REPLACES BITNER BITCRANE (N)SH(K)TÖU-J (FO) | 0.6/1 kV | (N)SHTÖU-J | 12E9 | PCP rubber

FC-NSHTK-FO 4G16+12E9 0.6/1 kV

Replacement for BITNER BiTcrane (N)SH(K)TÖU-J (FO) 4G16+12E9. Low-Voltage Reeling Cable with Integrated Optical Fibres with 12 single-mode fibres E9/125 (G.652.D) – construction, dimensions, weight, current rating, fibre data, standards and installation guidance.

Document no. FC-TDS-FO1959-2026-AEF2-EN · Revision 0 · Issued 4 November 2026 · Language: English (AU)

01 Application and Product Overview

FC-NSHTK-FO 4G16+12E9 is a low-Voltage Reeling Cable with Integrated Optical Fibres rated 0.6/1 kV and the FeiChun replacement for BITNER BiTcrane (N)SH(K)TÖU-J (FO) 4G16+12E9. It has an outer diameter of 27.5 – 29.5 mm, weighs about 1,210 kg/km and carries 99 A in free air at 30 °C. The series covers 16 – 120 mm².

Design

4 cores of 16 mm² stranded around a central optical element with 12 single-mode fibres E9/125 (G.652.D); the green-yellow protective core lies in the outer layer. An anti-torsion braid lies between inner and outer sheath.

Typical applications

- Low-voltage motor-driven and spring-driven reels of cranes and trolleys
- Single-mode fibres for long data links to the terminal or mine control system
- Mobile machines that need power and a fibre-optic data link in one reeling cable
- RTG, RMG and gantry cranes with remote monitoring
- Outdoor service with oil, UV radiation and ozone

4G16+12E9	0.6/1 kV	99 A	Ø 29.5 mm
Cross-section	Rated voltage U_0/U	Current at 30 °C	Outer dimension, max

Key features

- Plain fine-wire class 5 copper conductors to IEC 60228
- Optical element: 12 single-mode fibres E9/125 (G.652.D) in gel-filled loose tubes
- Travel speed up to 180 m/min, torsion ±25 °/m
- Anti-torsion braid between inner and outer sheath
- Flame-retardant to IEC 60332-1-2; oil-resistant to EN 60811-404; UV and ozone resistant

Replacement reference

REFERENCE PRODUCT
BITNER BiTcrane (N)SH(K)TÖU-J (FO) 4G16+12E9
(N)SHTÖU-J

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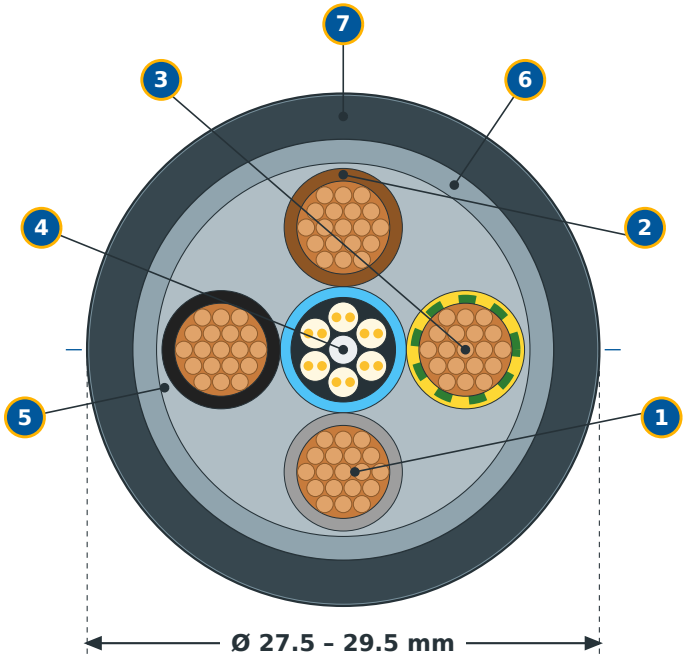
FEICHUN REPLACEMENT
FC-NSHTK-FO 4G16+12E9 0.6/1 kV
Low-Voltage Reeling Cable with Integrated Optical Fibres

The FeiChun cable has the same core configuration, voltage rating and field of application as the reference product. Dimensions and weights are FeiChun design values; compare them with reels, guides and glands before direct replacement.

02 Construction

FEICHUN · CROSS-SECTION A-A · 0.6/1 kV

FC-NSHTK-FO
Sample size 4G16+12E9 · Rev 0 · Illustrative, not to scale



No.	Component	Material
1	Conductor	Plain fine-wire copper, class 5 to IEC 60228
2	Insulation	EPR rubber compound 3GI3 to DIN VDE 0207-20
3	Protective earth conductor	Green-yellow insulated copper
4	Optical element	12 single-mode fibres E9/125 (G.652.D); ETFE tubes around GRP support
5	Filler and anti-torsion braid	Rubber filler; polyester braid
6	Inner sheath	Rubber compound 5GM3
7	Outer sheath	Polychloroprene (PCP/CR) rubber compound 5GM5 to DIN VDE 0207-21, black

The drawing shows 4G16+12E9. Other sizes have the same construction with scaled dimensions.

Construction details

Construction basis	FeiChun standard construction for (N)SHTÖU-J reeling cables with integrated optical fibres, designed to DIN VDE 0250-813. The core configuration, voltage rating and optical element match the reference type.
Conductor	Plain copper, very finely stranded, class 5 to IEC 60228 / DIN VDE 0295
Insulation	EPR rubber compound 3GI3 to DIN VDE 0207-20
Core identification	Colour code to HD 308; green-yellow protective core
Protective earth	Green-yellow protective core
Optical element	12 single-mode fibres E9/125 (G.652.D); located at the centre of the cable
Inner sheath	Rubber compound 5GM3 to DIN VDE 0207-21
Anti-torsion braid	Polyester (synthetic thread) braid, vulcanised between inner and outer sheath
Outer sheath	Polychloroprene (PCP/CR) rubber compound 5GM5 to DIN VDE 0207-21, black; resistant to oil (EN 60811-404), UV radiation and ozone
Marking	FEICHUN FC-NSHTK-FO 4G16+12E9 0.6/1 kV, metre marking

Optical fibre data

Fibre type	Single-mode E9/125 µm, ITU-T G.652.D
Attenuation, cabled	≤ 0.40 dB/km at 1310 nm; ≤ 0.30 dB/km at 1550 nm
Typical link reach	1 and 10 Gbit/s Ethernet up to 10 km
Optical element	Six gel-filled ETFE buffer tubes (1–4 fibres each) stranded around a central GRP support element, with a rubber element sheath; 250 µm coated fibres
Fibre identification	Colour code to IEC 60304 / DIN VDE 0888; tubes colour-coded
Fibre strain	Fibres lie with excess length in the tubes so that reeling strain is not transferred to the fibres
Optical test	Attenuation of every fibre measured by OTDR after cabling; values in the test certificate

Sheath material

Polychloroprene (PCP/CR) rubber 5GM5 is the classic heavy-duty sheath of DIN VDE 0250 cables: flame-retardant, resistant to oil, weather, ozone and UV radiation, and elastic under repeated bending.

03 Electrical, Thermal and Mechanical Data

Electrical data

Rated voltage U_0/U	0.6/1 kV AC
Test voltage	3.5 kV AC, 5 min
Current-carrying capacity	DIN VDE 0298-4, 30 °C ambient; see table
Conductor resistance	Maximum at 20 °C, class 5 to IEC 60228

Thermal and mechanical data

Maximum conductor temperature	+90 °C
Short-circuit temperature	+250 °C
Ambient temperature, fixed	-40 … +80 °C
Ambient temperature, moving	-35 … +80 °C
Minimum bending radius, moving	See table (6 × D)
Maximum tensile load	20 N/mm² of copper cross-section of the power cores
Maximum travel speed	180 m/min
Maximum torsion	±25 °/m
Flame propagation	IEC 60332-1-2
Halogen-free sheath	No
Oil, ozone and UV resistance	Resistant

04 Dimensions, Weights and Ratings

The highlighted row is 4G16+12E9; the adjacent sizes of the series are shown for comparison.

Type designation	Article no.	Conductor Ø max mm	Outer Ø min mm	Outer Ø max mm	Min. bend radius mm	Weight approx. kg/km	Max. pull N	R_{20} max Ω/km	Rated current A	I_k (1 s) kA
4G16+12E9	**FC-FO1959-4G1612E9**	**5.2**	**27.5**	**29.5**	**176**	**1,210**	**1,280**	**1.21**	**99**	**2.29**
4G25+12E9	FC-FO1959-4G2512E9	6.5	31.5	33.0	198	1,690	2,000	0.780	131	3.58

Current-carrying capacity: design values to DIN VDE 0298-4, free air, 30 °C ambient. Pull force = 20 N/mm² × copper cross-section of the power cores. Dimensions and weights are nominal design values within manufacturing tolerances.

Ambient temperature factors

°C	20	25	30	35	40	45	50
Factor	1.08	1.04	1.00	0.96	0.91	0.87	0.82

Short-circuit rating

I_k = 0.143 kA/mm² × conductor cross-section for 1 s; for duration t: $I_{k,t} = I_{k,1s} / \sqrt{t}$.

05 Reel Design Data

Rated current for the number of layers on the reel (DIN VDE 0298-4 factors 0.80 / 0.61 / 0.49 / 0.41) and the minimum reel core diameter (2 × bending radius).

Type designation	Outer Ø max, mm	Min. reel core Ø, mm	Copper, kg/km	1 layer, A	2 layers, A	3 layers, A	4 layers, A
4G16+12E9	**29.5**	**352**	**570**	**79**	**60**	**49**	**41**
4G25+12E9	33.0	396	890	105	80	64	54

06 Selection Guide

Typical use: At 4G16+12E9 this size is common for gantry and trolley travel drives, medium pumps and sub-distribution feeders up to about 54 kW.

At 400 V and cos φ 0.85, 4G16+12E9 supplies a three-phase load of about 54 kW at 30 °C in free air.

At 690 V and cos φ 0.85, 4G16+12E9 supplies a three-phase load of about 93 kW at 30 °C in free air.

For comparison: 4G16+12E9 has 29.5 mm, 1,210 kg/km and 99 A; 4G25+12E9 has 33.0 mm, 1,690 kg/km and 131 A. Choose the smallest size whose current, after the temperature and reel-layer factors, covers the load.

Example. A circuit carries 79 A at 40 °C ambient. Required table current = 79 / 0.91 = 87 A, so 4G16+12E9 (99 A) is suitable.

On a reel with 2,500 mm flange diameter, 1,000 mm traverse and 352 mm core, about 4,750 m of 4G16+12E9 can be wound (indicative).

07 Standards and Testing

Standard	Scope
DIN VDE 0250-814	Design reference for the construction
IEC 60228 / DIN VDE 0295	Conductors, class 5
DIN VDE 0207-20 / -21	Insulation and sheath compounds
DIN VDE 0298-3 / -4	Bending radii, tensile loads and current ratings
IEC 60332-1-2	Flame propagation, single cable
EN 60811-404	Mineral oil resistance
ITU-T G.652.D	Single-mode optical fibres
IEC 60794-1-21	Optical cables – mechanical test methods

Routine and type tests

- AC voltage test on every delivery length: 3.5 kV, 5 min
- Conductor resistance, dimensions and insulation thickness
- Continuity of all conductors and fibres
- Flame propagation, IEC 60332-1-2 (type test)

Test documentation: every delivery comes with a test certificate from FeiChun’s own laboratory; third-party witnessed tests can be arranged at the buyer’s cost.

08 Installation, Marking and Delivery

Installation guidance

- Unwind the cable tangentially from the drum; avoid loops, kinks and pulling over the drum flange.
- Keep the bending radius and tensile load within the values in this datasheet.
- Protect trailing cables from being run over; use cable bridges or hangers where vehicles cross.
- Connect the protective conductor at both ends before the other cores.

Sheath marking

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FEICHUN FC-NSHTK-FO 4G16+12E9 0.6/1 kV [year] [metre mark]
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Packing and delivery

Packing	Steel or fumigated wooden drums; cable ends sealed
Delivery length	As ordered, in one continuous length
Lead time	2–3 weeks after technical approval
Warranty	1 year, covering failures not caused by human factors
Terms	FCA buyer's nominated forwarder's warehouse in China (Incoterms 2020); prices subject to LME copper

Order example: FC-NSHTK-FO 4G16+12E9 0.6/1 kV – replacement for BITNER BiTcrane (N)SH(K)TÖU-J (FO) 4G16+12E9, 500 m on one drum. State type, cross-section, voltage, length per piece and installation conditions when requesting a quotation.

09 Certification and Quality

FeiChun holds CE (Low Voltage Directive), EAC and UKCA certificates and an ATEX documentation verification for defined product groups. Whether a certificate scope covers this construction is confirmed per project. All cable is routine-tested over 100 % of the delivered length.

10 Related Datasheets

- FC-NSHTK-FO 4G16+12G62.5 0.6/1 kV – replaces BITNER BiTcrane (N)SH(K)TÖU-J (FO)
- FC-NSHTK-FO 4G25+12G62.5 0.6/1 kV – replaces BITNER BiTcrane (N)SH(K)TÖU-J (FO)
- FC-NSHTK-FO 4G25+12E9 0.6/1 kV – replaces BITNER BiTcrane (N)SH(K)TÖU-J (FO)
- FC-NSHTK-FO 4G35+12G62.5 0.6/1 kV – replaces BITNER BiTcrane (N)SH(K)TÖU-J (FO)
- FC-NSHTK-FO 5G16+12G62.5 0.6/1 kV – replaces BITNER BiTcrane (N)SH(K)TÖU-J (FO)
- FC-NSHTK-FO 3×35+3G6+12G62.5 0.6/1 kV – replaces BITNER BiTcrane (N)SH(K)TÖU-J (FO)
- FC-NSHTK-FOP 4G16+12G62.5 0.6/1 kV – replaces BITNER BiTcrane (N)SH(K)TÖU-J (FO) PLUS

Library overview: FeiChun replacements for BITNER fibre-optic reeling cables

Frequently asked questions

Can FC-NSHTK-FO 4G16+12E9 replace BITNER BiTcrane (N)SH(K)TÖU-J (FO) 4G16+12E9?
Yes. It has the same core configuration, voltage rating, optical-fibre type and count, and field of application. Compare outer dimension, bending radius, weight and the fibre-optic rotary joint (FORJ) channels with your reel before ordering; FeiChun confirms suitability on request.

What are the outer diameter and minimum bending radius of 4G16+12E9?
Outer diameter 27.5 – 29.5 mm; minimum bending radius in moving operation 176 mm (6 × D).

Which optical fibres are included?
12 single-mode fibres E9/125 (G.652.D). Other fibre counts and types (E9/125, G50/125, G62.5/125 or combinations) are available on request.

How are the fibres connected on the reel?
Through a fibre-optic rotary joint (FORJ) on the reel axis, normally combined with the slip-ring assembly. Match the FORJ channels and fibre type (single-mode or multimode) to the fibres in use and keep spare fibres for later expansion.

What current can 4G16+12E9 carry?
99 A in free air at 30 °C. Apply the temperature factors and, on reels, the layer factors in this datasheet.

11 Trademark Notice and Intellectual Property

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Document control
Document no. FC-TDS-FO1959-2026-AEF2-EN
Revision 0
Date 4 November 2026
Product FC-NSHTK-FO 4G16+12E9 0.6/1 kV