












Special cables

	Cable type	Page	Ordering key	Weight kg/km	Amount of fibers
	Simplex cables with tight tube	116	01-.../FJZ-...19	3	1
	Rugged simplex cables	118	01-.../FJH(ZN)Z-...27	40	1
	Industry Link TWINFLEX and rugged minicord breakout cables	120	02-.../FJ(ZN)Z-...17 02-.../...(ZN)Z-...22	28 46	2 2
	Industry Link TWINFIX	122	02-.../...(ZNG)H-...22	61	2
	Industry link QUADFIX	124	04-.../FJSN(ZNG)H-...22 04-H200/VJSN(ZNG)H-...22	91	4
	Mobile field cables	126	02-.../FSN(ZN)Z-...56 04-.../FSN(ZN)Z-...56 08-.../FSN(ZN)Z-...68 12-.../FSN(ZN)Z-...80	24 26 40 53	2 4 8 12
	Glass-armoured riser cables 2 tubes	128	02-.../F(ZNG)H-...48 02-.../F(ZNG)H-...55 02-.../F(ZNG)H-...70	26 35 55	2 2 2
	Glass-armoured riser cables 4 tubes	130	04-.../FSN(ZNG)H-...55	33	4
	Rugged multi-fiber loose tube up to 24 fibers (dry)	132	24-.../Q(ZNG)Z-...70	44	up to 24
	Drag chain cables	134	12-.../FSN(ZN)YZ-...130	128	up to 12
	RADOX drag chain cable	136	12-.../FSN(ZN)YR-...130	160	up to 12
	Hybrid cables	138	04-.../CWJSNH-...27+...C15 08-.../CWJSNH-...27+...C15 60-.../WSN(ZNG)Y-...150+...C... 96-.../WSN(ZNG)Y-...180+...C...		up to 4 up to 8 up to 60 up to 96

Amount of conductors	Tube Ø mm	Simplex cable Ø mm	Jacket Ø mm	Jacket material	Direct connector termination	Tensile strength N	Crush resistance N/dm	Temperature range in service °C	Fire propagation IEC 60332-1-2	Fire propagation IEC 60332-3-24	CPR 2011/305/EU
	0.9		1.9	TPU	•	180	10 000	-40 to +85			
	0.9	2.7	6.0	TPU	•	4000	20 000	-25 to +70			
	0.9 0.9	1.7 2.2	6.0 7.5 x 8	TPU TPU	• •	2000 2000	6000 6000	-40 to +70 -40 to +70		p p	
	0.9	2.2	7.5x7.2	LSFH™	•	2000	6000	-40 to +70	p	p	Dca-s1a, d0, a1
	0.9	2.2	9.0	LSFH™	•	2000	15 000	-40 to +70	p	p	Cca-s1a, d0, a1
	0.9 0.9 0.9 0.9		5.6 5.6 6.8 8.0	TPU TPU TPU TPU	• • • •	4000 4000 4000 4000	21 000 21 000 21 000 10 000	-60 to +85 -60 to +85 -60 to +85 -60 to +85			
	0.9 0.9 0.9		4.8 5.5 7.0	LSFH™ LSFH™ LSFH™	• • •	1000 1000 1000	20 000 20 000 20 000	-40 to +75 -40 to +75 -40 to +75	p p p	p p p	Dca-s2, d0, a1 Dca-s1a, d0, a1 Dca-s2a, d1, a1
	0.9		5.5	LSFH™	•	1000	20 000	-40 to +75	p	p	
			7.0	TPU		2500	9000	-45 to +85			
	0.9		13.0	TPU	•	4000	4000	-30 to +85			
	0.9		13	RADOX	•	4000	15 000	-30 to +85	p		
up to 3 up to 4 up to 4 up to 4	0.9 0.9 3.0 3.0	2.7 2.7 2.5 2.5	10.0 13.0 15.0 8.0	LSFH™ LSFH™ PE PE	• •	2000 4000 9000 13 000	10 000 10 000 8000 8000	-20 to +70 -20 to +70 -40 to +70 -40 to +70	p p	p	

Simplex cables with tight tube



Properties

- Metal free indoor and outdoor cable
- Strain relieved with aramide yarn
- For direct connector assembly with strain relief
- Tight bend radii
- For high mechanical and thermal stability
- Halogen free and non-corrosive fire gases

Applications

- For outdoor and indoor installations
- Patch cable in distribution centres

Design

Tube	tight tube 0.9 mm	
Strain relief	aramide yarn	
Jacket material	TPU	
Jacket colour	E9	yellow
	G50 - OM2	orange
	G50 - OM3	turquoise
	G50 - OM4	heather violet
	G62.5 - OM1	orange

According to IEC 60794-1-2

Ordering information

01-.../FJZ-...19

Please see page 162.

Simplex cables with tight tube

Specification			
Jacket Ø	mm	1.9	
Tube Ø	mm	0.9	
Approx. weight	kg/km	3	

Mechanical properties				
Tensile strength	during installation	N	180	IEC 60794-1-2 E1
	in service	N	90	
Min. bend radius ¹⁾	during installation	mm	50	IEC 60794-1-2 E11
	in service	mm	25	
Crush resistance	short-term	N/dm	10 000	IEC 60794-1-2 E3
	long-term	N/dm	2000	
Impact resistance	Wp = 0.74 J	impacts	30	IEC 60794-1-2 E4
Repeated bending	r = 30 mm, weight = 1 kg	cycles	2500	IEC 60794-1-2 E6

Thermal properties				
Temperature range	during installation	°C	-10 to +50	IEC 60794-1-22 F12
	in service	°C	-40 to +85	
	in storage	°C	-40 to +85	

Combustion properties			
Fire load	MJ/m	0.11	
2011/65/EC (RoHS)		compliant	

¹⁾ Smaller bending radius are possible with E9/125 LowBend (ITU G.657) and G50/125-OM3/OM4 BendOptimized.

Rugged simplex cables



Properties

- Metal free indoor and outdoor cable
- Strain relieved with aramide yarn
- For direct connector assembly with strain relief
- High chemical resistance against acids and alkalies
- For high mechanical and thermal stability
- Halogen free and non-corrosive fire gases
- Improved crash resistance

Applications

- Industry LAN
- Mobile data cablings in harsh environment
- Machinery cablings, drag chains

Design

Cable design	1 single fiber cable with tight tubes	
Strain relief	aramide yarn	
Jacket material	TPU/black	
Jacket colour	E9	yellow
	G50 - OM2	orange
	G62.5 - OM1	orange

According to IEC 60794-1-2

Ordering information

01-.../FJH(ZN)Z...27

Please see page 162.

Rugged simplex cables

Specification			
Jacket Ø	mm	6.0	
Single fiber cable Ø	mm	2.7	
Tube Ø	mm	0.9	
Approx. weight	kg/km	40	

Mechanical properties				
Tensile strength	during installation	N	4000	IEC 60794-1-2 E1
	in service	N	1500	
Min. bend radius	during installation	mm	90	IEC 60794-1-2 E11
	in service	mm	60	
Crush resistance	short-term	N/dm	20 000	IEC 60794-1-2 E3
	long-term	N/dm	10 000	
Impact resistance	Wp = 2.25J	impacts	150	IEC 60794-1-2 E4
Repeated bending	r = 30 mm, weight = 2.5 kg	cycles	10 000	IEC 60794-1-2 E6
Flexing	r = 77 mm velocity = 2.2 m/s L = 2 m	cycles	100 000	HUBER+SUHNER drag chain test

Thermal properties				
Temperature range	during installation	°C	-10 to +60	IEC 60794-1-22 F1
	in service	°C	-25 to +70	
	in storage	°C	-40 to +70	

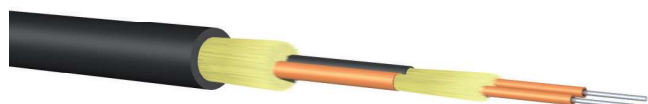
Combustion properties			
Fire load		MJ/m	0.57
Halogen acid gas	jacket material		p
Degree of acidity	jacket material		p
2011/65/EC (RoHS)			compliant

p = passed

Industry Link TWINFLEX and rugged minicord breakout cables



Rugged minicord breakout



Industry Link TWINFLEX

Properties

- Metal free indoor and outdoor cable
- For direct connector assembly with strain relief
- Strain relieved with aramide yarn
- Ripcord for easy jacket removal
- Halogen free and non-corrosive fire gases
- Improved crush resistance
- For high thermal and mechanical stability
- High chemical resistance against acids and alkalis
- High abrasive resistance

Applications

- For flexible, moved and fixed use
- Industrial Ethernet and LAN
- Machine cabling, drag chains
- As control or data cable in factory automation
- Mobile data cabling for harsh environment
- Connection to outdoor devices

Design

Cable design	2 single fiber cables with tight tubes 1 ripcord
Strain relief	aramide yarn
Jacket material	TPU
Jacket colour	black

According to IEC 60794-1-2

Ordering information

Rugged minicord breakout	02-.../FJ(ZN)Z-...17
TWINFLEX	02-.../...(ZN)Z-...22

Please see page 162.

Conformance

TWINFLEX cables with H200 and POF meet PROFINET specification.

Industry Link TWINFLEX and rugged minicord breakout cables

Specification							
Cable type		rugged minicord breakout		Industry Link TWINFLEX			
Fiber types		E9, G50, G62	H200	G50, G62	H200	POF980	
Jacket Ø	mm	6.0		7.5 × 8.0			
Single fiber cable Ø	mm	1.7		2.2			
Tube Ø	mm	0.9	0.9	0.9	0.5	2.2	
Channel marking on single fiber		numbered		black and orange with arrows			
Approx. weight	kg/km	28		46			

Mechanical properties								
Tensile strength	during installation	N	2000	2000	2000	2000	2000	IEC 60794-1-2 E1
	in service	N	1000	500	1000	1000	1000	
Min. bend radius	during installation	mm	25	25	40	60	25	IEC 60794-1-2 E11
	in service	mm	25	25	25	50	25	
Crush resistance	short-term	N/dm	6000	2000	6000	6000	6000	IEC 60794-1-2 E3
	long-term	N/dm	2000	1000	2000	2000	4000	
Impact resistance	W _p = 1.5 J W _p = 2.2 J	impacts	200	200	200	200	200	IEC 60794-1-2 E4
Repeated bending	r = 30 mm/10 kg r = 60 mm/1 kg	cycles	20 000		10 000	10 000	10 000	IEC 60794-1-2 E6
Flexing	r = 77 mm	cycles	100 000					HUBER+SUHNER ¹⁾
Flexing	r = 70 mm r = 80 mm				100 000	100 000	100 000	IEC 60794-1-2 E8 IEC 60794-1-2 E8
Torsion	± 360° ± 1440°	cycles	3		100	10	10	IEC 60794-1-2 E7

Thermal properties								
Temperature range	during installation	°C	-20 to +60			-10 to +60	-30 to +70	IEC 60794-1-22 F1
	in service	°C	-40 to +70			-20 to +70	-30 to +70	
	in storage	°C	-40 to +70			-25 to +70	-30 to +70	

Combustion properties								
Fire load		MJ/m	0.6	0.6	0.75	0.75	0.93	
2011/65/EC (RoHS)			compliant					

Conformance								
PROFINET	Specification ²⁾					yes	yes	

¹⁾ Drag chain test

²⁾ Standard with H+S marking. According to PROFINET specification with PROFINET marking (PROFINET Type C 2K200/230 or PROFINET Type C 2P980/1000)

Industry Link TWINFIX – glass-armoured breakout cables



Properties

- Metal free indoor and outdoor cable
- For direct connector assembly with strain relief
- Rodent-protected, glass-armoured
- Easy stripping
- Low smoke, halogen free and self-extinguishing
- Improved crush resistance
- For high thermal and mechanical stability
- UV protected, suitable for outdoor use
- Longitudinal and transversal watertight cable

Applications

- For fixed installation
- Industrial Ethernet and LAN
- Machine cabling
- As control or data cable in factory automation
- Data cabling for harsh environment
- Connection to outdoor devices
- LSFH™ – for applications involving high safety requirements in case of fire

Design

Cable design	2 single fiber cables with tight tubes
Strain relief	glass-armoured
Jacket material	LSFH™
Jacket colour	black

According to IEC 60794-1-2

Ordering information

02-.../(ZNG)H...22

02-.../(ZNG)H...22_UN (optional)

Please see page 163.

Approvals

UL listed acc. OFN/OFNG

Industry Link TWINFIX – glass-armoured breakout cables

Specification						
Cable type		Industry Link TWINFIX				
Fiber types		E9, G50, G62	H200	POF980		
Jacket Ø	mm	7.5 × 7.2	7.5 × 7.2	7.5 × 7.2		
Single fiber cable Ø	mm	2.2	2.2			
Tube Ø	mm	0.9	0.9	2.2		
Channel marking on single fiber		black and orange with arrows				
Approx. weight	kg/km	61	67	67		

Mechanical properties						
Tensile strength	during installation	N	2000	2000	2000	IEC 60794-1-2 E1
	in service	N	1000	1000	1000	
Min. bend radius	during installation	mm	40	105	25	IEC 60794-1-2 E11
	in service	mm	25	70	25	
Crush resistance	short-term	N/dm	6000	6000	5000	IEC 60794-1-2 E3
	long-term	N/dm	2000	2000	2000	
Impact resistance	Wp = 2.2 J	impacts	200	200	200	IEC 60794-1-2 E4
Repeated bending	r = 60 mm/1 kg	cycles	10 000	10 000	10 000	IEC 60794-1-2 E6
Torsion	± 360°	cycles	10	10	10	IEC 60794-1-2 E7
Water penetration	h = 1 m, 24 d, p < 3 m		p	p	p	IEC 60794-1-2 F5A

Thermal properties						
Temperature range	during installation	°C	-10 to +60	-10 to +60	-10 to +60	IEC 60794-1-22 F1
	in service	°C	-40 to +70	-20 to +70	-30 to +70	
	in storage	°C	-45 to +70	-25 to +70	-30 to +70	

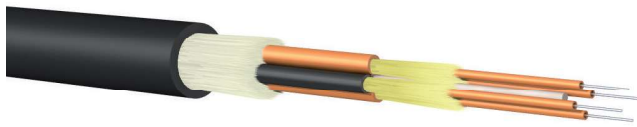
Combustion properties						
Fire load		MJ/m	1.15	1.1	1.25	
Fire propagation	on a vertical cable bundle		p	p		IEC 60332-3-24
Fire test	with circuit integrity (CI)	min	90			IEC 60331-25
Halogen acid gas	jacket material		p	p	p	IEC 60754-1
Degree of acidity	jacket material		p	p	p	IEC 60754-2
2011/65/EC (RoHS)			compliant			

Conformance						
PROFINET	specification ¹⁾			yes	yes	
(EU) No 305/2011 (CPR)			Dca-s1 a, d0, a1			EN 50575

p = passed

¹⁾ Standard black jacket and with H+S marking. According to PROFINET specification with green jacket and PROFINET marking (PROFINET Type B 2K200/230 or PROFINET Type B 2P980/1000)

Industry Link QUADFIX – glass-armoured breakout cables



Properties

- Metal free indoor and outdoor cable
- Rodent-protected, glass-armoured
- For direct connector assembly with strain relief
- Easy stripping
- UV-protected, suitable for outdoor use
- For high thermal and mechanical stability
- Low smoke, halogen free and self-extinguishing
- Improved crush resistance
- Longitudinal and transversal watertight cable

Applications

- For fixed installation
- Industrial Ethernet and LAN
- As control or data cable in industrial plants
- Cabling in harsh environment conditions
- LSFH™ – for applications involving high safety requirements in case of fire

Design

Cable design	4 single fiber cables with tight tubes
Strain relief	glass-armoured
Jacket material	LSFH™
Jacket colour	black

According to IEC 60794-1-2

Ordering information

04.../FJSN(ZNG)H...22

04-H200/VJSN(ZNG)H...22

Please see page 163.

Approvals

UL listed acc. OFN/OFNG

Industry Link QUADFIX – glass-armoured breakout cables

Specification					
Cable type		Industry Link QUADFIX			
Fiber types		E9, G50, G62	H200		
Jacket Ø	mm	9	9		
Single fiber cable Ø	mm	2.2	2.2		
Tube Ø	mm	0.9	0.5		
Approx. weight	kg/km	91	87		

Mechanical properties					
Tensile strength	during installation	N	2000	2000	IEC 60794-1-2 E1
	in service	N	1000	1000	
Min. bend radius	during installation	mm	135	135	IEC 60794-1-2 E11
	in service	mm	90	90	
Crush resistance	short-term	N/dm	15 000	6000	IEC 60794-1-2 E3
	long-term	N/dm	4000	2000	
Impact resistance	Wp = 2.2 J	impact	200	200	IEC 60794-1-2 E4
Water penetration	h = 1 m, 24 h, p < 3 m		p	p	IEC 60794-1-2 F5A

Thermal properties					
Temperature range	during installation	°C	-10 to +60	-10 to +60	IEC 60794-1-22 F1
	in service	°C	-40 to +70	-20 to +70	
	in storage	°C	-40 to +70	-25 to +70	

Combustion properties					
Fire load		MJ/m	1.63	1.62	
Fire propagation	on a vertical cable bundle		p	p	IEC 60332-3-24
Fire test	with circuit integrity (CI)	min	180		IEC 60331-25
Halogen acid gas	jacket material		p	p	IEC 60754-1
Degree of acidity	jacket material		p	p	IEC 60754-2
2011/65/EC (RoHS)			compliant	compliant	
(EU) No 305/2011 (CPR)			Cca-s1a, d0, a1		EN 50575

p = passed

Mobile field cables



Properties

- High tensile strength
- For direct connector assembly
- Excellent coiling capability
- High chemical resistance against acids and alkalis
- For high mechanical and thermal stability
- Halogen free and non-corrosive fire gases
- Improved crush resistance
- UV-protected, suitable for outdoor use
- Metal free
- Easy stripping
- High tensile strength, high abrasion and cut resistance

Applications

- Fixed or mobile data cabling (MASTERLINE mobile)
- Data cabling for harsh environment
- Military tactical field use
- Field video broadcast
- Machine cabling, drag chains

Design

Cable design	2, 4, 8 and 12 tight tubes
Strain relief	aramide yarn
Jacket material	TPU
Jacket colour	black

According to IEC 60794-1-2

Ordering information

02-.../FSN(ZN)Z...56
04-.../FSN(ZN)Z...56
08-.../FSN(ZN)Z...68
12-.../FSN(ZN)Z...80

Please see page 163.

Mobile field cables

Specification						
Number of Fiber		2	4	8	12	
Jacket Ø	mm	5.6	5.6	6.8	8.0	
Tube Ø	mm	0.9	0.9	0.9	0.9	coloured
Approx. weight	kg/km	24	26	40	53	

Mechanical properties								
Tensile strength	during installation	N	4000	4000	4000	4000	IEC 60794-1-2 E1	
	in service	N	2000	2000	2000	2000		
Min. bend radius	during installation	mm	90	90	90	120	IEC 60794-1-2 E11	
	in service	mm	45	45	45	80		
Crush resistance	short-term	E9 G50	N/dm	21 000 19 000	21 000 19 000	21 000 19 000	10 000 10 000	IEC 60794-1-2 E3
	long-term	E9 G50	N/dm	6000 8000	6000 8000	6000 2000	2000 2000	
Repeated bending	r=50 mm, weight = 2 kg r=80 mm, weight = 5 kg	cycles	20 000	20 000	20 000	20 000	IEC 60794-1-2 E6	
Flexing	r=100 mm, weight = 1 kg r=120 mm, weight = 2 kg r=80 mm, weight = 1.5 kg	cycles	100 000	100 000	100 000	100 000	IEC 60794-1-2 E8	
Impact resistance	Wp = 2.21 J	impacts	300	300	300	300	IEC 60794-1-2 E4	
Coiling capability	length= 500 m/r=45 mm length= 500 m/r=80 mm length= 100 m/r=80 mm	cycles	5	5	5	5	HUBER+SUHNER	
Torsion	± 1440°, l = 1000 mm ± 360°, l = 1000 mm	cycles	1000	1000	1000	1000	IEC 60794-1-2 F5B IEC 60794-1-2 E7	

Thermal properties						
Temperature range	during installation	°C	-45 to +85			IEC 60794-1-22 F1
	in service	°C	-60 to +85			
	in storage	°C	-60 to +85			

Combustion properties						
Fire load	MJ/m	0.5	0.5	0.75	0.7	
2011/65/EC (RoHS)		compliant				

p = passed

Glass-armoured riser cables – 2 fibers



Properties

- Metal free indoor and outdoor cable
- Rodent-protected, glass-armoured
- For vertical applications
- For direct connector assembly
- Halogen free and self-extinguishing
- Low fire load for high safety requirements
- Longitudinal and transversal watertight cable

Applications

- For FTTA installation
- Data cable in distribution networks

Design

Cable design	2 tight tubes
Strain relief and rodent protection	glass-armoured
Jacket material	LSFH™
Jacket colour	black

According to IEC 60794-1-2

Ordering information

02-.../F(ZNG)H...48

02-.../F(ZNG)H...55

02-.../F(ZNG)H...70

Please see page 164.

Approvals

UL listed acc. OFNR

Glass-armoured riser cables – 2 fibers

Specification						
Number of fibers		2	2	2		
Jacket Ø	mm	4.8	5.5	7.0		
Tube Ø	mm	0.9	0.9	0.9	coloured	
Approx. weight	kg/km	26	35	55		

Mechanical properties						
Tensile strength	during installation	N	1000	1000	1000	IEC 60794-1-2 E1
	in service	N	500	500	500	
Min. bend radius ¹⁾	during installation	mm	72	83	105	IEC 60794-1-2 E11
	in service	mm	48	60	70	
Crush resistance SM	short-term	N/dm	20 000	20 000	20 000	IEC 60794-1-2 E3
	long-term	N/dm	6000	6000	6000	
Crush resistance MM	short-term	N/dm	20 000	20 000	20 000	IEC 60794-1-2 E3
	long-term	N/dm	7500	6000	6000	
Water penetration	h = 1 m, 24 h, p < 3 m		p	p	p	IEC 60794-1-2 F5B

Thermal properties						
Temperature range	during installation	°C	-40 to +70	-25 to +75	-25 to +75	IEC 60794-1-22 F1
	in service	°C	-40 to +75	-40 to +75	-40 to +75	
	in storage	°C	-40 to +75	-40 to +75	-40 to +75	

Combustion properties						
Fire load		MJ/m	0.46	0.67	1.2	
Fire propagation	on a vertical single cable		p	p	p	IEC 60332-1-2
	on a vertical cable bundle		p	p	p	IEC 60332-3-25
	on a vertical cable bundle		p	p	p	UL 1666
Halogen acid gas			p	p	p	IEC 60754-1
Degree of acidity			p	p	p	IEC 60754-2
2011/65/EC (RoHS)			compliant			
(EU) No 305/2011 (CPR)			*	**	***	EN 50575

- * Dca-s2, d0, a1
- ** Dca-s1a, d0, a1
- *** Dca-s1a, d1, a1

¹⁾ Smaller bending radius are possible with E9/125 LowBend (ITU G.657) and G50/125-OM3/OM4 BendOptimized.

Glass-armoured riser cables - 4 fibers



Properties

- Metal free indoor and outdoor cable
- Rodent-protected, glass-armoured
- Ripcord for easy jacked removal
- For direct connector assembly
- Low smoke, halogen free and self-extinguishing
- Low fire load for high safety requirements
- Longitudinal and transversal watertight cable

Applications

- For FTTA installation
- Data cable in distribution networks

Design

Cable design	central strength member (non metallic) 4 tight tubes 1 ripcord
Strain relief and rodent protection	glass-armoured
Jacket material	LSFH™
Jacket colour	black

According to IEC 60794-1-2

Ordering information

04.../FSN(ZNG)H...55

Please see page 164.

Glass-armoured riser cables - 4 fibers

Specification				
Fiber types		E9	G50, G62	
Number of fiber		4	4	
Jacket Ø	mm	5.5	5.5	
Tube Ø	mm	0.9	0.9	coloured
Approx. weight	kg/km	33	33	

Mechanical properties					
Tensile strength	during installation	N	1000	1000	IEC 60794-1-2 E1
	in service	N	500	500	
Min. bend radius ¹⁾	during installation	mm	83	83	IEC 60794-1-2 E11
	in service	mm	60	60	
Crush resistance	short-term	N/dm	20 000	6000	IEC 60794-1-2 E3
	long-term	N/dm	3000	2000	
Impact resistance	W _p = 1.53 J	impacts	100	200	IEC 60794-1-2 E4
Repeated bending	r = 40 mm, weight = 1 kg	cycles	10 000	10 000	IEC 60794-1-2 E6
Flexing	r = 100 mm, weight = 1.5 kg	cycles	20 000	20 000	IEC 60794-1-2 E8
Torsion	± 360°, l = 1000 mm	cycles	1000	1000	IEC 60794-1-2 E7
Water penetration	h = 1 m, 24 h, p < 3 m		p	p	IEC 60794-1-2 F5B

Thermal properties					
Temperature range	during installation	°C	-25 to +75	-25 to +75	IEC 60794-1-22 F1
	in service	°C	-40 to +75	-40 to +75	
	in storage	°C	-40 to +75	-40 to +75	

Combustion properties					
Fire load		MJ/m	0.7	0.7	
Fire propagation	on a vertical single cable		p	p	IEC 60332-1-2
	on a vertical cable bundle		p	p	IEC 60332-3-24
	on a vertical cable bundle		p	p	UL 1666
Halogen acid gas	jacket material		p	p	IEC 60754-1
Degree of acidity	jacket material		p	p	IEC 60754-2
2011/65/EC (RoHS)			compliant		

p = passed

¹⁾ Smaller bending radius are possible with E9/125 LowBend (ITU G.657) and G50/125-OM3/OM4 BendOptimized.

Rugged multi-fiber loose tube up to 24 fibers (jelly-free)



Properties

- Metal and jelly free cable
- Rodent-protected, glass-armoured
- For mobile applications
- No need for cleaning the fibers
- Longitudinal and transversal watertight cable

Applications

- Fixed or mobile data cabling
- Data cabling for harsh environment
- Machine cabling, drag chains

Design

Cable design	dry multi-fiber loose tube with 2 up to 24 fibers
Strain relief and rodent protection	glass-arming
Jacket material	TPU
Jacket colour	black

According to IEC 60794-1-2

Ordering information

24.../Q(ZNG)Z-...70

Please see page 165.

Rugged multi-fiber loose tube up to 24 fibers (jelly-free)

Specification			
Number of fiber	mm	2 to 24	
Jacket Ø	mm	7.0	
Tube Ø	mm	2.8	coloured
Approx. weight	kg/km	44	

Mechanical properties				
Tensile strength	during installation	N	2500	IEC 60794-1-2 E1
	in service	N	1500	
Min. bend radius	during installation	mm	50	IEC 60794-1-2 E11
	in service	mm	70	
Crush resistance	short-term	N/dm	9000	IEC 60794-1-2 E3
	long-term	N/dm	2000	
Impact resistance	Wp = 1.5 J	impacts	100	IEC 60794-1-2 E4
Repeated bending	r = 50 mm, weight = 2 kg	cycles	10 000	IEC 60794-1-2 E6
Flexing	r = 120 mm velocity = 1.4 m/s	cycles	100 000	IEC 60794-1-2 E8
Water penetration	h = 1 m, 24 h, p < 3 m		p	IEC 60794-1-2 F5B

Thermal properties				
Temperature range	during installation	°C	-25 to +70	IEC 60794-1-22 F1
	in service	°C	-45 to +85	
	in storage	°C	-45 to +85	

Combustion properties			
Fire load	MJ/m	0.58	
2011/65/EC (RoHS)		compliant	

Drag chain cables



Properties

- Strain relieved with aramide yarn
- For direct connector assembly
- High chemical resistance against acids and alkalis
- For high mechanical and thermal stability
- Halogen free and non-corrosive fire gases
- Improved crush resistance
- Metal free

Applications

- Medium to large drag chains
- Cabling in industrial applications
- As control or data cable in industry robots, cranes, production lines and automation systems
- Cable design allows for a permanent load with more than one million drag chain cycles

Design

Cable design	up to 12 tight tubes strength member
Strain relief and rodent protection	aramide yarn
Jacket material	TPU (optional TPU flame retardant)
Jacket colour	black

According to IEC 60794-1-2

Ordering information

12-.../FSN(ZN)YZ-...130
12-.../FSN(ZN)YU-...130 (Flame retardant outer jacket)

Please see page 165.

Drag chain cables

Specification				
Fiber types	mm	E9	G50, G62.5	
Jacket Ø	mm	13	13	
Tube Ø	mm	0.9	0.9	coloured
Approx. weight	kg/km	128	128	

Mechanical properties					
Tensile strength	during installation	N	4000	4000	IEC 60794-1-2 E1
	in service	N	2000	2000	
Min. bend radius	during installation	mm	200	200	IEC 60794-1-2 E11
	in service	mm	100	100	
Crush resistance	short-term	N/dm	4000	4000	IEC 60794-1-2 E3
	long-term	N/dm	2000	2000	
Repeated bending	r = 100 mm, weight = 5 kg	cycles	5000	5000	IEC 60794-1-2 E6
Flexing	r = 120 mm velocity = 0.5 m/s, L = 2.0 m	cycles	100 000	100 000	IEC 60794-1-2 E8
Flexing	r = 100 mm velocity = 2 m/s, L = 2.0 m	cycles	1 000 000	1 000 000	HUBER+SUHNER drag chain test

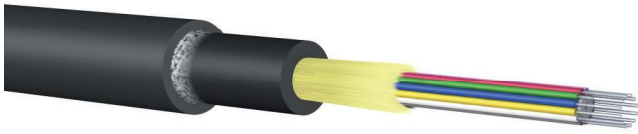
Thermal properties					
Temperature range	during installation	°C	-10 to +50	-10 to +50	IEC 60794-1-22 F1
	in service	°C	-40 to +85	-30 to +85	
	in storage	°C	-40 to +85	-40 to +85	

Combustion properties				
Fire load		MJ/m	3.49	
Fire propagation	on a vertical single cable		p*	IEC 60332-1-2
2011/65/EC (RoHS)			compliant	

p = passed

* only with TPU flame retardant outer jacket

RADOX® Drag chain cable



Properties

- Strain relieved with aramide yarn
- For direct connector assembly
- High chemical resistance against acids and alkalis
- For high mechanical and thermal stability
- Halogen free and non-corrosive fire gases
- Improved crush resistance
- Metal free
- Weld bead resistant cable outer jacket

Applications

- Medium to large drag chains
- Cabling in industrial applications
- As control or data cable in industry robots, cranes, production lines and automation systems
- Cable design allows for a permanent load with more than one million drag chain cycles

Design

Cable design	up to 12 tight tubes strength member
Strain relief and rodent protection	aramide yarn
Jacket material	RADOX®
Jacket colour	black

According to IEC 60794-1-2

Ordering information

12.../FSN(ZN)YR...130

Please see page 165.

Drag chain cable

Specification			
Fiber types	mm	E9.G50	
Jacket Ø	mm	13	
Tube Ø	mm	0.9	coloured
Approx. weight	kg/km	160	

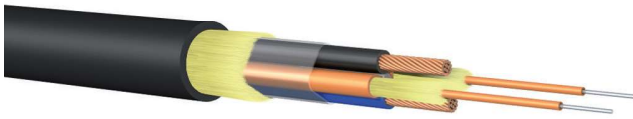
Mechanical properties				
Tensile strength	during installation	N	4000	IEC 60794-1-2 E1
	in service	N	2000	
Min. bend radius	during installation	mm	200	IEC 60794-1-2 E11
	in service	mm	100	
Crush resistance	short-term	N/dm	15 000	IEC 60794-1-2 E3
	long-term	N/dm	5000	
Repeated bending	r = 100 mm, weight = 5 kg	cycles	5000	IEC 60794-1-2 E6
Flexing	r = 120 mm velocity = 0.5 m/s, L = 2.0 m	cycles	25 000	IEC 60794-1-2 E8

Thermal properties				
Temperature range	during installation	°C	-10 to +50	IEC 60794-1-22 F1
	in service	°C	-30 to +85	
	in storage	°C	-40 to +85	

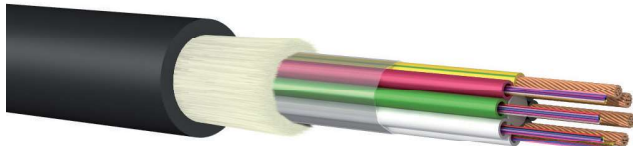
Combustion properties				
Fire load		MJ/m	4.6	
Fire propagation	on a vertical single cable		p	IEC 60332-1-2
2011/65/EC (RoHS)			compliant	

p = passed

Hybrid cables



Hybrid breakout cable



Hybrid multi-fiber loose tube cable

Properties

- Custom designed cable configuration
- Each fiber strain relieved
- High chemical resistance against acids and alkalies
- Tube can be stripped up to 2 m in one piece
- For high mechanical requirements
- Low smoke, halogen free and self extinguishing
- Hybrid multi-fiber loose tube cables are rodent protected (glass armoured)

Applications

- As data and power cable for industry, LAN, video, tele-phone or customer-specific applications
- Installation outdoors, in moist, wet cable ducts
- With LSFH™ jacket ideal for applications involving high safety requirements in case of a fire (installation indoors)

Design of hybrid breakout cables

Cable design	single fiber semi-tight tubes, orange, numbered
Conductor	1.5 mm ² up to 4 conductors
Strain relief	aramide yarn
Jacket material	LSFH™
Jacket colour	black

Design of hybrid multi-fiber loose tube cables

Cable design	multi-fiber loose tubes
Conductor	1.5 mm ² up to 4 conductors 2.5 mm ² up to 4 conductors
Strain relief	glass-armouring
Jacket material	PE (optional LSFH™)
Jacket colour	black

According to IEC 60794-1-2

Ordering information

- Hybrid breakout cables
04-.../CWJSN(ZN)H-...27+...-C15
08-.../CWJSN(ZN)H-...27+...-C15
- Hybrid multi-fiber loose tube cables, PE jacket/LSFH™
bis 60-.../WSN(ZNG)-...150+...-C...
bis 96-.../WSN(ZNG)-...180+...-C.

Hybrid cable order on request.

Hybrid cables

Specification fiber optic components						
			4-way Breakout	8-way Breakout	5-way Multi-fiber loose tube	8-way Multi-fiber loose tube
Jacket Ø		mm	10.0	13.0	15.0	18.0
Single fiber cable Ø/multi-fiber loose tube Ø		mm	2.7	2.7	2.8	2.8
Channel marking on single fiber			numbered		coloured	

Specification conductor						
Outer Ø conductor ¹⁾	1.5 mm ²	mm	2.7	2.7	2.7	2.7
	2.5 mm ²	mm			3.5	3.5
Rated voltage U ₀ /U	1.5 mm ²	V	600/1000			
	2.5 mm ²	V	600/1000			
Electrical resistance	1.5 mm ²	Ω/km	13.7	13.7	13.7	13.7
	2.5 mm ²				8.2	8.2
Jacket material			RADOX 125, halogen free			

Mechanical properties							
Tensile strength	during installation	N	2000	4000	9000	13000	IEC 60794-1-2 E1
	in service	N	1000	2000	4500	6500	
Min. bend radius	during installation	mm	150	200	225	270	IEC 60794-1-2 E11
	in service	mm	100	130	150	180	
Crush resistance	short-term	N/dm	10 000	10 000	8000	8000	IEC 60794-1-2 E3
	long-term	N/dm	2000	2000	3000	3000	
Impact resistance	r = 25 mm W _p = 2.21 J U _p = 4.41 J	impacts	50	50	100	100	IEC 60794-1-2 E4

Thermal properties						
Temperature range	during installation	°C	-10 to +50		-10 to +50	IEC 60794-1-22 F1
	in service	°C	-20 to +70		-40 to +70	
	in storage	°C	-25 to +70		-40 to +70	

Combustion properties						
Fire propagation		p	p	p ²⁾	p ²⁾	IEC 60332-1-2
2011/65/EC (RoHS)		compliant				

p = passed

Other hybrid cable types available upon request.

¹⁾ Customer-specific order of colours for conductors. Available colours are black, red, white, blue, yellow/green

²⁾ Only applies to LSFH™, PE jacket material 'not passed'

Order information for special cables

Simplex cables 1.9 mm

PUR jacket with tight tube 0.9 mm



Item no.	Cable type	Description
84032682	01-E9/FJU-E19	1-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 1.9 mm, jacket PUR yellow
84063323	01-E9A2/FJU-E19-FG	1-fiber, 9/125 µm acc.ITU-G.657-A2, Ø 1.9 mm, jacket PUR yellow
84032683	01-G50/FJU-D19	1-fiber, 50/125 µm OM2, Ø 1.9 mm, jacket PUR orange
84068995	01-G50/FJU-D19-F	1-fiber, 50/125 µm OM3 BendOptimized, Ø 1.9 mm, jacket PUR orange
84037265	01-G62/FJU-D19	1-fiber, 62.5/125 µm OM1, Ø 1.9 mm, jacket PUR orange

Rugged simplex cables 6.0 mm

PUR jacket with 2.7 mm/tight tube 0.9 mm



Item no.	Cable type	Description
22523102	01-G50/FJH(ZN)Z-D27	1-fiber, 50/125 µm OM2, Ø 6.0 mm, jacket PUR orange
22523103	01-G62/FJH(ZN)Z-B27	1-fiber, 62.5/125 µm OM2, Ø 6.0 mm, jacket PUR green
84020985	01-H200/FJH(ZN)Z-D27	1-fiber, HCS 200/230/500 µm, Ø 6.0 mm, jacket PUR orange

Rugged minicord breakout cables

PUR jacket with simplex 1.7 mm/tight tube 0.9 mm



Item no.	Cable type	Description
84010318	02-E9/FJ(ZN)Z-G17	2-fiber, 9/125 µm acc.G.652.D/G.657.A1, Ø 6.0 mm, jacket PUR black
84080260	02-E9A2/FJ(ZN)Z-G17-FG	2-fiber, 9/125 µm acc.ITU-G.657-A2, Ø 6.0 mm, jacket PUR black
23037747	02-G50/FJ(ZN)Z-G17	2-fiber, 50/125 µm OM2, Ø 6.0 mm, jacket PUR black
23037748	02-G62/FJ(ZN)Z-G17	2-fiber, 62.5/125 µm OM1, Ø 6.0 mm, jacket PUR black
23037749	02-H200/FJ(ZN)Z-G17	2-fiber, HCS 200/230/500 µm, Ø 6.0 mm, jacket PUR black

TWINFLEX Industrial Link

PUR jacket with simplex 2.2 mm/tight tube 0.9 mm



Item no.	Cable type	Description
84045039	02-G50/FJ(ZN)Z-G22	2-fiber, 50/125 µm OM2, Ø 7.5 × 8.0 mm, jacket PUR black
84045188	02-G62/FJ(ZN)Z-G22	2-fiber, 62.5/125 µm OM1, Ø 7.5 × 8.0 mm, jacket PUR black
84045184	02-H200/VJ(ZN)Z-G22	2-fiber, HCS 200/230/500 µm, Ø 7.5 × 8.0 mm, jacket PUR black
84057089	02-POF980/M(ZN)Z-G22	2-fiber, POF 980/1000 µm, Ø 7.5 × 8.0 mm, jacket PUR black

Order information for special cables

TWINFIX Industrial Link

LSFH™ jacket with simplex 2.2 mm/tight tube 0.9 mm



Item no.	Cable type	Description
84118658	02-E9/FJ(ZNG)H-G22#D	2-fiber, 9/125 µm acc.G.652.D/G.657.A1, Ø 7.5 × 7.2 mm, jacket LSFH black
84045041	02-G50/FJ(ZNG)H-G22#D	2-fiber, 50/125 µm OM2, Ø 7.5 × 7.2 mm, jacket LSFH black
84125961	02-G50/FJ(ZNG)H-G22-UN	2-fiber, 50/125 µm OM2, Ø 7.5 × 7.2 mm, jacket LSFH black UL rating acc.OFN/OFNG
84045187	02-G62/FJ(ZNG)H-G22#D	2-fiber, 62.5/125 µm OM1, Ø 7.5 × 7.2 mm, jacket LSFH black
84125963	02-G62/FJ(ZNG)H-G22-UN	2-fiber, 62.5/125 µm OM1, Ø 7.5 × 7.2 mm, jacket LSFH black UL rating acc.OFN/OFNG
84043741	02-H200/VJ(ZNG)H-G22#D	2-fiber, HCS 200/230/500, Ø 7.5 × 7.2 mm, jacket LSFH black
84057090	02-POF980/M(ZNG)H-G22	2-fiber, POF 980/1000, Ø 7.5 × 7.2 mm, jacket LSFH black

QUADFIX Industrial Link

LSFH™ jacket with simplex 2.2 mm/tight tube 0.9 mm



Item no.	Cable type	Description
84102119	04-E9/FJ(ZNG)H-G22#C	4-fiber, 9/125 µm acc.G.652.D/G.657.A1, Ø 9.0 mm, jacket LSFH black
84092090	04-G50/FJ(ZNG)H-G22#C	4-fiber, 50/125 µm OM2, Ø 9.0 mm, jacket LSFH black
84092091	04-G62/FJ(ZNG)H-G22#C	4-fiber, 62.5/125 µm OM1, Ø 9.0 mm, jacket LSFH black
tbid	04-H200/VJ(ZNG)H-G22#C	4-fiber, HCS 200/230/500 µm, Ø 9.0 mm, jacket LSFH black

Mobile field cables

PUR jacket with tight tube 0.9 mm



Item no.	Cable type	Description
84096489	02-E9/FSN(ZN)Z-G56	2-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 5.6 mm, jacket PUR black
84096494	02-G50/FSN(ZN)Z-G56	2-fiber, 50/125 µm OM2, Ø 5.6 mm, jacket PUR black
tbid	02-G62/FSN(ZN)Z-G56	2-fiber, 62.5/125 µm OM1, Ø 5.6 mm, jacket PUR black
84035585	04-E9/FSN(ZN)Z-G56	4-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 5.6 mm, jacket PUR black
84035586	04-G50/FSN(ZN)Z-G56	4-fiber, 50/125 µm OM2, Ø 5.6 mm, jacket PUR black
84035587	04-G62/FSN(ZN)Z-G56	4-fiber, 62.5/125 µm OM1, Ø 5.6 mm, jacket PUR black
84016109	08-E9/FSN(ZN)Z-G68	8-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 6.8 mm, jacket PUR black
84016115	08-G50/FSN(ZN)Z-G68	8-fiber, 50/125 µm OM2, Ø 6.8 mm, jacket PUR black
84013027	08-G62/FSN(ZN)Z-G68	8-fiber, 62.5/125 µm OM1, Ø 6.8 mm, jacket PUR black
84016119	12-E9/FSN(ZN)Z-G80	12-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 8 mm, jacket PUR black
84016120	12-G50/FSN(ZN)Z-G80	12-fiber, 50/125 µm OM2, Ø 8 mm, jacket PUR black
84038810	12-G62/FSN(ZN)Z-G80	12-fiber, 62.5/125 µm OM1, Ø 8 mm, jacket PUR black

Order information for special cables

Glass-armoured riser cables – 2 fibers

LSFH™ jacket with tight tube 0.9 mm



Item no.	Cable type	Description
84118844	02-E9A2/F(ZNG)H-G48	2-fiber, 9/125 µm Low Bend acc.ITU-G.657-A2, Ø 4.8 mm, jacket LSFH black
84142653	02-E9A2/F(ZNG)H-G48-UR	2-fiber, 9/125 µm Low Bend acc.ITU-G.657-A2, Ø 4.8 mm, jacket LSFH black UL rating acc.OFN/OFNG
84130268	02-G50/F(ZNG)H-G48-F	2-fiber, 50/125 µm OM3, Ø 4.8 mm, jacket LSFH black
84080315	02-E9A1/F(ZNG)H-G55	2-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 5.5 mm, jacket LSFH black
84128336	02-E9A1/F(ZNG)H-G55-UR	2-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 5.5 mm, jacket LSFH black UL rating acc.OFN/OFNG
84066685	02-G50/F(ZNG)H-G55	2-fiber, 50/125 µm OM2, Ø 5.5 mm, jacket LSFH black
84128340	02-G50/F(ZNG)H-G55-UR	2-fiber, 50/125 µm OM2, Ø 5.5 mm, jacket LSFH black UL rating acc.OFN/OFNG
84129729	02-G62/F(ZNG)H-G55#D	2-fiber, 62.5/125 µm OM1, Ø 5.5 mm, jacket LSFH black
84080314	02-E9A1/F(ZNG)H-G70	2-fiber, 9/125 µm acc. G.652.D/G.657-A1, Ø 7 mm, jacket LSFH black
84128357	02-E9A1/F(ZNG)H-G70-UR	2-fiber, 9/125 µm acc. G.652.D/G.657-A1, Ø 7 mm, jacket LSFH black UL rating acc.OFN/OFNG
84125119	02-G50/F(ZNG)H-G70	2-fiber, 50/125 µm OM2, Ø 7 mm, jacket LSFH black
84066684	02-G50/F(ZNG)H-G70-UR	2-fiber, 50/125 µm OM2, Ø 7 mm, jacket LSFH black UL rating acc.OFN/OFNG

Glass-armoured riser cables – 4 fibers

LSFH™ jacket with tight tube 0.9 mm



Item no.	Cable type	Description
84104260	04-E9A1/FSN(ZNG)H-G55	4-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 5.5 mm, jacket LSFH black
84075876	04-G50/FSN(ZNG)H-G55	4-fiber, 50/125 µm OM2, Ø 5.5 mm, jacket LSFH black
84129724	04-G62/FSN(ZNG)H-G55	4-fiber, 62.5/125 µm OM1, Ø 5.5 mm, jacket LSFH black

Order information for special cables

Rugged multi-fiber loose tube cables – up to 24 fibers (dry block)

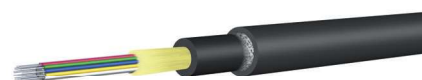
with 7.0 mm PUR jacket



Item no.	Cable type	Description
85027090	12-12E9/Q(ZNG)Z-G70	12-fiber, 9/125 µm acc. G.652.D, Ø 7.0 mm, jacket PUR black
tbd	12-12G50/Q(ZNG)Z-G70	12-fiber, 50/125 µm OM2, Ø 7.0 mm, jacket PUR black
tbd	12-12G62/Q(ZNG)Z-G70	12-fiber, 62.5/125 µm OM1, Ø 7.0 mm, jacket PUR black

Drag chain cables – up to 12 fibers

PUR jacket with tight tube 0.9 mm



Item no.	Cable type	Description
84104254	04-G50/FSN(ZN)YZ-G130	4-fiber, 50/125 µm OM2, Ø 13 mm, jacket PUR black
84074001	04-G50/FSN(ZN)YZ-G130-F	4-fiber, 50/125 µm OM3 BendOptimized, Ø 13 mm, jacket PUR black
84006996	06-G50/FSN(ZN)YZ-G130	6-fiber, 50/125 µm OM2, Ø 13 mm, jacket PUR black
84006999	06-G62/FSN(ZN)YZ-G130	6-fiber, 62.5/125 µm, Ø 13 mm, jacket PUR black
84006997	08-G50/FSN(ZN)YZ-G130	8-fiber, 50/125 µm OM2, Ø 13 mm, jacket PUR black
84034417	12-E9/FSN(ZN)YZ-G130	12-fiber, 9/125 µm acc.G.652.D/G.657-A1, Ø 13 mm, jacket PUR black
84006998	12-G50/FSN(ZN)YZ-G130	12-fiber, 50/125 µm OM2, Ø 13 mm, jacket PUR black
84007000	12-G62/FSN(ZN)YZ-G130	12-fiber, 62.5/125 µm, Ø 13 mm, jacket PUR black