SERIES CATALOGUE · FLAT MV REELING

3.6/6 · 6/10 · 8.7/15 kV

Based on DIN VDE 0250-813

PROTOLON (FL) / (FL)-LWL Equivalent

FC-FLR · FC-FLR-LWL (N)TSFLCGEWÖU Medium Voltage Flat Reeling Cables

Complete series catalogue — six types covering 3.6/6 kV, 6/10 kV and 8.7/15 kV, each available with or without an integrated fibre-optic element, for container cranes, gantries, stacker-reclaimers and large mobile equipment.

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Language **English (AU)**

01 Series Overview

FC-FLR flat reeling cables are flexible medium voltage cables for high mechanical stresses — dynamic tensile loads, frequent changes of direction within one plane and continuous running over rollers. The parallel core arrangement gives a low stacking height on monospiral drums and in flat-cable guides, while the split concentric earth conductor around each core ensures a symmetrical electric field and reliable fault-current return.

Each voltage class is offered as FC-FLR (power only) and FC-FLR-LWL with an integrated fibre-optic element for interference-free, high-bandwidth data transmission — power and communications in a single cable.

Typical applications

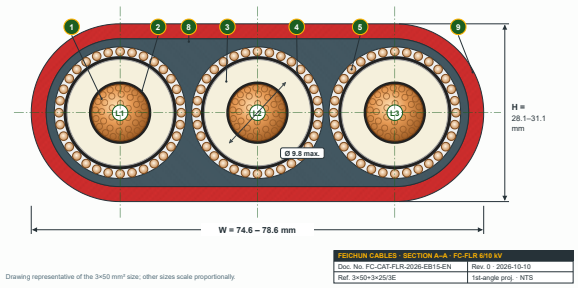
- STS and RMG container cranes on monospiral drums
- Stacker-reclaimers, ship loaders and bulk handling gantries
- Large mobile equipment and mining excavators
- Mobile substations and transfer cars
- Outdoor and indoor use — resistant to ozone, UV, moisture and oil

3.6 – 15 kV	120 m/min	15 N/mm²	6 – 24
Rated voltage range	Travel speed (reeling)	Max. tensile load on conductor	Fibres (LWL versions)

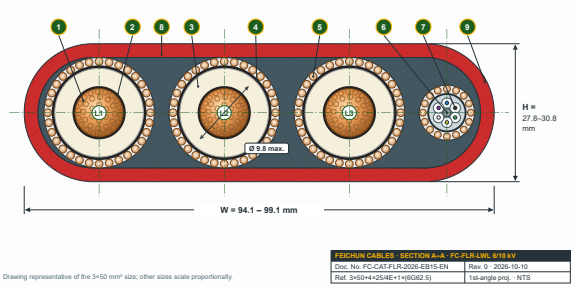
Selection guide

FeiChun type	Reference type	Rated voltage	Fibre optics	Size range	Section
FC-FLR (N)TSFLCGEWÖU 3,6/6 kV	PROTOLON (FL) 3,6/6 kV	**3.6/6 kV**	No	3×25 – 3×120 mm²	§05
FC-FLR-LWL (N)TSFLCGEWÖU 3,6/6 kV	PROTOLON (FL)-LWL 3,6/6 kV	**3.6/6 kV**	Yes — 6G62.5 standard	3×35 – 3×95 mm²	§05
FC-FLR (N)TSFLCGEWÖU 6/10 kV	PROTOLON (FL) 6/10 kV	**6/10 kV**	No	3×25 – 3×120 mm²	§06
FC-FLR-LWL (N)TSFLCGEWÖU 6/10 kV	PROTOLON (FL)-LWL 6/10 kV	**6/10 kV**	Yes — 6G62.5 standard	3×35 – 3×95 mm²	§06
FC-FLR (N)TSFLCGEWÖU 8,7/15 kV	PROTOLON (FL) 8,7/15 kV	**8.7/15 kV**	No	3×25 – 3×120 mm²	§07
FC-FLR-LWL (N)TSFLCGEWÖU 8,7/15 kV	PROTOLON (FL)-LWL 8,7/15 kV	**8.7/15 kV**	Yes — 6G62.5 standard	3×35 – 3×70 mm²	§07

02 Construction



FC-FLR — power only (shown: 3×50+3×25/3E)



FC-FLR-LWL — with fibre optics (shown: 3×50+4×25/4E+1×(6G62.5))

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 in warm condition
5	Earth conductor	Tinned Cu wires, split and applied concentrically around each core
6	FO central element (LWL only)	Non-metallic FRP strength member
7	FO tubes & fibres (LWL only)	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 (plus the FO element in LWL versions) laid in parallel; earth conductor split and distributed concentrically around each core
Electrical field control	Triple-extruded inner semicon / EPR insulation / outer semicon in one continuous process
Core identification	Natural insulation with black semiconductive layer; numbered tapes L1, L2, L3
Optical element	Six loose tubes around a central FRP support; 6 / 12 / 18 / 24 fibres
Sheath colour	Red (standard); yellow or black on request

03 Technical Data

Electrical parameters by voltage class

Parameter	3.6/6 kV	6/10 kV	8.7/15 kV
Rated voltage U_0/U	3.6/6 kV	6/10 kV	8.7/15 kV
Max. operating voltage AC	4.2/7.2 kV	6.9/12 kV	10.4/18 kV
Max. operating voltage DC	5.4/10.8 kV	9/18 kV	13.5/27 kV
AC test voltage, 5 min	11 kV	17 kV	24 kV
Partial discharge at 1.73 U_0		≤ 10 pC	

Thermal, mechanical & chemical parameters (all types)

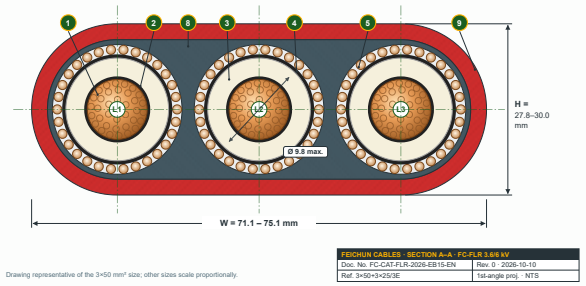
Parameter	Value
Max. conductor temperature	+90 °C
Short-circuit temperature	+250 °C (max. 5 s)
Ambient — fixed installation	−50 °C to +80 °C
Ambient — fully flexible operation	−35 °C to +80 °C
Max. tensile load	15 N/mm² of total phase conductor cross-section
Min. bending radius	Per DIN VDE 0298-3 — see type tables (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
Resistance	Oil (DIN EN 60811-404), ozone, UV and moisture — unrestricted outdoor use; water resistance per HD 22.16

04 Optical Fibre Data (FC-FLR-LWL)

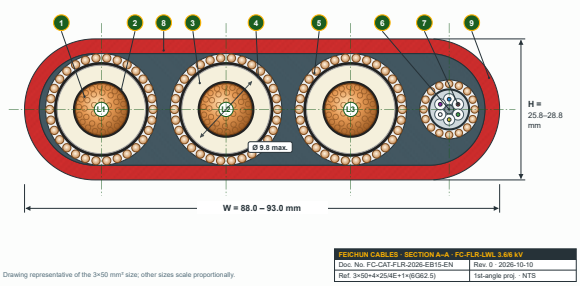
Characteristic	G50/125 µm Multimode OM2/OM3	G62.5/125 µm Multimode OM1 (standard)	E9/125 µm Single-mode OS2
Fibre type	Graded-index	Graded-index	Monomode
Core / cladding / coating Ø	50 / 125 / 250 µm	62.5 / 125 / 250 µm	9 / 125 / 250 µm
Attenuation at 850 nm	≤ 2.8 dB/km	≤ 3.3 dB/km	—
Attenuation at 1310 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		

FEICHUN CABLES

05 **3.6/6 kV** **Types**



FC-FLR (N)TSFLCGEWÖU 3,6/6 kV
power only (shown: 3×50+3×25/3E)



FC-FLR-LWL (N)TSFLCGEWÖU 3,6/6 kV
with fibre optics (shown: 3×50+4×25/4E+1×(6G62.5))

FC-FLR (N)TSFLCGEWÖU 3,6/6 kV

equivalent to PROTOLON (FL)

Cores × cross-section mm²	FeiChun part no.	Conductor Ø max. mm	Height (H)		Width (W)		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)
			min. mm	max. mm	min. mm	max. mm						
3×25+3×25/3E	FC-FLR06-02525	6.9	24.2	27.2	64.3	68.3	408	2,730	1,125	0.795	105	3.58
3×35+3×25/3E	FC-FLR06-03525	8.3	24.7	27.7	65.8	69.8	416	3,120	1,575	0.565	130	5.01
3×50+3×25/3E	FC-FLR06-05025	9.8	27.8	30.0	71.1	75.1	450	3,860	2,250	0.393	162	7.15
3×70+3×35/3E	FC-FLR06-07035	11.4	28.9	31.9	76.8	80.8	479	4,730	3,150	0.277	200	10.01
3×95+3×50/3E	FC-FLR06-09550	13.3	31.0	34.0	82.5	86.5	495	5,600	4,275	0.210	241	13.59
3×120+3×70/3E	FC-FLR06-12070	15.1	35.4	37.4	92.3	97.3	561	7,400	5,400	0.164	282	17.16

FC-FLR-LWL (N)TSFLCGEWÖU 3,6/6 kV

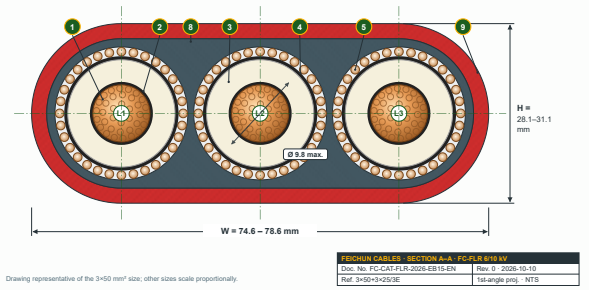
equivalent to PROTOLON (FL)-LWL

Cores × cross-section mm²	FeiChun part no.	Conductor Ø max. mm	Height (H)		Width (W)		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)
			min. mm	max. mm	min. mm	max. mm						
3×35+4×25/4E +1×(6G62.5)	FC-FLR06-03525F	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-FLR06-05025F	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-FLR06-07035F	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-FLR06-09550F	13.3	30.6	33.6	105.3	110.3	504	6,720	4,275	0.210	241	13.59

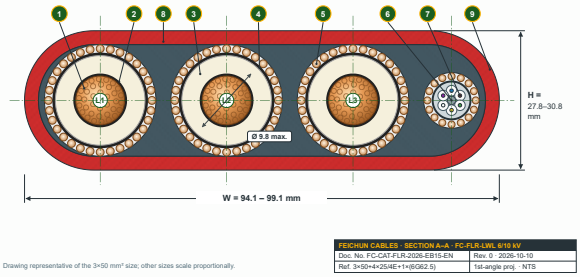
Other sizes, sheath colours and fibre configurations (12 / 18 / 24 fibres, G50 or E9) are manufactured to order.

06 6/10 kV

Types



FC-FLR (N)TSFLCGEWÖU 6/10 kV
power only (shown: 3×50+3×25/3E)



FC-FLR-LWL (N)TSFLCGEWÖU 6/10 kV
with fibre optics (shown: 3×50+4×25/4E+1×(6G62.5))

FC-FLR (N)TSFLCGEWÖU 6/10 kV

equivalent to PROTOLON (FL)

Cores × cross-section mm²	FeiChun part no.	Conductor Ø max. mm	Height (H)		Width (W)		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)
			min. mm	max. mm	min. mm	max. mm						
3×25+3×25/3E	FC-FLR10-02525	6.9	25.0	27.5	66.7	69.7	413	2,860	1,125	0.795	105	3.58
3×35+3×25/3E	FC-FLR10-03525	8.3	25.5	28.5	68.2	72.2	428	3,260	1,575	0.565	130	5.01
4×35+4×25/4E	FC-FLR10-43525	8.3	25.5	28.5	86.7	91.7	428	4,110	2,100	0.565	130	5.01
3×50+3×25/3E	FC-FLR10-05025	9.8	28.1	31.1	74.6	78.6	467	4,030	2,250	0.393	162	7.15
3×70+3×35/3E	FC-FLR10-07035	11.4	29.7	32.7	79.2	83.2	491	4,850	3,150	0.277	200	10.01
4×70+4×35/4E	FC-FLR10-47035	11.4	29.5	32.5	100.9	105.9	488	6,240	4,200	0.277	200	10.01
3×95+3×50/3E	FC-FLR10-09550	13.3	31.7	34.7	84.7	89.7	521	5,920	4,275	0.210	241	13.59
3×120+3×70/3E	FC-FLR10-12070	15.1	35.1	38.1	92.9	97.9	572	7,420	5,400	0.164	282	17.16

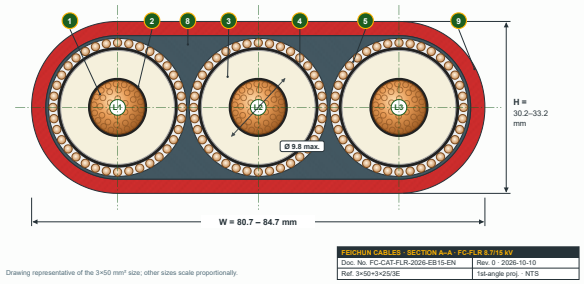
FC-FLR-LWL (N)TSFLCGEWÖU 6/10 kV

equivalent to PROTOLON (FL)-LWL

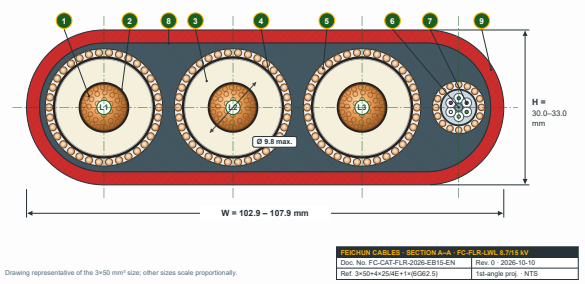
Cores × cross-section mm²	FeiChun part no.	Conductor Ø max. mm	Height (H)		Width (W)		Min. bending radius mm	Weight approx. kg/km	Max. tensile force N	R_{20} max. Ω/km	Current rating A	Short-circuit current kA (1 s)
			min. mm	max. mm	min. mm	max. mm						
3×35+4×25/4E +1×(6G62.5)	FC-FLR10-03525F	8.3	25.3	28.3	86.7	91.7	425	3,910	1,575	0.565	130	5.01
3×50+4×25/4E +1×(6G62.5)	FC-FLR10-05025F	9.8	27.8	30.8	94.1	99.1	462	4,810	2,250	0.393	162	7.15
3×70+4×35/4E +1×(6G62.5)	FC-FLR10-07035F	11.4	29.5	32.5	100.9	105.9	488	5,800	3,150	0.277	200	10.01
3×95+4×50/4E +1×(6G62.5)	FC-FLR10-09550F	13.3	31.4	34.4	108.5	113.5	516	6,940	4,275	0.210	241	13.59

Other sizes, sheath colours and fibre configurations (12 / 18 / 24 fibres, G50 or E9) are manufactured to order.

07 **8.7/15 kV** **Types**



FC-FLR (N)TSFLCGEWÖU 8,7/15 kV
power only (shown: 3×50+3×25/3E)



FC-FLR-LWL (N)TSFLCGEWÖU 8,7/15 kV
with fibre optics (shown: 3×50+4×25/4E+1×(6G62.5))

FC-FLR (N)TSFLCGEWÖU 8,7/15 kV

equivalent to PROTOLON (FL)

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)
3×25+3×25/3E	FC-FLR15-02525	6.9	27.7	30.7	73.3	77.3	461	3,390	1,125	0.795	111	3.58
3×35+3×25/3E	FC-FLR15-03525	8.3	28.7	31.7	76.2	80.2	476	3,820	1,575	0.565	138	5.01
3×50+3×25/3E	FC-FLR15-05025	9.8	30.2	33.2	80.7	84.7	498	4,440	2,250	0.393	172	7.15
3×70+3×35/3E	FC-FLR15-07035	11.4	33.3	36.3	87.5	92.5	545	5,610	3,150	0.277	212	10.01
3×95+3×50/3E	FC-FLR15-09550	13.3	35.3	38.3	93.5	98.5	575	6,700	4,275	0.210	255	13.59
3×120+3×70/3E	FC-FLR15-12070	15.1	37.3	40.3	99.5	104.5	605	8,000	5,400	0.164	297	17.16

FC-FLR-LWL (N)TSFLCGEWÖU 8,7/15 kV

equivalent to PROTOLON (FL)-LWL

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-FLR15-03525F	8.3	29.3	32.3	96.9	101.9	485	4,630	1,575	0.565	138	5.01
3×50+4×25/4E +1×(6G62.5)	FC-FLR15-05025F	9.8	30.0	33.0	102.9	107.9	495	5,400	2,250	0.393	172	7.15
3×70+4×35/4E +1×(6G62.5)	FC-FLR15-07035F	11.4	31.7	34.7	109.7	114.7	520	6,460	3,150	0.277	212	10.01

Other sizes, sheath colours and fibre configurations (12 / 18 / 24 fibres, G50 or E9) are manufactured to order.

08 Rating Factors, Standards & Tests

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

Current ratings in the type tables are nominal values for rubber cables reeled in one layer at 30 °C ambient (DIN VDE 0298-4).

Standard	Scope
DIN VDE 0250-813	Basis of design (flat MV 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
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 on every drum (11 / 17 / 24 kV) and partial discharge measurement
- Conductor resistance and dimensional checks
- OTDR attenuation test of every fibre (LWL versions), report supplied with drum
- Reversed bending test and reeling test (type test)
- Ozone, UV and oil resistance

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

09 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 drum — never pull off over the flange; avoid loops and twisting.
- Torsion is not permitted; keep at least 20 × D between S-type direction changes.
- Keep tensile force within the tabulated limit, including acceleration and braking peaks.

Sheath marking

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FEICHUN FC-FLR[-LWL] (N)TSFLCGEWÖU
[cores × cross-section] [U0/U] [year]
[serial no.] [metre mark]
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- Use stress-control terminations rated for the cable voltage class and connect each split earth conductor at both ends.

Fibre-optic termination (LWL): 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.

10 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. EAЭC KG417/052.CN.02.15390 · TR CU 004/2011, 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.

11 Trademark Notice & Intellectual Property

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