MINING REELING CONTROL CABLE · MOBILE MACHINERY | 0.6/1 kV | 5 sizes | CSP rubber

FC-MCR-S 3G 0.6/1 kV

Mining Reeling Control Cable 0.6/1 kV – 3-core reeling control cable, CSP rubber sheath. Complete technical data sheet: construction, dimensions, weights, current ratings, standards and installation guidance for 5 sizes.

Document no. FC-TDS-MC038-2026-9691-EN · Revision 0 · Issued 2 November 2026 · Language: English

01 Application and Product Overview

FC-MCR-S 3G is a 3-core reeling control cable rated 0.6/1 kV for cable reels on drill rigs, LHD machines, shuttle cars and mobile mining plant. It has fine-wire class 5 copper cores with halogen-free EPR/HEPR rubber insulation, an inner sheath and an outer sheath of chlorosulfonated polyethylene (CSP) rubber, resistant to weather, ozone and oil. Core cross-sections: 0.75 – 4 mm².

Design

3 cores in concentric layers with a short lay length and polyester binder tape. Black cores carry white numbers; the green-yellow protective core lies in the outer layer. The cores are bound with halogen-free filler and covered by an inner sheath before the outer sheath is applied. Cables with few cores are used for dedicated circuits such as brake, limit-switch or sensor supply.

Typical applications

- Control, signal and measuring circuits of drill rigs, LHD machines, shuttle cars and mobile crushers supplied through a cable reel
- Spring-driven and motor-driven cable reels on mining machines, cable handlers and conveyor take-up systems
- Operation with repeated winding, unwinding and bending within the permitted bending radius
- Wet, muddy, oily and abrasive environments typical of underground headings and open pits
- Control cabinets, junction boxes and remote-control stations of mining machinery
- Open-pit and surface duty that calls for a rubber sheath with proven weather, ozone and oil resistance

5 sizes	0.6/1 kV	+90 °C	CSP rubber
Cross-section 0.75 – 4 mm²	Rated voltage U_0/U	Maximum conductor temperature	Sheath: CSP rubber

Key features

- Fine-wire class 5 copper cores with insulation thickness to 0.6/1 kV for reliable operation on a reel
- 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)
- CSP rubber sheath with proven weather, ozone and oil resistance
- Flame retardant to IEC 60332-1-2

Service notes for mining duty

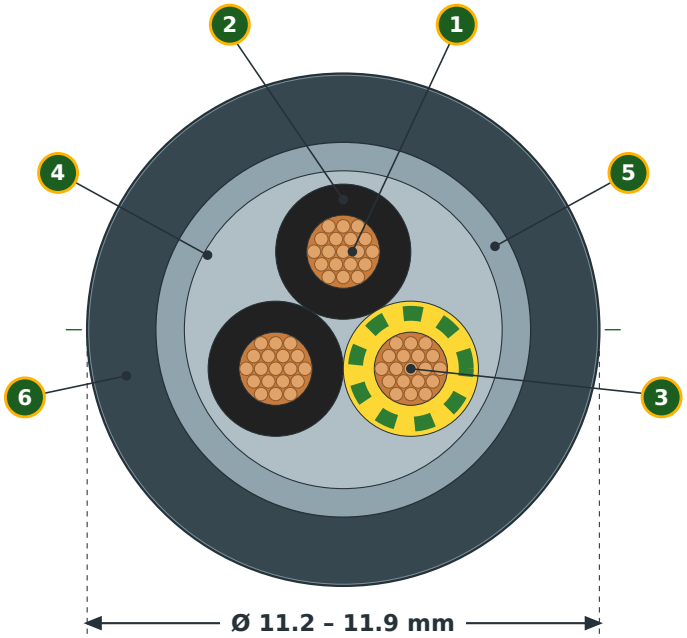
- Strip the outer sheath only as far as required for termination and seal the cable entry against water.
- Mark spare cores at both ends; a broken core in a reeling cable often appears first as an intermittent signal.

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02 Construction

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

FC-MCR-S
Sample size 3G1.5 · 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	Filler and binder tape	Halogen-free compound, polyester tape
5	Inner sheath	Halogen-free polymer compound
6	Outer sheath	Chlorosulfonated polyethylene (CSP) rubber, resistant to weather, ozone and oil

The drawing shows size 3G1.5. 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
Stranding	Cores stranded in concentric layers with a short lay length; polyester binder tape
Inner sheath	Halogen-free polymer compound, extruded tightly over the stranded cores
Outer sheath	Chlorosulfonated polyethylene (CSP) rubber, resistant to weather, ozone and oil

Sheath material

The chlorosulfonated polyethylene (CSP) rubber sheath is a proven heavy-duty trailing-cable material: excellent resistance to weather, ozone, heat and mineral oil, good mechanical robustness and low-temperature flexibility to −30 °C in motion. CSP 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

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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 (CSP rubber sheath)
UV and ozone resistance	Resistant
Mineral oil resistance	Resistant, IEC 60811-404

04 Dimensions, Weights and Rated Data – 0.6/1 kV (5 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
3G0.75	FC-MC038-001	1.2	10.1	10.7	64	122	34	26.0	15	0.107
3G1	FC-MC038-002	1.4	10.5	11.2	68	135	45	19.5	17	0.143
3G1.5	FC-MC038-003	1.7	11.2	11.9	72	161	68	13.3	23	0.214
3G2.5	FC-MC038-004	2.2	12.3	13.1	104	208	112	7.98	31	0.357
3G4	FC-MC038-005	2.7	13.6	14.5	116	273	180	4.95	42	0.572

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
3G0.75	10.7	64	128	20	12.2
3G1	11.2	68	136	27	13.5
3G1.5	11.9	72	144	40	16.1
3G2.5	13.1	104	208	67	20.8
3G4	14.5	116	232	107	27.3

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.
- Rated current falls with the number of layers on the reel because heat is not dissipated; see the layer factors below.

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06 Selection Guide and Sizing Aid

FC-MCR-S 3G covers 5 sizes. The smallest, 3G0.75, has an outer diameter of up to 10.7 mm and weighs about 122 kg/km; the largest, 3G4, has an outer diameter of up to 14.5 mm and weighs about 273 kg/km, 2.2 times as much. Across the range the rated current per core rises from 15 A to 42 A at 30 °C, and the minimum bending radius from 64 mm to 116 mm.

Example 1. A circuit carries 14 A per core at an ambient temperature of 40 °C. Required table current = 14 / 0.91 = 16 A per core. The smallest suitable size is 3G1 with 17 A per core.

Example 2. A circuit carries 27 A per core at an ambient temperature of 35 °C. Required table current = 27 / 0.96 = 29 A per core. The smallest suitable size is 3G2.5 with 31 A per core.

Type designation cores × mm²	Total copper mm²	Cable weight kg/100 m	Winding capacity m	Free-hanging length m (vertical)
3G0.75	2.25	12.2	37,745	28
3G1	3	13.5	34,665	33
3G1.5	4.5	16.1	30,495	43
3G2.5	7.5	20.8	25,195	54
3G4	12	27.3	20,440	67

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. Free-hanging length = permissible pull ÷ (weight × 9.81); it is the length at which the cable’s own weight reaches the rated pull, without any safety factor for hoisting.

07 Engineering Profile by Size

Each size of FC-MCR-S 3G with the values that matter when sizing a circuit: dimensions, weight, copper share, heat and voltage drop at rated current, and the permissible pull. Voltage drop is for 100 m of cable at rated current with conductors at 90 °C (single-phase AC or DC round trip).

3G0.75: Ø 10.7 mm; bend radius 64 mm; weight 122 kg/km. Voltage drop at rated current (15 A) is 99.4 V per 100 m, loss 14.9 W/m, and the cable can support 28 m of its own length vertically at the rated pull of 34 N. A 500 m length of 3G0.75 weighs about 61 kg; with a 128 mm minimum core the drum must be sized for that load.

For 3G1 the design values are: Ø 11.2 mm, 135 kg/km, 45 N permissible pull, 17 A rated current. The copper accounts for 20% of the weight, and 14.4 W/m is dissipated at full load, so heat-sensitive reel layers should be derated as shown in section 04. Reel and handling: at 3G1 the minimum reel core is 136 mm and the cable weighs 13.5 kg per 100 m, so a 500 m length weighs about 68 kg before the drum.

Size 3G1.5 has a maximum conductor resistance of 13.30 Ω/km, a copper content of 40 kg/km and a minimum bending radius of 72 mm (reel core 144 mm). Short-circuit capability for 1 s is 0.21 kA. Expect 78.0 V of drop per 100 m at 23 A. Per 100 m, 3G1.5 contains 4.0 kg of copper and 12.1 kg of insulation, filler and sheath material, which sets the scrap value and the recycling split.

Size 3G2.5 has a maximum conductor resistance of 7.98 Ω/km, a copper content of 67 kg/km and a minimum bending radius of 104 mm (reel core 208 mm). Short-circuit capability for 1 s is 0.36 kA. Expect 63.1 V of drop per 100 m at 31 A. Handling 3G2.5: 20.8 kg per 100 m, bending radius 104 mm; two people can lift a 20 m piece of about 4.2 kg.

At 3G4 the cable measures Ø 14.5 mm and weighs roughly 273 kg/km. It carries 42 A at 30 °C ambient, which produces 22.3 W/m of heat and a 53.0 V drop per 100 m. The permissible pull is 180 N, so a vertical length of 67 m can hang from its own weight before that limit is reached. A 500 m length of 3G4 weighs about 136 kg; with a 232 mm minimum core the drum must be sized for that load.

08 Configuration Guidance and Variant Comparison

Typical case: a machine whose control cabinet needs 3 circuits through the reel. For this case FC-MCR-S 3G is a fit in the 3G1.5 size (Ø 11.9 mm).

CSP rubber suits open-pit and surface duty where heat, weather, ozone and oil dominate over abrasion, and where halogen content is acceptable.

Rated 0.6/1 kV, the cable covers the common 400 V, 690 V and 1,000 V mining supplies.

In the drawn size 3G1.5 the cores fill 54% of the circle inside the inner sheath, the inner sheath is 0.6 mm thick and the outer sheath 1.6 mm, giving a total wall of 2.2 mm around a core bundle of Ø 7.2 mm.

FC-MCR-S 3G is one of 360 datasheets in the mining reeling control cable group and one of 953 in the library. The next larger core count, FC-MCR-S 4G, measures 12.8 mm and weighs 192 kg/km (this model: 161 kg/km).

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Element inventory and core layout

Element inventory of the drawn size 3G1.5: 3 elements with 4.5 mm² of copper in total. The 3 cores are stranded in 1 concentric layer (layer 1: 3 cores), counted from the centre outwards, each layer with a short lay length and alternating lay direction. Keeping about 15 % of the cores as spare leaves 1 usable circuits plus the protective core; plan the core allocation before ordering because the number cannot be changed after manufacture.

Element	Quantity	Cross-section	Ø over insulation mm	Copper mm²
Power / main core	2	1.5 mm²	3.1	3.0
Protective (PE) conductor	1	1.5 mm²	3.1	1.5

Termination data (indicative)

Type designation cores × mm²	Outer Ø or W × H mm	Cable gland thread	Lug / ferrule bolt	Strip length mm	Terminal row mm	Gland-to-bend straight mm
3G0.75	10.7	M20	ferrule	12	15	32
3G1	11.2	M25	ferrule	12	15	34
3G1.5	11.9	M25	ferrule	12	15	36
3G2.5	13.1	M25	ferrule	12	15	52
3G4	14.5	M25	ferrule	12	22	58

Gland, lug and terminal-row values are planning guides computed from the dimensions above; confirm them with the accessory manufacturer.

Comparison with related variants at size 3G1.5

Variant	Differs in	Outer Ø / H mm	Weight kg/km	Pull N	Current A
This datasheet FC-MCR-S 3G	–	11.9	161	68	23
FC-MCR-A 3G 0.6/1 kV	sheath	11.9 (+0%)	145 (-10%)	68 (+0%)	23 (+0%)
FC-MCR-R 3G 0.6/1 kV	sheath	11.9 (+0%)	156 (-3%)	68 (+0%)	23 (+0%)
FC-MCR-S 2× 0.6/1 kV	configuration	11.4 (-4%)	138 (-14%)	45 (-34%)	23 (+0%)
FC-MCR-S 4G 0.6/1 kV	configuration	12.8 (+8%)	192 (+19%)	90 (+32%)	18 (-22%)
FC-MCR-S-C 3G 0.6/1 kV	screen	12.8 (+8%)	207 (+29%)	68 (+0%)	23 (+0%)
FC-MCR-S-HT 3G 0.6/1 kV	tensile braid	13.2 (+11%)	194 (+20%)	980 (+1341%)	23 (+0%)

Percentages show the change against this datasheet for the same cross-section; use them to judge what a change of sheath, voltage class, screen or tensile braid costs in size and weight.

09 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 0293-308	Core identification
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)

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.

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10 Installation, Marking and Delivery

Installation guidance

- Do not exceed the tensile load in the table; relieve the cable of tension at the reel hub and at the machine.
- 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-MCR-S [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	At least 3 years against manufacturing defects
Reel label	Type, cross-section, length, gross/net weight, batch no., reel no.

Ordering information

Order example: FC-MCR-S 3G1.5 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.

11 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.

Mine-specific approvals (for example coal-mine safety marks, MSHA, or ATEX / IECEx for gassy atmospheres) are not implied by this datasheet; they depend on the project, the machine and the country and are arranged with the end user.

12 Related Datasheets

Variants of this cable with a different sheath, configuration or voltage. All datasheets are in PDF format.

- FC-MCR-A 3G 0.6/1 kV – 3-core reeling control cable, PUR low-temp
- FC-MCR-R 3G 0.6/1 kV – 3-core reeling control cable, CPE rubber
- FC-MCR-S 2× 0.6/1 kV – 2-core reeling control cable, CSP rubber
- FC-MCR-S 4G 0.6/1 kV – 4-core reeling control cable, CSP rubber
- FC-MCR-S-C 3G 0.6/1 kV – 3-core reeling control cable with overall tinned-copper braid screen, CSP rubber
- FC-MCR-S-HT 3G 0.6/1 kV – 3-core reeling control cable, with aramid tensile support braid, CSP rubber
- FC-MCR-S 3G 300/500 V – 3-core reeling control cable, CSP rubber
- FC-MCR-S 5G 0.6/1 kV – 5-core reeling control cable, CSP rubber

Overview of all datasheets: Mining Reeling Control Cables 300/500 V and 0.6/1 kV

Frequently asked questions

What is FC-MCR-S 3G used for?
Typical applications include control, signal and measuring circuits of drill rigs, LHD machines, shuttle cars and mobile crushers supplied through a cable reel.

What are the outer diameter and minimum bending radius of 3G1.5?
The outer diameter is 11.2 to 11.9 mm and the minimum bending radius in moving or reeling operation is 72 mm (6 to 10 × D depending on diameter).

What minimum reel core diameter is needed for 3G1.5?
At least 144 mm, which is twice the minimum bending radius of 72 mm. A larger core diameter extends cable life.

What current can each core of 3G1.5 carry?
The table gives 23 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.

How much tensile load can 3G1.5 take, and how long can it hang freely?
The permissible pull force is 68 N. With a weight of about 161 kg/km this corresponds to a free-hanging vertical length of about 43 m before the rated pull is reached; apply your own safety factor for hoisting or suspended installations.

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What is the voltage drop and heat loss of 3G1.5 at rated current?
At 23 A and a conductor temperature of 90 °C the voltage drop is about 78.0 V per 100 m and the conductor loss about 17.9 W per metre (maximum resistance 13.300 Ω/km at 20 °C).

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

Which cross-sections are available?
FC-MCR-S 3G: 0.75, 1, 1.5, 2.5, 4 mm². Other sizes and special designs can be produced to order.

Does this datasheet include mine-specific approvals?
No. Mine-specific approvals, such as coal-mine safety marks, MSHA or ATEX/IECEx for gassy atmospheres, depend on the project and the country and are not implied by this document. Send the requirements to FeiChun technical support.

13 Trademark Notice and Intellectual Property

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Document control

Document no. FC-TDS-MC038-2026-9691-EN
Revision 0 — first issue
Date 2 November 2026
Product FC-MCR-S 0.6/1 kV

Prepared — Engineering | Checked — QC | Approved — International Business

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