escalators
- Cable Harnesses for elevators and escalators
- Bus Cables
- Cables and Wires for special industrial applications in the transfer of information and energy as well as in high frequency technology

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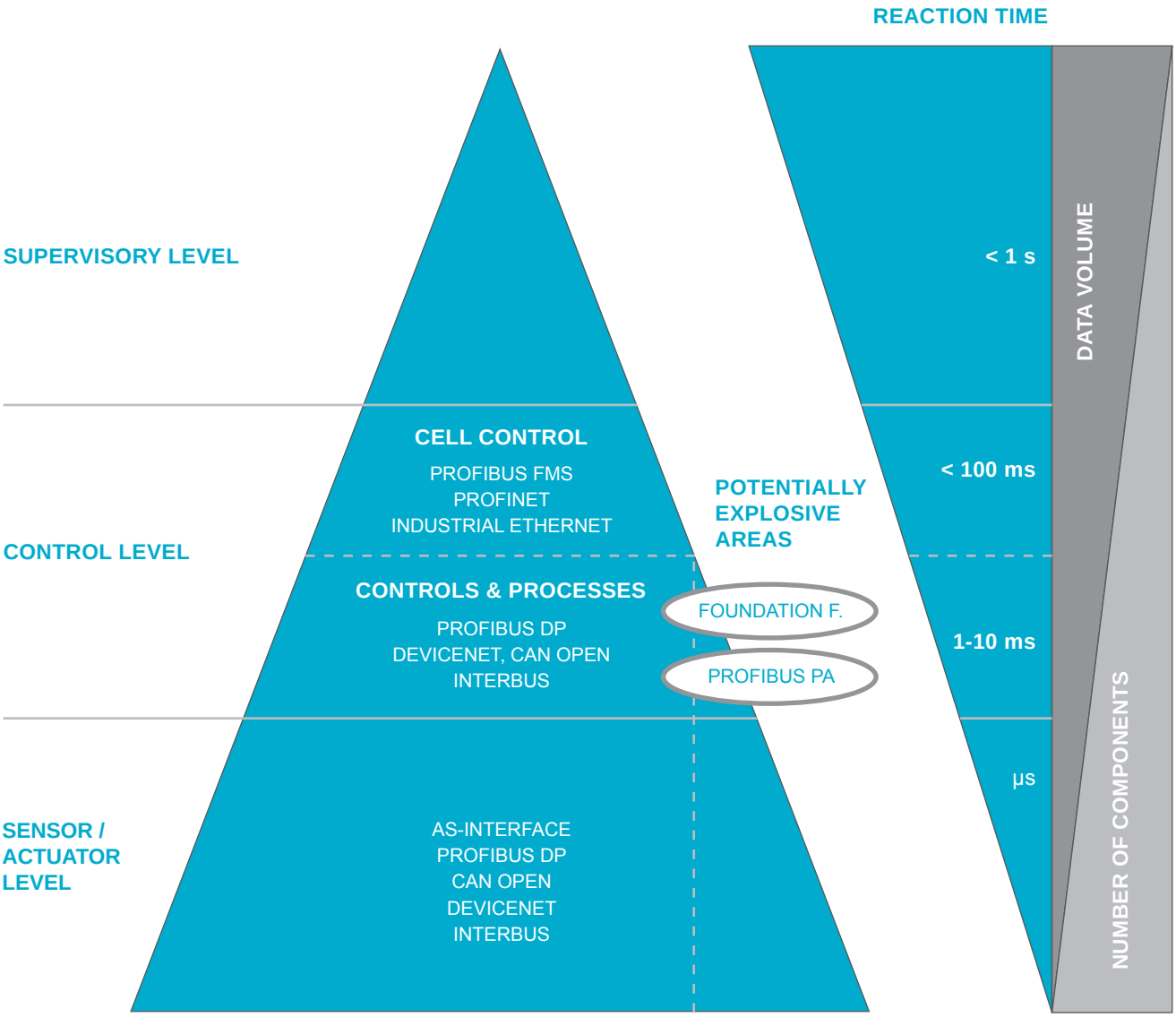
Gebauer & Griller

Structure of Communication



Please note:

Gebauer & Griller Kabelwerke GmbH reserves the right to improve, enhance or otherwise modify its products without prior notification.

This may, in particular, result in changes concerning data and other information on the products. A legal right for the delivery of a specific product with precisely determined specifications is only given by a binding order accepted by Gebauer & Griller.

UL/CSA Approvals

News from North America

The current 2015 edition of Rule Set 79 concentrating on industrial machinery, and issued by the National Fire Protection Agency (NFPA), still prefers the use of listed cables. Exceptions have now been included into the Rules to cover the Underwriters Laboratories (UL) - Recognised Cables AWM Styles. Details are to be found in Section 12.9.2 of the current version of NFPA 79.

In the following we will define in more detail the listings used by Gebauer & Griller for the catalogue products and explain why it still can make sense and be practical to use UL-recognised cables.

Communications cables compliant with UL 444

They are intended for applications described in Article 800 of the National Electrical Code (NEC - NFPA 70). And while they are intended for the use with a nominal voltage of 300 V, they are not labelled as such. Depending on the planned cable laying method, UL places increasingly stringent requirements on the flame-resistance of the products.

CMX listed cables

must at least pass the test of vertical flame propagation (VW-1 or FT1). Cables of this type are intended for restricted use inside buildings.

CMG listed cables

are intended for general use (i.e. in all applications that are not distribution channels - plenum or risers) and have to meet exceptionally high flame-resistance requirements. Taken as a basis, the FT4 / IEEE 1202 flame test in accordance with UL 1685 and / or CSA 22.2 No. 3, is a multi-cable flame test that imposes even higher demands than the IEC 60332-3 flame test common in Europe.

Fibre Optic Cables compliant with UL 1651

Fibre optic cables are used for control, signalling and telecommunications purposes in accordance with Article 770 of the NEC. Here, too, varying requirements are imposed on flame-resistance which depends on the cable laying method used.

OFNG listed cables

are characterised by a non-metallic cable structure and are intended for general use. As an equivalent to CMG listed cables, OFNG cables must pass the FT4 test according to CSA.

Power-limited circuit cables compliant with UL 13

Article 725 of the NEC defines class 1, class 2 and class 3 circuits. Cables of this type must also pass the FT4/IEEE 1202 test according to UL 1685.

CL2 and CL3 listed cables

are intended for general use (except with distribution channels, as risers or if on cable trays). CL3-listed cables feature a nominal voltage of 300 V.

Listed PLTC Cables (Power Limited Tray Cables)

are suited for cable trays as well as for outdoor use which requires higher UV and oil resistance. The additional suffix –ER (Exposed Run) indicates that the cables may also be used without protection between tray and end device, but only if they are protected against physical damage. The basic parameters for this kind of usage are also included in the NEC.

Why it does make sense to use UL-recognised cables ?

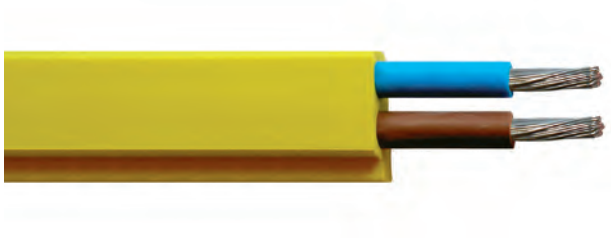
NEC allows a parallel laying only for cables of the same nominal voltage class. Therefore, in some cases, UL approvals for cables of a higher nominal voltage class are also indicated, in addition to the UL-listed cables.

AWM Cables (Appliance Wiring Material) compliant with UL 758

are solely for use as factory-installed wiring in an overall enclosure of appliances (internal wiring) or as external interconnecting cables for appliances (external wiring). They are by no means intended for installation in buildings or physical structures. Cables for internal wiring have to pass the horizontal flame test according to UL 2556, while cables for external wiring have to pass the cable flame test, the latter involving higher flame-retardant requirements than the vertical flame propagation test VW-1 and / or FT1.

ASi

ASi – Actuator Sensor Interface



Application

ASi cables, standardised in EN 50295 / IEC 62026 are used to connect devices of the lowest field level such as sensors and actuators. Data and energy are transmitted via an unscreened twin-wire flat cable with a special profile to prevent the reversal of poles.

Simple installation is guaranteed by using the cable piercing technology. TPE with rubber-like properties as insulation and jacket material exceeds the performance of competitive products especially as regards oil resistance.

For an even better oil resistance, and for drag chain applications we recommend the use of our PUR-sheathed version. The best choice for applications in which the highest level of flame-resistance is required is our c(UL)us CMG listed PVC version.

In addition to above properties, all cables meet the requirements of EU Directive 2011/65 (RoHS).

→ Gebauer & Griller is the first and only producer of ASi cables holding an AWM Style for TPE, a material which excels with rubber-like properties and an excellent oil resistance.

Construction

Conductor:	Extra fine stranded tinned copper wires, nom. cross section 1.5 or 2.5 mm²
Insulation:	Thermoplastic elastomer (TPE), polyolefin or special compound of polyvinylchloride (PVC)
Sheath:	Thermoplastic elastomer (TPE), thermoplastic polyurethane compound (PUR), matt, low adhesion, halogen-free, flame-retardant or special compound of polyvinylchloride (PVC), yellow (similar RAL 1012), black (similar RAL 9005) or red (similar RAL 3000) on request
Dimensions:	Approx. 10.0 x 4.0 mm

Mechanical Properties

Temperature range:	-40°C to +105°C fixed installation (TPE) -40°C to +80°C fixed installation (PUR) -40°C to +90°C fixed installation (PVC) -30°C to +70°C flexible application (PUR)
Min. bending radius:	12 mm fixed installation 24 mm flexible application

Electrical Properties

Conductor resistance:	13.7 ohm / km (1.5 mm²) max. 8.21 ohm / km (2.5 mm²)
Operating voltage:	max. 300 V (peak value, not for connection to public mains)
Test voltage:	2.0 kV

Technical Data

Type	Sheath	OD mm	Weight [kg/km]	Cu index [kg/km]	Part number	UL
ASi BUS 2x1.5 TPE YE	TPE	4.0 x 10.0	66	30.0	90301	-
for fixed installation and flexible application without compulsory guide						
ASi BUS 2x1.5 TPE YE (UR) AWM	TPE	4.0 x 10.0	66	30.0	80479	AWM
for fixed installation and flexible application without compulsory guide, approvals: (UR) recognition AWM style 21439 (105°C, 300V) according to UL 758						
ASi BUS 2x1.5 FR TPE YE c(UR)us AWM	TPE	4.0 x 10.0	68	30.0	143738	AWM
for fixed installation and flexible application without compulsory guide, approvals: c(UR)us recognition AWM style 2103 (105°C, 300V) according to UL 758 in preparation						
ASi BUS 2x1.5 TPE BK	TPE	4.0 x 10.0	66	30.0	90302	-
for fixed installation and flexible application without compulsory guide						
ASi BUS 2x1.5 TPE BK (UR) AWM	TPE	4.0 x 10.0	66	30.0	80489	AWM
for fixed installation and flexible application without compulsory guide, approvals: (UR) recognition AWM style 21439 (105°C, 300V) according to UL 758						
ASi BUS 2x1.5 FR TPE BK c(UR)us AWM	TPE	4.0 x 10.0	68	30.0	143739	AWM
for fixed installation and flexible application without compulsory guide, approvals: c(UR)us recognition AWM style 2103 (105°C, 300V) according to UL 758 in preparation						
ASi BUS highflex 2x1.5 FR-PUR YE	PUR	4.0 x 10.0	60	30.0	21806	-
for continuous flexing applications, e.g. in draig chains, halogen-free						
ASi BUS highflex 2x1.5 FR-PUR YE c(UR)us AWM	PUR	4.0 x 10.0	60	30.0	107364	AWM
for continuous flexing applications, e.g. in draig chains, halogen-free; approvals: c(UR)us recognition AWM style 20549 (80°C, 300V) according to UL 758						
ASi BUS highflex 2x1.5 FR-PUR BK	PUR	4.0 x 10.0	60	30.0	75244	-
for continuous flexing applications, e.g. in draig chains, halogen-free						
ASi BUS highflex 2x1.5 FR-PUR BK c(UR)us AWM	PUR	4.0 x 10.0	60	30.0	107366	AWM
for continuous flexing applications, e.g. in draig chains, halogen-free; approvals: c(UR)us recognition AWM style 20549 (80°C, 300V) according to UL 758						
ASi BUS 2x1.5 FR-PVC YE c(UL)us CMG	PVC	4.0 x 10.0	68	30.0	110612	CMG
for fixed installation and flexible application without compulsory guide, approvals: c(UL)us listing CMG according to UL 444, (UL) listing CL2 according to UL13 in preparation						
ASi BUS 2x1.5 FR-PVC BK c(UL)us CMG	PVC	4.0 x 10.0	68	30.0	110614	CMG
for fixed installation and flexible application without compulsory guide, approvals: c(UL)us listing CMG according to UL 444, (UL) listing CL2 according to UL13 in preparation						
ASi BUS Long Distance 2x2.5 FR-PUR YE c(UR)us AWM	PUR	4.0 x 10.0	76	50.0	143740	AWM
for fixed installation and flexible application without compulsory guide, halogen-free; approvals: c(UR)us recognition AWM style 20549 (80°C, 300V) according to UL 758						
ASi BUS Long Distance 2x2.5 FR-PUR BK c(UR)us AWM	PUR	4.0 x 10.0	76	50.0	143742	AWM
for fixed installation and flexible application without compulsory guide, halogen-free; approvals: c(UR)us recognition AWM style 20549 (80°C, 300V) according to UL 758						

Resistances

	Oil resistance		Flame resistance		UV resistance	
TPE	+	IEC 60811-2-1	o	FH2-25 (IEC 707)	o	
TPE AWM 21439	+	IEC 60811-2-1 UL 2556	o	FH2-25 (IEC 707) Horizontal Flame Test (UL 2556)	o	
TPE AWM 2103	+	IEC 60811-2-1 UL 2556	o	IEC 60332-1-2 FT1 (UL 2556)	o	
PUR	++	IEC 60811-2-1	o	IEC 60332-1-2	o / +	YE / BK
PUR AWM	++	IEC 60811-2-1 UL 2556	o	IEC 60332-1-2 Horizontal Flame Test (UL 2556)	o / +	YE / BK
PVC CMG	+	IEC 60811-2-1 UL 2556	++	IEC 60332-3-24 FT4 (UL 1685 / CSA)	o / +	YE / BK

++ excellent / + good / o adequate / - poor

PROFIBUS DP / FMS / FIP

Application

PROFIBUS (**PRO**cess **FI**eld **BUS**) is a fieldbus standard that is specified in EN 61158 and EN 61784 (formerly EN 50170) and supports a wide variety of applications in automated manufacturing.

Gebauer & Griller's PROFIBUS cables provide trouble-free communication between devices from different manufacturers without the need for specific interface adapters.

These cables are suitable not only for PROFIBUS DP (**D**ecentralized **P**eripherals) and PROFIBUS FMS (**F**ieldbus **M**essage **S**pecification) but also for FIP (**F**actory **I**nstrumentation **P**rotocol) applications. Depending on bit rates, segment lengths of up to 1,200 m can be achieved. For easy connectorization and quick installation we suggest the use of our fast-connect versions.

By using various sheath materials, we are able to offer the perfect cable for any application. For the North American markets the cables can also be supplied with the appropriate UL approvals.

Gebauer & Griller is a member of PI (Profibus & Profinet International).

→ **Maximum line length of a bus segment**

PROFIBUS DP (Simatic Net)

9.6 kbit/s	=	max. 1,200 m
19.2 kbit/s	=	max. 1,200 m
93.75 kbit/s	=	max. 1,200 m
187.5 kbit/s	=	max. 1,000 m
500 kbit/s	=	max. 400 m
1.5 Mbit/s	=	max. 200 m
12.0 Mbit/s	=	max. 100 m

FIP

1.0 Mbit/s	=	max. 200 m
2.5 Mbit/s	=	max. 200 m

Construction

Conductor:	Data pairs: Bare copper wire, diameter: 0.64mm ≈ AWG22 or 7-stranded bare copper wires AWG24 Power supply cores: Stranded bare copper wires 1.0 mm²
Insulation:	Data pairs: Foam-skin polyolefin (red and green) Power supply cores: Polyolefin (colour coded in accordence with DIN VDE 0293)
Wrapping:	Plastic tape and / or extruded covering (fast connect design)
Screening:	Plastic bonded aluminium tape, braid of tinned copper wires
Sheath:	Special compound of polyvinylchloride (PVC), thermoplastic, halogen-free, flame-retardant polymer compound (FRNC), thermoplastic polyurethane compound (PUR) matt, low adhesion, halogen-free and flame-retardant or polyethylene (PE). violet (similar RAL 4001), black (similar RAL 9005) or blue (similar RAL 5015)

Mechanical Properties

Temperature range:	-40°C to +80°C fixed installation -40°C to +70°C fixed installation (PE) -25°C to +80°C fixed installation (FRNC) -40°C to +105°C fixed installation (PROFIBUS DP Extemp) -10°C to +70°C flexible application (only flexible designs)
Min. bending radius:	8 x cable diameter fixed installation 15 x cable diameter flexible application (only flexible designs)

Electrical Properties

Impedance:	150 ± 15 ohm
Loop resistance:	max. 110.0 ohm / km (solid conductor) max. 175.2 ohm / km (7-stranded conductor) max. 39.0 ohm / km (power supply)
Capacitance:	nom. 30 nF / km
Operating voltage:	max. 250 V (peak value, not for connection to public mains)

Supported Connector Types

- 9-pin D-Sub-connector
- 5-pin M12-connector
- Hybrid connectors

Simatic Net is a registered trademark of Siemens AG

Technical Data

Type	Sheath	OD mm	Weight [kg/km]	Cu index [kg/km]	Part number	UL
PROFIBUS DP 1x2x0.64-150 FR-PVC VT DESINA	PVC	8.0	60	30.0	50171	-
for fixed installation using standard cable design						
PROFIBUS DP 1x2x0.64-150 FR-PVC VT DESINA c(UL)us CMX	PVC	8.0	60	30.0	80749	CMX
for fixed installation using standard cable design; approvals: c(UL)us listing CMX according to UL 444						
PROFIBUS DP Burial 1x2x0.64-150 FR-PVC/PE VT/BK	PVC/PE	10.0	98	30.0	80750	-
for direct burial using standard cable design						
PROFIBUS DP Extemp 1x2x0.64-150 FR-PVC VT DESINA	PVC	8.0	60	30.0	110615	-
for fixed installation with extended temperature range up to 105°C using standard cable design						
PROFIBUS DP 1x2x0.64-150 FC FR-PVC VT DESINA	PVC	8.0	74	30.0	50175	-
for fixed installation using fast connect design						
PROFIBUS DP 1x2x0.64-150 FC FR-PVC VT DESINA c(UL)us CMG	PVC	8.0	76	30.0	106649	CMG
for fixed installation using fast connect design approvals: c(UL)us listing CMG according to UL 444, (UL) listing CL3 according to UL 13, c(UR)us recognition AWM style 20201 (60°C, 600V) according to UL 758						
PROFIBUS DP 1x2x0.64-150 FC FR-PVC BU c(UL)us CMG	PVC	8.0	76	30.0	110617	CMG
for fixed installation in intrinsically safe circuits using fast connect design approvals: c(UL)us listing CMG according to UL 444, UL listing CL3 according to UL 13, c(RU)us recognition AWM style 20201 (60°C, 600V) according to UL 758						
PROFIBUS DP 1x2x0.64-150 FC FRNC VT DESINA c(UL)us CM	FRNC	8.0	83	30.0	80752	CM
for fixed installation using fast connect design, halogen-free; approvals: c(UL)us listing CM according to UL 444						
PROFIBUS DP 1x2x0.64-150 FC FR-PUR VT DESINA c(UL)us CMX	PUR	8.0	89	30.0	80753	CMX
for fixed installation using fast connect design, halogen-free; approvals: c(UL)us listing CMX according to UL 444						
PROFIBUS DP 1x2x0.64-150 FC PE BK	PE	8.0	71	30.0	99865	-
for fixed installation in food and beverage industry using fast connect design						
PROFIBUS DP flex 1x2x0.64L-150 FR-PVC VT DESINA c(UL)us CMG	PVC	8.0	67	30.0	110619	CMG
for fixed installation and flexible application without compulsory guide using standard cable design approvals: c(UL)us listing CMG according to UL 444, (UL) listing CL3 according to UL 13, c(UR)us recognition AWM style 20201 (60°C, 600V) according to UL 758						
PROFIBUS DP flex 1x2x0.64L-150+3x1.0 FR-PVC VT DESINA c(UR)us AWM	PVC	9.8	108	60.0	110630	AWM
for fixed installation and flexible application without compulsory guide for connection to Siemens ET 200C with integrated power supply using standard cable design approvals: c(UR)us recognition AWM style 2464 (80°C, 300V) according to UL 758						

Resistances

	Oil resistance		Flame resistance		UV resistance	
PVC	o		o	IEC 60332-1-2	+	
PVC AWM	o		+	IEC 60332-1-2 Cable Flame Test (UL 2556)	o	
PVC CMX	o		+	IEC 60332-1-2 VW-1 (UL 1685)	+	
PVC CMG	++	UL 2556	++	IEC 60332-3-24 FT4 (UL 1685 / CSA)	++	UL 2556
PE	+		-		++	
FRNC CM	o		++	IEC 60332-3-24 UL Flame Exposure (UL 1685 / CSA)	-	
PUR CMX	++	IEC 60811-2-1	+	IEC 60332-1-2 VW-1 (UL 2556)	+	

++ excellent / + good / o adequate / - poor

PROFIBUS DP / FMS / FIP, highly flexible

Application

PROFIBUS (**PRO**cess **FI**eld **BUS**) is a fieldbus standard that is specified in EN 61158 and EN 61784 (formerly EN 50170) and supports a wide variety of applications in automated manufacturing.

Gebauer & Griller's highly flexible PROFIBUS cables have been specifically designed for applications in frequently moving machine parts, in cable carriers or on robots and cable carts and provide trouble-free communication between devices from different manufacturers without the need of specific interface adapters.

These cables are suitable not only for PROFIBUS DP (**D**ecentralized **P**eripherals) and PROFIBUS FMS (**F**ieldbus **M**essage **S**pecification) but also for FIP (**F**actory **I**nstrumentation **P**rotocol) applications and can optionally be supplied with an integrated power supply. Furthermore, these products are flame-resistant and can also be supplied with the appropriate approvals for the North American markets. The specific cable types for optical data transmission are to be found in this catalogue under the heading POF/PCF/GOF in the Bus Cables Section, from page 46 onwards.

→ Maximum line length of a bus segment

PROFIBUS DP (Simatic Net)

9.6 kbit/s	=	max. 1,200 m
19.2 kbit/s	=	max. 1,200 m
93.75 kbit/s	=	max. 1,200 m
187.5 kbit/s	=	max. 1,000 m
500 kbit/s	=	max. 400 m
1.5 Mbit/s	=	max. 200 m
12.0 Mbit/s	=	max. 100 m

FIP

1.0 Mbit/s	=	max. 200 m
2.5 Mbit/s	=	max. 200 m

Construction

Conductor:	Extra fine stranded bare copper wires (Data pairs: Approx. ø 0.65 mm or ø 0.8 mm, power supply cores 1.0 mm² or 1.5 mm²)
Insulation:	Data pairs: Foam-skin polyolefin (red and green), Power supply cores: Polyolefin or special compound of polyvinylchloride (PVC) (core identification in accordance with DIN VDE 0293 - coloured or continuously numbered)
Wrapping:	Slide taping (optional) and / or extruded covering (fast connect design)
Screening:	Plastic bonded aluminium tape, braid of tinned copper wires
Sheath:	Thermoplastic polyurethane compound (PUR), matt, low adhesion, halogen-free and flame-retardant or special compound of polyvinylchloride (PVC), violet (similar RAL 4001) or turquoise blue (similar RAL5018)

Mechanical Properties

Temperature range:	-30°C to +70°C flexible application (PUR) -10°C to +70°C flexible application (PVC)
Min. bending radius:	8 x cable diameter flexible application 15 x cable diameter flexible application (fast connect design, design for torsional stress and with integrated power supply)

Electrical Properties

Impedance:	150 ± 15 ohm
Loop resistance:	max. 133.0 ohm / km max. 39.0 ohm / km (power supply 1.0 mm²) max. 26.6 ohm / km (power supply 1.5 mm²)
Capacitance:	nom. 30 nF / km
Operating voltage:	max. 250 V (peak value, not for connection to public mains)

Supported Connector Types

- 9-pin D-Sub-connector
- 5-pin M12-connector
- Hybrid connectors

ECOFAST is a registered trademark of Siemens AG

Technical Data

Type	Sheath	OD mm	Weight [kg/km]	Cu index [kg/km]	Part number	UL
PROFIBUS DP highflex 1x2x0.64L-150 FR-PUR VT DESINA	PUR	8.0	65	30.0	105979	-
for continuous flexing, e.g. in drag chains using standard cable design, halogen-free						
PROFIBUS DP highflex 1x2x0.64L-150 FR-PUR VT DESINA c(UL)us CMX	PUR	8.0	65	30.0	106594	CMX
for continuous flexing, e.g. in drag chains using standard cable design, halogen-free; approvals: c(UL)us listing CMX according to UL 444						
PROFIBUS DP highflex 1x2x0.64L-150 FC FR-PUR VT DESINA c(UL)us CMX	PUR	8.0	80	30.0	107368	CMX
for continuous flexing, e.g. in drag chains in fast connect design, approvals: c(UL)us listing CMX according to UL 444						
PROFIBUS DP highflex 1x2x0.64L-150 FC FR-PUR TQ c(UL)us CMX	PUR	8.0	80	30.0	119934	CMX
for continuous flexing, e.g. in drag chains in fast connect design, approvals: c(UL)us listing CMX according to UL 444						
PROFIBUS DP Torsion 1x2x0.8L-150 FR-PUR VT DESINA c(UL)us CMX	PUR	8.0	71	31.0	107373	CMX
for torsional stress, e.g. robotics using standard cable design, approvals: c(UL)us listing CMX according to UL 444						
PROFIBUS DP Festoon 1x2x0.64L FR-PVC VT DESINA c(UL)us CMG	PVC	8.0	65	30.0	110644	CMG
for festoon mounting, e.g. cable trolleys using standard cable design; approvals: c(UL)us listing CMG according to UL 444, (UL) listing CL3 according to UL 13, c(UR)us recognition AWM style 20201 (60°C, 600V) according to UL 758						
PROFIBUS DP highflex 1x2x0.64L-150+3x1.0 FR-PUR VT DESINA c(UL)us CMX	PUR	10.0	118	60.0	80809	CMX
for continuous flexing, e.g. in drag chains for connection to Siemens ET 200X with integrated power supply using standard cable design approvals: c(UL)us listing CMX according to UL 444						
PROFIBUS DP highflex 1x2x0.64L-150+2x1.5 FR-PUR VT DESINA c(UL)us CMX	PUR	11.0	140	60.0	110645	CMX
for continuous flexing, e.g. in drag chains for connection to ECOFAST systems with integrated power supply using standard cable design approvals: c(UL)us listing CMX according to UL 444						
PROFIBUS DP highflex 1x2x0.64L-150+2x1.5 FR-PVC VT DESINA c(UL)us CMG	PVC	11.0	150	60.0	110646	CMG
for continuous flexing, e.g. in drag chains for connection to ECOFAST systems with integrated power supply using standard cable design approvals: c(UL)us listing CMX according to UL 444 in preparation						
PROFIBUS DP highflex 1x2x0.64L-150+4x1.5 FR-PUR VT DESINA	PUR	11.3	165	90.0	80923	-
for continuous flexing, e.g. in drag chains for connection to ECOFAST systems with integrated power supply using standard cable design, halogen-free						
PROFIBUS DP highflex 1x2x0.64L-150+4x1.5 FR-PVC VT DESINA c(UL)us CMG	PVC	11.3	175	90.0	110653	CMG
for continuous flexing, e.g. in drag chains for connection to ECOFAST systems with integrated power supply using standard cable design approvals: c(UL)us listing CMG according to UL 444 in preparation						

Resistances

	Oil resistance		Flame resistance		UV resistance	
PUR	++	IEC 60811-2-1	o	IEC 60332-1-2	+	
PUR CMX	++	IEC 60811-2-1	+	IEC 60332-1-2 VW-1 (UL 2556)	+	
PVC CMG	++	UL 2556	++	IEC 60332-3-24 FT4 (UL 1685 / CSA)	++	UL 2556

++ excellent / + good / o adequate / - poor

PROFIBUS PA

Application

PROFIBUS (**PRO**cess **FI**eld **BUS**) PA (**P**rocess **A**utomation) cables, like PROFIBUS FMS and PROFIBUS DP, are also specified in EN 61158 and EN 61784 (formerly EN 50170) and have been designed specifically for application in process automation. They serve as connection between sensors and actuators (data and power supply of the devices), especially in potentially explosive, hazardous areas.

For longer transmissions routes, designs with increased conductor cross-sections are available. Apart from the standard versions all PROFIBUS PA cables are supplied with the appropriate UL approvals for the North American markets.

Construction

Conductor:	Fine stranded bare copper wires 1.0 mm², solid bare copper wire (fast connect design) or stranded, bare copper wires AWG18, AWG16 or AWG14
Insulation:	Polyolefin or foam-skin polyolefin (red and green)
Wrapping:	Plastic tape and / or extruded covering (fast connect design)
Screening:	Plastic bonded aluminium tape (optional) and stranded tinned drain wire (optional), braid of tinned copper wires
Sheath:	Special compound of polyvinylchloride (PVC), blue (similar RAL 5015) for installation in intrinsically safe circuits or black (similar RAL 9005)

Mechanical Properties

Temperature range:	-40°C to +80°C fixed installation -10°C to +70°C flexible application
Min. bending radius:	5 x cable diameter fixed installation 10 x cable diameter flexible application

Electrical Properties

Impedance:	100 ± 20 ohm at 31.25 kHz
Loop resistance:	max. 39.0 ohm / km (1.0 mm²) max. 36.4 ohm / km (AWG18, solid conductor) max. 43.8 ohm / km (AWG18, 7-stranded conductor) max. 27.4 ohm / km (AWG16) max. 17.2 ohm / km (AWG14)
Capacitance:	nom. 52 nF / km
Operating voltage:	max. 250 V (peak value, not for connection to public mains)

Supported Connector Types

- 4-pin M12-connector

Technical Data

Type	Sheath	OD mm	Weight [kg/km]	Cu index [kg/km]	Part number	UL
PROFIBUS PA 1x2x1.0-100 FR-PVC BU	PVC	8.0	84	45.0	68234	-
for fixed installation and flexible application without compulsory guide in intrinsically safe circuits using standard cable design						
PROFIBUS PA 1x2x1.0-100 FR-PVC BK	PVC	8.0	84	45.0	80998	-
for fixed installation and flexible application without compulsory guide using standard cable design						
PROFIBUS PA 1x2xAWG18-100 FC FR-PVC BU c(UL)us CMG	PVC	8.0	97	45.0	81132	CMG
for fixed installation in intrinsically safe circuits using fast connect design; approvals: c(UL)us listing CMG according to UL 444, (UL) listing CL3 according to UL 13, c(UR)us recognition AWM style 20201 (60°C, 600V) according to UL 758						
PROFIBUS PA 1x2xAWG18-100 FC FR-PVC BK c(UL)us CMG	PVC	8.0	97	45.0	81253	CMG
for fixed installation using fast connect design; approvals: c(UL)us listing CMG according to UL 444, (UL) listing CL3 according to UL 13, c(UR)us recognition AWM style 20201 (60°C, 600V) according to UL 758						
PROFIBUS PA 1x2xAWG18-100 FR-PVC BU c(UL)us CMG	PVC	8.0	84	45.0	143743	CMG
for fixed installation and flexible application without compulsory guide in intrinsically safe circuits using standard cable design; approvals: c(UL)us listing CMG according to UL 444, (UL) listing PLTC according to UL 13, c(UR)us recognition AWM style 20201 (60°C, 600V) according to UL 758						
PROFIBUS PA 1x2xAWG18-100 FR-PVC BK c(UL)us CMG	PVC	8.0	84	45.0	143744	CMG
for fixed installation and flexible application without compulsory guide using standard cable design; approvals: c(UL)us listing CMG according to UL 444, (UL) listing PLTC according to UL 13, c(UR)us recognition AWM style 20201 (60°C, 600V) according to UL 758						
PROFIBUS PA 1x2xAWG16-100 FR-PVC BU c(UL)us CMG	PVC	9.0	108	66.0	80949	CMG
for fixed installation and flexible application without compulsory guide in intrinsically safe circuits using standard cable design; approvals: c(UL)us listing CMG according to UL 444, (UL) listing PLTC according to UL 13, c(UR)us recognition AWM style 20201 (60°C, 600V) according to UL 758						
PROFIBUS PA 1x2xAWG16-100 FR-PVC BK c(UL)us CMG	PVC	9.0	108	66.0	81076	CMG
for fixed installation and flexible application without compulsory guide using standard cable design; approvals: c(UL)us listing CMG according to UL 444, (UL) listing PLTC according to UL 13, c(UR)us recognition AWM style 20201 (60°C, 600V) according to UL 758						
PROFIBUS PA 1x2xAWG14-100 FR-PVC BU c(UL)us CMG	PVC	10.5	143	77.0	110809	CMG
for fixed installation and flexible application without compulsory guide in intrinsically safe circuits using standard cable design; approvals: c(UL)us listing CMG according to UL 444, (UL) listing PLTC according to UL 13, c(UR)us recognition AWM style 20201 (60°C, 600V) according to UL 758						
PROFIBUS PA 1x2xAWG14-100 FR-PVC BK c(UL)us CMG	PVC	10.5	143	77.0	110865	CMG
for fixed installation and flexible application without compulsory guide using standard cable design; approvals: c(UL)us listing CMG according to UL 444, (UL) listing PLTC according to UL 13, c(UR)us recognition AWM style 20201 (60°C, 600V) according to UL 758						

Resistances

	Oil resistance		Flame resistance		UV resistance	
PVC	o		o	IEC 60332-1-2	+	
PVC CMG	++	UL 2556	++	IEC 60332-3-24 FT4 (UL 1685 / CSA)	++	UL 2556

++ excellent / + good / o adequate / - poor

FOUNDATION™ Fieldbus

Application

The FOUNDATION™ Fieldbus cables manufactured by us follow the guidelines of the Fieldbus FOUNDATION™ for Type A cables as well as IEC 61158.

The cables have been designed for application in process automation – also in potentially explosive, hazardous areas – permitting a maximum transmission length of 1,900 metres. Cable versions for longer transmission routes are also available. All versions are supplied with the appropriate UL approvals for the North American markets.

Construction

Conductor:	Stranded bare copper wires AWG18, AWG16 or AWG14
Insulation:	Polyolefin or foam-skin polyolefin (orange and blue)
Wrapping:	Plastic tape
Screening:	Plastic bonded aluminium tape, stranded tinned drain wire and braid of tinned copper wires (except Eco design)
Sheath:	Special compound of polyvinylchloride (PVC), blue (similar RAL 5015) for installation in intrinsically safe circuits or orange (similar RAL 2003)

Mechanical Properties

Temperature range:	-40°C to +80°C fixed installation -10°C to +70°C flexible application
Min. bending radius:	5 x cable diameter fixed installation 10 x cable diameter flexible application

Electrical Properties

Impedance:	100 ± 20 ohm at 31.25 kHz
Loop resistance:	max. 43.8 ohm / km (AWG18) max. 27.4 ohm / km (AWG16) max. 17.2 ohm / km (AWG14)
Capacitance:	max. 60 nF / km
Operating voltage:	max. 300 V (peak value, not for connection to public mains)

Supported Connector Types

- 4-pin 7/8”-connector
- 4-pin M12-connector

Technical Data

Type	Sheath	OD mm	Weight [kg/km]	Cu index [kg/km]	Part number	UL
FOUNDATION™ Fieldbus Eco 1x2xAWG18-100 FR-PVC BU c(UL)us CMG	PVC	7.4	65	23.0	143745	CMG
for fixed installation and flexible application without compulsory guide in intrinsically safe circuits using standard cable design approvals: c(UL)us listing CMG according to UL 444, (UL) listing PLTC according to UL 13						
FOUNDATION™ Fieldbus Eco 1x2xAWG18-100 FR-PVC OG c(UL)us CMG	PVC	7.4	65	23.0	143747	CMG
for fixed installation and flexible application without compulsory guide using standard cable design approvals: c(UL)us listing CMG according to UL 444, (UL) listing PLTC according to UL 13						
FOUNDATION™ Fieldbus 1x2xAWG18-100 FR-PVC BU c(UL)us CMG	PVC	8.0	84	45.0	81255	CMG
for fixed installation and flexible application without compulsory guide in intrinsically safe circuits using standard cable design; approvals: c(UL)us listing CMG according to UL 444, (UL) listing PLTC according to UL 13, c(UR)us recognition AWM style 20201 (60°C, 600V) according to UL 758						
FOUNDATION™ Fieldbus 1x2xAWG18-100 FR-PVC OG c(UL)us CMG	PVC	8.0	84	45.0	81288	CMG
for fixed installation and flexible application without compulsory guide using standard cable design; approvals: c(UL)us listing CMG according to UL 444, (UL) listing PLTC according to UL 13, c(UR)us recognition AWM style 20201 (60°C, 600V) according to UL 758						
FOUNDATION™ Fieldbus 1x2xAWG16-100 FR-PVC BU c(UL)us CMG	PVC	9.0	108	66.0	81261	CMG
for fixed installation and flexible application without compulsory guide in intrinsically safe circuits using standard cable design; approvals: c(UL)us listing CMG according to UL 444, (UL) listing PLTC according to UL 13, c(UR)us recognition AWM style 20201 (60°C, 600V) according to UL 758						
FOUNDATION™ Fieldbus 1x2xAWG16-100 FR-PVC OG c(UL)us CMG	PVC	9.0	108	66.0	81302	CMG
for fixed installation and flexible application without compulsory guide using standard cable design; approvals: c(UL)us listing CMG according to UL 444, (UL) listing PLTC according to UL 13, c(UR)us recognition AWM style 20201 (60°C, 600V) according to UL 758						
FOUNDATION™ Fieldbus 1x2xAWG14-100 FR-PVC BU c(UL)us CMG	PVC	10.5	143	77.0	81262	CMG
for fixed installation and flexible application without compulsory guide in intrinsically safe circuits using standard cable design; approvals: c(UL)us listing CMG according to UL 444, (UL) listing PLTC according to UL 13, c(UR)us recognition AWM style 20201 (60°C, 600V) according to UL 758						
FOUNDATION™ Fieldbus 1x2xAWG14-100 FR-PVC OG c(UL)us CMG	PVC	10.5	143	77.0	81316	CMG
for fixed installation and flexible application without compulsory guide using standard cable design; approvals: c(UL)us listing CMG according to UL 444, (UL) listing PLTC according to UL 13, c(UR)us recognition AWM style 20201 (60°C, 600V) according to UL 758						

Resistances

	Oil resistance		Flame resistance		UV resistance	
PVC CMG	++	UL 2556	++	IEC 60332-3-24 FT4 (UL 1685 / CSA)	++	UL 2556

++ excellent / + good / o adequate / - poor

PROFINET 2-pair versions

Application

The non-proprietary PROFINET standard allows for transmission rates of up to 100 Mbit/s. The exceptional feature of these cables lies in the use of an unchanging, continuous AWG22 cross-section, no matter if the indoor installation is fixed (Type A) or partly flexible (Type B). The exception to the rule is the cable for applications in control cabinets (Cabinet Cables). The standard versions as well as the cables with rodent protection are supplied in the easy-to-install fast-connect design. All cables, with the exception of the high-temperature version, are supplied with the appropriate UL approvals for the North American markets.

→ **4-pair PROFINET cables are to be found on pages 20/21 and 24/25, in the section "Industrial Ethernet".**
For connecting buildings as well as for applications in areas with high electromagnetic interference, we recommend our fibre optic cables. They are to be found in this catalogue under the heading POF/PCF/GOF in the Bus Cables Section, from page 46 onwards.

Supported Connector Types

- PROFINET compliant RJ45-connector
- M12-connector
- Hybrid connectors

Construction

Conductor:	Solid bare copper wire (Type A), 7-stranded tinned copper wires AWG22 (Type B) or 7-stranded tinned copper wires AWG24 (Cabinet Cable) (data pairs), power supply cores 0.34 mm² or 1.5 mm²
Insulation:	Data pairs: Polyolefin, foam-skin polyolefin or fluorinated ethylene propylene (FEP) (white, yellow, blue and orange) Power supply cores: Polyolefin or special compound of polyvinylchloride (PVC) (core identification in accordance with DIN VDE 0293 – coloured or continuously numbered)
Wrapping:	Plastic tape (fast connect design with additional extruded covering)
Screening:	Plastic bonded aluminium tape and braid of tinned copper wires
Sheath:	Special compound of polyvinylchloride (PVC), thermoplastic, halogen-free, flame-retardant polymer compound (FRNC) or fluorinated ethylene propylene (FEP), green (similar RAL 6018)
Rodent protection:	2 layers of galvanized steel tape (optional)
Outer sheath:	Special compound of polyvinylchloride (PVC), black (similar RAL 9005) (optional)

Mechanical Properties

Temperature range:	-40°C to +80°C fixed installation -25°C to +80°C fixed installation (FRNC) -50°C to +180°C (short time use 205°C) fixed installation (FEP) -10°C to +70°C flexible application (only flexible designs) -30°C to +70°C flexible application (PUR)
Min. bending radius:	10 x cable diameter fixed installation 15 x cable diameter flexible application (only flexible designs)

Electrical Properties

Impedance:	nom. 100 ohm according to IEC 61156-5 (AWG22) or IEC 61156-6 (AWG24)
Loop resistance:	max. 115.0 ohm / km (AWG22) max. 181.8 ohm / km (AWG24) max. 115.0 ohm / km (power supply 0.34 mm²) max. 26.6 ohm / km (power supply 1.5 mm²)
Capacitance:	nom. 48 nF / km
Operating voltage:	max. 125 V (peak value, not for connection to public mains)
RF properties:	Cat.5e according to IEC 61156-5 (AWG22) Cat.5e according to IEC 61156-6 (AWG24)

Technical Data

Type	Sheath	OD mm	Weight [kg/km]	Cu index [kg/km]	Part number	UL
PROFINET Type A Cat.5e 2x2xAWG22-100 FC FR-PVC GN c(UL)us CMG	PVC	6.5	68	32.0	81494	CMG
for fixed installation using fast connect design; approvals: c(UL)us listing CMG according to UL 444, (UL) listing PLTC according to UL 13, c(UR)us recognition AWM style 20201 (60°C, 600V) according to UL 758						
PROFINET Type A Cat.5e 2x2xAWG22-100 FC FRNC GN c(UL)us CMG	FRNC	6.5	71	32.0	76381	CMG
for fixed installation using fast connect design, halogen-free; approvals: c(UL)us listing CMG according to UL 444, (UL) listing PLTC according to UL 13 in preparation						
PROFINET Type A Cat.5e 2x2xAWG22-100 FC RP FR-PVC GN/BK c(UL)us CMG	PVC	9.3	141	32.0	110813	CMG
for fixed installation using fast connect design with rodent protection; approvals: c(UL)us listing CMG according to UL 444, (UL) listing PLTC according to UL 13, c(UR)us recognition AWM style 20201 (60°C, 600V) according to UL 758						
PROFINET Type A Cat.5e Hightemp 2x2xAWG22-100 FEP GN	FEP	5.4	62	32.0	110823	-
for fixed installation high temperature ranges up to 180°C (short time use 205°C) using standard cable design						
PROFINET Type B Cat.5e 2x2xAWG22-100 FC FR-PVC GN c(UL)us CMG	PVC	6.5	69	32.0	75269	CMG
for flexible application without compulsory guide using fast connect design; approvals: c(UL)us listing CMG according to UL 444, (UL) listing PLTC according to UL 13, c(UR)us recognition AWM style 20201 (60°C, 600V) according to UL 758						
PROFINET Type B Outdoor Cat.5e 2x2xAWG22-100 FC FR-PVC BK c(UL)us CMG	PVC	6.5	69	32.0	143749	CMG
for flexible application without compulsory guide using fast connect design with increased UV-resistance; approvals: c(UL)us listing CMG according to UL 444, (UL) listing PLTC according to UL 13, c(UR)us recognition AWM style 20201 (60°C, 600V) according to UL 758						
PROFINET Type B Cat.5e 2x2xAWG22-100 FC FRNC GN c(UL)us CMG	FRNC	6.5	72	32.0	76415	CMG
for flexible application without compulsory guide using fast connect design, halogen-free; approvals: c(UL)us listing CMG according to UL 444, (UL) listing PLTC according to UL 13 in preparation						
PROFINET Type B Cat.5e 2x2xAWG22-100+4x0.34 FRNC GN c(UL)us CMG	FRNC	8.5	108	54.0	110910	CMG
for flexible application without compulsory guide with integrated power supply using standard cable design, halogen-free; approvals: c(UL)us listing CMG according to UL 444, (UL) listing PLTC according to UL 13 in preparation						
PROFINET Type B Cat. 5e 2x2xAWG22-100+4x1.5 FRNC GN c(UR)us AWM	FRNC	10.3	153	94.0	110915	AWM
for flexible application without compulsory guide with integrated power supply using standard cable design, halogen-free; approvals: c(UR)us recognition AWM style 21282 (80°C, 150V) according to UL 758 in preparation						
PROFINET Cabinet Cable Cat.5e 2x2xAWG24-100 FR-PVC GN c(UR)us AWM	PVC	5.2	37	22.0	130176	AWM
for flexible application without compulsory guide using standard cable design, approvals: c(UR)us recognition AWM style 20601 (80°C, 300V) according to UL 758						
PROFINET Cabinet Cable Cat.5e 2x2xAWG24-100 FRNC GN c(UR)us AWM	FRNC	5.2	39	22.0	130180	AWM
for flexible application without compulsory guide using standard cable design, approvals: c(UR)us recognition AWM style 21282 (80°C, 150V) according to UL 758 in preparation						
PROFINET Cabinet Cable Cat.5e 2x2xAWG24-100 FR-PUR GN c(UR)us AWM	PUR	5.2	37	22.0	130179	AWM
for flexible application without compulsory guide using standard cable design, approvals: c(UR)us recognition AWM style 21198 (80°C, 300V) according to UL 758						

Resistances

	Oil resistance		Flame resistance		UV resistance	
PVC CMG	++	UL 2556	++	IEC 60332-3-24 FT4 (UL 1685 / CSA)	++	UL 2556
PVC AWM	o		o	IEC 60332-1-2 Horizontal Flame Test (UL 2556)	o	
FRNC CMG	++	UL 2556	++	IEC 60332-3-24 FT4 (UL 1685 / CSA)	++	UL 2556
FRNC AWM	o		o	Horizontal Flame Test (UL 2556)	-	
PUR AWM	++	IEC 60811-2-1	o	Horizontal Flame Test (UL 2556)	+	
FEP	++		++		++	

++ excellent / + good / o adequate / - poor

PROFINET 2-pair versions, highly flexible

Application

The highly flexible (Type C) version also features the unchanging cross-section of the standard PROFINET cable, in order to achieve transmission rates in drag chains of up to 100 Mbit/s.

Special screening and a rugged polyurethane sheath guarantee the performance of the cables even in extreme industrial environments. The PVC version is used in applications requesting high flame-resistance. Both versions are also available as design suitable for insulation displacement connection (IDC). To round off the range there are also versions for torsional stress applications as well as for festoon mounting.

Apart from the torsional stress version the highly flexible PROFINET cables are supplied in the easy-to-install fast-connect design. All cables are supplied with the appropriate UL approvals for the North American markets.

Construction

Conductor:	Extra fine stranded bare or 7-stranded tinned copper wires AWG22
Insulation:	Polyolefin or foam-skin polyolefin (white, yellow, blue and orange)
Wrapping:	Plastic tape (optional) and extruded covering (except cable for torsional stress)
Screening:	Conductive slide taping and braid of tinned copper wires
Sheath:	Special compound of polyvinylchloride (PVC) or thermoplastic polyurethane compound (PUR), matt, low adhesion, halogen-free, flame-retardant, green (similar RAL 6018)

Mechanical Properties

Temperature range:	-10°C to +70°C flexible application (PVC) -30°C to +70°C flexible application (PUR)
Min. bending radius:	8 x cable diameter flexible application 15 x cable diameter flexible application (cable for torsional stress and festoon mounting)

Electrical Properties

Impedance:	nom. 100 ohm according to IEC 61156-6
Loop resistance:	max. 110.8 ohm / km
Capacitance:	48 nF / km
Operating voltage:	max. 125 V (peak value, not for connection to public mains)
RF properties:	Cat.5e according to IEC 61156-6

Supported Connector Types

- PROFINET compliant RJ45-connector
- M12-connector
- Hybrid connectors

Technical Data

Type	Sheath	OD mm	Weight [kg/km]	Cu index [kg/km]	Part number	UL
PROFINET Type C Cat.5e 2x2xAWG22-100 FC FR-PUR GN c(UL)us CMX	PUR	6.5	68	32.0	81536	CMX
for continuous flexing, e.g. in drag chains in fast connect design, halogen-free; approvals: c(UL)us listing CMX according to UL 444						
PROFINET Type C Cat.5e 2x2xAWG22-100 FC IDC FR-PUR GN c(UL)us CMX	PUR	6.5	68	32.0	110866	CMX
for continuous flexing, e.g. in drag chains in fast connect design, suitable for insulation displacement connection technology, halogen-free approvals: c(UL)us listing CMX according to UL 444						
PROFINET Type C Cat.5e 2x2xAWG22-100 FC FR-PVC GN c(UL)us CMG	PVC	6.5	70	32.0	81535	CMG
for continuous flexing, e.g. in drag chains in fast connect design; approvals: c(UL)us listing CMG according to UL 444, (UL) listing PLTC according to UL 13, c(RU)us recognition AWM style 20201 (60°C, 600V) according to UL 758						
PROFINET Type C Cat.5e 2x2xAWG22-100 FC IDC FR-PVC GN c(UL)us CMG	PVC	6.5	70	32.0	110867	CMG
for continuous flexing, e.g. in drag chains in fast connect design, suitable for insulation displacement connection technology; approvals: c(UL)us listing CMG according to UL 444, (UL) listing PLTC according to UL 13, c(RU)us recognition AWM style 20201 (60°C, 600V) according to UL 758						
PROFINET Type C Cat.5e Torsion 2x2xAWG22-100 FR-PUR GN c(UL)us AWM	PUR	6.5	54	32.0	110868	AWM
for torsional stress, e.g. robotics using standard cable design, halogen-free approvals: c(UL)us recognition AWM style 21198 (80°C, 300V) according to UL 758						
PROFINET Type C Cat.5e Festoon 2x2xAWG22-100 FC IDC FR-PVC GN c(UL)us CMG	PVC	6.5	74	32.0	110869	CMG
for festoon mounting, e.g. cable trolleys in fast connect design, suitable for insulation displacement connection technology; approvals: c(UL)us listing CMG according to UL 444, (UL) listing PLTC according to UL 13, c(RU)us recognition AWM style 20201 (60°C, 600V) according to UL 758						

Resistances

	Oil resistance		Flame resistance		UV resistance	
PUR CMX	++	IEC 60811-2-1	+	IEC 60332-1-2 VW-1 (UL 2556)	+	
PUR AWM	++	IEC 60811-2-1	o	Horizontal Flame Test (UL 2556)	+	
PVC CMG	++	UL 2556	++	IEC 60332-3-24 FT4 (UL 1685 / CSA)	++	UL 2556

++ excellent / + good / o adequate / - poor

Industrial Ethernet Cat.5e

Application

Gebauer & Griller Industrial Ethernet cables are applied in industrial automation, in indoor areas, in fixed installations as well as partly flexible applications without compulsory guide.

The cables are available in 2-pair and 4-pair versions and allow transmission rates of up to 1,024 Mbit/s. The sheath materials used plus a special screening guarantee excellent performance of the cables especially in extreme industrial environments. Approvals for the North American markets are a must-have for every exporting company.

The DRIVE CLiQ cables include a version for pure data transmission as well as one with integrated power supply. Cables for the real-time based EtherCAT® System complete the range of cables.

→ **DIVE CLiQ is a serial real-time interface based on Ethernet technology, acting between the key drive systems including motors and encoders and is used to reduce component diversity. Electronic type labels in the devices allow the automatic identification of all drive components via the DRIVE CLiQ cable, therefore manual data input is no longer necessary in start-ups or exchanges. Other than conventional resolver cables, DRIVE CLiQ cables can be plugged and unplugged under power which further reduces downtimes.**

Construction

Conductor:	Data pairs: bare copper wire AWG24, 7-stranded bare copper wires AWG26 or AWG24 or extra fine stranded bare copper wires AWG26 Power supply cores: Stranded-bare copper wires AWG22
Insulation:	Data pairs: (Foam-skin) polyolefin or fluorinated ethylene propylene (FEP) (colour coded according to IEC 60708, DRIVE CLiQ-cables: green, yellow, pink and blue) Power supply cores: Polyolefin (red and black)
Wrapping:	Plastic tape
Screening:	Plastic bonded aluminium tape and braid of tinned copper wires
Sheath:	Special compound of polyvinylchloride (PVC), thermoplastic polyurethane compound (PUR), matt, low adhesion, halogen-free, flame-retardant, thermoplastic, halogen-free, flame-retardant polymer compound (FRNC) or fluorinated ethylene propylene (FEP), green (similar RAL 6018)

Mechanical Properties

Temperature range:	-40°C to +80°C fixed installation -25°C to +80°C fixed installation (FRNC) -50°C to +180°C (short time use 205°C) fixed installation (FEP) -10°C to +70°C flexible application -30°C to +70°C flexible application (PUR)
Min. bending radius:	8 x cable diameter fixed installation 15 x cable diameter flexible application

Electrical Properties

Impedance:	nom. 100 ohm according to IEC 61156-5 (solid conductor) or IEC 61156-6 (stranded conductor)
Loop resistance:	max. 187.6 ohm / km (AWG24, solid conductor) max. 175.2 ohm / km (AWG24, 7-stranded conductor) max. 280.0 ohm / km (AWG26) max. 110.8 ohm / km (AWG22, power supply)
Capacitance:	nom. 48 nF / km
Operating voltage:	max. 125 V (peak value, not for connection to public mains)
RF properties:	Cat.5e according to IEC 61156-5 (solid conductor) or IEC 61156-6 (stranded conductor)

Supported Connector Types

- RJ45-connector (for harsh environments)
- RJ45-connector with integrated power supply pins
- M8-connector

Technical Data

Type	Sheath	OD mm	Weight [kg/km]	Cu index [kg/km]	Part number	UL
Industrial Ethernet Cat.5e 4x2xAWG24-100 FR-PVC GN c(UL)us CMG	PVC	6.5	60	35.0	131877	CMG
for fixed installation using standard cable design; approvals: c(UL)us listing CMG according to UL 444, (UL) listing CL3 according to UL 13						
Industrial Ethernet Cat.5e 4x2xAWG24-100 FR-PUR GN c(UL)us CMX	PUR	6.5	57	35.0	131881	CMX
for fixed installation using standard cable design, halogen-free; approvals: c(UL)us listing CMX according to UL 444						
Industrial Ethernet Cat.5e 4x2xAWG24-100 FRNC GN	FRNC	6.5	60	35.0	131885	-
for fixed installation using standard cable design, halogen-free						
Industrial Ethernet Cat.5e Hightemp 4x2xAWG24-100 FEP GN	FEP	6.5	75	38.0	131888	-
for fixed installation high temperature ranges up to 180°C (short time use 205°C) using standard cable design						
Industrial Ethernet Cat.5e flex 4x2xAWG26-100 FR-PVC GN c(UL)us CMG	PVC	6.2	54	30.0	113251	CMG
PROFINET compliant as Cabinet Cable, for flexible application without compulsory guide using standard cable design; approvals: c(UL)us listing CMG according to UL 444, (UL) listing CL2 according to UL 13						
Industrial Ethernet Cat.5e flex 4x2xAWG26-100 FR-PUR GN c(UL)us CMX	PUR	6.2	51	30.0	131882	CMX
PROFINET compliant as Cabinet Cable, for flexible application without compulsory guide using standard cable design, halogen-free approvals: c(UL)us listing CMX according to UL 444						
Industrial Ethernet Cat.5e flex 4x2xAWG26-100 FRNC GN	FRNC	6.2	55	30.0	131886	-
PROFINET compliant as Cabinet Cable, for flexible application without compulsory guide using standard cable design, halogen-free						
Industrial Ethernet DC Cat.5e flex 2x2xAWG24-100 FR-PVC GN c(UL)us CMG	PVC	6.8	60	30.0	107026	CMG
for fixed installation and flexible application without compulsory guide for connection to DRIVE CLiQ interface using standard cable design approvals: c(UL)us listing CMG according to UL 444						
Industrial Ethernet DC Cat.5e flex 2x2xAWG24-100+1x2xAWG22 FR-PVC GN c(UR)us AWM	PVC	7.0	69	38.0	107025	AWM
for fixed installation and flexible application without compulsory guide for connection to DRIVE CLiQ interface with integrated power supply using standard cable design; approvals: c(UR)us recognition AWM style 20601 (80°C, 300V) according to UL 758						
Industrial Ethernet EC Cat.5e flex 2x2xAWG26-100 FR-PVC GN c(UR)us AWM	PVC	4.9	32	20.0	136763	AWM
for flexible application without compulsory guide for connection to EtherCAT® systems using standard cable design approvals: c(UR)us recognition AWM style 20601 (80°C, 300V) according to UL 758						
Industrial Ethernet EC Cat.5e flex 2x2xAWG26-100 FR-PUR GN c(UR)us AWM	PUR	4.9	29	20.0	143750	AWM
for flexible application without compulsory guide for connection to EtherCAT® systems using standard cable design approvals: c(UR)us recognition AWM style 20963 (80°C, 30V) according to UL 758						

Resistances

	Oil resistance		Flame resistance		UV resistance	
PVC CMG	++	UL 2556	++	IEC 60332-3-24 FT4 (UL 1685 / CSA)	++	UL 2556
PVC AWM	o		o	Horizontal Flame Test (UL 2556)	o	
PUR CMX	++	IEC 60811-2-1	+	IEC 60332-1-2 VW-1 (UL 2556)	+	
PUR AWM	++	IEC 60811-2-1	o	Horizontal Flame Test (UL 2556)	+	
FRNC	o		+	IEC 60332-1-2	-	
FEP	++		++		++	

++ excellent / + good / o adequate / - poor

Industrial Ethernet Cat.5e / Cat.6 / Cat.6$_A$, highly flexible

Application

Ethernet, i.e. TCP/IP (**T**ransmission **C**ontrol **P**rotocol / **I**nternet **P**rotocol) has been established in the office world for many years. Based on consistent refinement of the cables Gebauer & Griller is able to meet the increased requirements of category Cat.6$_A$ and can even guarantee the successful application of those cables in drag chains.

As a matter of fact the cables allow for application in harsh industrial environments and show an excellent resistance to oil and chemicals (Industrial Ethernet), for data transmission rates of up to 10 Gbit/s.

The majority of the cables are available with the appropriate UL approvals for export markets.

For DRIVE CLiQ systems, two drag chain versions with integrated power supply are available, depending on the respective requirements of the drag chain.

New to the range of Gebauer & Griller is a drag chain cable for the real-time based EtherCAT® system.

→ **EtherCAT® is an Ethernet based real-time fieldbus system setting new standards of performance. Operation is similar to a conventional fieldbus system due to a flexible topology and simple configuration. Its cost-effective implementation means the system can nowadays be used in applications where in the past it was not an issue to use Ethernet-based systems. EtherCAT® substitutes the complex and costly Ethernet star topology for a simple linear or tree structure, therefore expensive infrastructure components are no longer necessary; at the same time any Ethernet device can be integrated via switch or switch ports.**

Construction

Conductor:	Extra fine stranded bare copper wires AWG26 (data pairs) or AWG22 (power supply cores)
Insulation:	Data pairs: Foam-skin polyolefin (colour coded according to IEC 60708, DRIVE CLiQ-cable: (green, yellow, pink and blue) or polyolefin (white, yellow, blue and orange) (EtherCAT®) Power supply cores: Polyolefin (red and black)
Pair screening:	Plastic bonded aluminium tape (optional)
Separator:	Profile filler (optional)
Covering:	Thermoplastic elastomer (TPE) (optional)
Screening:	Plastic bonded aluminium tape (optional), braid of tinned copper wires
Sheath:	Thermoplastic polyurethane compound (PUR), matt, low adhesion, halogen-free, flame-retardant, water blue (similar RAL 5021) or green (similar RAL 6018)

Mechanical Properties

Temperature range:	-30°C to +70°C
Min. bending radius:	15 x cable diameter flexible application

Electrical Properties

Impedance:	nom. 100 ohm according to IEC 61156-6
Loop resistance:	max. 280.0 ohm / km max. 110.8 ohm / km (power supply)
Capacitance:	48 nF / km
Operating voltage:	max. 125 V (peak value, not for connection to public mains)
RF properties:	Cat.5e, Cat.6 or Cat.6$_A$ according to IEC 61156-6

Supported Connector Types

- RJ45-connector (for harsh environments)
- RJ45-connector with integrated power supply pins
- M8-connector

Technical Data

Type	Sheath	OD mm	Weight [kg/km]	Cu index [kg/km]	Part number	UL
Industrial Ethernet Cat.5e highflex 2x2xAWG26-100 FR-PUR BU	PUR	5.8	39	20.0	81538	-
for continuous flexing, e.g. in drag chains, halogen-free						
Industrial Ethernet Cat.5e highflex 4x2xAWG26-100 FR-PUR BU	PUR	6.3	52	27.0	81567	-
for continuous flexing, e.g. in drag chains, halogen-free						
Industrial Ethernet Cat.5e highflex 2x2xAWG26-100 FR-PUR GN c(UR)us AWM	PUR	4.8	30	18.0	143791	AWM
for continuous flexing, e.g. in drag chains using standard cable design, halogen-free approvals: c(UR)us recognition AWM style 20963 (80°C, 30V) according to UL 758						
Industrial Ethernet Cat.5e highflex 4x2xAWG26-100 FR-PUR GN c(UR)us AWM	PUR	6.8	55	28.0	116180	AWM
for continuous flexing, e.g. in drag chains using standard cable design, halogen-free approvals: c(UR)us recognition AWM style 20963 (80°C, 30V) according to UL 758						
Industrial Ethernet EC Cat.5e highflex 2x2xAWG26-100 FR-PUR GN c(UR)us AWM	PUR	5.3	35	20.0	136644	AWM
for continuous flexing, e.g. in drag chains for connection to EtherCAT® systems using standard cable design, halogen-free approvals: c(UR)us recognition AWM style 20963 (80°C, 30V) according to UL 758						
Industrial Ethernet Cat.5e Torsion 4x2xAWG26-100 FR-PUR GN c(UR)us AWM	PUR	7.1	57	26.0	123686	AWM
for torsional stress, e.g. robotics using standard cable design approvals: c(UR)us recognition AWM style 20963 (80°C, 30V) according to UL 758						
Industrial Ethernet DC Cat.5e highflex 2x2xAWG26-100+1x2xAWG22 FR-PUR GN c(UL)us CMX	PUR	7.0	65	38.0	106993	CMX
for continuous flexing, e.g. in drag chains for connection to DRIVE CLiQ interface with integrated power supply using standard cable design, halogen-free approvals: c(UL)us listing CMX according to UL 444						
Industrial Ethernet DC plus Cat.5e highflex 2x2xAWG26-100+1x2xAWG22 FR-PUR GN c(UL)us CMX	PUR	7.0	66	40.0	143752	CMX
for continuous flexing with higher requirements, e.g. in drag chains for connection to DRIVE CLiQ interface with integrated power supply using standard cable design, halogen-free; approvals: c(UL)us listing CMX according to UL 444						
Industrial Ethernet Cat.6 highflex 4x2xAWG26-100 FC FR-PUR GN c(UL)us CMX	PUR	7.8	70	34.0	128319	CMX
for continuous flexing, e.g. in drag chains using fast connect design, halogen-free approvals: c(UL)us listing CMX according to UL 444						
Industrial Ethernet Cat.6_A highflex 4x2xAWG26-100 FR-PUR GN c(UL)us CMX	PUR	7.8	66	34.0	137132	CMX
for continuous flexing, e.g. in drag chains using standard cable design, halogen-free approvals: c(UL)us listing CMX according to UL 444						

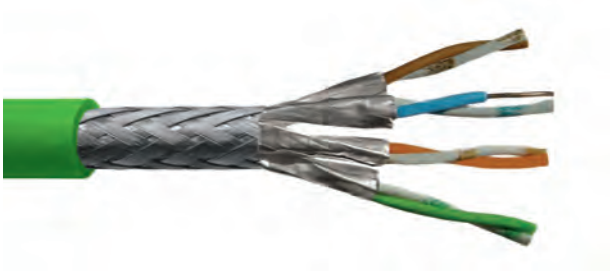
Resistances

	Oil resistance		Flame resistance		UV resistance	
PUR CMX	++	IEC 60811-2-1	+	IEC 60332-1-2 VW-1 (UL 2556)	+	
PUR AWM	++	IEC 60811-2-1	o	Horizontal Flame Test (UL 2556)	+	

++ excellent / + good / o adequate / - poor

Ethernet

Industrial Ethernet Cat.7



Application

Gebauer & Griller Industrial Ethernet cables are for applications in industrial automation, in indoor areas, in fixed installations as well as partly flexible applications without compulsory guide.

The cables of this new product group meet and even exceed the requirements of category 7 according to IEC 61156, are available in 2-pair and 4-pair versions and allow data transmission rates of up to 10 Gbit/s. The sheath materials used plus a special screening guarantee excellent performance of the cables especially in extreme industrial environments. The table on the next page indicates the various resistances and will help you to select the best-suited cable for your purposes. Approvals for the North American markets are a must-have for every exporting company.

→ **Increased protection of persons and commodity values is achieved by using halogen-free material in PUR and FRNC versions as well as high flame resistance in the PVC version.**

Construction

Conductor:	Bare copper wire AWG22, 7-stranded tinned copper wires AWG23 or 7-stranded bare copper wires AWG26
Insulation:	Foam-skin polyolefin (colour coded in accordence with IEC 60708)
Pair screening:	Plastic bonded aluminium tape, tinned drain wire (optional)
Wrapping:	Plastic tape and extruded covering (optional)
Screening:	Braid of tinned copper wires
Sheath:	Special compound of polyvinylchloride (PVC), thermoplastic polyurethane compound (PUR), matt, low adhesion, halogen-free and flame-retardant or thermoplastic, halogen-free, flame-retardant polymer compound (FRNC), green (similar RAL 6018)

Mechanical Properties

Temperature range:	-40°C to +80°C fixed installation -25°C to +80°C fixed installation (FRNC) -10°C to +70°C flexible application (only flexible designs) -30°C to +70°C flexible application (only flexible designs, PUR)
Min. bending radius:	8 x cable diameter fixed installation 15 x cable diameter flexible application

Electrical Properties

Impedance:	nom. 100 ohm according to IEC 61156-5 (AWG22) or IEC 61156-6 (AWG23 and AWG26)
Loop resistance:	max. 115.0 ohm / km (AWG22) max. 146.2 ohm / km (AWG23) max. 280.0 ohm / km (AWG26)
Capacitance:	nom. 48 nF / km
Operating voltage:	max. 125 V (peak value, not for connection to public mains)
RF properties:	Cat.7 according to IEC 61156-5 (AWG22) or IEC 61156-6 (AWG23 and AWG26)

Supported Connector Types

- RJ45-connector (for harsh environments)

Technical Data

Type	Sheath	OD mm	Weight [kg/km]	Cu index [kg/km]	Part number	UL
Industrial Ethernet Cat.7 4x2xAWG22-100 FR-PVC GN c(UL)us CMG	PVC	8.8	98	53.0	131895	CMG
PROFINET compliant, for fixed installation using standard cable design approvals: c(UL)us listing CMG according to UL 444, (UL) listing CL3 according to UL 13						
Industrial Ethernet Cat.7 4x2xAWG22-100 FC FR-PVC GN c(UL)us CMG	PVC	9.6	93	44.0	143756	CMG
PROFINET compliant, for fixed installation using fast connect design approvals: c(UL)us listing CMG according to UL 444						
Industrial Ethernet Cat.7 4x2xAWG22-100 FR-PUR GN c(UL)us CMX	PUR	8.8	91	53.0	131900	CMX
PROFINET compliant, for fixed installation using standard cable design, halogen-free approvals: c(UL)us listing CMX according to UL 444						
Industrial Ethernet Cat.7 4x2xAWG22-100 FRNC GN c(UL)us CM	FRNC	8.8	99	53.0	131903	CM
PROFINET compliant, for fixed installation using standard cable design, halogen-free approvals: c(UL)us listing CM according to UL 444 in preparation						
Industrial Ethernet Cat.7 flex 4x2xAWG23-100 FR-PVC GN c(UL)us CMG	PVC	8.8	92	48.0	143753	CMG
PROFINET compliant, for fixed installation and flexible application without compulsory guide using standard cable design approvals: c(UL)us listing CMG according to UL 444						
Industrial Ethernet Cat.7 flex 4x2xAWG23-100 FR-PUR GN c(UL)us CMX	PUR	8.8	86	48.0	143754	CMX
PROFINET compliant, for fixed installation and flexible application without compulsory guide using standard cable design approvals: c(UL)us listing CMX according to UL 444						
Industrial Ethernet Cat.7 flex 4x2xAWG23-100 FRNC GN c(UL)us CM	FRNC	8.8	92	48.0	143755	CM
PROFINET compliant, for fixed installation and flexible application without compulsory guide using standard cable design approvals: c(UL)us listing CM according to UL 444 in preparation						
Industrial Ethernet Cat.7 flex 4x2xAWG26-100 FR-PVC GN c(UL)us CMG	PVC	7.0	66	33.0	113253	CMG
for flexible application without compulsory guide using standard cable design approvals: c(UL)us listing CMG according to UL 444, (UL) listing CL2 according to UL 13						
Industrial Ethernet Cat.7 flex 4x2xAWG26-100 FR-PUR GN c(UL)us CMX	PUR	7.0	61	33.0	113244	CMX
for flexible application without compulsory guide using standard cable design, halogen-free approvals: c(UL)us listing CMX according to UL 444						
Industrial Ethernet Cat.7 flex 4x2xAWG26-100 FRNC GN	FRNC	7.0	66	33.0	131904	-
for flexible application without compulsory guide using standard cable design, halogen-free						

Resistances

	Oil resistance		Flame resistance		UV resistance	
PVC CMG	++	UL 2556	++	IEC 60332-3-24 FT4 (UL 1685 / CSA)	++	UL 2556
PUR CMX	++	IEC 60811-2-1	+	IEC 60332-1-2 VW-1 (UL 2556)	+	
FRNC CM	o		++	IEC 60332-3-24 UL Flame Exposure (UL 1685 / CSA)	++	UL 2556
FRNC	o		+	IEC 60332-1-2	-	

++ excellent / + good / o adequate / - poor

INTERBUS

Application

The INTERBUS system was developed by Phoenix Contact and is a standardised fieldbus system specified in European Standard EN 50254, in international standard IEC 61158 and in the German national standard DIN 19258.

In manufacturing automation the INTERBUS cables of Gebauer & Griller serve as remote bus cables (Type RBC) or as installation remote bus cables with integrated power supply (Type INBC).

Available are versions for indoor installation as well as cables with increased UV resistance for outdoor installation and direct burial. All cables are supplied with the appropriate UL approvals for the North American markets. We offer indoor cables with a green outer sheath as well as with a violet outer sheath compliant with DESINA.

Cables with POF, PCF and optical fibres for optical communications transmission add to the range; those products are to be found in this catalogue from page 46 onwards.

→ **Maximum line length of a bus segment**

500 kbit/s = max. 400 m

Construction

Conductor:	Stranded or fine stranded bare copper wires 0.22 mm² (data pairs) or 1.0 mm² (power supply)
Insulation:	Polyolefin (data pairs: colour coded in accordence with DIN 47100 respectively power supply cores: red, blue and yellow/green)
Wrapping:	Plastic tape
Screening:	Braid of tinned copper wires
Sheath:	Special compound of polyvinylchloride (PVC), green (similar RAL 6017), violet (similar RAL 4001) or black (similar RAL 9005)

Mechanical Properties

Temperature range:	-40°C to +80°C fixed installation -10°C to +70°C flexible application
Min. bending radius:	8 x cable diameter fixed installation 15 x cable diameter flexible application

Electrical Properties

Impedance:	150 ± 15 ohm
Loop resistance:	max. 186.0 ohm / km max. 39.0 ohm / km (power supply)
Capacitance:	max. 60 nF/ km
Operating voltage:	max. 250 V (peak value, not for connection to public mains)

Supported Connector Types

- 9-pin D-Sub-connector
- 5-pin M12-connector
- 9-pin circular connector

Technical Data

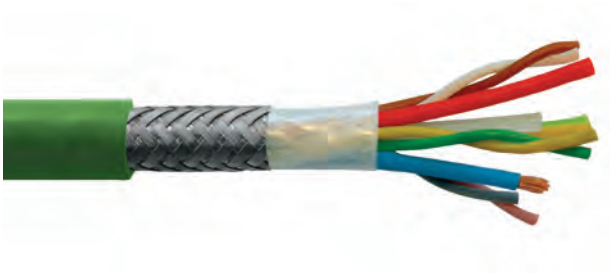
Type	Sheath	OD mm	Weight [kg/km]	Cu index [kg/km]	Part number	UL
INTERBUS 3x2x0.22-100 FR-PVC GN	PVC	7.2	68	37.0	81597	-
for fixed installation and flexible application without compulsory guide using standard cable design						
INTERBUS 3x2x0.22-100 FR-PVC GN c(UL)us CMX	PVC	7.2	68	37.0	81638	CMX
for fixed installation and flexible application without compulsory guide using standard cable design approvals: c(UL)us listing CMX according to UL 444						
INTERBUS 3x2x0.22-100 FR-PVC VT DESINA	PVC	7.2	68	37.0	28111	-
for fixed installation and flexible application without compulsory guide using standard cable design						
INTERBUS 3x2x0.22-100 FR-PVC VT DESINA c(UL)us CMX	PVC	7.2	68	37.0	106830	CMX
for fixed installation and flexible application without compulsory guide using standard cable design approvals: c(UL)us listing CMX according to UL 444						
INTERBUS Burial 3x2x0.22-100 FR-PVC BK	PVC	9.0	68	37.0	81649	-
for direct burial and flexible outdoor use without compulsory guide using standard cable design						
INTERBUS Burial 3x2x0.22-100 FR-PVC BK c(UL)us CMX	PVC	9.0	68	37.0	81650	CMX
for direct burial and flexible outdoor use without compulsory guide using standard cable design approvals: c(UL)us listing CMX according to UL 444						
INTERBUS 3x2x0.22-100+3x1.0 FR-PVC GN	PVC	7.9	89	60.0	81640	-
for fixed installation and flexible application without compulsory guide with integrated power supply using standard cable design						
INTERBUS 3x2x0.22-100+3x1.0 FR-PVC GN c(UL)us CMX	PVC	7.9	89	60.0	81642	CMX
for fixed installation and flexible application without compulsory guide with integrated power supply using standard cable design approvals: c(UL)us listing CMX according to UL 444						
INTERBUS 3x2x0.22-100+3x1.0 FR-PVC VT DESINA	PVC	7.9	89	60.0	106831	-
for fixed installation and flexible application without compulsory guide with integrated power supply using standard cable design						
INTERBUS 3x2x0.22-100+3x1.0 FR-PVC VT DESINA c(UL)us CMX	PVC	7.9	89	60.0	106832	CMX
for fixed installation and flexible application without compulsory guide with integrated power supply using standard cable design approvals: c(UL)us listing CMX according to UL 444						
INTERBUS Burial 3x2x0.22-100+3x1.0 FR-PVC BK	PVC	9.7	89	60.0	81651	-
for direct burial and flexible outdoor use without compulsory guide with integrated power supply using standard cable design						
INTERBUS Burial 3x2x0.22-100+3x1.0 FR-PVC BK c(UL)us CMX	PVC	9.7	89	60.0	81652	CMX
for direct burial and flexible outdoor use without compulsory guide with integrated power supply using standard cable design approvals: c(UL)us listing CMX according to UL 444						

Resistances

	Oil resistance		Flame resistance		UV resistance	
PVC	o		o	IEC 60332-1-2	+	
PVC CMX	o		+	IEC 60332-1-2 VW-1 (UL 2556)	+	

++ excellent / + good / o adequate / - poor

INTERBUS, highly flexible



Application

For a continuous flexible application in machines and drag chains Gebauer & Griller has developed remote bus cables (Type RBC) and installation remote bus cables with integrated power supply (Type INBC) for interbus systems; these cables are characterised by an improved resistance to oil, chemicals and UV radiation and are, above all, halogen-free. We offer indoor cables with a green outer sheath as well as with a violet outer sheath compliant with DESINA.

For export to the North American markets, the cables are supplied with the appropriate UL approvals. Cables with POF, PCF and optical fibres for optical communications transmission add to the range; those products are to be found in this catalogue from page 46 onwards.

→ **Maximum line length of a bus segment**

500 kbit/s = max. 400 m

Construction

Conductor:	Extra fine stranded bare copper wires 0.25 mm² (data pairs) or 1.0 mm² (power supply cores)
Insulation:	Polyolefin (data: colour coded in accordence with DIN 47100 respectively power supply cores: red, blue and yellow/green)
Wrapping:	Slide taping
Screening:	Braid of tinned copper wires
Sheath:	Thermoplastic polyurethane compound (PUR), matt, low adhesion, halogen-free and flame-retardant, green (similar RAL 6017) or violet (similar RAL 4001)

Mechanical Properties

Temperature range:	-30°C to +70°C flexible application
Min. bending radius:	15 x cable diameter flexible application

Electrical Properties

Impedance:	100 ± 15 ohm
Loop resistance:	max. 159.8 ohm / km max. 39.0 ohm / km (power supply)
Capacitance:	max. 60 nF / km
Operating voltage:	max. 250 V (peak value, not for connection to public mains)

Supported Connector Types

- 9-pin D-Sub-connector
- 5-pin M12-connector
- 9-pin circular connector

Technical Data

Type	Sheath	OD mm	Weight [kg/km]	Cu index [kg/km]	Part number	UL
INTERBUS highflex 3x2x0.25-100 FR-PUR GN	PUR	7.8	67	39.0	81661	-
for continuous flexing, e.g. in drag chains using standard cable design, halogen-free						
INTERBUS highflex 3x2x0.25-100 FR-PUR GN c(UL)us CMX	PUR	7.8	67	39.0	81662	CMX
for continuous flexing, e.g. in drag chains using standard cable design, halogen-free approvals: c(UL)us listing CMX according to UL 444						
INTERBUS highflex 3x2x0.25-100 FR-PUR VT DESINA	PUR	7.8	67	39.0	88604	-
for continuous flexing, e.g. in drag chains using standard cable design, halogen-free						
INTERBUS highflex 3x2x0.25-100 FR-PUR VT DESINA c(UL)us CMX	PUR	7.8	67	39.0	106834	CMX
for continuous flexing, e.g. in drag chains using standard cable design, halogen-free approvals: c(UL)us listing CMX according to UL 444						
INTERBUS highflex 3x2x0.25-100+3x1.0 FR-PUR GN	PUR	7.9	95	62.0	81704	-
for continuous flexing, e.g. in drag chains using standard cable design, halogen-free						
INTERBUS highflex 3x2x0.25-100+3x1.0 FR-PUR GN c(UL)us CMX	PUR	7.9	95	62.0	81781	CMX
for continuous flexing, e.g. in drag chains using standard cable design, halogen-free approvals: c(UL)us listing CMX according to UL 444						
INTERBUS highflex 3x2x0.25-100+3x1.0 FR-PUR VT DESINA	PUR	7.9	95	62.0	88483	-
for continuous flexing, e.g. in drag chains with integrated power supply cores using standard cable design, halogen-free						
INTERBUS highflex 3x2x0.25-100+3x1.0 FR-PUR VT DESINA c(UL)us CMX	PUR	7.9	95	62.0	88602	CMX
for continuous flexing, e.g. in drag chains with integrated power supply cores using standard cable design, halogen-free approvals: c(UL)us listing CMX according to UL 444						

Resistances

	Oil resistance		Flame resistance		UV resistance	
PUR	++	IEC 60811-2-1	o	IEC 60332-1-2	+	
PUR CMX	++	IEC 60811-2-1	+	IEC 60332-1-2 VW-1 (UL 2556)	+	

++ excellent / + good / o adequate / - poor

MULTIBUS

MULTIBUS

Application

MULTIBUS are indoor bus cables for fixed installation and flexible application without compulsory guide, with transmission rates of up to 1 Mbit/s.

Depending on the number of pairs (there are one- two- and three-pair versions) the cables are applicable for a wide variety of fieldbus systems such as e.g. DIN Messbus (measurement bus), BITBUS (IEEE 1118), Local Operating Network (LON) SUCOnet-P, Modulink-P, VariNet-P.

Cables for export are available with c(UL)us CMX Listing.

→ **Maximum line length of a bus segment**

9.6 - 93.75	kbit/s = max. 1,200 m
187.5	kbit/s = max. 1,000 m
500	kbit/s = max. 400 m

Construction

Conductor:	Stranded bare copper wires 0.22 mm²
Insulation:	Polyolefin (colour coded in accordence with DIN 47100)
Wrapping:	Plastic tape
Screening:	Braid of tinned copper wires
Sheath:	Special compound of polyvinylchloride (PVC), violet (similar RAL 4001)

Mechanical Properties

Temperature range:	-40°C to +80°C fixed installation -10°C to +70°C flexible application
Min. bending radius:	8 x cable diameter fixed installation 15 x cable diameter flexible application

Electrical Properties

Impedance:	100 to 120 ohm
Loop resistance:	max. 186.0 ohm / km
Capacitance:	max. 60 nF / km
Operating voltage:	max. 250 V (peak value, not for connection to public mains)

Supported Connector Types

- 9-pin D-Sub-connector
- 5-pin M12-connector

Technical Data

Type	Sheath	OD mm	Weight [kg/km]	Cu index [kg/km]	Part number	UL
MULTIBUS 1x2x0.22-110 FR-PVC VT DESINA	PVC	5.7	43	18.0	80568	-
for fixed installation and flexible application without compulsory guide using standard cable design						
MULTIBUS 1x2x0.22-110 FR-PVC VT DESINA c(UL)us CMX	PVC	5.7	48	23.0	80607	CMX
for fixed installation and flexible application without compulsory guide using standard cable design approvals: c(UL)us listing CMX according to UL 444						
MULTIBUS 2x2x0.22-110 FR-PVC VT DESINA	PVC	7.1	61	28.0	80624	-
for fixed installation and flexible application without compulsory guide using standard cable design						
MULTIBUS 2x2x0.22-110 FR-PVC VT DESINA c(UL)us CMX	PVC	7.1	65	32.0	80634	CMX
for fixed installation and flexible application without compulsory guide using standard cable design approvals: c(UL)us listing CMX according to UL 444						
MULTIBUS 3x2x0.22-110 FR-PVC VT DESINA	PVC	7.4	64	37.0	80635	-
for fixed installation and flexible application without compulsory guide using standard cable design						
MULTIBUS 3x2x0.22-110 FR-PVC VT DESINA c(UL)us CMX	PVC	7.4	64	37.0	80637	CMX
for fixed installation and flexible application without compulsory guide using standard cable design approvals: c(UL)us listing CMX according to UL 444						

Resistances

	Oil resistance		Flame resistance		UV resistance	
PVC	o		o	IEC 60332-1-2	+	
PVC CMX	o		+	IEC 60332-1-2 VW-1 (UL 2556)	+	

++ excellent / + good / o adequate / - poor

MULTIBUS

MULTIBUS, highly flexible

Application

The Gebauer & Griller multibus cables are applicable in a wide variety of fieldbus systems such as e.g. DIN Messbus (measurement bus), BITBUS (IEEE 1118), Local Operating Network (LON) SUCOnet-P, Modulink-P, VariNet-P. They are specifically suitable for applications in frequently moving machine parts and for the compulsory-guided use in drag chains, but are not suitable for robots.

The cables are highly resistant to most types of mineral oils and greases and are, above all, halogen-free and flame-resistant. There are one- two- and three-pair versions as well as versions with and without UL approvals.

→ Maximum line length of a bus segment

9.6 - 93.75	kbit/s	= max. 1,200 m
187.5	kbit/s	= max. 1,000 m
500	kbit/s	= max. 400 m

Construction

Conductor:	Extra fine stranded bare copper wires 0.25 mm²
Insulation:	Polyolefin (colour coded in accordence with DIN 47100)
Wrapping:	Slide taping
Screening:	Braid of tinned copper wires
Sheath:	Thermoplastic polyurethane compound (PUR), matt, low adhesion, halogen-free and flame-retardant, violet (similar RAL 4001)

Mechanical Properties

Temperature range:	-30°C to +70°C
Min. bending radius:	15 x cable diameter flexible application

Electrical Properties

Impedance:	100 to 120 ohm
Loop resistance:	159.8 ohm / km
Capacitance:	max. 60 nF / km
Operating voltage:	max. 250 V (peak value, not for connection to public mains)

Supported Connector Types

- 9-pin D-Sub-connector
- 5-pin M12-connector

BITBUS is a registered trademark of Intel Corp.
SUCOnet-P is a registered trademark of Moeller group of companies
Modulink-P is a registered trademark of Weidmüller GmbH & CO
VariNet-P is a registered trademark of Pepperl+Fuchs GmbH

Technical Data

Type	Sheath	OD mm	Weight [kg/km]	Cu index [kg/km]	Part number	UL
MULTIBUS highflex 1x2x0.25-110 FR-PUR VT DESINA	PUR	6.0	39	17.0	80638	-
for continuous flexing, e.g. in drag chains using standard cable design, halogen-free						
MULTIBUS highflex 1x2x0.25-110 FR-PUR VT DESINA c(UL)us CMX	PUR	6.2	48	25.0	80657	CMX
for continuous flexing, e.g. in drag chains using standard cable design, halogen-free approvals: c(UL)us listing CMX according to UL 444						
MULTIBUS highflex 2x2x0.25-110 FR-PUR VT DESINA	PUR	7.9	65	33.0	80716	-
for continuous flexing, e.g. in drag chains using standard cable design, halogen-free						
MULTIBUS highflex 2x2x0.25-110 FR-PUR VT DESINA c(UL)us CMX	PUR	7.9	70	35.0	80742	CMX
for continuous flexing, e.g. in drag chains using standard cable design, halogen-free approvals: c(UL)us listing CMX according to UL 444						
MULTIBUS highflex 3x2x0.25-110 FR-PUR VT DESINA	PUR	8.0	72	39.0	80747	-
for continuous flexing, e.g. in drag chains using standard cable design, halogen-free						
MULTIBUS highflex 3x2x0.25-110 FR-PUR VT DESINA c(UL)us CMX	PUR	8.0	72	39.0	80748	CMX
for continuous flexing, e.g. in drag chains using standard cable design, halogen-free approvals: c(UL)us listing CMX according to UL 444						

Resistances

	Oil resistance		Flame resistance		UV resistance	
PUR	++	IEC 60811-2-1	o		+	
PUR CMX	++	IEC 60811-2-1	+	IEC 60332-1-2 VW-1 (UL 2556)	+	

++ excellent / + good / o adequate / - poor

CAN BUS

CAN – Controller Area Network

Application

Originally coming from the automotive industry, CAN is a bus system which is also highly appreciated in manufacturing automation and is specified in ISO 11898.

The cables have been designed for indoor use, in fixed installations and partly flexible applications without compulsory guide and can achieve segment lengths of up to 1,000 m depending on the conductor cross-section and the transmission rate. They combine optimum data transfer through low-capacitance insulation with a reduced outer diameter.

The standard cables for export to the North American markets are available with an UL CMX Listing. On request cables with the superior listing c(UL)us CMG/PLTC can also be supplied.

→ Maximum line length of a bus segment

0	... 40 m	AWG24, AWG22
40 m	... 300 m	AWG22, AWG20
300 m	... 600 m	AWG20
600 m	... 1,000 m	AWG19

Construction

Conductor:	7-stranded bare copper wires AWG24, AWG22, AWG20 or fine stranded bare copper wires AWG19
Insulation:	Foam-skin polyolefin (colour coded in accordence with DIN 47100)
Wrapping:	Plastic tape
Screening:	Braid of tinned copper wires
Sheath:	Special compound of polyvinylchloride (PVC), violet (similar RAL 4001)

Mechanical Properties

Temperature range:	-40°C to +80°C fixed installation (PVC) -40°C to +70°C fixed installation (PE) -10°C to +70°C flexible application (PVC)
Min. bending radius:	8 x cable diameter fixed installation 15 x cable diameter flexible application

Electrical Properties

Impedance:	120 ± 12 ohm
Loop resistance:	max. 175.2 ohm / km (AWG24) max. 110.8 ohm / km (AWG22) max. 68.8 ohm / km (AWG20) max. 55.0 ohm / km (AWG19)
Capacitance:	max. 40 nF / km
Operating voltage:	max. 250 V (peak value, not for connection to public mains)

Supported Connector Types

- 9-pin D-Sub-connector

Technical Data

Type	Sheath	OD mm	Weight [kg/km]	Cu index [kg/km]	Part number	UL
CAN BUS 1x2xAWG24-120 FR-PVC VT DESINA c(UL)us CMX	PVC	5.8	40	17.0	81794	CMX
for fixed installation and flexible application without compulsory guide using standard cable design approvals: c(UL)us listing CMX according to UL 444						
CAN BUS 2x2xAWG24-120 FR-PVC VT DESINA c(UL)us CMX	PVC	7.5	60	35.0	81825	CMX
for fixed installation and flexible application without compulsory guide using standard cable design approvals: c(UL)us listing CMX according to UL 444						
CAN BUS 1x2xAWG22-120 FR-PVC VT DESINA c(UL)us CMX	PVC	6.8	56	26.0	81826	CMX
for fixed installation and flexible application without compulsory guide using standard cable design approvals: c(UL)us listing CMX according to UL 444						
CAN BUS 2x2xAWG22-120 FR-PVC VT DESINA c(UL)us CMX	PVC	8.5	72	46.0	81856	CMX
for fixed installation and flexible application without compulsory guide using standard cable design approvals: c(UL)us listing CMX according to UL 444						
CAN BUS 1x2xAWG20-120 FR-PVC VT DESINA c(UL)us CMX	PVC	7.5	66	42.0	81950	CMX
for fixed installation and flexible application without compulsory guide using standard cable design approvals: c(UL)us listing CMX according to UL 444						
CAN BUS 2x2xAWG20-120 FR-PVC VT DESINA c(UL)us CMX	PVC	9.6	99	59.0	82020	CMX
for fixed installation and flexible application without compulsory guide using standard cable design approvals: c(UL)us listing CMX according to UL 444						
CAN BUS 1x2xAWG19-120 FR-PVC VT DESINA c(UL)us CMX	PVC	8.7	87	53.0	135423	CMX
for fixed installation and flexible application without compulsory guide using standard cable design approvals: c(UL)us listing CMX according to UL 444						
CAN BUS 2x2xAWG19-120 FR-PVC VT DESINA c(UL)us CMX	PVC	11.6	147	81.0	135424	CMX
for fixed installation and flexible application without compulsory guide using standard cable design approvals: c(UL)us listing CMX according to UL 444						
CAN BUS Burial 2x2xAWG20-120 FR-PVC/PE VT/BK	PVC/PE	11.6	138	59.0	133160	-
for direct burial using standard cable design						
CAN BUS Burial 2x2xAWG19-120 FR-PVC/PE VT/BK	PVC/PE	13.6	194	81.0	143759	-
for direct burial using standard cable design						

Resistances

	Oil resistance		Flame resistance		UV resistance	
PVC CMX	o		++	IEC 60332-1-2 VW-1 (UL 2556)	+	
PE	+		-		++	

++ excellent / + good / o adequate / - poor

CAN BUS

CAN – Controller Area Network, highly flexible

Application

The Gebauer & Griller CAN bus cables are designed specifically for highly flexible applications in frequently moving machine parts and in drag chains, and combine optimal data transfer through low-capacitance insulation and reduced outer diameter with increased mechanical stress resistance and improved resistance to oil, UV radiation and microbes.

Moreover, the cables are halogen-free and flame-resistant and are supplied with the appropriate approvals for the North American markets.

All cables meet and even exceed the requirements of ISO 11898.

→ Maximum line length of a bus segment

0 ... 40 m	AWG24, AWG22
40 m ... 300 m	AWG22, AWG20
300 m ... 600 m	AWG20

Construction

Conductor:	Extra fine stranded bare copper wires AWG24, AWG22 or AWG20
Insulation:	Foam-skin polyolefin (colour coded in accordence with DIN 47100)
Wrapping:	Slide taping
Screening:	Braid of tinned copper wires
Sheath:	Thermoplastic polyurethane compound (PUR), matt, low adhesion, halogen-free and flame-retardant, violet (similar RAL 4001)

Mechanical Properties

Temperature range:	-30°C to +70°C flexible application
Min. bending radius:	15 x cable diameter flexible application

Electrical Properties

Impedance:	120 ± 12 ohm
Loop resistance:	max. 175.2 ohm / km (AWG24) max. 110.8 ohm / km (AWG22) max. 68.8 ohm / km (AWG20)
Capacitance:	max. 40 nF / km
Operating voltage:	max. 250 V (peak value, not for connection to public mains)

Supported Connector Types

- 9-pin D-Sub-connector

Technical Data

Type	Sheath	OD mm	Weight [kg/km]	Cu index [kg/km]	Part number	UL
CAN BUS highflex 1x2xAWG24-120 FR-PUR VT DESINA c(UL)us CMX	PUR	6.5	44	24.0	82060	CMX
for continuous flexing, e.g. in drag chains using standard cable design, halogen-free approvals: c(UL)us listing CMX according to UL 444						
CAN BUS highflex 2x2xAWG24-120 FR-PUR VT DESINA c(UL)us CMX	PUR	8.4	72	33.0	82096	CMX
for continuous flexing, e.g. in drag chains using standard cable design, halogen-free approvals: c(UL)us listing CMX according to UL 444						
CAN BUS highflex 1x2xAWG22-120 FR-PUR VT DESINA c(UL)us CMX	PUR	6.9	47	33.0	82189	CMX
for continuous flexing, e.g. in drag chains using standard cable design, halogen-free approvals: c(UL)us listing CMX according to UL 444						
CAN BUS highflex 2x2xAWG22-120 FR-PUR VT DESINA c(UL)us CMX	PUR	9.5	87	52.0	82193	CMX
for continuous flexing, e.g. in drag chains using standard cable design, halogen-free approvals: c(UL)us listing CMX according to UL 444						
CAN BUS highflex 1x2xAWG20-120 FR-PUR VT DESINA c(UL)us CMX	PUR	7.7	61	42.0	82210	CMX
for continuous flexing, e.g. in drag chains using standard cable design, halogen-free approvals: c(UL)us listing CMX according to UL 444						
CAN BUS highflex 2x2xAWG20-120 FR-PUR VT DESINA c(UL)us CMX	PUR	10.1	118	59.0	82345	CMX
for continuous flexing, e.g. in drag chains using standard cable design, halogen-free approvals: c(UL)us listing CMX according to UL 444						

Resistances

	Oil resistance		Flame resistance		UV resistance	
PUR CMX	++	IEC 60811-2-1	+	IEC 60332-1-2 VW-1 (UL 2556)	+	

++ excellent / + good / o adequate / - poor

DeviceNet™

DeviceNet™

Application

DeviceNet™ is a bus system developed by Allen Bradley (Rockwell Automation) and is based on the proven and reliable CAN technology.

Thicker cables (2xAWG18+2xAWG15) normally serve as backbone (trunk cables). Connection of various industrial devices (e.g. PLCs, limit switches, etc.) to the backbone is in general by means of thinner cables (2xAWG24+2xAWG22), as drop cables. However, thinner cables can also be used as supply cables but then shorter transmission distances will be achieved, with the same data rate. Medium-thick cables – mid cables – (2xAWG20+2xAWG18) can be used for both applications but in these cases restrictions in lengths and / or data rates have to be considered.

As standard, all cables are supplied with the appropriate approvals for the North American markets.

→ **Maximum cable lengths of a bus segment**

Trunk Cable thick
2xAWG18+2xAWG15
125 kbit/s = max. 500 m
250 kbit/s = max. 250 m
500 kbit/s = max. 100 m

Trunk Cable thin
2xAWG24+2xAWG22
125 kbit/s = max. 100 m
250 kbit/s = max. 100 m
500 kbit/s = max. 100 m

Drop Cable
125 kbit/s = max. 6 m
250 kbit/s = max. 6 m
500 kbit/s = max. 6 m

Drop Cable cumulative length
125 kbit/s = max. 156 m
250 kbit/s = max. 78 m
500 kbit/s = max. 39 m

Construction

Conductor:	Stranded tinned copper wires Data pairs: AWG18, AWG20 or AWG24 Power supply cores: AWG15, AWG18 or AWG22
Insulation:	Data pairs: Foam-skin polyolefin (white and blue) Power supply cores: Polyolefin or special compound of polyvinylchloride (PVC) (red and black)
Pair screening:	Plastic bonded aluminium tape
Drain wire:	Stranded tinned copper wires AWG18 or AWG22
Screening:	Braid of tinned copper wires
Sheath:	Special compound of polyvinylchloride (PVC), grey (similar RAL 7001) or thermoplastic, halogen-free, flame-retardant polymer compound (FRNC), violet (similar RAL 4001)

Mechanical Properties

Temperature range:	-40°C to +80°C fixed installation (PVC), -25°C to +80°C fixed installation (FRNC) -10°C to +70°C flexible application
Min. bending radius:	5 x cable diameter fixed installation 10 x cable diameter flexible application

Electrical Properties

Impedance:	120 ± 12 ohm
Loop resistance:	max. 181.8 ohm / km (AWG24) max. 114.8 ohm / km (AWG22) max. 71.6 ohm / km (AWG20) max. 45.4 ohm / km (AWG18) max. 22.6 ohm / km (AWG15)
Capacitance:	nom. 40 nF / km
Operating voltage:	max. 300 V (peak value, not for connection to public mains)

Supported Connector Types

- 9-pin D-Sub-connector
- 5-pin M12-connector
- 5-pin 7/8”-connector

Technical Data

Type	Sheath	OD mm	Weight [kg/km]	Cu index [kg/km]	Part number	UL
DeviceNet™ 2xAWG18-120+2xAWG15 FR-PVC GY c(UL)us CMG	PVC	12.2	201	88.0	65033	CMG
for fixed installation and flexible application without compulsory guide as trunk cable using standard cable design; approvals: c(UL)us listing CMG according to UL 444, (UL) listing PLTC according to UL 13, c(UR)us recognition AWM style 20201 (60°C, 600V) according to UL 758						
DeviceNet™ 2xAWG20-120+2xAWG18 FR-PVC GY c(UL)us CMG	PVC	10.6	137	67.0	143763	CMG
for fixed installation and flexible application without compulsory guide as drop cable or as trunk cable using standard cable design; approvals: c(UL)us listing CMG according to UL 444, (UL) listing CL3 according to UL 13, c(UR)us recognition AWM style 20201 (60°C, 600V) according to UL 758						
DeviceNet™ 2xAWG24-120+2xAWG22 FR-PVC GY c(UL)us CMG	PVC	7.0	66	34.0	65039	CMG
for fixed installation and flexible application without compulsory guide as drop cable using standard cable design; approvals: c(UL)us listing CMG according to UL 444, (UL) listing CL3 according to UL 13, c(UR)us recognition AWM style 20201 (60°C, 600V) according to UL 758						
DeviceNet™ 2xAWG18-120+2xAWG15 FRNC VT DESINA c(UL)us CMG	FRNC	12.2	209	88.0	65030	CMG
for fixed installation and flexible application without compulsory guide as trunk cable using standard cable design, halogen-free approvals: c(UL)us listing CMG according to UL 444, (UL) listing PLTC according to UL 13 in preparation						
DeviceNet™ 2xAWG24-120+2xAWG22 FRNC VT DESINA c(UL)us CMG	FRNC	7.0	67	34.0	65031	CMG
for fixed installation and flexible application without compulsory guide as drop cable using standard cable design, halogen-free approvals: c(UL)us listing CMG according to UL 444, (UL) listing CL3 according to UL 13 in preparation						

Resistances

	Oil resistance		Flame resistance		UV resistance	
PVC CMG	++	UL 2556	++	IEC 60332-3-24 FT4 (UL 1685 / CSA)	++	UL 2556
FRNC CMG	++	UL 2556	++	IEC 60332-3-24 FT4 (UL 1685 / CSA)	++	UL 2556

++ excellent / + good / o adequate / - poor

DeviceNet™

DeviceNet™, highly flexible

Application

The Gebauer & Griller DeviceNet™ cables have been designed specifically for application in drag chains and are based on the requirements of the bus system developed by Allen Bradley (Rockwell Automation). Thicker cables (2xAWG18+2xAWG15) normally serve as backbone (trunk cables). Connection of various industrial devices (e.g. PLCs, limit switches, etc.) to the backbone is in general by means of thinner cables (2xAWG24+2xAWG22), as drop cables. However, thinner cables can also be used as supply cables but then shorter transmission distances will be achieved, with the same data rate.

As standard, all cables are supplied with the appropriate approvals for the North American markets.

→ **Maximum cable lengths of a bus segment**

Trunk Cable thick
2xAWG18+2xAWG15
125 kbit/s = max. 500 m
250 kbit/s = max. 250 m
500 kbit/s = max. 100 m

Trunk Cable thin
2xAWG24+2xAWG22
125 kbit/s = max. 100 m
250 kbit/s = max. 100 m
500 kbit/s = max. 100 m

Drop Cable
125 kbit/s = max. 6 m
250 kbit/s = max. 6 m
500 kbit/s = max. 6 m

Drop Cable cumulative length
125 kbit/s = max. 156 m
250 kbit/s = max. 78 m
500 kbit/s = max. 39 m

Construction

Conductor:	Extra fine stranded tinned copper wires. Data pairs: AWG18 or AWG24 Power supply cores: AWG15 or AWG22
Insulation:	Data pairs: foam-skin polyolefin (white and blue) Power supply cores: Polyolefin or special compound of polyvinylchloride (PVC) (red and black)
Pair screening:	Plastic bonded aluminium tape
Drain wire:	Stranded tinned copper wires AWG18 or AWG22
Screening:	Conductive slide taping and and braid of tinned copper wires
Sheath:	Thermoplastic polyurethane compound (PUR), matt, low adhesion, halogen-free and flame-retardant, violet (similar RAL 4001) or special compound of polyvinylchloride (PVC), grey (similar RAL 7001)

Mechanical Properties

Temperature range:	-40°C to +80°C (PUR) flexible application -10°C to +80°C (PVC) flexible application
Min. bending radius:	10 x cable diameter flexible application

Electrical Properties

Impedance:	120 ± 12 ohm
Loop resistance:	max. 181.8 ohm / km (AWG24) max. 114.8 ohm / km (AWG22) max. 45.4 ohm / km (AWG18) max. 22.6 ohm / km (AWG15)
Capacitance:	nom. 40 nF / km
Operating voltage:	max. 300 V (peak value, not for connection to public mains)

Supported Connector Types

- 9-pin D-Sub-connector
- 5-pin M12-connector
- 5-pin 7/8”-connector

Technical Data

Type	Sheath	OD mm	Weight [kg/km]	Cu index [kg/km]	Part number	UL
DeviceNet™ highflex 2xAWG18-120+2xAWG15 FR-PUR VT DESINA c(UL)us CMX	PUR	12.2	195	94.0	65040	CMX
for continuous flexing, e.g. in drag chains as trunk cable using standard cable design, halogen-free approvals: c(UL)us listing CMX according to UL 444, (UL) listing CL2X						
DeviceNet™ highflex 2xAWG24-120+2xAWG22 FR-PUR VT DESINA c(UL)us CMX	PUR	7.0	62	36.0	65041	CMX
for continuous flexing, e.g. in drag chains as drop cable using standard cable design, halogen-free approvals: c(UL)us listing CMX according to UL 444, (UL) listing CL2X						
DeviceNet™ highflex 2xAWG18-120+2xAWG15 FR-PVC GY c(UL)us CMG	PVC	12.2	203	94.0	65047	CMG
for continuous flexing, e.g. in drag chains as trunk cable using standard cable design; approvals: c(UL)us listing CMG according to UL 444, (UL) listing PLTC according to UL 13, c(UR)us recognition AWM style 20201 (60°C, 600V) according to UL 758						
DeviceNet™ highflex 2xAWG24-120+2xAWG22 FR-PVC GY c(UL)us CMG	PVC	7.0	66	36.0	65049	CMG
for continuous flexing, e.g. in drag chains as drop cable using standard cable design; approvals: c(UL)us listing CMG according to UL 444, (UL) listing CL3 according to UL 13, c(UR)us recognition AWM style 20201 (60°C, 600V) according to UL 758						

Resistances

	Oil resistance		Flame resistance		UV resistance	
PUR CMX	++	IEC 60811-2-1	+	IEC 60332-1-2 VW-1 (UL 2556)	+	
PVC CMG	++	UL 2556	++	IEC 60332-3-24 FT4 (UL 1685 / CSA)	++	UL 2556

++ excellent / + good / o adequate / - poor

SAFETY BUS

Application

SAFETY BUS is a secure and open fieldbus system for the decentralised interlinking of safety-oriented applications in automation technology. Gebauer & Griller offers cables for fixed installation and partly flexible applications without compulsory guide as well as a highly flexible version for the use in drag chains. In standard cables the special core insulation is protected by an inner jacket (fast-installation design) and a PVC outer sheath, in the drag chain version an abrasion-proof PUR sheath is used.

New to the range are two cable versions, one is halogen-free and highly flame-resistant for the protection of areas with many persons and commodity values and the other one is a robust version for occasional movements.

Most of our cables hold the appropriate approvals for the North American markets.

→ Maximum cable lengths of a bus segment

50 kbit/s	=	max. 1,000 m
125 kbit/s	=	max. 500 m
250 kbit/s	=	max. 250 m
500 kbit/s	=	max. 100 m

Construction

Conductor:	Stranded or extra fine stranded bare copper wires 0.75mm²
Insulation:	Foam-skin polyolefin (white, brown and green)
Wrapping:	Slide taping or extruded covering (fast connect design)
Screening:	Braid of tinned copper wires
Sheath:	Special compound of polyvinylchloride (PVC), thermoplastic, halogen-free, flame-retardant polymer compound (FRNC) or thermoplastic polyurethane compound (PUR), matt, low adhesion, halogen-free and flame-retardant, yellow (similar RAL 1003)

Mechanical Properties

Temperature range:	-40°C to +80°C fixed installation -25°C to +80°C fixed installation (FRNC) -10°C to +70°C flexible application -30°C to +70°C flexible application (PUR)
Min. bending radius:	8 x cable diameter fixed installation 10 x cable diameter flexible application

Electrical Properties

Impedance:	100 to 120 ohm at 1 MHz
Conductor resistance:	26 ohm / km
Capacitance:	nom. 45 nF / km
Operating voltage:	max. 250 V (peak value, not for connection to public mains)

Supported Connector Types

- 9-pin D-Sub-connector

Technical Data

Type	Sheath	OD mm	Weight [kg/km]	Cu index [kg/km]	Part number	UL
SAFETY BUS 3x0.75-110 FC FR-PVC YE c(UR)us AWM	PVC	8.0	89	49.0	110800	AWM
for fixed installation and flexible application without compulsory guide using fast connect design approvals: c(UR)us recognition AWM style 2464 (80°C, 300V) according to UL 758						
SAFTEY BUS 3x0.75-110 FRNC YE	FRNC	7.8	81	49.0	143760	-
for fixed installation and flexible application without compulsory guide using standard cable design, halogen-free						
SAFETY BUS 3x0.75-110 FR-PUR YE c(UL)us CMX	PUR	7.8	76	49.0	117566	CMX
for fixed installation and flexible application without compulsory guide in harsh industrial environment using standard cable design, halogen-free; approvals: c(UL)us listing CMX according to UL 444						
SAFETY BUS highflex 3x0.75-110 FR-PUR YE c(UL)us CMX	PUR	8.0	74	49.0	110801	CMX
for continuous flexing, e.g. in drag chains using standard cable design, halogen-free approvals: c(UL)us listing CMX according to UL 444						

Resistances

	Oil resistance		Flame resistance		UV resistance	
PVC AWM	o		+	IEC 60332-1-2 Cable Flame Test (UL 2556)	o	
FRNC	o		++	IEC 60332-3-24	o	
PUR CMX	++	IEC 60811-2-1	+	IEC 60332-1-2 VW-1 Test (UL 2556)	o	

++ excellent / + good / o adequate / - poor

USB

USB, FireWire Cables

Application

Universal **S**erial **B**us (USB) was developed by Intel and is a serial bus system for connecting a computer to external devices. FireWire (IEEE 1394) was previously developed by Apple, as a serial interface, a system in which the devices were able to communicate without host.

Those standards, popular in the office world, are increasingly used in the world of industry, too. Therefore Gebauer & Griller offers USB and FireWire cables with excellent screening and rugged PUR sheaths for harsh industrial environments. For every bus system there exists a design for standard transmission routes according to the respective regulations as well as a version for considerably longer transmission distances. The USB cable for longer transmission distances is additionally applicable in drag chains.

To top it off, all cables of the range hold the c(UR)us recognition.

→ **Maximum cable lengths of a bus segment**

USB
2xAWG24+2xAWG20 = max. 10.0 m

FIREWIRE
2x2AWG26+2xAWG22 = max. 4.5 m
2x2AWG24+2xAWG22 = max. 10.0 m

Construction

Conductor:	Stranded or extra fine stranded tinned copper wires Data pairs: AWG24 (USB) AWG26 or AWG24 (FireWire) Power supply cores: AWG20 (USB) AWG22 (FireWire)
Insulation:	Data pairs: Polyolefin, green and white (USB), foam-skin polyolefin, red, green, orange and blue (FireWire) Power supply cores: Special compound of polyvinylchloride (PVC), red and black (USB), white and black (FireWire)
Pair screening:	Plastic bonded aluminium tape (optional)
Wrapping:	Plastic tape or slide taping (optional)
Screening:	Plastic bonded aluminium tape or contuctive slide taping and braid of tinned copper wires
Sheath:	Thermoplastic polyurethane compound (PUR), matt, low adhesion, halogen-free and flame-retardant, black (similar RAL 9005)

Mechanical Properties

Temperature range:	-40°C to +80°C fixed installation -10°C to +70°C flexible application
Min. bending radius:	8 x cable diameter fixed installation 15 x cable diameter flexible application

Electrical Properties

Impedance:	90 ohm ± 15% (USB) 110 ± 6 ohm (FireWire)
Loop resistance:	max. 290.0 ohm / km (AWG26) max. 181.8 ohm / km (AWG24) max. 114.8 ohm / km (AWG22) max. 71.6 ohm / km (AWG20)
Operating voltage:	max. 250 V (peak value, not for connection to public mains)

Supported Connector Types

- USB 2.0-connector
- IEEE 1394-connector

FireWire is a registered trademark of Apple Inc.

Technical Data

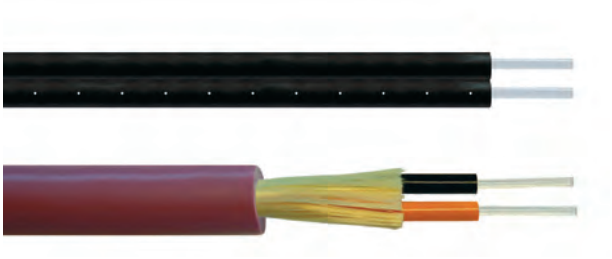
Type	Sheath	OD mm	Weight [kg/km]	Cu index [kg/km]	Part number	UL
USB 2.0 highflex 2xAWG24-90+2xAWG20 FR-PUR BK c(UR)us AWM	PUR	6.3	51	34.0	110873	AWM
for continuous flexing, e.g. in drag chains using standard cable design approvals: c(UR)us recognition AWM style 21198 (80°C, 300V) according to UL 758						
FireWire flex 2x2xAWG26-110+2xAWG22 FR-PUR BK c(UR)us AWM	PUR	6.8	64	34.0	110875	AWM
for fixed installation and flexible application without compulsory guide using standard cable design approvals: c(UR)us recognition AWM style 21198 (80°C, 300V) according to UL 758						
FireWire flex 2x2xAWG24-110+2xAWG22 FR-PUR BK c(UR)us AWM	PUR	7.0	68	41.0	110886	AWM
for fixed installation and flexible application without compulsory guide using standard cable design approvals: c(UR)us recognition AWM style 21198 (80°C, 300V) according to UL 758						

Resistances

	Oil resistance		Flame resistance		UV resistance	
PUR AWM	++	IEC 60811-2-1	+	Horizontal Flame Test (UL 2556)	+	

++ excellent / + good / o adequate / - poor

POF Cores, POF Bus Cables



Application

The use of POF (**P**olymer **O**ptical **F**ibres) for optical signal transmission combines easy installation with the advantages of fibre optic transmission systems (i.e. no influencing by electric or magnetic field interference, etc.)

Special material compounds guarantee smooth operation in harsh industrial environments. Gebauer & Griller POF cables can be used in a variety of bus systems (such as e.g. PROFIBUS, INTERBUS, etc.) due to the application of suitable interfaces, or rather, media converters.

The Simplex and Duplex core versions are predominantly used in applications with low mechanical stress such as e.g. in cabinets, etc. Sheathed cables for increased mechanical stress applications as well as our POF hybrid cables complete the delivery range.

The cables presented in these pages represent only a fraction of our wide range.

In case of interest we will gladly design a cable based on your requirements and specifications.

→ **Transmission distances**

max. 80 m

Construction

Conductor:	Data pairs: Step index fibre consisting of polymethylmethacrylate (PMMA) POF 980/1000 µm Power supply cores: Extra fine stranded bare copper wires 1.0 mm² or 1.5 mm²
Insulation:	Data pairs: Polyolefin or polyamide (PA), orange, black, red, green, blue, white and brown Power supply cores: polyolefin (blue and brown) or special compound of polyvinylchloride (PVC), black (with numbers)
Strengh members:	Aramid (optional)
Sheath:	Special compound of polyvinylchloride (PVC) or thermoplastic polyurethane compound (PUR), matt, low adhesion, halogen-free and flame-retardant, violet (similar RAL 4001), red (similar RAL 3000) or green (similar RAL 6018) (optional)

Mechanical Properties

Operating temperature:	-50°C to +80°C POF cores -20°C to +70°C POF cables
Temperature at laying:	-10°C to +50°C
Min. bending radius:	10 x cable diameter

Optical Properties

Attenuation:	max. 160 dB/km at 650 nm (laser) max. 230 dB/km at 660 nm (LED)
Bandwidth:	min. 10 MHz x 100 m
Numeric aperture:	0.5

Supported Connector Types

- ST (BFOC)-connector
- FSMA-connector
- HFBR 4501 / 4503 / 4506 / 4511 / 4513 / 4516 / 4531 / 4532 / 4533-connector
- F05-pin (TOSLINK compatible), F07-connector (TOSLINK compatible)
- SCRJ-connector

Technical Data

Type	Sheath	OD mm	Insulation mm	Insulation colour	Weight [kg/km]	Part number	UL/ resistances
POF SIMPLEX 1 P980/1000 PE BK	PE	2.2	-	-	3.8	51890	PE BS1
for use at low mechanical load, halogen-free[1)] ; also available in orange (Art. 110845), red (Art. 110846), green (Art. 110847), white (Art. 110848), grey (Art. 110850), a.o.							
POF SIMPLEX 1 P980/1000 PA BK	PA	2.2	-	-	4.0	110851	PA BS1
for flexible application without compulsory guide in harsh industrial environment, halogen-free[1)], also available in orange (Art. 51889) , other colors on request							
POF DUPLEX 2 P980/1000 PE BK	PE	4.4x2.2	-	-	7.6	51956	PE BS1
for use at low mechanical load, halogen-free[1)]							
POF DUPLEX 2 P980/1000 PA BK	PA	4.4x2.2	-	-	8.0	26494	PA BS1
for flexible application without compulsory guide in harsh industrial environment, halogen-free[1)]							
POF BUS CABLE 1 P980/1000 PE/FR-PUR RD	PUR	3.6	2.2	BK	11	110853	PUR BS1
for flexible SERCOS applications without compulsory guide and in harsh industrial environment, halogen-free[1)]							
POF BUS CABLE highflex 1 P980/1000 PE/FR-PUR RD	PUR	5.5	2.2	BK	30	110854	PUR BS1
at high mechanical load, for continuous flexing, e.g. in drag chains halogen-free[1)]							
POF BUS CABLE highflex 1 P980/1000 PE/FR-PUR RD	PUR	6.0	2.2	BK	30	74255	PUR BS1
for SERCOS applications at high mechanical load, for continuous flexing, e.g. in drag chains halogen-free[1)]							
POF BUS CABLE highflex heavy 1 P980/1000 PA/FR-PUR RD	PUR	6.0	2.2	BK	33	68872	PUR BS1
for SERCOS applications at extreme mechanical load, for continuous flexing, e.g. in drag chains halogen-free[1)]							
POF BUS CABLE 2 P980/1000 PE/FR-PUR VT DESINA	PUR	6.0	2.2	BK/OG	31	110924	PUR BS1
for flexible INTERBUS applications without compulsory guide in harsh industrial environment, halogen-free[1)]							
POF BUS CABLE heavy 2 P980/1000 PA/FR-PUR RD	PUR	6.0	2.2	BK/OG	34	55709	PUR BS1
for flexible INTERBUS applications without compulsory guide in very harsh industrial environment, halogen-free[1)]							
POF BUS CABLE 2 P980/1000 PA/FR-PVC VT DESINA	PVC	7.8	2.2	BK/OG	59	84159	PVC BS2
for flexible PROFIBUS applications without compulsory guide in industrial environment							
POF BUS CABLE 2 P980/1000 PA/FR-PVC GN	PVC	7.8	2.2	BK/OG	59	110861	PVC BS2
for flexible PROFINET applications without compulsory guide in industrial environment							
POF BUS CABLE highflex 2 P980/1000 PE/FR-PUR VT DESINA	PUR	6.0	2.2	BK/OG	31	110857	PUR BS1
at high mechanical load, for continuous flexing, e.g. in drag chains halogen-free[1)]							
POF BUS CABLE highflex heavy 2 P980/1000 PA/FR-PUR GN	PUR	8.0	2.2	BK/OG	53	110860	PUR BS1
for PROFIBUS/PROFINET applications at extreme mechanical load, for continuous flexing, e.g. in drag chains halogen-free[1)]							
POF BUS CABLE highflex 4 P980/1000 PE/FR-PUR VT DESINA	PUR	7.5	2.2	BK/OG BU/GN	50	106844	PUR BS1
at high mechanical load, for continuous flexing, e.g. in drag chains halogen-free[1)]							
POF HYBRIDBUS CABLE highflex 2 P980/1000+2x1.0 PE/FR-PUR VT DESINA	PUR	7.5	2.2	BK/OG BU/BN	63 Cu: 20	110859	PUR BS1
for PROFIBUS/PROFINET applications at high mechanical load with integrated power supply cores, for continuous flexing, e.g. in drag chains halogen-free[1)]							
POF HYBRIDBUS CABLE highflex 2 P980/1000+4x1.5 PA/FR-PVC/FR-PUR VT DESINA	PUR	9.4	2.2 2.5	BK/OG BK (No.)	120 Cu: 60	84180	PUR BS1
for PROFIBUS ECOFAST applications at high mechanical load with integrated power supply cores, for continuous flexing, e.g. in drag chains							

[1)] with the exception of the fibre coating

Resistances

	Oil resistance		Flame resistance		UV resistance	
PE BS1	+		-		++	
PA BS1	+		-		o	
PUR BS1	++	IEC 60811-2-1	-		+	
PVC BS2	o		o	IEC 60332-1-2	+	

++ excellent / + good / o adequate / - poor

PCF

PCF Cores, PCF Bus Cables

Application

Gebauer & Griller PCF (**P**olymer **C**ladded **F**ibre) bus cables are distinguished by a lower attenuation and thus longer transmission distances as compared to POF cables. On principle, the same transmission and reception devices as in POF can be used.

The cables are designed for fixed installation in indoor use, and especially the PUR-sheathed cables have an excellent resistance to most types of mineral oils and greases. By the use of suitable hardware, the cables can be applied in nearly every bus system.

The Simplex core with minimized diameter is – for example – highly suitable for applications in the SERCOS systems specified in ISO as well as in EN 61491.

In addition, versions for outdoor use and direct burial are also available.

→ **Transmission distances**

max. 500 m

Construction

Conductor:	Step index glass fibre coated with special polymer (PCF) 200/230/500 µm
Filling:	Petroleum jelly (optional)
Strengh members:	Aramid (optional)
Insulation:	Special compound of polyvinylchloride (PVC), or thermoplastic, halogen-free and flame-retardant polymer compound (FRNC), thermoplastic polyurethane compound (PUR), matt, low adhesion, halogen-free and flame-retardant orange, black, red, green or blue
Strengh members:	Aramid (optional)
Sheath:	Special compound of polyvinylchloride (PVC), thermoplastic, halogen-free and flame-retardant polymer compound (FRNC), thermoplastic polyurethane compound (PUR), matt, low adhesion, halogen-free and flame-retardant or polyethylene (PE), green (similar RAL 6018), orange (similar RAL 2003), red (similar RAL 3000) or black (similar RAL 9005) (optional)

Mechanical Properties

Operating temperature:	-20°C to +70°C
Temperature at laying:	-10°C to +50°C
Min. bending radius:	10 x cable diameter 20 x cable diameter (PN 110926, 110927, 110931, 111038)

Optical Properties

Attenuation:	max. 10 dB/km at 650 nm (laser) max. 8 dB/km at 850nm (LED)
Bandwidth:	min. 17 MHz x km at 650 nm (laser) min. 20 MHz x km at 850 nm (LED)
Numeric aperture:	0.37

Supported Connector Types

- ST (BFOC)-connector
- FSMA-connector
- HFBR 4521-connector
- SC-connector
- FC-connector
- LC-connector
- F05-connector (TOSLINK compatible), F07-connector (TOSLINK compatible)

Technical Data

Type	Sheath	OD mm	Insulation mm	Insulation colour	Weight [kg/km]	Part number	UL/ resistances
PCF SIMPLEX 1 K200/230 FR-PVC OG	PVC	2.2	-	-	4.0	110862	PVC BS1
for flexible application without compulsory guide at low mechanical load							
PCF SIMPLEX 1 K200/230 FR-PVC BK	PVC	2.2	-	-	4.0	104731	PVC BS1
for flexible application without compulsory guide at low mechanical load							
PCF SIMPLEX 1 K200/230 FRNC OG	FRNC	2.9	-	-	9.0	110863	FRNC BS1
for flexible indoor application without compulsory guide at low mechanical load, halogen-free[1)]							
PCF SIMPLEX 1 K200/230 FR-PUR BK	PUR	2.9	-	-	8.0	60171	PUR BS1
for flexible application without compulsory guide at high mechanical load, halogen-free[1)]							
PCF BUS CABLE 1 K200/230 FR-PVC/FR-PVC OG	PVC	5.0	2.2	OG	26	110864	PVC BS2
for flexible application without compulsory guide at high mechanical load							
PCF BUS CABLE Indoor 2 K200/230 FRNC/FRNC OG	FRNC	3.8x6.6	2.9	RD/GN	30	57909	FRNC BS1
for flexible indoor INTERBUS applications without compulsory guide, halogen-free[1)]							
PCF BUS CABLE 2 K200/230 FR-PVC/FR-PVC GN c(UL)us OFNG	PVC	7.2	2.2	BK/OG	61	84181	OFNG
for fixed indoor and outdoor PROFIBUS/PROFINET installations, approvals: c(UL)us listing OFNG according to UL 1651							
PCF BUS CABLE highflex 2 K200/230 FR-PVC/FR-PUR GN	PUR	8.8	2.2	BK/OG	68	110926	PUR BS1
for PROFIBUS/PROFINET applications with continuous flexing, e.g. in drag chains							
PCF BUS CABLE highflex 2 K200/230 FR-PVC/FR-PVC GN	PVC	8.8	2.2	BK/OG	75	110927	PVC BS3
for PROFIBUS/PROFINET applications with continuous flexing, e.g. in drag chains with increased flame-resistance							
PCF BUS CABLE Outdoor 2 K200/230 FRNC/PE BK	PE	7.0	2.2	BU/OG	39	110928	PE BS1
for fixed outdoor installation, halogen-free[1)]							
PCF BUS CABLE highflex 2 K200/230 FR-PVC/FR-PUR RD	PUR	7.0	2.2	BU/OG	44	83163	PUR BS1
for continuous flexing, e.g. in drag chains							
PCF BUS CABLE highflex 2 K200/230 FR-PVC/FR-PUR RD	PUR	7.4	2.2	BU/OG	59	110929	PUR BS1
for continuous flexing, e.g. in drag chains							
PCF BUS CABLE highflex 2 K200/230 FR-PVC/FR-PVC RD c(UL)us OFNG	PVC	7.4	2.2	BU/OG	66	110930	OFNG
for continuous flexing, e.g. in drag chains, approvals: c(UL)us listing OFNG according to UL 1651							
PCF BUS CABLE Outdoor 2 K200/230 FRNC/PE BK	PE	10.5	2.9	RD/GN	88	110931	PE BS1
for fixed outdoor INTERBUS installations, longitudinal watertight, halogen-free[1)]							
PCF BUS CABLE Burial 2 K200/230 RP PE BK	PE	7.5	-	OG	49	111038	PE BS1
for direct burial with non-metallic rodent protection, longitudinal and transversal watertight, halogen-free[1)]							

[1)] with the exception of the fibre coating

Resistances

	Oil resistance		Flame resistance		UV resistance	
PE BS1	+		-		++	
FRNC BS1	-		o	IEC 60332-1-2	-	
PUR BS1	++	IEC 60811-2-1	-		+	
PVC BS1	o		-		+	
PVC BS2	o		o	IEC 60332-1-2	+	
PVC BS3	++	UL 2556	++	IEC 60332-3-24	++	UL 2556
PVC OFNG	++	UL 2556	++	IEC 60332-3-24 FT4 (UL 1685 / CSA)	++	UL 2556

++ excellent / + good / o adequate / - poor

GOF

GOF Bus Cables

Application

Gebauer & Griller GOF (**G**lass **O**ptical **F**ibre) bus cables are distinguished by low attenuation and broad bandwidth. They allow for far longer transmission distances than POF and PCF bus cables.

Also in this cable group a distinction is made between indoor and outdoor cables and – according to their purpose – between fixed installation and partly flexible applications without compulsory guide; another possibility is the use in drag chains. Our direct burial type with non-metallic rodent protection is specifically suited for connecting buildings. Depending on the design as well as on the jacket materials used, several grades of flame-resistance as well as oil and UV resistances can be achieved.

For specific applications we offer cables with a special PUR sheath which combine improved tear and crush resistances with reduced outer diameters.

→ **Transmission distances**

max. 2,000 m

Supported Connector Types

- ST (BFOC)-connector
- SC-connector
- FC-connector
- LC-connector
- E2000-connector

Construction

Conductor:	Graded-index fibre G50/125 µm or G62.5/125 µm
Filling:	Petroleum jelly (optional)
Fibre coating:	Acrylate, special polyester or polyamide (PA)
Strengh members:	Aramid (optional)
Insulation:	Special compound of polyvinylchloride (PVC), thermoplastic, halogen-free and flame-retardant polymer compound (FRNC) or thermoplastic polyurethane compound (PUR), matt, low adhesion, halogen-free and flame-retardant, orange, black, grey, green or blue
Strengh members:	Aramid (optional)
Rodent protection:	Glass rovings (optional)
Sheath:	Special compound of polyvinylchloride (PVC), thermoplastic, halogen-free and flame-retardant polymer compound (FRNC), thermoplastic polyurethane compound (PUR), matt, low adhesion, halogen-free and flame-retardant or polyethylene (PE) orange (similar RAL 2003), green (similar RAL 6018) or black (similar RAL 9005)

Mechanical Properties

Operating temperature:	-25°C to +70°C
Temperature at laying:	-10°C to +50°C
Min. bending radius:	10 x cable diameter 20 x cable diameter (drag chain application) 15 x cable diameter (GOF BUS CABLE heavy without tensile stress) 30 x cable diameter (GOF BUS CABLE heavy under tensile stress)

Optical Properties

Attenuation:	max. 2.6 dB/km at 850 nm (G50) max. 2.9 dB/km at 850 nm (G62.5) max. 0.8 dB/km at 1,300 nm (G50) max. 0.9 dB/km at 1,300 nm (G62.5)
Bandwidth:	min. 600 MHz x km at 850 nm (G50) min. 200 MHz x km at 850 nm (G62.5) min. 1,200 MHz x km at 1,300 nm (G50) min. 600 MHz x km at 1,300 nm (G62.5)
Numeric aperture:	0.2 (G50) 0.275 (G62.5)

Technical Data

Type	Sheath	OD mm	Insulation mm	Insulation colour	Weight [kg/km]	Part number	UL/ resistances
GOF BUS CABLE 2 G62.5/125 FRNC/FRNC OG	FRNC	3.9x6.8	2.9	GY	31	110838	FRNC BS1
for indoor PROFIBUS applications, halogen-free							
GOF BUS CABLE 2 G62.5/125 FR-PVC/FR-PVC BK	PVC	6.3x9.8	3.5	GY	71	110839	PVC BS3
for indoor and outdoor PROFIBUS applications							
GOF BUS CABLE 2 G50/125 FR-PVC/FR-PVC GN	PVC	4.5x7.4	2.9	BK/OG	47	101760	PVC BS3
for PROFIBUS/PROFINET applications for fixed indoor and outdoor installation							
GOF BUS CABLE 2 G50/125 FRNC/FRNC GN	FRNC	9.2	2.9	BK/OG	78	110911	FRNC BS2
for PROFIBUS/PROFINET applications for fixed indoor installation, halogen-free							
GOF BUS CABLE Burial 2 G50/125 FR-PVC/PE BK	PE	10.5	2.9	BK/OG	101	110841	PE BS1
for PROFIBUS/PROFINET applications for direct burial with non-metallic rodent protection, longitudinal and transversal watertight							
GOF BUS CABLE highflex 2 G50/125 FR-PVC/FR-PUR GN	PUR	10.5	2.9	BK/OG	93	110913	PUR BS1
for PROFIBUS/PROFINET applications with continuous flexing, e.g. in drag chains at high mechanical load							
GOF BUS CABLE highflex 2 G50/125 FR-PVC/FR-PVC GN	PVC	10.5	2.9	BK/OG	102	110918	PVC BS3
for PROFIBUS/PROFINET applications with continuous flexing, e.g. in drag chains with increased flame-resistance							
GOF BUS CABLE highflex 2 G62.5/125 FR-PUR/FR-PUR BK	PUR	12.9	3.5	BK	125	110919	PUR BS1
for PROFIBUS/PROFINET applications with continuous flexing, e.g. in drag chains indoor and outdoor at high mechanical load, halogen-free							
GOF BUS CABLE heavy 2 G50/125 PA/FR-PUR BK	PUR	4.7	-	GN	23	84201	PUR BS1
for flexible indoor and outdoor application at extreme mechanical load, halogen-free							
GOF BUS CABLE heavy 2 G62.5/125 PA/FR-PUR BK	PUR	4.7	-	BU	23	76704	PUR BS1
for flexible indoor and outdoor application at extreme mechanical load, halogen-free							

Resistances

	Oil resistance		Flame resistance		UV resistance	
PE BS1	+		-		++	
FRNC BS1	-		o	IEC 60332-1-2	-	
FRNC BS2	-		++	IEC 60332-3-24	-	
PUR BS1	++	IEC 60811-2-1	-		+	
PVC BS3	++	UL 2556	++	IEC 60332-3-24	++	UL 2556

++ excellent / + good / o adequate / - poor

Bus Cables with copper conductors

Cable	Application	Impedance	Capacitance nom. [nF/km]
ASi 2x1.5 TPE	fixed installation/flexible application[1)]		
ASi 2x1.5 FR-PUR	drag chain application		
ASi 2x1.5 FR-PVC	fixed installation/flexible application[1)]		
ASi 2x2.5 FR-PUR	fixed installation/flexible application[1)]		
PROFIBUS DP 1x2x0.64-150 FR-PVC VT	fixed installation	150 ± 15	30
PROFIBUS DP Burial 1x2x0.64-150 FR-PVC/PE VT/BK	outdoor/burial	150 ± 15	30
PROFIBUS DP 1x2x0.64-150 FRNC VT	fixed installation	150 ± 15	30
PROFIBUS DP 1x2x0.64-150 FR-PUR VT	fixed installation	150 ± 15	30
PROFIBUS DP Extemp 1x2x0.64-150 FR-PVC VT	fixed installation	150 ± 15	30
PROFIBUS DP 1x2x0.64-150 PE BK	fixed installation	150 ± 15	30
PROFIBUS DP flex 1x2x0.64-150 FR-PVC VT	flexible application[1)]	150 ± 15	30
PROFIBUS DP flex 1x2x0.64L+3x1 FR-PVC VT	flexible application[1)]	150 ± 15	30
PROFIBUS DP highflex 1x2x0.64L-150 FR-PUR VT	drag chain application	150 ± 15	30
PROFIBUS DP highflex 1x2x0.64L-150 FC FR-PUR VT	drag chain application	150 ± 15	30
PROFIBUS DP Torsion 1x2x0.8L FR-PUR VT	torsion	150 ± 15	30
PROFIBUS DP Festoon 1x2x0.64L FR-PVC VT	festoon	150 ± 15	30
PROFIBUS DP highflex 1x2x0.64L-150+3x1.0 FR-PUR VT	drag chain application	150 ± 15	30
PROFIBUS DP highflex 1x2x0.64L-150+2x1.5 FR-PUR VT	drag chain application	150 ± 15	30
PROFIBUS DP highflex 1x2x0.64L-150+2x1.5 FR-PVC VT	drag chain application	150 ± 15	30
PROFIBUS DP highflex 1x2x0.64L-150+4x1.5 FR-PUR VT	drag chain application	150 ± 15	30
PROFIBUS DP highflex 1x2x0.64L-150+4x1.5 FR-PVC VT	drag chain application	150 ± 15	30
PROFIBUS PA 1x2x1.0-100 FR-PVC	fixed installation	100 ± 20 (31.25 kHz)	52
PROFIBUS PA 1x2xAWG18-100 FR-PVC	fixed installation	100 ± 20 (31.25 kHz)	52
PROFIBUS PA 1x2xAWG16-100 FR-PVC	fixed installation	100 ± 20 (31.25 kHz)	52
PROFIBUS PA 1x2xAWG14-100 FR-PVC	fixed installation	100 ± 20 (31.25 kHz)	52
FOUNDATION™ Fieldbus (Eco) 1x2xAWG18 FR-PVC	fixed installation	100 ± 20 (31.25 kHz)	52
FOUNDATION™ Fieldbus 1x2xAWG16 FR-PVC	fixed installation	100 ± 20 (31.25 kHz)	52
FOUNDATION™ Fieldbus 1x2xAWG14 FR-PVC	fixed installation	100 ± 20 (31.25 kHz)	52
PROFINET Type A 2x2xAWG22-100 FC (RP) FR-PVC GN(/BK)	fixed installation	100 ± 15	48
PROFINET Type A 2x2xAWG22-100 FC FRNC GN	fixed installation	100 ± 15	48
PROFINET Type A 2x2xAWG22-100 FEP GN	fixed installation	100 ± 15	48
PROFINET Type B (Outdoor) 2x2xAWG22-100 FC FR-PVC GN(BK)	flexible application[1)]	100 ± 15	48
PROFINET Type B 2x2xAWG22-100 FRNC GN	flexible application[1)]	100 ± 15	48
PROFINET Type B 2x2xAWG22-100+4x0.34 FRNC GN	flexible application[1)]	100 ± 15	48
PROFINET Type B 2x2xAWG22-100+4x1.5 FRNC GN	flexible application[1)]	100 ± 15	48
PROFINET Cabinet Cable Cat.5e 2x2xAWG24-100 FR-PVC GN	flexible application[1)]	101 ± 15	48
PROFINET Cabinet Cable Cat.5e 2x2xAWG24-100 FRNC GN	flexible application[1)]	102 ± 15	48
PROFINET Cabinet Cable Cat.5e 2x2xAWG24-100 FR-PUR GN	flexible application[1)]	103 ± 15	48
PROFINET Type C 2x2xAWG22-100 FC FR-PUR GN	drag chain application	100 ± 15	48
PROFINET Type C 2x2xAWG22-100 FC FR-PVC GN	drag chain application	100 ± 15	48
PROFINET Type C Torsion 2x2xAWG22-100 FR-PUR GN	torsion	100 ± 15	48
PROFINET Type C Festoon 2x2xAWG22-100 FC FR-PVC GN	festoon	100 ± 15	48

[1)] without compulsory guide

on

Operating voltage [V]	Max. loop resistance [ohm]	Min. bending radius fixed installation	Min. bending radius flexible application	Temperature range fixed installation [°C]	Temperature range flexible application [°C]
300	27.4	12 mm	24 mm	-40 to +105	
300	27.4	12 mm	24 mm	-40 to +80	-30 to +70
300	27.4	12 mm	24 mm	-40 to +90	-10 to +70
300	16.42	12 mm	24 mm	-40 to +80	-30 to +70
250	110.0	8 x d		-40 to +80	
250	110.0	8 x d		-40 to +70	
250	110.0	8 x d		-25 to +80	
250	110.0	8 x d		-40 to +80	
250	110.0	8 x d		-40 to +105	
250	110.0	8 x d		-40 to +70	
250	175.2		15 x d	-40 to +80	-10 to +70
250	175.2 / power supply 39.0		15 x d	-40 to +80	-10 to +70
250	133.0		8 x d		-30 to +70
250	133.0		15 x d		-30 to +70
250	133.0		15 x d		-30 to +70
250	133.0		8 x d		-10 to +70
250	133.0 / power supply 39.0		15 x d		-30 to +70
250	133.0 / power supply 26.6		15 x d		-30 to +70
250	133.0 / power supply 26.6		15 x d		-10 to +70
250	133.0 / power supply 26.6		15 x d		-30 to +70
250	133.0 / power supply 26.6		15 x d		-10 to +70
250	39.0	5 x d		-40 to +80	
250	43.8	5 x d		-40 to +80	
250	27.4	5 x d		-40 to +80	
250	17.2	5 x d		-40 to +80	
300	43.8	5 x d		-40 to +80	
300	27.4	10 x d		-40 to +80	
300	17.2	10 x d		-40 to +80	
125	115.0	10 x d		-40 to +80	
125	115.0	10 x d		-25 to +80	
125	115.0	10 x d		-50 to +180 (205)	
125	115.0	10 x d	5 x d	-40 to +80	-10 to +70
125	115.0	10 x d	5 x d	-25 to +80	-10 to +70
125	115.0 / power supply 115.0	10 x d	5 x d	-25 to +80	-10 to +70
125	115.0 / power supply 26.6	10 x d	5 x d	-25 to +80	-10 to +70
125	181.8	10 x d	5 x d	-40 to +80	-10 to +70
125	181.8	10 x d	5 x d	-25 to +80	-10 to +70
125	181.8	10 x d	5 x d	-40 to +80	-30 to +70
125	110.8		8 x d		-30 to +70
125	110.8		8 x d		-10 to +70
125	110.8		15 x d		-30 to +70
125	110.8		15 x d		-10 to +70

Bus Cables with copper conductors

Cable	Application	Impedance	Capacitance nom. [nF/km]
Industrial Ethernet Cat.5e 4x2xAWG24-100 FR-PVC GN	fixed installation	100 ± 15	48
Industrial Ethernet Cat.5e 4x2xAWG24-100 FR-PUR GN	fixed installation	100 ± 15	48
Industrial Ethernet Cat.5e 4x2xAWG24-100 FRNC GN	fixed installation	100 ± 15	48
Industrial Ethernet Cat.5e Hightemp 4x2xAWG24-100 FEP GN	fixed installation	100 ± 15	48
Industrial Ethernet Cat.5e flex 4x2xAWG26-100 FR-PVC GN	flexible application[1)]	100 ± 15	48
Industrial Ethernet Cat.5e flex 4x2xAWG26-100 FR-PUR GN	flexible application[1)]	100 ± 15	48
Industrial Ethernet Cat.5e flex 4x2xAWG26-100 FRNC GN	flexible application[1)]	100 ± 15	48
Industrial Ethernet DC Cat.5e flex 2x2xAWG24-100 FR-PVC GN	fixed installation/flexible application[1)]	100 ± 15	48
Industrial Ethernet DC Cat.5e flex 2x2xAWG26-100+1x2xAWG22 FR-PVC GN	fixed installation/flexible application[1)]	100 ± 15	48
Industrial Ethernet EC Cat.5e flex 2x2xAWG26-100 FR-PVC GN	fixed installation/flexible application[1)]	101 ± 15	48
Industrial Ethernet EC Cat.5e flex 2x2xAWG26-100 FR-PUR GN	fixed installation/flexible application[1)]	102 ± 15	48
Industrial Ethernet Cat.5e highflex Nx2xAWG26-100 FR-PUR	drag chain application	100 ± 15	48
Industrial Ethernet EC Cat.5e highflex 2x2xAWG26-100 FR-PUR GN	drag chain application	100 ± 15	48
Industrial Ethernet Cat.5e Torsion 4x2xAWG26-100 FR-PUR GN	torsion	100 ± 15	48
Industrial Ethernet DC (plus) Cat.5e highflex 2x2xAWG26-100+1x2xAWG22 FR-PUR GN	drag chain application	100 ± 15	48
Industrial Ethernet Cat.6 highflex 4x2xAWG26-100 FC FR-PUR GN	drag chain application	100 ± 15	48
Industrial Ethernet Cat.6_A highflex 4x2xAWG26-100 FR-PUR GN	drag chain application	100 ± 15	48
Industrial Ethernet Cat.7 4x2xAWG22-100 FR-PVC GN	fixed installation	100 ± 15	48
Industrial Ethernet Cat.7 4x2xAWG22-100 FC FR-PVC GN	fixed installation	100 ± 15	48
Industrial Ethernet Cat.7 4x2xAWG22-100 FR-PUR GN	fixed installation	100 ± 15	48
Industrial Ethernet Cat.7 4x2xAWG22-100 FRNC GN	fixed installation	100 ± 15	48
Industrial Ethernet Cat.7 flex 4x2xAWG23-100 FR-PVC GN	flexible application[1)]	100 ± 15	48
Industrial Ethernet Cat.7 flex 4x2xAWG23-100 FR-PUR GN	flexible application[1)]	100 ± 15	48
Industrial Ethernet Cat.7 flex 4x2xAWG23-100 FRNC GN	flexible application[1)]	100 ± 15	48
Industrial Ethernet Cat.7 flex 4x2xAWG26-100 FR-PVC GN	flexible application[1)]	100 ± 15	48
Industrial Ethernet Cat.7 flex 4x2xAWG26-100 FR-PUR GN	flexible application[1)]	100 ± 15	48
Industrial Ethernet Cat.7 flex 4x2xAWG26-100 FRNC GN	flexible application[1)]	100 ± 15	48
INTERBUS 3x2x0.22-100 FR-PVC	fixed installation/flexible application[1)]	100 ± 15	60
INTERBUS 3x2x0.22-100+3x1.0 FR-PVC	fixed installation/flexible application[1)]	100 ± 15	60
INTERBUS Burial 3x2x0.22-100 FR-PVC	outdoor/burial	100 ± 15	60
INTERBUS Burial 3x2x0.22-100+3x1.0 FR-PVC	outdoor/burial	100 ± 15	60
INTERBUS highflex 3x2x0.25-100 FR-PUR	drag chain application	100 ± 15	60
INTERBUS highflex 3x2x0.25-100+3x1.0 FR-PUR	drag chain application	100 ± 15	60
MULTIBUS Nx2x0.22-100 FR-PVC VT	fixed installation/flexible application[1)]	100 - 120	60
MULTIBUS highflex Nx2x0.25-100 FR-PUR VT	drag chain application	100 - 120	60
CAN BUS Nx2xAWG24-120 FR-PVC VT	fixed installation/flexible application[1)]	120 ± 12	40
CAN BUS Nx2xAWG22-120 FR-PVC VT	fixed installation/flexible application[1)]	120 ± 12	40
CAN BUS Nx2xAWG20-120 FR-PVC VT	fixed installation/flexible application[1)]	120 ± 12	40

[1)] without compulsory guide

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Operating voltage [V]	Max. loop resistance [ohm]	Min. bending radius fixed installation	Min. bending radius flexible application	Temperature range fixed installation [°C]	Temperature range flexible application [°C]
125	187.6	8 x d		-40 to +80	
125	187.6	8 x d		-40 to +80	
125	187.6	8 x d		-25 to +80	
125	187.6	8 x d		-50 to +180 (205)	
125	280 8	8 x d	15 x d	-40 to +80	-10 to +70
125	280 8	8 x d	15 x d	-40 to +80	-30 to +70
125	280 8	8 x d	15 x d	-25 to +80	-10 to +70
125	175.2	8 x d	15 x d	-40 to +80	-10 to +70
125	280.0 / power supply 110.8	8 x d	15 x d	-40 to +80	-10 to +70
125	280.0	8 x d	15 x d	-40 to +80	-10 to +70
125	280.0	8 x d	15 x d	-40 to +80	-30 to +70
125	280.0		15 x d		-30 to +70
125	280.0		15 x d		-30 to +70
125	280.0		15 x d		-30 to +70
125	280.0 / power supply 110.8	8 x d	15 x d		-30 to +70
125	280.0		15 x d		-30 to +70
125	280.0		15 x d		-30 to +70
125	115.0	8 x d		-40 to +80	
125	115.0	8 x d		-40 to +80	
125	115.0	8 x d		-40 to +80	
125	115.0	8 x d		-25 to +80	
125	146.2	8 x d	15 x d	-40 to +80	-10 to +70
125	146.2	8 x d	15 x d	-40 to +80	-30 to +70
125	146.2	8 x d	15 x d	-25 to +80	-10 to +70
125	280.0	8 x d	15 x d	-40 to +80	-10 to +70
125	280.0	8 x d	15 x d	-40 to +80	-30 to +70
125	280.0	8 x d	15 x d	-25 to +80	-10 to +70
250	186.0	8 x d	15 x d	-40 to +80	-10 to +70
250	186.0 / power supply 39.0	8 x d	15 x d	-40 to +80	-10 to +70
250	186.0	8 x d	15 x d	-40 to +80	-10 to +70
250	186.0 / power supply 39.0	8 x d	15 x d	-40 to +80	-10 to +70
250	159.8		15 x d		
250	159.8 / power supply 39.0		15 x d		-30 to +70
250	186.0	8 x d	15 x d	-40 to +80	-10 to +70
250	159.8		15 x d		-30 to +70
250	175.2	8 x d	15 x d	-40 to +80	-10 to +70
250	110.8	8 x d	15 x d	-40 to +80	-10 to +70
250	68.8	8 x d	15 x d	-40 to +80	-10 to +70

Bus Cables with copper conductors

Cable	Application	Impedance	Capacitance nom. [nF/km]
CAN BUS Nx2xAWG19-120 FR-PVC VT	fixed installation/flexible application[1)]	120 ± 12	40
CAN BUS Burial 2x2xAWG20-120 FR-PVC/PE VT/BK	fixed installation/flexible application[1)]	120 ± 12	40
CAN BUS Burial 2x2xAWG19-120 FR-PVC/PE VT/BK	fixed installation/flexible application[1)]	120 ± 12	40
CAN BUS highflex Nx2xAWG24-120 FR-PUR VT	drag chain application	120 ± 12	40
CAN BUS highflex Nx2xAWG22-120 FR-PUR VT	drag chain application	120 ± 12	40
CAN BUS highflex Nx2xAWG20-120 FR-PUR VT	drag chain application	120 ± 12	40
DeviceNet™ 2xAWG18-120+2xAWG15 PVC GY	fixed installation/flexible application[1)]	120 ± 12	40
DeviceNet™ 2xAWG20-120+2xAWG18 FR-PVC GY	fixed installation/flexible application[1)]	120 ± 12	40
DeviceNet™ 2xAWG24-120+2xAWG22 PVC GY	fixed installation/flexible application[1)]	120 ± 12	40
DeviceNet™ 2xAWG18-120+2xAWG15 FRNC VT	fixed installation/flexible application[1)]	120 ± 12	40
DeviceNet™ 2xAWG24-120+2xAWG22 FRNC VT	fixed installation/flexible application[1)]	120 ± 12	40
Device-Net™ highflex 2xAWG18-120+2xAWG15 FR-PUR VT	drag chain application	120 ± 12	40
Device-Net™ highflex 2xAWG24-120+2xAWG22 FR-PUR VT	drag chain application	120 ± 12	40
Device-Net™ highflex 2xAWG18-120+2xAWG15 FR-PVC GY	drag chain application	120 ± 12	40
Device-Net™ highflex 2xAWG24-120+2xAWG22 FR-PVC GY	drag chain application	120 ± 12	40
SAFETY BUS 3x0.75-110 FC FR-PVC YE	fixed installation/flexible application[1)]	100 - 120	45
SAFETY BUS 3x0.75-110 FRNC YE	fixed installation/flexible application[1)]	100 - 120	45
SAFETY BUS 3x0.75-110 FR-PUR YE	fixed installation/flexible application[1)]	100 - 120	45
SAFETY BUS highflex 3x0.75-110 FR-PUR YE	drag chain application	100 - 120	45
USB highflex 2xAWG24-90+2xAWG20 FR-PUR BK	drag chain application	90 ± 15%	
FireWire flex 2x2xAWG26-110+2xAWG22 FR-PUR BK	fixed installation/flexible application[1)]	110 ± 6	
FireWire flex 2x2xAWG24-110+2xAWG22 FR-PUR BK	fixed installation/flexible application[1)]	110 ± 6	

Fibre Optic Bus Cables

Cable	Application	Mechanical load	Bus type
POF SIMPLEX 1 P980/1000 PE	indoor/fixed installation	low	-
POF SIMPLEX 1 P980/1000 PA	indoor/flexible installation[1)]	high	-
POF DUPLEX 2 P980/1000 PE	indoor/fixed installation	low	-
POF DUPLEX 2 P980/1000 PA	indoor/flexible installation[1)]	high	-
POF BUS CABLE 1 P980/1000 PE/FR PUR RD	indoor/flexible installation[1)]	low	SERCOS
POF BUS CABLE highflex 1 P980/1000 PE/FR PUR RD Ø5.5mm	drag chain application	high	-
POF BUS CABLE highflex 1 P980/1000 PE/FR PUR RD Ø6.0mm	drag chain application	high	SERCOS
POF BUS CABLE highflex heavy 1 P980/1000 PA/FR PUR RD	drag chain application	extreme high	SERCOS
POF BUS CABLE 2 P980/1000 PE/FR PUR VT	drag chain application	high	INTERBUS
POF BUS CABLE heavy 2 P980/1000 PA/FR PUR RD	indoor/flexible installation[1)]	extreme high	INTERBUS

[1)] without compulsory guide

Operating voltage [V]	Max. loop resistance [ohm]	Min. bending radius fixed installation	Min. bending radius flexible application	Temperature range fixed installation [°C]	Temperature range flexible application [°C]
250	55.0	8 x d	15 x d	-40 to +80	-10 to +70
250	68.8	8 x d	15 x d	-40 to +70	
250	55.0	8 x d	15 x d	-40 to +70	
250	175.2		15 x d		-30 to +70
250	110.8		15 x d		-30 to +70
250	68.8		15 x d		-30 to +70
300	45.4 / power supply 22.6	5 x d	10 x d	-40 to +80	-10 to +70
300	71.6 / power supply 45.4	5 x d	10 x d	-40 to +80	-10 to +70
300	181.8 / power supply 114.8	5 x d	10 x d	-40 to +80	-10 to +70
300	45.4 / power supply 22.6	5 x d	10 x d	-25 to +80	-10 to +70
300	181.8 / power supply 114.8	5 x d	10 x d	-25 to +80	-10 to +70
300	45.4 / power supply 22.6		10 x d		-40 to +80
300	181.8 / power supply 114.8		10 x d		-40 to +80
300	45.4 / power supply 22.6		10 x d		-10 to +70
300	181.8 / power supply 114.8		10 x d		-10 to +70
250	26.0	8 x d	10 x d	-40 to +80	-10 to +70
250	26.0	8 x d	10 x d	-25 to +80	-10 to +70
250	26.0	8 x d	10 x d	-40 to +80	-30 to +70
250	26.0		10 x d		-30 to +70
250	181.8 / power supply 71.6		15 x d		-30 to +70
250	290.0 / power supply 114.8	8 x d	15 x d	-40 to +80	-30 to +70
250	181.8 / power supply 114.8	8 x d	15 x d	-40 to +80	-30 to +70

Max. attenuation [dB/km]	Min. bandwidth [MHz x km]	At laser/LED, GOF: laser+LED [nm]	Numeric aperture	Min. bending radius [mm]	Operating temperature [°C]	Temperature at laying [°C]
160 / 230	10 MHz x 100m	650 / 660	0.5	10 x d	-50 to +80	-10 to +50
160 / 230	10 MHz x 100m	650 / 660	0.5	10 x d	-50 to +80	-10 to +50
160 / 230	10 MHz x 100m	650 / 660	0.5	10 x d	-50 to +80	-10 to +50
160 / 230	10 MHz x 100m	650 / 660	0.5	10 x d	-50 to +80	-10 to +50
160 / 230	10 MHz x 100m	650 / 660	0.5	10 x d	-20 to +70	-10 to +50
160 / 230	10 MHz x 100m	650 / 660	0.5	10 x d	-20 to +70	-10 to +50
160 / 230	10 MHz x 100m	650 / 660	0.5	10 x d	-20 to +70	-10 to +50
160 / 230	10 MHz x 100m	650 / 660	0.5	10 x d	-20 to +70	-10 to +50
160 / 230	10 MHz x 100m	650 / 660	0.5	10 x d	-20 to +70	-10 to +50
160 / 230	10 MHz x 100m	650 / 660	0.5	10 x d	-20 to +70	-10 to +50

Fibre Optic Bus Cables

Cable	Application	Mechanical load	Preferable bus type
POF BUS CABLE 2 P980/1000 PA/FR PVC VT	indoor/flexible installation[1)]	moderate	PROFIBUS
POF BUS CABLE 2 P980/1000 PA/FR PVC GN	indoor/flexible installation[1)]	moderate	PROFINET
POF BUS CABLE highflex 2 P980/1000 PE/FR PUR VT	drag chain application	high	-
POF BUS CABLE highflex heavy 2 P980/1000 PA/FR PUR GN	drag chain application	extreme high	PROFIBUS / PROFINET
POF BUS CABLE highflex 4 P980/1000 PE/FR PUR VT	drag chain application	high	-
POF HYBRIDBUS CABLE highflex 2 P980/1000+2x1.0 PE/ FR-PUR VT	drag chain application	high	PROFIBUS / PROFINET
POF HYBRIDBUS CABLE highflex 2 P980/1000+4x1.5 PA/FR-PVC/FR-PUR VT	drag chain application	high	PROFIBUS
PCF SIMPLEX 1 K200/230 FR-PVC	indoor/flexible installation[1)]	low	-
PCF SIMPLEX 1 K200/230 FR-FRNC	indoor/flexible installation[1)]	low	-
PCF SIMPLEX 1 K200/230 FR-PUR	indoor/flexible installation[1)]	high	-
PCF BUS CABLE 1 K200/230 FR-PVC/FR-PVC OG	indoor/flexible installation[1)]	high	-
PCF BUS CABLE Indoor 2 K200/230 FRNC/FRNC OG	indoor/flexible installation[1)]	low	INTERBUS
PCF BUS CABLE 2 K200/230 FR-PVC/FR-PVC GN	indoor/outdoor/fixed instal-lation	moderate	PROFIBUS / PROFINET
PCF BUS CABLE highflex 2 K200/230 FR-PVC/FR-PUR GN	drag chain application	high	PROFIBUS / PROFINET
PCF BUS CABLE highflex 2 K200/230 FR-PVC/FR-PVC GN	drag chain application	high	PROFIBUS / PROFINET
PCF BUS CABLE Outdoor 2 K2 00/230 FRNC/PE BK	outdoor/fixed installation	high	-
PCF BUS CABLE highflex 2 K200/230 FR-PVC/FR-PUR RD	drag chain application	high	-
PCF BUS CABLE highflex 2 K200/230 FR-PVC/FR-PVC RD	drag chain application	high	-
PCF BUS CABLE Outdoor 2 K200/230 FRNC/PE BK	outdoor/fixed installation	high	INTERBUS
PCF BUS CABLE Burial 2 K200/230 RP PE BK	burial	high	-
GOF BUS CABLE 2 G62.5/125 FRNC/FRNC OG	indoor	low	PROFIBUS
GOF BUS CABLE 2 G62.5/125 FR-PVC/FR-PVC BK	indoor/outdoor	high	PROFIBUS
GOF BUS CABLE 2 G50/125 FR-PVC/FR-PVC GN	indoor/outdoor	moderate	PROFIBUS / PROFINET
GOF BUS CABLE 2 G50/125 FRNC/FRNC GN	indoor/fixed installation	high	PROFIBUS / PROFINET
GOF BUS CABLE Burial 2 G50/125 FR-PVC/PE BK	burial	high	-
GOF BUS CABLE highflex 2 G50/125 FR-PVC/FR-PUR GN	drag chain application	high	-
GOF BUS CABLE highflex 2 G50/125 FR-PVC/FR-PVC GN	drag chain application	high	PROFIBUS / PROFINET
GOF BUS CABLE highflex 2 G62.5/125 FR-PUR/FR-PUR BK	drag chain application	high	PROFIBUS / PROFINET
GOF BUS CABLE heavy 2 G50/125 PA/FR-PUR BK	indoor/outdoor	extreme high	-
GOF BUS CABLE heavy 2 G62.5/125 PA/FR-PUR BK	indoor/outdoor	extreme high	-

[1)] without compulsory guide

Max. attenuation [dB/km]	Min. bandwidth [MHz x km]	At laser/LED, GOF: laser+LED [nm]	Numeric aperture	Min. bending radius [mm]	Operating temperature [°C]	Temperature at laying [°C]
160 / 230	40 MHz x 100m	650 / 660	0.5	10 x d	-20 to +70	-10 to +50
160 / 230	40 MHz x 100m	650 / 660	0.5	10 x d	-20 to +70	-10 to +50
160 / 230	10 MHz x 100m	650 / 660	0.5	10 x d	-20 to +70	-10 to +50
160 / 230	40 MHz x 100m	650 / 660	0.5	10 x d	-20 to +70	-10 to +50
160 / 230	10 MHz x 100m	650 / 660	0.5	10 x d	-20 to +70	-10 to +50
160 / 230	40 MHz x 100m	650 / 660	0.5	10 x d	-20 to +70	-10 to +50
160 / 230	40 MHz x 100m	650 / 660	0.5	10 x d	-20 to +70	-10 to +50
10 / 8	17 / 20	650 / 850	0.37	10 x d	-20 to +70	-10 to +50
10 / 8	17 / 20	650 / 850	0.37	10 x d	-20 to +70	-10 to +50
10 / 8	17 / 20	650 / 850	0.37	10 x d	-20 to +70	-10 to +50
10 / 8	17 / 20	650 / 850	0.37	10 x d	-20 to +70	-10 to +50
10 / 8	17 / 20	650 / 850	0.37	10 x d	-20 to +70	-10 to +50
10 / 8	17 / 20	650 / 850	0.37	10 x d	-20 to +70	-10 to +50
10 / 8	17 / 20	650 / 850	0.37	20 x d	-20 to +70	-10 to +50
10 / 8	17 / 20	650 / 850	0.37	20 x d	-20 to +70	-10 to +50
10 / 8	17 / 20	650 / 850	0.37	10 x d	-20 to +70	-10 to +50
10 / 8	17 / 20	650 / 850	0.37	10 x d	-20 to +70	-10 to +50
10 / 8	17 / 20	650 / 850	0.37	10 x d	-20 to +70	-10 to +50
10 / 8	17 / 20	650 / 850	0.37	20 x d	-20 to +70	-10 to +50
10 / 8	17 / 20	650 / 850	0.37	20 x d	-20 to +70	-10 to +50
2.9 / 0.9	200 / 600	850 / 1,300	0.275	10 x d	-25 to +70	-10 to +50
2.9 / 0.9	200 / 600	850 / 1,300	0.275	10 x d	-25 to +70	-10 to +50
2.6 / 0.8	600 / 1,200	850 / 1,300	0.2	10 x d	-25 to +70	-10 to +50
2.6 / 0.8	600 / 1,200	850 / 1,300	0.2	10 x d	-25 to +70	-10 to +50
2.6 / 0.8	600 / 1,200	850 / 1,300	0.2	10 x d	-25 to +70	-10 to +50
2.6 / 0.8	600 / 1,200	850 / 1,300	0.2	20 x d	-25 to +70	-10 to +50
2.6 / 0.8	600 / 1,200	850 / 1,300	0.2	20 x d	-25 to +70	-10 to +50
2.9 / 0.9	200 / 600	850 / 1,300	0.275	20 x d	-25 to +70	-10 to +50
2.6 / 0.8	600 / 1,200	850 / 1,300	0.2	15 / 30 (Zug) x d	-25 to +70	-10 to +50
2.9 / 0.9	200 / 600	850 / 1,300	0.275	15 / 30 (Zug) x d	-25 to +70	-10 to +50

Gebauer & Griller

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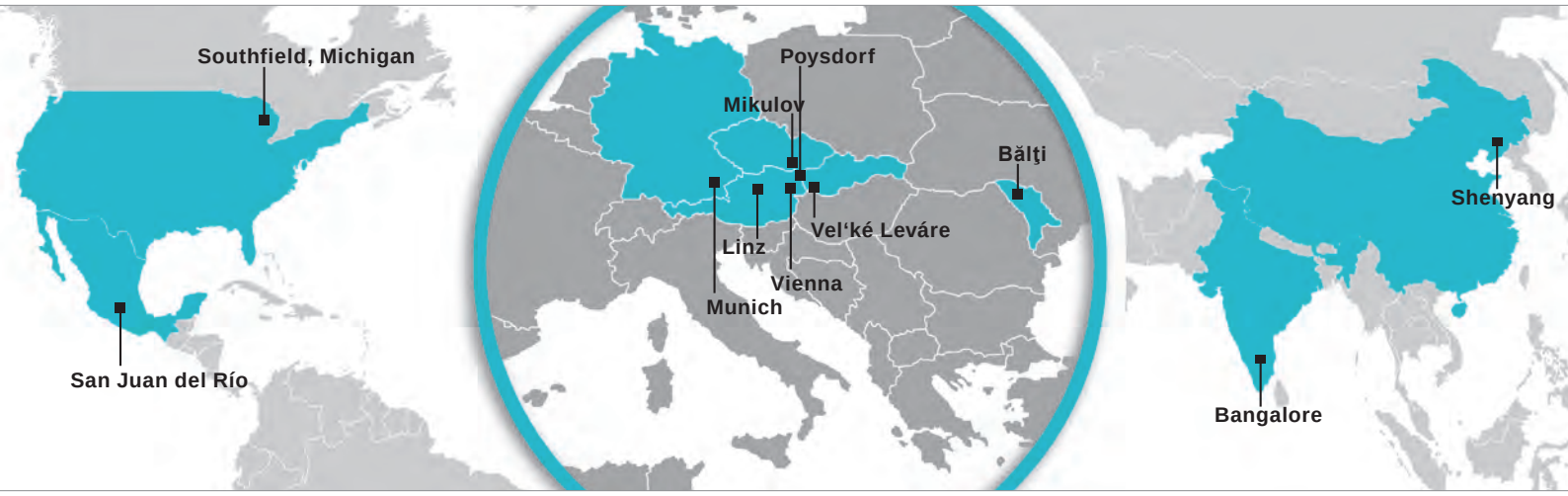

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