TYPE · ROUND MV REELING + FO | 12/20 kV | Based on DIN VDE 0250-813 | PROTOLON XPRT-LWL Equivalent

FC-MVR-LWL (N)TSKCGEWÖU 12/20 kV

Round medium voltage reeling cable with integrated fibre optics — EPR insulated, anti-torsion braid, double-layer red sheath — for high-speed container cranes, ship-to-shore cranes, stacker-reclaimers and large mobile equipment.

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01 Application & Product Overview

FC-MVR-LWL is a heavy-duty round medium voltage reeling cable for the combined transmission of power and data under high to extreme mechanical stress — high travel speeds, dynamic tensile loads, frequent changes of direction in different planes, running over rollers and torsional stress.

Three EPR-insulated power cores are stranded around a central cradle separator. The earth conductor is split into two parts in two outer interstices, and the fibre-optic element occupies the third interstice, protected from crushing and bending stress. An anti-torsion braid vulcanised between the inner and outer sheaths keeps the cable stable during high-speed reeling.

Typical applications

- STS, RMG and RTG container cranes on motor-driven reeling drums
- Ship loaders, stacker-reclaimers and bulk-handling gantries
- Large mobile mining equipment and excavators
- Plants requiring power + Ethernet / fieldbus over one cable
- Outdoor and indoor use — resistant to ozone, UV, moisture and oil

12/20 kV	240 m/min	20 / 30 N/mm²	± 25 °/m
Rated voltage U_0/U	Travel speed (reeling), higher on request	Static / dynamic tensile load on conductor	Permissible torsional stress

Cross-reference

REFERENCE TYPE	FEICHUN EQUIVALENT

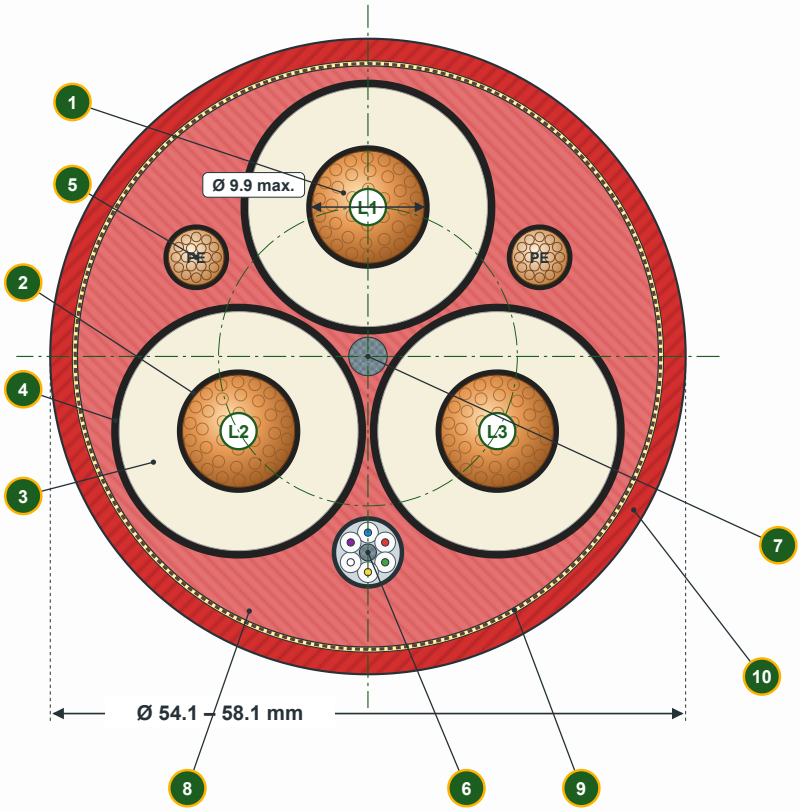
PROTOLON XPRT-LWL (N)TSKCGEWÖU 12/20 kV

FC-MVR-LWL (N)TSKCGEWÖU 12/20 kV

Also suitable as a direct replacement for earlier PROTOLON (SMK)-LWL (N)TSKCGEWÖU 12/20 kV installations — same designation, dimensions within the same envelope.

FEICHUN CABLES

02 Construction



FEICHUN · SECTION A–A · 12/20 kV

FC-MVR-LWL (N)TSKCGEWÖU

Doc. No. FC-TDS-MVR-2026-702D
Ref. 3×50+2×25/2+1×(6G62.5)
Rev. 0 · 2026-10-10 · 1st-angle · NTS

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

Pos.	Element	Material
1	Phase conductor	Tinned annealed Cu, very finely stranded, class 5 (IEC 60228) / class FS (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 semiconductive compound, black, strippable cold
5	Earth conductor	Tinned Cu, split into 2 parts in 2 interstices, semiconductive covering
6	Fibre-optic element	6 gel-filled ETFE tubes around a central FRP support, 1–4 fibres per tube, in the 3rd interstice
7	Cradle separator	Central profiled rubber element
8	Inner sheath	EPR-based rubber compound, red, longitudinally water-blocking
9	Anti-torsion braid	Polyester yarn braid, vulcanised between inner and outer sheath
10	Outer sheath	Polychloroprene (CR/PCP), min. 5GM5, abrasion- and tear-resistant, red

Design features

Item	Description
Core arrangement	Three power cores stranded around a central cradle separator; earth conductor split in 2 interstices; FO element in the 3rd interstice
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
Sheath system	Double-layer sandwich sheath with vulcanised anti-torsion braid — torsion-stable, high tear and abrasion resistance
Fibre coding	Specially developed colour code for unambiguous identification of each fibre
Sheath colour	Red (standard); yellow or black on request

FEICHUN CABLE

03 Electrical, Thermal & Mechanical Data

Electrical parameters

Parameter	Value
Rated voltage U_0/U	12/20 kV
Max. operating voltage AC	13.9/24 kV
Max. operating voltage DC	20.8/36 kV
AC test voltage	29 kV, 5 min
Partial discharge	≤ 10 pC at 1.73 U_0
Current rating basis	DIN VDE 0298-4; laid in air, 30 °C ambient — apply reeling factors (§05)
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	20 N/mm² static; 30 N/mm² dynamic (acceleration) — of total phase conductor cross-section
Torsional stress	± 25 °/m
Min. bending radius	Per DIN VDE 0298-3 — see table §05
S-type direction changes	Min. spacing 20 × D
Travel speed	Up to 240 m/min (reeling); higher speeds on request
Resistance	Oil (DIN EN 60811-404), ozone, UV, moisture; water resistance per HD 22.16

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	≥ 200 MHz·km	—
Bandwidth at 1300 nm	≥ 1200 MHz·km	≥ 500 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 — 12/20 kV

Cores × cross-section mm²	FeiChun part no.	Conductor Ø max. mm	Earth cond. Ø max. mm	Outer diameter		Min. bending radius mm	Weight approx. kg/km	Max. tensile force		R_{20} max. Ω/km	Current rating A	Short-circuit current kA (1 s)
				min. mm	max. mm			static N	dynamic N			
3×25+2×25/2 +1×(6G62.5)	FC-MVR20-02525F	7.1	5.0	46.6	49.6	496	3,200	1,500	2,250	0.795	139	3.58
3×35+2×25/2 +1×(6G62.5)	FC-MVR20-03525F	8.3	5.0	50.1	54.1	541	3,880	2,100	3,150	0.565	172	5.01
3×50+2×25/2 +1×(6G62.5)	FC-MVR20-05025F	9.9	5.0	54.1	58.1	581	4,670	3,000	4,500	0.393	215	7.15
3×70+2×35/2 +1×(6G62.5)	FC-MVR20-07035F	11.8	5.9	58.2	62.2	622	5,640	4,200	6,300	0.277	265	10.01
3×95+2×50/2 +1×(6G62.5)	FC-MVR20-09550F	13.8	7.2	64.0	68.0	680	7,050	5,700	8,550	0.210	319	13.59
3×120+2×70/2 +1×(6G62.5)	FC-MVR20-12070F	15.4	8.3	68.0	72.0	720	8,360	7,200	10,800	0.164	371	17.16
3×150+2×70/2 +1×(6G62.5)	FC-MVR20-15070F	17.2	8.3	73.3	77.3	773	9,840	9,000	13,500	0.132	428	21.45
3×185+2×95/2 +1×(6G62.5)	FC-MVR20-18595F	19.0	9.8	77.2	81.2	812	11,410	11,100	16,650	0.108	488	26.46
3×240+2×120/2 +1×(6G62.5)	FC-MVR20-24012F	21.8	11.0	85.1	90.1	901	14,440	14,400	21,600	0.0817	574	34.32
3×300+2×150/2 +1×(6G62.5)	FC-MVR20-30015F	24.4	12.0	91.3	96.3	963	17,810	18,000	27,000	0.0654	660	42.90

Current rating: nominal value for rubber cables laid in air at 30 °C ambient (DIN VDE 0298-4) — multiply by the factors below for reeled operation and other ambient temperatures. Designs with 12, 18 or 24 fibres, G50 or E9 fibre types and alternative earth configurations are manufactured to order.

Reeling factors — cylindrical drum

Layers on drum	1	2	3	4	5
Factor	0.80	0.61	0.49	0.42	0.38

Ambient temperature factors (90 °C conductor)

°C	20	25	30	35	40	45	50
Factor	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 (MV trailing / reeling cable)
DIN VDE 0295 / IEC 60228	Conductors, class 5 / FS
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 29 kV on every drum, partial discharge measurement
- Conductor resistance and dimensional checks
- OTDR attenuation test of every fibre, report supplied with drum
- Reeling, reversed bending and torsion tests (type test)
- Ozone, UV and oil resistance — unrestricted outdoor use

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

- Drum core diameter ≥ 2 × minimum bending radius; use guide rollers sized to the same radius.
- Unwind tangentially from the delivery drum — never pull off over the flange; avoid loops and kinks.
- Keep torsion within ± 25 °/m; maintain at least 20 × D between S-type direction changes.
- Keep tensile force within the static/dynamic limits tabulated, including acceleration and braking peaks.
- Lay out and relax the cable before the first reeling; check tension-control settings at commissioning.

Sheath marking

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FEICHUN FC-MVR-LWL (N)TSKCGEWÖU
3×50+2×25/2+1×(6G62.5) 12/20 kV 2026
[serial no.] [metre mark]
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- Use stress-control terminations rated for 12/20 kV EPR cables (24 kV equipment class) and connect both earth conductor parts at each end.

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; pulling eye on request
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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Technical & Sales Contact

Anhui FeiChun Special Cable Co., Ltd.

International Business Department

No. 1 Park, Private Science & Technology Park, Hefei National ETDZ, Hefei, Anhui, China

Technical: Tech@feichuncables.com

Mining & heavy industry: mining@feichuncables.com

Zihao Yang, Global Sales Manager:

zihao.yang@feichuncables.com

WhatsApp: +86 138 5512 3218

Web: www.feichuncables.com

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