REPLACES TRATOS TRATOSFLEX ESDB-FO | 3.6/6 kV | DIN VDE 0250-813 | 24E9 | PCP rubber, red

FC-ESDB-FO 3×120+2×70/2+24E9

3.6/6 kV

Replacement for Tratos TRATOSFLEX ESDB-FO 3×120+2×70/2+24E9. Medium-Voltage Reeling Cable with Integrated Optical Fibres with 24 single-mode fibres E9/125 (G.652.D) – construction, dimensions, weight, current rating, fibre data, standards and installation guidance.

Document no. FC-TDS-FO0762-2026-8CF7-EN · Revision 0 · Issued 4 November 2026 · Language: English (AU)

01 Application and Product Overview

FC-ESDB-FO 3×120+2×70/2+24E9 is a medium-Voltage Reeling Cable with Integrated Optical Fibres rated 3.6/6 kV and the FeiChun replacement for Tratos TRATOSFLEX ESDB-FO 3×120+2×70/2+24E9. It has an outer diameter of 59.0 – 63.0 mm, weighs about 6,660 kg/km and carries 322 A in free air at 30 °C. The series covers 25 – 185 mm².

Design

Three power cores rated 3.6/6 kV with EPR insulation between inner and outer semi-conductive layers. The protective earth conductor is split into two parts in two outer interstices; the optical element with 24 single-mode fibres E9/125 (G.652.D) lies in the third interstice. An anti-torsion braid is vulcanised between inner and outer sheath.

Typical applications

- Motor-driven monospiral and cylindrical reels of ship-to-shore, RMG, RTG and ASC cranes
- Single-mode fibres for long data links to the terminal or mine control system
- Ship loaders, stackers, reclaimers and bucket-wheel machines on rails
- Power supply and data link (PLC, CCTV, remote operation) in one reeling cable
- Outdoor port service with UV radiation, ozone and seawater spray

3×120+2×70/2+24E9	3.6/6 kV	322 A	Ø 63.0 mm
Cross-section	Rated voltage U_0/U	Current at 30 °C	Outer dimension, max

Key features

- Tinned fine-wire class 5 copper conductors to IEC 60228
- HEPR insulation with inner and outer semi-conductive layers, cross-linked in one process
- Optical element: 24 single-mode fibres E9/125 (G.652.D) in gel-filled loose tubes
- Travel speed up to 300 m/min
- 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
Tratos TRATOSFLEX ESDB-FO 3×120+2×70/2+24E9
DIN VDE 0250-813

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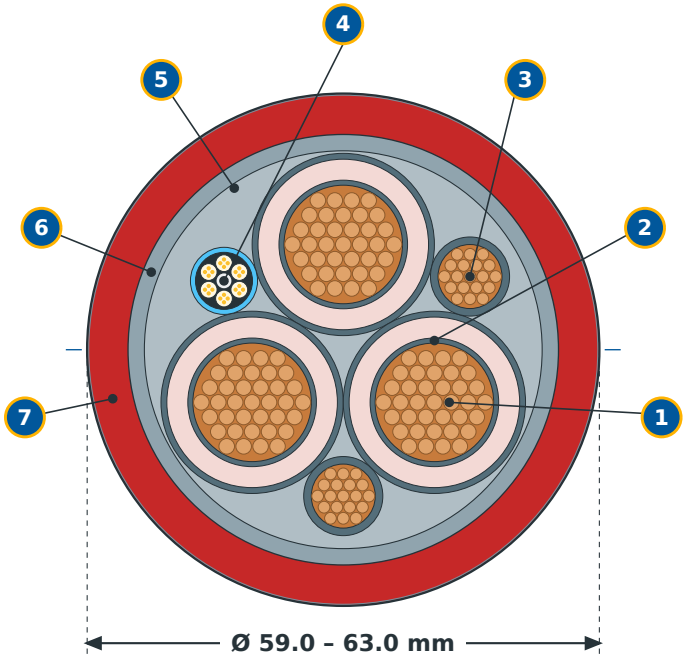
FEICHUN REPLACEMENT
FC-ESDB-FO 3×120+2×70/2+24E9 3.6/6 kV
Medium-Voltage Reeling Cable with Integrated Optical Fibres

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 · 3.6/6 kV

FC-ESDB-FO
Sample size 3×120+2×70/2+24E9 · Rev 0 · Illustrative, not to scale



No.	Component	Material
1	Conductor	Tinned fine-wire copper, class 5 to IEC 60228
2	Insulation and semi-conductive layers	HEPR between inner and outer semi-conductive layers
3	Protective earth conductor	Copper, semi-conductive rubber covering
4	Optical element	24 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 GM1b
7	Outer sheath	Polychloroprene rubber compound 5GM5 to DIN VDE 0207-21, red

The drawing shows 3×120+2×70/2+24E9. Other sizes have the same construction with scaled dimensions.

Construction details

Construction basis	Construction matched to the published construction of the reference product (insulation, earth arrangement, optical element position and sheath system). FeiChun materials meet the same DIN VDE 0207 compound classes.
Conductor	Tinned copper, very finely stranded, class 5 to IEC 60228 / DIN VDE 0295
Insulation	HEPR (high-modulus EPR) compound to DIN VDE 0207-20, with inner and outer semi-conductive rubber layers extruded and cross-linked in one process; the outer layer strips easily
Core identification	Natural-coloured insulation under black semi-conductive layer; cores numbered 1–3
Protective earth	Copper, class 5, with semi-conductive rubber covering, split into two parts in two outer interstices
Optical element	24 single-mode fibres E9/125 (G.652.D); located in an outer interstice
Inner sheath	Rubber compound GM1b to DIN VDE 0207-21
Anti-torsion braid	Polyester (synthetic thread) braid, vulcanised between inner and outer sheath
Outer sheath	Polychloroprene rubber compound 5GM5 to DIN VDE 0207-21, red; resistant to oil (EN 60811-404), UV radiation and ozone
Marking	FEICHUN FC-ESDB-FO 3×120+2×70/2+24E9 3.6/6 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

The red polychloroprene (CR) outer sheath, compound 5GM5 to DIN VDE 0207-21, is abrasion- and tear-resistant, flame-retardant and resistant to oil, weather, ozone and UV radiation. The red colour identifies medium-voltage cables on site.

03 Electrical, Thermal and Mechanical Data

Electrical data

Rated voltage U_0/U	3.6/6 kV AC
Test voltage	11 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	-30 … +80 °C
Minimum bending radius, moving	See table (12 × D)
Maximum tensile load	20 N/mm² of copper cross-section of the power cores
Maximum travel speed	300 m/min
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 3×120+2×70/2+24E9; 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
3×95+2×50/2+24E9	FC-FO0762-395250224E	12.6	55.5	59.0	708	5,540	5,700	0.206	278	13.59
3×120+2×70/2+24E9	**FC-FO0762-3120270224**	**14.2**	**59.0**	**63.0**	**756**	**6,660**	**7,200**	**0.161**	**322**	**17.16**
3×150+2×70/2+24E9	FC-FO0762-3150270224	15.8	63.0	67.0	804	7,780	9,000	0.129	370	21.45

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
3×95+2×50/2+24E9	59.0	1,416	2,980	222	170	136	114
3×120+2×70/2+24E9	**63.0**	**1,512**	**3,820**	**258**	**196**	**158**	**132**
3×150+2×70/2+24E9	67.0	1,608	4,620	296	226	181	152

06 Selection Guide

Typical use: 3×120+2×70/2+24E9 is a heavy MV feeder for ship-to-shore cranes, draglines, shovels and dredgers of about 3.3 MVA.

At 6 kV, 3×120+2×70/2+24E9 transmits about 3.35 MVA continuously in free air at 30 °C (one layer on a reel: about 2.68 MVA).

For comparison: 3×95+2×50/2+24E9 has 59.0 mm, 5,540 kg/km and 278 A; 3×150+2×70/2+24E9 has 67.0 mm, 7,780 kg/km and 370 A. Choose the smallest size whose current, after the temperature and reel-layer factors, covers the load.

Example. A circuit carries 257 A at 40 °C ambient. Required table current = 257 / 0.91 = 283 A, so 3×120+2×70/2+24E9 (322 A) is suitable.

On a reel with 2,500 mm flange diameter, 1,000 mm traverse and 1,512 mm core, about 580 m of 3×120+2×70/2+24E9 can be wound (indicative).

07 Standards and Testing

Standard	Scope
DIN VDE 0250-813	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
IEC 60502-2 (method)	Partial-discharge and voltage tests

Routine and type tests

- AC voltage test on every delivery length: 11 kV, 5 min
- Conductor resistance, dimensions and insulation thickness
- Continuity of all conductors and fibres
- Partial-discharge test of the power cores (IEC 60502-2 method)
- 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.
- Use a reel core diameter of at least twice the minimum bending radius; fit a guide so that turns do not cross.
- Before first operation, let the cable relax at full length to release torsion from transport.
- Use MV terminations and couplers suitable for screened flexible cores; connect all earth conductors at both ends.

Sheath marking

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FEICHUN FC-ESDB-FO 3×120+2×70/2+24E9 3.6/6 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-ESDB-FO 3×120+2×70/2+24E9 3.6/6 kV – replacement for Tratos TRATOSFLEX ESDB-FO 3×120+2×70/2+24E9, 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-ESDB-FO 3×120+2×70/2+12E9 3.6/6 kV – replaces Tratos TRATOSFLEX ESDB-FO
- FC-ESDB-FO 3×120+2×70/2+12G62.5 3.6/6 kV – replaces Tratos TRATOSFLEX ESDB-FO
- FC-ESDB-FO 3×120+2×70/2+12E9+12G62.5 3.6/6 kV – replaces Tratos TRATOSFLEX ESDB-FO
- FC-ESDB-FO 3×95+2×50/2+12E9 3.6/6 kV – replaces Tratos TRATOSFLEX ESDB-FO
- FC-ES3-FO 3×35+2×25/2+24G62.5 3.6/6 kV – replaces Tratos TRATOSFLEX ES3-FO
- FC-ES3-FO 3×25+2×25/2+24G62.5 6/10 kV – replaces Tratos TRATOSFLEX ES3-FO
- FC-ES3-FO 3×35+2×25/2+24G62.5 8.7/15 kV – replaces Tratos TRATOSFLEX ES3-FO
- FC-ES3-FO 3×35+2×25/2+24G62.5 12/20 kV – replaces Tratos TRATOSFLEX ES3-FO

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

Frequently asked questions

Can FC-ESDB-FO 3×120+2×70/2+24E9 replace Tratos TRATOSFLEX ESDB-FO 3×120+2×70/2+24E9?
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 3×120+2×70/2+24E9?
Outer diameter 59.0 – 63.0 mm; minimum bending radius in moving operation 756 mm (12 × D).

Which optical fibres are included?
24 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 3×120+2×70/2+24E9 carry?
322 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-FO0762-2026-8CF7-EN
Revision 0
Date 4 November 2026
Product FC-ESDB-FO 3×120+2×70/2+24E9 3.6/6 kV