REELING CONTROL CABLE · PORT CRANES & SPREADERS | FIBRE-OPTIC HYBRID | 0.6/1 kV | 3 sizes | CPE rubber | 12E9

FC-CR-R-F-C 36G 0.6/1 kV

Hybrid Control and Fibre-Optic Reeling Cable 0.6/1 kV – 36-core reeling control cable with a central optical element (12 single-mode fibres G.652.D), overall tinned-copper braid screen, CPE rubber sheath. Complete technical data sheet: construction, dimensions, weights, current ratings, standards and installation guidance for 3 sizes.

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01 Application and Product Overview

FC-CR-R-F-C 36G is a 36-core reeling control cable with a central optical element (12 single-mode fibres G.652.D), overall tinned-copper braid screen rated 0.6/1 kV for cable reels on port cranes, spreaders and yard equipment. It has fine-wire class 5 copper cores with halogen-free EPR/HEPR rubber insulation, an inner sheath and an outer sheath of chlorinated polyethylene (CPE) rubber, resistant to weather, ozone and oil. Core cross-sections: 0.75 – 1.5 mm².

Design

36 control cores are stranded in concentric layers around a central optical element, with the green-yellow protective core in the outer layer. The cable contains one optical element (12 single-mode fibres G.652.D). Single-mode fibres carry the crane data, video and remote-operation links over the full length of the terminal with very low attenuation, so a single reel cable can connect the crane to the terminal operating system without intermediate repeaters. An overall tinned-copper braid screen (≥ 85 % coverage) protects the copper control circuits against interference from converter-fed drives.

Typical applications

- Control, signal and measuring circuits of crane trolleys, spreaders, headblocks and mobile machinery supplied through a cable reel
- Remote-controlled and automated cranes that send PLC, video and remote-operation data over single-mode fibre through the reel
- Spring-driven and motor-driven cable reels on RTG, RMG, STS and yard equipment
- Operation with repeated winding, unwinding and bending within the permitted bending radius
- Wet, oily and abrasive outdoor environments typical of container terminals and bulk ports
- Circuits that need protection against electromagnetic interference: the overall tinned-copper braid screen limits coupling between control cores and nearby power cables

3 sizes	0.6/1 kV	+90 °C	CPE rubber
Cross-section 0.75 – 1.5 mm²	Rated voltage U_0/U	Maximum conductor temperature	Sheath: CPE rubber

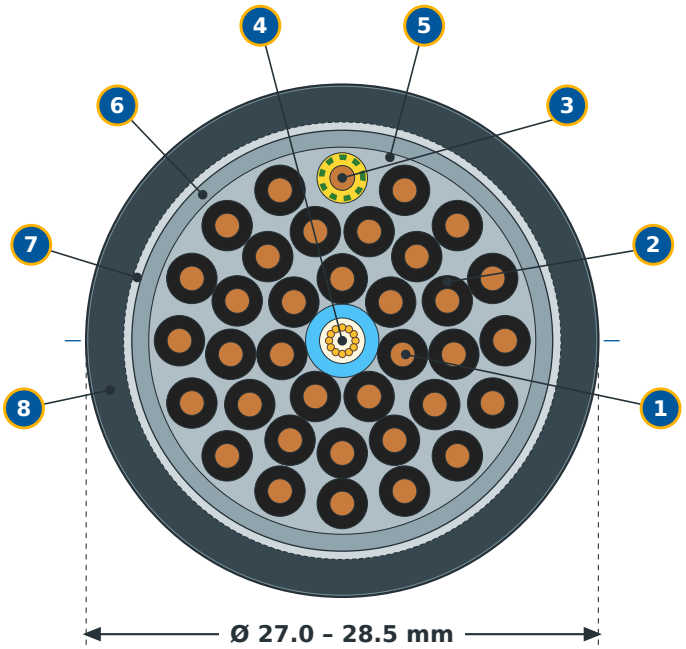
Key features

- Fine-wire class 5 copper cores with insulation thickness to 0.6/1 kV for reliable operation on a reel
- 12 single-mode fibres G.652.D in a crush-resistant loose-tube element on the cable axis
- Cores laid in concentric layers with a short lay length and polyester binder tape
- Number-printed black cores; green-yellow protective core in the outer layer (G types)
- CPE rubber sheath with proven weather, ozone and oil resistance
- Overall tinned-copper braid screen (≥ 85 % coverage) for EMC
- Flame retardant to IEC 60332-1-2

02 Construction

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

FC-CR-R-F-C
Sample size 36G1+12E9 C · Rev 0 · Illustrative, not to scale



No.	Component	Material
1	Conductor	Bare annealed fine-wire copper, class 5 to IEC 60228
2	Insulation	Halogen-free EPR/HEPR rubber
3	Protective (PE) core	Class 5 copper, green-yellow insulation
4	Optical element	12 single-mode fibres G.652.D; gel-filled loose tube, aramid strength members
5	Filler and binder tape	Halogen-free compound, polyester tape
6	Inner sheath	Halogen-free polymer compound
7	Overall screen	Tinned-copper wire braid, coverage ≥ 85 %
8	Outer sheath	Chlorinated polyethylene (CPE) rubber, resistant to weather, ozone and oil

The drawing shows size 36G1+12E9 C. Other sizes have the same construction with scaled dimensions.

Construction details

Conductor	Bare annealed fine-wire copper, class 5 to DIN EN 60228 / IEC 60228 / VDE 0295
Insulation	Halogen-free EPR/HEPR rubber to IEC 60502-1, maximum conductor temperature 90 °C
Core identification	Black cores with white numbers; green-yellow protective core in the outer layer
Optical element	Central element: 12 single-mode fibres G.652.D
Stranding	Control cores stranded in concentric layers around the optical element with a short lay length; polyester binder tape
Overall screen	Tinned-copper wire braid, coverage ≥ 85 %, between inner and outer sheath
Inner sheath	Halogen-free polymer compound, extruded tightly over the stranded cores
Outer sheath	Chlorinated polyethylene (CPE) rubber, resistant to weather, ozone and oil

Optical fibre data

Fibre type	Single-mode E9/125 µm, ITU-T G.652.D / IEC 60793-2-50 B-652.D, low water peak
Attenuation, cabled	≤ 0.40 dB/km at 1310 nm; ≤ 0.30 dB/km at 1550 nm
Mode-field diameter	9.2 ± 0.4 µm at 1310 nm
Typical link reach	1 Gbit/s and 10 Gbit/s Ethernet up to 10 km (1000BASE-LX, 10GBASE-LR)
Optical element	Gel-filled loose tube with aramid strength members and a crush-resistant TPU element sheath, placed on the cable axis where bending strain is lowest
Fibre colours	IEC 60304 / DIN VDE 0888 colour sequence; tube and element marked for identification
Fibre strain, reeling	≤ 0.25 % at the rated tensile load of the cable
Optical test	Attenuation of every fibre measured by OTDR after cabling; values recorded in the test certificate

Sheath material

The chlorinated polyethylene (CPE) rubber sheath offers good resistance to weather, ozone and mineral oil with good mechanical robustness and flexibility to −30 °C in motion, at a favourable cost level. CPE contains halogen; where halogen-free cables are specified, select the PUR version of the same construction.

03 Electrical, Thermal and Mechanical Characteristics

Electrical data

Rated voltage U_0/U	0.6/1 kV AC
Test voltage	3.5 kV AC, 5 min
Maximum operating voltage, DC	0.9/1.8 kV
Current-carrying capacity	To DIN VDE 0298-4 at 30 °C ambient; the table gives rated design values
Conductor resistance	Maximum at 20 °C, class 5 to IEC 60228

Thermal and mechanical data

Maximum conductor temperature	+90 °C
Maximum temperature at short circuit	+250 °C
Ambient temperature, fixed installation	−40 °C to +90 °C
Ambient temperature, in motion	−30 °C to +90 °C
Minimum bending radius	Fixed: 4 × D (D ≥ 8 mm), 3 × D (D < 8 mm); moving or reeling: 6 × D (D ≤ 12 mm), 8 × D (D ≤ 20 mm), 10 × D (D > 20 mm)
Maximum tensile load	15 N/mm² continuous, on the total copper cross-section of the power cores
Maximum travelling speed	60 m/min on a cable reel; higher speeds on request
Flame propagation	IEC 60332-1-2 / DIN EN 60332-1-2
Halogen-free	No (CPE rubber sheath)
UV and ozone resistance	Resistant
Mineral oil resistance	Resistant, IEC 60811-404
Optical element, temperature in operation	−40 °C to +70 °C

Sheath material comparison

Property	PUR	PUR low-temp	CSP rubber	CPE rubber	PCP rubber	HFFR rubber
Abrasion resistance	Excellent	Excellent	Good	**Good**	Very good	Good
Cut and tear resistance	Excellent	Excellent	Good	**Good**	Very good	Good
Mineral oil resistance	Very good	Very good	Very good	**Very good**	Very good	Good
Weather, UV and ozone resistance	Very good	Very good	Excellent	**Very good**	Excellent	Very good
Cold flexibility (moving)	−30 °C	−40 °C	−30 °C	**−30 °C**	−25 °C	−25 °C
Halogen-free (IEC 60754-1/-2)	Yes	Yes	No	**No**	No	Yes

The column of the sheath used in this cable is highlighted. Ratings are qualitative; ask FeiChun for test data on a specific requirement.

04 Dimensions, Weights and Rated Data – 0.6/1 kV (3 sizes)

Type designation cores × mm²	FeiChun article no.	Conductor Ø max mm	Outer Ø min mm	Outer Ø max mm	Min. bend radius mm	Weight approx. kg/km	Max. pull force N	R_{20} max Ω/km	Current per core A	I_k (1 s) kA
36G0.75+12E9 C	FC-CR249-001	1.2	26.0	27.5	276	900	400	26.0	6	0.107
36G1+12E9 C	FC-CR249-002	1.4	27.0	28.5	284	1,030	540	19.5	7	0.143
36G1.5+12E9 C	FC-CR249-003	1.7	29.0	31.0	310	1,270	810	13.3	9	0.214

Current-carrying capacity: rated design values to DIN VDE 0298-4 for flexible cables, free air, 30 °C ambient; values per core include the derating factor for the number of cores; for other ambient temperatures, grouping or layered winding on a reel, apply the factors below. Pull

force = 15 N/mm² × total copper cross-section of the power cores. Diameters, dimensions and weights are nominal design values and vary within manufacturing tolerances; confirm critical dimensions before dimensioning reels, guides or festoon systems. Other sizes and configurations are produced to order.

Ambient temperature factors (conductor 90 °C)

°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 current rating

I_k = 0.143 kA/mm² × cross-section of the power core (conductor 90 °C → 250 °C). For another short-circuit duration t: $I_{k,t} = I_{k,1s} / \sqrt{t}$ (0.1 s ≤ t ≤ 5 s).

05 Reeling Performance and Reel Design Data

The values below support the dimensioning of the cable reel: minimum reel core diameter, copper weight for earthing and loop-resistance calculations, cable weight, and the rated current for the number of layers wound on the reel.

Type designation cores × mm²	Outer Ø max mm	Min. bend radius on reel, mm	Min. reel core Ø mm	Copper weight kg/km	Cable weight kg/100 m
36G0.75+12E9 C	27.5	276	552	338	90.0
36G1+12E9 C	28.5	284	568	420	103.0
36G1.5+12E9 C	31.0	310	620	590	127.0

Reel design guidance

- Minimum reel core diameter = 2 × minimum bending radius = 2 × minimum bending radius (outer diameter D).
- Spring reels suit short travel and low tensile load; motor-driven reels with torque control keep the cable under constant, low tension.
- Fit a guide or level-wind that keeps the cable parallel to the reel axis to prevent crossing turns.
- Rated current falls with the number of layers on the reel because heat is not dissipated; see the layer factors below.

06 Selection Guide and Sizing Aid

FC-CR-R-F-C 36G covers 3 sizes. The smallest, 36G0.75+12E9 C, has an outer diameter of up to 27.5 mm and weighs about 900 kg/km; the largest, 36G1.5+12E9 C, has an outer diameter of up to 31.0 mm and weighs about 1,270 kg/km, 1.4 times as much. Across the range the rated current per core rises from 6 A to 9 A at 30 °C, and the minimum bending radius from 276 mm to 310 mm.

Example 1. A circuit carries 6 A per core at an ambient temperature of 40 °C. Required table current = 6 / 0.91 = 7 A per core. The smallest suitable size is 36G1+12E9 C with 7 A per core.

Example 2. A circuit carries 8 A per core at an ambient temperature of 35 °C. Required table current = 8 / 0.96 = 9 A per core. The smallest suitable size is 36G1.5+12E9 C with 9 A per core.

Type designation cores × mm²	Total copper mm²	Cable weight kg/100 m	Winding capacity m
36G0.75+12E9 C	27	90.0	5,395
36G1+12E9 C	36	103.0	4,925
36G1.5+12E9 C	54	127.0	4,205

Winding capacity is an indicative value for a reel with 2,500 mm flange diameter, 1,000 mm traverse width, core diameter equal to the minimum reel core diameter and 90 % fill; it is not a substitute for the reel manufacturer’s calculation.

07 Standards and Testing

Standard	Scope
DIN EN 60228 / IEC 60228 / VDE 0295	Conductors, class 5
IEC 60502-1	Insulation compound, power cables up to 1 kV
DIN VDE 0298-3	Application of cables – bending radii and tensile loads
DIN VDE 0298-4	Application of cables – current-carrying capacity
DIN EN 60332-1-2 / IEC 60332-1-2	Flame propagation, single cable
DIN VDE 0298-300	Core identification
DIN VDE 0250-814	Design reference for flexible reeling and trailing cables (NSHTÖU type)
ITU-T G.652.D / IEC 60793-2-50	Single-mode optical fibres
IEC 60794-1-21	Optical cables – mechanical test methods
IEC 60811-404	Mineral oil immersion test

Routine and type tests

- AC voltage test on every reel length (routine test): 3.5 kV AC, 5 min
- Conductor resistance and checks of dimensions, insulation thickness and sheath thickness
- Continuity of conductors and protective earth
- Bending, tensile tests (type test)
- Flame propagation (IEC 60332-1-2)
- Optical attenuation of every fibre by OTDR after cabling (routine test); reeling and torsion tests with optical monitoring (type test)

Test documentation: every delivery is accompanied by 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

- Use a reel core diameter of at least twice the minimum bending radius; keep the cable free of loops and kinks while winding.
- Do not exceed the tensile load in the table; relieve the cable of tension at the reel hub and at the trolley.
- Connect the protective core (G types) at both ends; terminate the screen 360° where fitted.
- Keep control cables away from unscreened power cables running in parallel where possible.
- Inspect the sheath regularly for abrasion and mechanical damage.

Sheath marking

FEICHUN FC-CR-R-F-C [cross-section] 0.6/1 kV [year] [serial no.] [metre mark]

Packing and delivery

Reel	Steel or fumigated wooden reels; cable ends sealed with heat-shrink caps
Delivery length	As ordered, in one continuous length without joints
Lead time	2–3 weeks after technical approval
Warranty	1 year, covering failures not caused by human factors
Reel label	Type, cross-section, length, gross/net weight, batch no., reel no.

Ordering information

Field	Example	Meaning
Series code	FC-CR-R-F-C	FeiChun series and sheath system
Core configuration	36G1+12E9 C	Number of cores with G (protective core included) or × (no protective core), and core cross-section in mm²
Rated voltage	0.6/1 kV	U_0/U, AC
Length and packing	500 m, steel reel	Delivery length in one piece; reel type on request

Order example: FC-CR-R-F-C 36G1+12E9 C 0.6/1 kV – 500 m on one steel reel. When requesting a quotation, state the cable type, configuration, cross-section, voltage, length per piece, required standards and installation conditions.

09 Certification and Quality

All cable is subject to FeiChun's quality control, with routine testing over 100 % of the delivered length. Certificates, type tests and third-party tests (for example partial discharge or compatibility with cable accessories) are provided per project requirement; copies of the records are available on request.

The CE, EAC and UKCA certificates listed in datasheet FC-TDS-TMP-2026-9238-EN apply to the FC-TPU-M D2X11Y product group. Confirm with FeiChun that the certificate scope covers this construction before quoting it in a tender.

10 Related Datasheets

Variants of this cable that differ in one attribute – sheath, configuration, optical fibres or voltage. All datasheets are in PDF format.

- FC-CR-U-F-C 36G 0.6/1 kV – 36-core reeling control cable with a central optical element (12 single-mode fibres G.652.D), overall tinned-copper braid screen, PUR
- FC-CR-R-FM-C 36G 0.6/1 kV – 36-core reeling control cable with a central optical element (12 multimode fibres OM2 50/125), overall tinned-copper braid screen, CPE rubber
- FC-CR-R-F-C 6G 0.6/1 kV – 6-core reeling control cable with a central optical element (12 single-mode fibres G.652.D), overall tinned-copper braid screen, CPE rubber
- FC-CR-R-F 36G 0.6/1 kV – 36-core reeling control cable with a central optical element (12 single-mode fibres G.652.D), CPE rubber
- FC-CR-A-F-C 36G 0.6/1 kV – 36-core reeling control cable with a central optical element (12 single-mode fibres G.652.D), overall tinned-copper braid screen, PUR low-temp
- FC-CR-R-F-C 12G 0.6/1 kV – 12-core reeling control cable with a central optical element (12 single-mode fibres G.652.D), overall tinned-copper braid screen, CPE rubber
- FC-CR-S-F-C 36G 0.6/1 kV – 36-core reeling control cable with a central optical element (12 single-mode fibres G.652.D), overall tinned-copper braid screen, CSP rubber
- FC-CR-R-F-C 18G 0.6/1 kV – 18-core reeling control cable with a central optical element (12 single-mode fibres G.652.D), overall tinned-copper braid screen, CPE rubber

Overview of all datasheets: Reeling Control Cables 0.6/1 kV

Frequently asked questions

What is FC-CR-R-F-C 36G used for?
Typical applications include control, signal and measuring circuits of crane trolleys, spreaders, headblocks and mobile machinery supplied through a cable reel.

What are the outer diameter and minimum bending radius of 36G1+12E9 C?
The outer diameter is 27.0 to 28.5 mm and the minimum bending radius in moving or reeling operation is 284 mm (6 to 10 × D depending on diameter).

What minimum reel core diameter is needed for 36G1+12E9 C?
At least 568 mm, which is twice the minimum bending radius of 284 mm. A larger core diameter extends cable life.

What current can each core of 36G1+12E9 C carry?
The table gives 7 A per core in free air at 30 °C ambient, already reduced for the number of cores; apply the ambient temperature factor and, on a reel, the layer factor.

Which optical fibres does FC-CR-R-F-C 36G contain?
12 single-mode fibres G.652.D. 1 Gbit/s and 10 Gbit/s Ethernet up to 10 km (1000BASE-LX, 10GBASE-LR).

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

Is this cable halogen-free?
No. The CPE rubber sheath contains halogen. If halogen-free cables are required, select the HFFR rubber or PUR version of the same construction.

Which cross-sections are available?
FC-CR-R-F-C 36G: 0.75, 1, 1.5 mm². Other sizes and special designs can be produced to order.

11 Trademark Notice and Intellectual Property

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