TYPE · FLAT MV REELING + FO | 3.6/6 kV | Based on DIN VDE 0250-813 | PROTOLON (FL)-LWL Equivalent

FC-FLR-LWL (N)TSFLCGEWÖU 3,6/6 kV

Medium voltage flat reeling cable with integrated fibre optics — EPR insulated, split concentric earth, red CR outer sheath — for fast-moving container cranes, gantries, large mobile equipment and excavators.

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01 Application & Product Overview

FC-FLR-LWL is a flexible medium voltage flat reeling cable designed for the combined transmission of power and data under high mechanical stress — dynamic tensile loads, frequent directional changes within one plane and continuous running over rollers and guides.

The parallel (flat) core arrangement allows compact stacking on monospiral reeling drums and in flat-cable guiding systems. A central fibre-optic element provides interference-free, high-bandwidth communication for crane control, CCTV and automation networks, eliminating separate data cables or slip-ring signal channels.

Typical applications

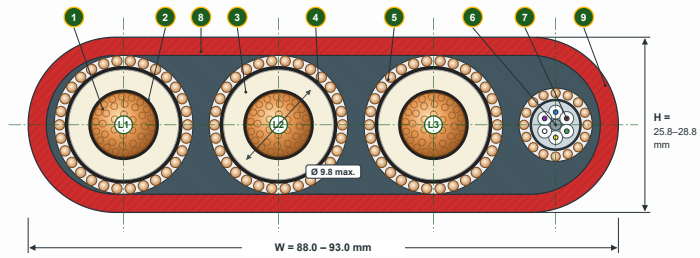
- STS / ship-to-shore and RMG container cranes on monospiral drums
- Stacker-reclaimers, ship loaders and bulk handling gantries
- Large mobile equipment and mining excavators
- Outdoor and indoor use — resistant to ozone, UV, moisture and oil
- Plants requiring power + Ethernet / fieldbus over one cable

3.6/6 kV	120 m/min	15 N/mm²	6 – 24 fibres
Rated voltage U_0/U	Travel speed (reeling)	Max. tensile load on conductor	G62.5 · G50 · E9 (OS2)

Cross-reference

REFERENCE TYPE	FEICHUN EQUIVALENT
PROTOLON (FL)-LWL (N)TSFLCGEWÖU 3,6/6 kV	FC-FLR-LWL (N)TSFLCGEWÖU 3,6/6 kV

02 Construction



FEICHUN CABLES · SECTION A–A · FC-FLR-LWL 3.6/6 kV

Doc. No. FC-TDS-FLF-2026-1D0A	Rev. 0 · 2026-10-10
Ref. 3×50+4×25/4E+1×(6G62.5)	1st-angle proj. · NTS

Drawing representative of the 3×50 mm² size; other sizes scale proportionally.

Pos.	Element	Material
1	Phase conductor	Tinned annealed Cu, finely stranded, class 5 (IEC 60228) / class F (DIN VDE 0295)
2	Inner semiconductive layer	Extruded semiconductive EPR
3	Insulation	High-grade EPR, min. 3GI3 (DIN VDE 0207-20), natural colour
4	Outer semiconductive layer	Modified EPR, black, strippable (warm)
5	Earth conductor	Tinned Cu wires, split & concentrically applied around each core
6	FO central element	Non-metallic FRP strength member
7	FO tubes & fibres	6 gel-filled ETFE tubes, 1–4 fibres each, colour-coded
8	Inner sheath / bedding	Rubber compound, black, filling the inter-core spaces
9	Outer sheath	Polychloroprene (CR), min. 5GM5, red

Design features

Item	Description
Core arrangement	Three power cores and one fibre-optic element laid in parallel (flat); earth conductor split into 4 parts, concentrically distributed around each power core and the FO element
Electrical field control	Triple-extruded inner semicon / EPR insulation / outer semicon, cured in one continuous process
Core identification	Natural insulation with black semiconductive layer; numbered tapes L1, L2, L3
Optical element	Six loose tubes stranded around a central FRP support; each tube contains 1, 2, 3 or 4 fibres (6 / 12 / 18 / 24 fibres total)
Fibre coding	Specially developed colour code for unambiguous identification of each fibre
Sheath colour	Red (standard); yellow or black on request

03 Electrical, Thermal & Mechanical Data

Electrical parameters

Parameter	Value
Rated voltage U_0/U	3.6/6 kV
Max. operating voltage AC	4.2/7.2 kV
Max. operating voltage DC	5.4/10.8 kV
AC test voltage	11 kV, 5 min
Partial discharge	≤ 10 pC at 1.73 U_0
Current rating basis	DIN VDE 0298-4; reeled in 1 layer, 30 °C ambient
Data transmission	Integrated FO element for high data-rate, EMI-immune communication

Thermal & mechanical parameters

Parameter	Value
Max. conductor temperature	+90 °C
Short-circuit temperature	+250 °C (max. 5 s)
Ambient – fixed installation	−50 °C to +80 °C
Ambient – fully flexible	−35 °C to +80 °C
Max. tensile load	15 N/mm² of total phase conductor cross-section
Min. bending radius	Per DIN VDE 0298-3 — see table §05 (based on D = 1.5 × flat cable height)
S-type direction changes	Min. spacing 20 × D
Travel speed	Up to 120 m/min (gantry, reeling)
Torsional stress	Not permitted

04 Optical Fibre Data

Characteristic	G50/125 µm Multimode OM2/OM3	G62.5/125 µm Multimode OM1 (standard)	E9/125 µm Single-mode OS2
Fibre type	Graded-index	Graded-index	Monomode
Core / cladding / coating Ø	50 / 125 / 250 µm	62.5 / 125 / 250 µm	9 / 125 / 250 µm
Attenuation at 850 nm	≤ 2.8 dB/km	≤ 3.3 dB/km	—
Attenuation at 1310 nm	≤ 0.8 dB/km	≤ 0.9 dB/km	≤ 0.4 dB/km
Attenuation at 1550 nm	—	—	≤ 0.3 dB/km
Bandwidth at 850 nm	≥ 400 MHz·km	≥ 400 MHz·km	—
Bandwidth at 1300 nm	≥ 1200 MHz·km	≥ 600 MHz·km	—
Numerical aperture	0.20 ± 0.02	0.275 ± 0.02	0.14 ± 0.02
Chromatic dispersion 1310 / 1550 nm	—	—	≤ 3.5 / ≤ 18 ps/(nm·km)
Fibre count	6 (standard) · 12 · 18 · 24 — in six gel-filled loose tubes		

05 Dimensions, Weights & Ratings — 3.6/6 kV

Cores × cross-section mm²	FeiChun part no.	Conductor Ø max. mm	Height (H) min. mm	Height (H) max. mm	Width (W) min. mm	Width (W) max. mm	Min. bending radius mm	Weight approx. kg/km	Max. tensile force N	R_{20} max. Ω/km	Current rating A	Short-circuit current kA (1 s)
3×35+4×25/4E+1×(6G62.5)	FC-FLR06-03525	8.3	24.5	27.5	83.5	88.5	413	3,700	1,575	0.565	130	5.01
3×50+4×25/4E+1×(6G62.5)	FC-FLR06-05025	9.8	25.8	28.8	88.0	93.0	432	4,250	2,250	0.393	162	7.15
3×70+4×35/4E+1×(6G62.5)	FC-FLR06-07035	11.4	28.7	31.7	97.7	102.7	476	5,590	3,150	0.277	200	10.01
3×95+4×50/4E+1×(6G62.5)	FC-FLR06-09550	13.3	30.6	33.6	105.3	110.3	504	6,720	4,275	0.210	241	13.59

Current rating: nominal value for rubber-insulated cables reeled in one layer at 30 °C ambient (DIN VDE 0298-4). Designs with 12, 18 or 24 fibres, G50 or E9 fibre types, and larger conductor sizes (3×120 mm² and above) are manufactured to order — dimensions confirmed with the order acknowledgement.

Ambient temperature correction factors (90 °C conductor)

Ambient °C	10	15	20	25	30	35	40	45	50
Factor	1.15	1.12	1.08	1.04	1.00	0.96	0.91	0.87	0.82

06 Standards, Tests & Resistance Properties

Standard	Scope
DIN VDE 0250-813	Basis of design (flat MV trailing / reeling cable)
DIN VDE 0295 / IEC 60228	Conductors, class 5 / F
DIN VDE 0207-20 / -21	Insulation (3GI3) and sheath (5GM5) compounds
DIN VDE 0298-3 / -4	Bending radii, current ratings
DIN EN 60811-404	Oil resistance of sheath
HD 22.16 / EN 50525-1	Water resistance; general requirements
IEC 60793 / IEC 60794	Optical fibres and FO cable tests

Routine & type tests

- AC voltage test 11 kV on every drum, partial discharge measurement
- Conductor resistance and dimensional checks
- OTDR attenuation test of every fibre, report supplied with drum
- Reversed bending test and reeling test (type test)
- Ozone, UV and weathering resistance — unrestricted outdoor use
- Oil resistance per DIN EN 60811-404

Test documentation: each delivery is accompanied by a FeiChun in-house laboratory inspection certificate (electrical + OTDR). Third-party witnessed testing can be arranged at the buyer's cost.

07 Installation, Marking & Delivery

Installation notes

- Use monospiral reeling drums sized for flat cable; drum core diameter ≥ 2 × minimum bending radius.
- Unwind tangentially from the delivery

Sheath marking

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FEICHUN FC-FLR-LWL (N)TSFLCGEWÖU 3×50+4×25/4E+1×(6G62.5) 3,6/6 kV 2026 [serial no.] [metre mark]
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drum — never pull off over the flange; avoid loops and twisting.

- Torsion is not permitted; maintain at least 20 × D between S-type direction changes.
- Keep tensile force within the tabulated limit, including acceleration and deceleration peaks.
- Lay out and relax the cable before the first reeling; check tension-control settings at commissioning.

Fibre-optic termination: preparation of the FO element requires specialised skills and tooling. Factory pre-assembly of FO connectors or pigtails is recommended — please supply connection dimensions with the order.

Packing & delivery

Item	Standard
Drum	Steel or fumigated wooden drums, ends sealed with heat-shrink caps
Lengths	To order, single continuous length (no joints)
Production lead time	2–3 weeks after technical confirmation
Warranty	Min. 3 years against manufacturing defects
Drum label	Type, size, length, gross/net weight, batch no., drum no.

08 Certifications & Quality

CE — LVD 2014/35/EU

Attestation No. M.2025.206.C116598 · EN 50525-1:2011+A1:2022 · UDEM International Certification · valid to 01.04.2030

EAC — TR CU 004/2011

Certificate No. ЕАЭС KG417/052.CN.02.15390 · GOST 31996-2012, GOST 31565-2012 · valid 24.10.2025–23.10.2030

UKCA — Verification

No. ICR/VC/HS2508110 · BS EN 50525-1:2011+A1:2022 · ICR Polska · valid to 17.08.2030

FeiChun also holds ATEX (Directive 2014/34/EU) documentation verification and IECEx / VDE related approvals for designated product families. Certificate copies are available on request.

09 Trademark Notice & Intellectual Property

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