UNITRONIC® BUS and ETHERLINE® – which cable suits which fieldbus system?

Usage criteria	Cable designation																								
	UNITRONIC® BUS IBS A	UNITRONIC® BUS IBS P COMBI A	UNITRONIC® BUS IBS FD P	UNITRONIC® BUS IBS FD P COMBI	UNITRONIC® BUS IBS Yv COMBI	UNITRONIC® BUS LD A + BUS LD FD P A	UNITRONIC® BUS PB A	UNITRONIC® BUS PB PE	UNITRONIC® BUS PB 7-W A	UNITRONIC® BUS PA	UNITRONIC® BUS PB FD P	UNITRONIC® BUS PB TORSION	UNITRONIC® BUS PB FESTOON	UNITRONIC® BUS PB FD P HYBRID	UNITRONIC® BUS PB Yv, PB YY	UNITRONIC® BUS PB PE FC	UNITRONIC® BUS PB H FC	UNITRONIC® BUS PB P FC	UNITRONIC® BUS PA FC	UNITRONIC® BUS PB FD P FC	UNITRONIC® BUS PB BURIAL FC	UNITRONIC® BUS CAN	UNITRONIC® BUS CAN FD P	UNITRONIC® BUS CAN BURIAL	UNITRONIC® BUS PB HEAT 180	UNITRONIC® BUS IS	UNITRONIC® BUS PB TRAY	UNITRONIC® BUS CAN TRAY
DIN VDE Standards																									
UL/CSA-approved	✔	✔	✔	✔	✔	✔	✔		✔			✔	✔	✔			✔	✔	✔	✔		✔	✔				✔	✔
Installation																									
Fixed installation	✔	✔				✔	✔	✔	✔	✔					✔	✔	✔	✔	✔			✔		✔	✔		✔	✔
Flexible									✔													✔		✔	✔	✔		
Highly flexible (drag chains etc.)			✔	✔		✔					✔	✔	✔	✔						✔			✔					
Suitable for outdoor use/direct burial, UV-resistant					✔										✔	✔					✔			✔		✔		
Z_∞ Mean characteristic Impedance																									
100–120 ohms	✔	✔	✔	✔	✔	✔				✔									✔			✔	✔	✔			✔	✔
150 ohms							✔	✔	✔		✔	✔	✔	✔	✔	✔	✔	✔		✔	✔				✔			
Dimensions																									
In mm², or diameter in mm, or AWG size																									
3 x 2 x 0.22	✔																								
3 x 2 x 0.25			✔																						
3 x 2 x 0.25 + 3 x 1.0		✔		✔																					
3 x 2 x 0.22 + 3 x 1.0					✔																				
1 x 2 x 0.22/2 x 2 x 0.22/3 x 2 x 0.22						✔																			
1 x 2 x 0.64							✔	✔	✔		✔		✔		✔	✔	✔	✔		✔	✔			✔		✔		
1 x 2 x 1.0										✔															
1 x 2 x 0.8												✔							✔						
1 x 2 x 0.64 + 4 x 1.5														✔											
1 x 2 x 0.25/2 x 2 x 0.25																						✔	✔		
1 x 2 x 0.34/2 x 2 x 0.34																						✔	✔					✔
1 x 2 x 0.5/2 x 2 x 0.5																						✔	✔	✔				
1 x 2 x 0.75/2 x 2 x 0.75																						✔						
2 x 6 + 2 x 2.5 + 1 x 4 x 0.5																										✔		
Bus systems																									
INTERBUS® DIN 19258 EN 50251 sensor/actuator bus	✔																								
INTERBUS® (Phoenix Contact)	✔	✔	✔	✔	✔																				
SUCOnet p® (Klöckner-Möller), Modulink® P (Weidmüller) MODBUS VariNet®-P (Pepperl + Fuchs)						✔																			
PROFIBUS-DP, -FMS, FIP							✔	✔	✔		✔	✔	✔	✔	✔	✔	✔	✔		✔	✔			✔		✔		
PROFIBUS-PA, Foundation™ Fieldbus										✔									✔									
CAN ISO 11898, CAN open																						✔	✔	✔				✔
AS-INTERFACE																												
EIB																												
CC-Link®																												
Device Net™ (Allen-Bradley/Rockwell Automation)																												
Industrial Ethernet/Fast Ethernet																												
ISOBUS (ISO 11783-2)																										✔		

Legend

7-W	= 7-wire braided conductor	LD	= Long distance		
AS-I	= AS-INTERFACE	P	= Polyurethane outer sheath		
COMBI IBS	= Installation bus cable for INTERBUS	PB	= **PROFI BUS**		
DN	= **D**evice **N**et	PE	= Polyethylene outer sheath		
EIB	= European Installation Bus	PROFIBUS-DP	= **D**ecentralised **P**eriphery		
FD	= Cable suitable for drag chains	PROFIBUS-FMS	= **F**ieldbus **M**essage **S**pecification		
FRNC	= **F**lame **R**etardant **N**on **C**orrosive	PROFIBUS-PA	= **P**rocess **A**utomation		
G	= Rubber outer sheath (EPDM)	TPE	= Thermoplastic elastomer		
H	= Halogen-free material	Yv	= Cable for routing outdoors/underground with reinforced PVC outer sheath		
IBS	= Remote bus cable for INTERBUS				
L2	= Abbr. for SINEC L2-DP	YY	= Twin PVC outer sheath		

Trademarks

- CC-Link® = is a registered trademark of CLPA, Japan
- DeviceNet™ = is a registered trademark of Open Device Vendors Association (ODVA)
- Foundation™ = is a registered trademark of Foundation Fieldbus
- INTERBUS® = is a registered trademark of Phoenix Contact GmbH & Co.
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- VariNet®-P = is a registered trademark of Pepperl + Fuchs GmbH

UNITRONIC® BUS and ETHERLINE® – which cable suits which fieldbus system?

Usage criteria	Cable designation																															
	UNITRONIC® BUS ASI (G)	UNITRONIC® BUS ASI LD FD P	UNITRONIC® BUS ASI FD (TPE) A	UNITRONIC® BUS ASI FD P FRNC	UNITRONIC® BUS ASI (PVC) A	UNITRONIC® BUS DN THICK FRNC	UNITRONIC® BUS DN THIN FRNC	UNITRONIC® BUS DN THICK Y	UNITRONIC® BUS DN THIN Y	UNITRONIC® BUS DN THICK FD P	UNITRONIC® BUS DN THIN FD P	UNITRONIC® BUS DN THICK FD Y	UNITRONIC® BUS DN THIN FD Y	UNITRONIC® BUS EIB, BUS EIB H	UNITRONIC® BUS EIB COMBI	UNITRONIC® BUS FF 3, FF 3 ARM	UNITRONIC® BUS FF 2	UNITRONIC® BUS CC	UNITRONIC® BUS CC FD P FRNC	ETHERLINE® H, P	ETHERLINE® H-H	ETHERLINE® H FLEX, P-FLEX	ETHERLINE® PN Cat.5	ETHERLINE® FD Cat.5	ETHERLINE® PN Cat.5 FD	ETHERLINE® PN FLEX Cat.5	ETHERLINE® Cat.5 ARM	ETHERLINE® Cat.5 FRNC HYBRID	ETHERLINE® Cat.6$_A$	ETHERLINE® Cat.7	ETHERLINE® TORSION Cat.5	ETHERLINE® FD P Cat.6	ETHERLINE® TORSION Cat.6$_A$	ETHERLINE® FD Cat.6$_A$	ETHERLINE® PN Cat.6$_A$ FLEX	ETHERLINE® EC FLEX/FD Cat.5e	ETHERLINE® Y FLEX Cat.5e	ETHERLINE® TRAY ER PN Y FC	ETHERLINE® TORSION Cat.7
DIN VDE Standards																																	
UL/CSA-approved		✔	✔		✔	✔	✔	✔	✔	✔	✔	✔	✔			✔	✔	✔	✔					✔	✔	✔		✔		✔	✔	✔	✔	✔	✔	✔	✔	✔
Installation																																	
Fixed installation	✔	✔	✔	✔	✔	✔	✔	✔	✔					✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Flexible	✔	✔	✔		✔	✔	✔	✔	✔								✔			✔			✔	✔	✔	✔	✔		✔		✔	✔	✔	✔	✔	✔		✔
Highly flexible (drag chains, torsional stress etc.)		✔	✔							✔	✔	✔	✔						✔					✔	✔					✔	✔	✔	✔		✔		✔
Suitable for outdoor use/direct burial, UV-resistant																																	
Z_∞ Mean characteristic Impedance																																	
100–120 ohms						✔	✔	✔	✔	✔	✔	✔	✔			✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Dimensions																																	
In mm², or diameter in mm, or AWG size																																	
1 x 2 x 0.5, 2 x 2 x 0.5																																	
2 x 1.5	✔		✔	✔	✔																												
2 x 2.5		✔																															
AWG 18 + 15					✔		✔		✔																								
AWG 24 + 22						✔		✔		✔																								
2 x 2 x 0.8														✔																			
2 x 2 x 0.8 + 3 x 1.5															✔																		
2 x 2 x AWG 24/1 and 4 x 2 x AWG 24/1																				✔													
4 x 2 x AWG 24/1																					✔												
4 x 2 x AWG 24/7																															✔	✔			✔
2 x 2 x AWG 26/7 and 4 x 2 x AWG 26/7																						✔											
4 x 2 x AWG 26/7																																✔	✔
2 x 2 x AWG 22/1																							✔				✔						✔
2 x 2 x AWG 26/19, 4 x 2 x AWG 26/19																								✔									
2 x 2 x AWG 22/7																									✔	✔							
2 x 2 x AWG 22/19																														✔			
1 x 2 x 1.1 + 1 x 1.1																✔																	
1 x 2 x 1.1																	✔																
3 x 1 x AWG 20																		✔	✔														
4 x 2 x AWG 22/1																												✔	✔				
4 x 2 x AWG 22/7																																	
4 x 2 x AWG 23/7																															✔		
2 x 2 x AWG 22/7 + 4 x 1.5																												✔					
4 x 2 x AWG 26/19																														✔			
Bus systems																																	
INTERBUS® DIN 19258 EN 50251 sensor/actuator bus																																	
INTERBUS® (Phoenix Contact)																																	
SUCOnet p® (Klöckner-Möller), Modulink® P (Weidmüller) MODBUS VariNet®-P (Pepperl + Fuchs)																																	
PROFIBUS DIN 19245 EN 50170																																	
PROFIBUS-DP, -FMS, FIP																																	
PROFIBUS-PA, Foundation™ Fieldbus																✔	✔																
CAN ISO 11898, CAN open						✔	✔	✔	✔	✔	✔	✔	✔																				
AS-INTERFACE	✔	✔	✔	✔	✔																												
EIB														✔	✔																		
CC-Link®																		✔	✔														
Device Net™ (Allen-Bradley/Rockwell Automation)					✔	✔	✔	✔	✔	✔	✔	✔	✔																				
Industrial Ethernet/Fast Ethernet																			✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
PROFINET																						✔		✔	✔	✔	✔		✔		✔	✔	✔			✔	✔		
EtherCAT																			✔	✔	✔	✔						✔	✔	✔	✔	✔	✔	✔		✔	✔		

Legend

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PE	=	Polyethylene outer sheath
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PROFIBUS-FMS	=	**F**ieldbus **M**essage **S**pecification
PROFIBUS-PA	=	**P**rocess **A**utomation
TPE	=	Thermoplastic elastomer
Yv	=	Cable for routing outdoors/underground with reinforced PVC outer sheath
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UNITRONIC® BUS and ETHERLINE® – technical data

Usage criteria	Cable designation														
	UNITRONIC® BUS IBS fixed installation	UNITRONIC® BUS IBS FD P highly flexible application	UNITRONIC® BUS IBS Yv suitable for outdoor use/direct burial	UNITRONIC® BUS LD fixed installation	UNITRONIC® BUS LD FD P highly flexible application	UNITRONIC® BUS PB fixed installation	UNITRONIC® BUS PB FD P + PB FD P FC highly flexible application	UNITRONIC® BUS PB Yv suitable for outdoor use/direct burial	UNITRONIC® BUS PA (BU + BK) fixed installation	UNITRONIC® BUS CAN fixed installation (0.22 mm²)	UNITRONIC® BUS FD P CAN FD P highly flexible application (0.25 mm²)	UNITRONIC® BUS FF 3 ARM fixed installation	UNITRONIC® BUS FF 2 fixed installation	UNITRONIC® BUS CAN TRAY	UNITRONIC® BUS PB TRAY
Parameter															
Characteristic impedance Ω	100	100	100	100–120	100–120	150 +/-15	150 +/-15	150 +/-15	100 +/-20	120	120	100	100	120	150 +/-15
Mutual capacitance (800 Hz) max. nF/km	60	60	60	60	60	30	30	30	52	40	40	56	65	40	30
Peak operating voltage V (not for power applications)	250	250	250	250	250	250	250	250	250	250	250	300	300	250	250
Test voltage, core/core, U_{eff} V	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	2000	2000
Conductor resistance (loop) Data network cable pair max. Ω/km	186	159.8	186	186	159.8	110	145, 133	115	44	186	159.8	≤ 24	≤ 24	110.8	110
Minimum bending radius, fixed installation	8 x D	–	8 x D	8 x D	–	75 mm	–	75 mm	65 mm	8 x D	–	15 x D	15 x D	8 x D	8 x D
Minimum bending radius, flexing	–	15 x D	–	–	15 x D	–	**	–	–	–	15 x D	–	–	–	–
Temperature range fixed installation from °C	- 30	- 40	- 40	- 40	- 40	- 40	- 40	- 40	- 30	- 30	- 40	- 25	- 25	- 40	- 40
Temperature range fixed installation to °C	+ 80	+ 80	+ 70	+ 80	+ 80	+ 80	+ 80	+ 80	+ 80	+ 80	+ 80	+ 80	+ 105	+ 80	+ 80
Temperature range flexing from °C	–	- 30	–	- 5	- 30	–	- 30	–	–	- 5	- 30	–	–	- 10	- 10
Temperature range flexing to °C		+ 70		+ 70	+ 70		+ 70			+ 70	+ 70			+ 70	+ 70

Usage criteria	Cable designation														
	UNITRONIC® BUS CC	UNITRONIC® BUS CC FD P FRNC	ETHERLINE® H Cat.5e	ETHERLINE® P Cat.5e	ETHERLINE® H-H Cat.5e	ETHERLINE® H FLEX Cat.5e	ETHERLINE® P FLEX Cat.5e	ETHERLINE® Y FLEX Cat.5e	ETHERLINE® Y EC FLEX Cat.5e	ETHERLINE® P EC FLEX Cat.5e	ETHERLINE® P EC FD Cat.5e	ETHERLINE® PN Cat.5 Y FLEX FC	ETHERLINE® PN Cat.5 FRNC FLEX FC	ETHERLINE® TORSION Cat.5	
Parameter															
Characteristic impedance Ω	110	110	100	100	100	100	100	100	100	100	100	100	100	100	
Mutual capacitance (800 Hz) max. nF/km	60	60	48	46	46	48	48	–	–	–	–	–	–	–	
Peak operating voltage V (not for power applications)	300	300	125	125	125	125	125	125	100	100	100	125	125	100	
Test voltage, core/core, U_{eff} V	2000	2000	1000	1000	1000	1000	1000	1000	1000	1000	1000	2000	2000	700	
Conductor resistance (loop) Data network cable pair max. Ω/km	37.8	37.8	192	186.6	186.6	284	284	–	–	–	–	–	–	–	
Minimum bending radius, fixed installation	15 x D	4 x D	7.5-8 x D	7.5-8 x D	8 x D	8 x D	8 x D	8 x D	4 x D	4 x D	4 x D	10 x D	4 x D	5 x D	
Minimum bending radius, flexing	–	8 x D	–	–	–	15 x D	15 x D	15 x D	8 x D	8 x D	8 x D	15 x D	8 x D	5 x D	
Temperature range fixed installation from °C	- 40	- 40	- 30	- 30	- 30	- 30	- 30	- 40	- 30	- 40	- 40	- 40	- 25	- 40	
Temperature range fixed installation to °C	+ 70	+ 80	+ 80	+ 80	+ 80	+ 80	+ 80	+ 80	+ 80	+ 80	+ 80	+ 80	+ 80	+ 80	
Temperature range flexing from °C	–	- 40	- 5	- 5	- 5	- 5	- 5	- 10	- 5	- 30	- 30	- 20	- 25	- 40	
Temperature range flexing to °C		+ 80	+ 60	+ 60	+ 60	+ 60	+ 60	+ 70	+ 50	+ 50	+ 50	+ 60	+ 80	+ 80	

**without FC = 65 mm/FC = 120 mm

Usage criteria	Cable designation													
	ETHERLINE® PN Cat.5e Y	ETHERLINE® TRAY ER PN Y FC	ETHERLINE® Y FC Cat.5	ETHERLINE® Cat.5e YY	ETHERLINE® FD P Cat.5e	ETHERLINE® FD P FC Cat.5 highly flexible application	ETHERLINE® PN Cat.6$_A$ FRNC FC + ETHERLINE® PN Cat.7 FRNC	ETHERLINE® PN Cat.6$_A$ P FC + ETHERLINE® PN Cat.7 P	ETHERLINE® PN Cat.6$_A$ Y FC + ETHERLINE® PN + Cat.7 Y	ETHERLINE® PN Cat.6$_A$ Y FLEX FC	ETHERLINE® PN Cat.6$_A$ FRNC FLEX FC	ETHERLINE® FD Cat.6$_A$ + TORSION Y Cat.6$_A$	ETHERLINE® FD P Cat.6$_A$ + TORSION P Cat.6$_A$	ETHERLINE® TORSION Cat.7
Parameter														
Characteristic impedance Ω	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Mutual capacitance (800 Hz) max. nF/km	48	48	48	48	50	52	–	–	–	–	–	–	–	50
Peak operating voltage V (not for power applications)	125	125	125	125	125	125	125	125	125	125	125	125	125	125
Test voltage, core/core, U_{eff} V	1000	2000	1000	1000	1000	700	1000	1000	1000	1000	1000	1000	1000	750
Conductor resistance (loop) Data network cable pair max. Ω/km	118	115	115	118	290	120	118	118	118	143	143	175	175	175
Minimum bending radius, fixed installation	7.5 x D	10 x D	10 x D	4 x D	8 x D	5 x D	4 x D	4 x D	4 x D	8 x D	8 x D	8 x D	8 x D	8 x D
Minimum bending radius, flexing	15 x D	15 x D	15 x D	8 x D	15 x D	8 x D	8 x D	8 x D	8 x D	15 x D	15 x D	15 x D	15 x D	15 x D
Temperature range fixed installation from °C	- 40	- 40	- 40	- 25	- 30	- 30	- 25	- 40	- 30	- 10	- 25	- 40	- 40	- 40
Temperature range fixed installation to °C	+ 70	+ 80	+ 80	+ 80	+ 80	+ 70	+ 80	+ 80	+ 80	+ 70	+ 80	+ 80	+ 80	+ 80
Temperature range flexing from °C	- 5	- 20	- 20	- 5	- 5	- 20	–	–	–	- 10	- 25	- 10	- 30	- 30
Temperature range flexing to °C	+ 50	+ 60	+ 60	+ 70	+ 70	+ 60				+ 70	+ 80	+ 70	+ 70	+ 70

Usage criteria	Cable designation												
	UNITRONIC® BUS ASI (G) yellow + black fixed installation/flexible	UNITRONIC® BUS ASI (TPE) yellow + black fixed installation/flexible	UNITRONIC® BUS ASI LD FD P yellow + black highly flexible application	UNITRONIC® BUS ASI FD (TPE) A yellow + black highly flexible application	UNITRONIC® BUS ASI FD P FRNC yellow + black fixed installation	UNITRONIC® BUS ASI (PVC) A yellow + black fixed installation	UNITRONIC® DeviceNet THICK + THIN (halogen-free) fixed installation	UNITRONIC® DeviceNet THICK + THIN (PVC) fixed installation	UNITRONIC® DeviceNet THICK + THIN (PUR) highly flexible	UNITRONIC® DeviceNet THICK + THIN (PVC) highly flexible	UNITRONIC® BUS SAFTEY fixed installation/highly flexible	UNITRONIC® BUS EIB fixed installation	UNITRONIC® BUS EIB COMBI fixed installation
Parameter													
Characteristic impedance Ω	–	–	–	–	–	–	120	120	120	120	100-200	–	–
Mutual capacitance (800 Hz) max. nF/km	–	–	–	–	–	–	39.8	39.8	39.8	39.8	45	max. 100	max. 100
Peak operating voltage V (not for power applications)	300	300	300	300	300	300	300	300	300	300	250	250	250
Test voltage, core/core, U_{eff} V	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	3000	4000	4000
Conductor resistance (loop) Data network cable pair max. Ω/km	27.4	27.4	16.5	27.4	27.4	27.4	THICK 45 THIN 180	THICK 45 THIN 180	THICK 45 THIN 180	THICK 45 THIN 180	52	max. 130	max. 130
Minimum bending radius, fixed installation	3 x D	3 x D	3 x D	3 x D	3 x D	3 x D	10 x D	10 x D	–	–	8 x D	10 x D	10 x D
Minimum bending radius, flexing	–	–	6 x D	6 x D	–	–	–	–	10 x D	10 x D	–	–	–
Temperature range fixed installation from °C	- 40	- 40	- 40	- 40	- 40	- 30	- 25	- 20	–	–	- 40	- 30	- 30
Temperature range fixed installation to °C	+ 85	+ 85	+ 80	+ 105	+ 80	+ 90	+ 80	+ 80			+ 80	+ 70	+ 70
Temperature range flexing from °C	–	–	- 30	- 30	- 30	–	–	–	- 40	- 10	- 30	–	–
Temperature range flexing to °C			+ 70	+ 105	+ 70				+ 80	+ 80	+ 80		