MINING REELING CONTROL CABLE · MOBILE MACHINERY | 0.6/1 kV | 5 sizes | PUR low-temp

FC-MCR-A 4G 0.6/1 kV

Mining Reeling Control Cable 0.6/1 kV – 4-core reeling control cable, halogen-free low-temperature PUR sheath. Complete technical data sheet: construction, dimensions, weights, current ratings, standards and installation guidance for 5 sizes.

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01 Application and Product Overview

FC-MCR-A 4G is a 4-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 cross-linked polyethylene (XLPE) insulation, an inner sheath and an outer sheath of halogen-free polyurethane (PUR), flame-retardant, low-temperature grade. Core cross-sections: 0.75 – 4 mm².

Design

4 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
- Operations where the ambient temperature falls to −40 °C while the cable is in motion, such as open-pit mines and decline portals in cold climates

5 sizes	0.6/1 kV	+90 °C	Halogen-free
Cross-section 0.75 – 4 mm²	Rated voltage U_0/U	Maximum conductor temperature	Sheath: PUR low-temp

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)
- Halogen-free insulation and sheaths; no halogen acid gases when burned (IEC 60754-1/-2)
- Flexible in motion down to −40 °C (fixed installation −50 °C)
- Flame retardant to IEC 60332-1-2

Service notes for mining duty

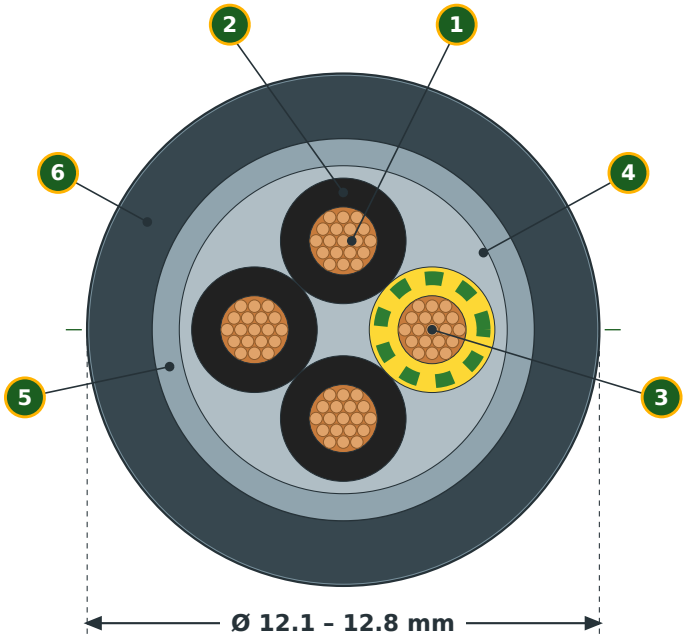
- Route control cables on the reel in a separate channel from MV or unscreened power cables, or use the screened version.
- Mark spare cores at both ends; a broken core in a reeling cable often appears first as an intermittent signal.

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02 Construction

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

FC-MCR-A
Sample size 4G1.5 · 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 cross-linked polyethylene (XLPE)
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	Halogen-free polyurethane (PUR), flame-retardant, low-temperature grade

The drawing shows size 4G1.5. 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 cross-linked polyethylene (XLPE) 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	Halogen-free polyurethane (PUR), flame-retardant, low-temperature grade

Sheath material

The low-temperature grade of halogen-free polyurethane (PUR) keeps the sheath flexible down to −40 °C in motion (−50 °C fixed), so the cable can be reeled and trailed at sub-zero surface temperatures without sheath cracking. It retains the abrasion, cut and tear resistance of standard PUR, resists mineral oil, UV radiation and ozone, and emits no halogen acid gases when burned. Typical use: open-pit and portal-to-decline operations in cold climates, and mines with cold intake air.

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	−50 °C to +80 °C
Ambient temperature, in motion	−40 °C to +80 °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	Yes (insulation, inner and outer sheath); IEC 60754-1/-2
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
4G0.75	FC-MC021-001	1.2	10.8	11.5	68	126	45	26.0	12	0.107
4G1	FC-MC021-002	1.4	11.3	12.0	72	142	60	19.5	14	0.143
4G1.5	FC-MC021-003	1.7	12.1	12.8	102	173	90	13.3	18	0.214
4G2.5	FC-MC021-004	2.2	13.3	14.1	112	230	150	7.98	25	0.357
4G4	FC-MC021-005	2.7	14.8	15.7	126	309	240	4.95	33	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
4G0.75	11.5	68	136	27	12.6
4G1	12.0	72	144	36	14.2
4G1.5	12.8	102	204	53	17.3
4G2.5	14.1	112	224	89	23.0
4G4	15.7	126	252	142	30.9

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.

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06 Selection Guide and Sizing Aid

FC-MCR-A 4G covers 5 sizes. The smallest, 4G0.75, has an outer diameter of up to 11.5 mm and weighs about 126 kg/km; the largest, 4G4, has an outer diameter of up to 15.7 mm and weighs about 309 kg/km, 2.5 times as much. Across the range the rated current per core rises from 12 A to 33 A at 30 °C, and the minimum bending radius from 68 mm to 126 mm.

Example 1. A circuit carries 12 A per core at an ambient temperature of 40 °C. Required table current = 12 / 0.91 = 14 A per core. The smallest suitable size is 4G1 with 14 A per core.

Example 2. A circuit carries 22 A per core at an ambient temperature of 35 °C. Required table current = 22 / 0.96 = 23 A per core. The smallest suitable size is 4G2.5 with 25 A per core.

Type designation cores × mm²	Total copper mm²	Cable weight kg/100 m	Winding capacity m	Free-hanging length m (vertical)
4G0.75	3	12.6	32,465	36
4G1	4	14.2	30,360	43
4G1.5	6	17.3	26,365	53
4G2.5	10	23.0	21,405	66
4G4	16	30.9	17,285	79

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-A 4G 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).

For 4G0.75 the design values are: Ø 11.5 mm, 126 kg/km, 45 N permissible pull, 12 A rated current. The copper accounts for 21% of the weight, and 9.5 W/m is dissipated at full load, so heat-sensitive reel layers should be derated as shown in section 04. Per 100 m, 4G0.75 contains 2.7 kg of copper and 9.9 kg of insulation, filler and sheath material, which sets the scrap value and the recycling split.

Size 4G1 has a maximum conductor resistance of 19.50 Ω/km, a copper content of 36 kg/km and a minimum bending radius of 72 mm (reel core 144 mm). Short-circuit capability for 1 s is 0.14 kA. Expect 69.6 V of drop per 100 m at 14 A. Handling 4G1: 14.2 kg per 100 m, bending radius 72 mm; two people can lift a 20 m piece of about 2.8 kg.

At 4G1.5 the cable measures Ø 12.8 mm and weighs roughly 173 kg/km. It carries 18 A at 30 °C ambient, which produces 11.0 W/m of heat and a 61.0 V drop per 100 m. The permissible pull is 90 N, so a vertical length of 53 m can hang from its own weight before that limit is reached. A 500 m length of 4G1.5 weighs about 86 kg; with a 204 mm minimum core the drum must be sized for that load.

At 4G2.5 the cable measures Ø 14.1 mm and weighs roughly 230 kg/km. It carries 25 A at 30 °C ambient, which produces 12.7 W/m of heat and a 50.9 V drop per 100 m. The permissible pull is 150 N, so a vertical length of 66 m can hang from its own weight before that limit is reached. Reel and handling: at 4G2.5 the minimum reel core is 224 mm and the cable weighs 23.0 kg per 100 m, so a 500 m length weighs about 115 kg before the drum.

4G4: outer Ø 15.7 mm, about 309 kg/km of which 142 kg/km is copper (46%). Rated current is 33 A in free air at 30 °C; at that current the conductor loss is about 13.7 W per metre and the voltage drop over 100 m is 41.7 V (conductors at 90 °C). Per 100 m, 4G4 contains 14.2 kg of copper and 16.7 kg of insulation, filler and sheath material, which sets the scrap value and the recycling split.

08 Configuration Guidance and Variant Comparison

Typical case: a drill rig that moves its control and sensor signals in a separate channel from the power reel. For this case FC-MCR-A 4G is a fit in the 4G1.5 size (Ø 12.8 mm).

Use the low-temperature PUR where the cable is reeled at sub-zero ambient temperatures and a standard PUR sheath would stiffen and crack.

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

In the drawn size 4G1.5 the cores fill 59% of the circle inside the inner sheath, the inner sheath is 0.7 mm thick and the outer sheath 1.6 mm, giving a total wall of 2.2 mm around a core bundle of Ø 8.0 mm.

FC-MCR-A 4G is one of 360 datasheets in the mining reeling control cable group and one of 953 in the library. The next smaller core count, FC-MCR-A 3G, has an outer Ø of 11.9 mm at 1.5 mm² against 12.8 mm here. The next larger

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core count, FC-MCR-A 5G, measures 13.8 mm and weighs 204 kg/km (this model: 173 kg/km).

Element inventory and core layout

Element inventory of the drawn size 4G1.5: 4 elements with 6.0 mm² of copper in total. The 4 cores are stranded in 1 concentric layer (layer 1: 4 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 2 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	3	1.5 mm²	3.1	4.5
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
4G0.75	11.5	M25	ferrule	12	20	34
4G1	12.0	M25	ferrule	12	20	36
4G1.5	12.8	M25	ferrule	12	20	51
4G2.5	14.1	M25	ferrule	12	20	56
4G4	15.7	M25	ferrule	12	30	63

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 4G1.5

Variant	Differs in	Outer Ø / H mm	Weight kg/km	Pull N	Current A
This datasheet FC-MCR-A 4G	–	12.8	173	90	18
FC-MCR-U 4G 0.6/1 kV	sheath	12.8 (+0%)	173 (+0%)	90 (+0%)	18 (+0%)
FC-MCR-S 4G 0.6/1 kV	sheath	12.8 (+0%)	192 (+11%)	90 (+0%)	18 (+0%)
FC-MCR-A 3G 0.6/1 kV	configuration	11.9 (-7%)	145 (-16%)	68 (-24%)	23 (+28%)
FC-MCR-A 5G 0.6/1 kV	configuration	13.8 (+8%)	204 (+18%)	112 (+24%)	18 (+0%)
FC-MCR-A-C 4G 0.6/1 kV	screen	13.7 (+7%)	221 (+28%)	90 (+0%)	18 (+0%)
FC-MCR-A-HT 4G 0.6/1 kV	tensile braid	14.1 (+10%)	207 (+20%)	1,100 (+1122%)	18 (+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 60754-1 / -2	Halogen acid gas emission when burned
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) and confirmation of halogen-free materials

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

- Use a reel core diameter of at least twice the minimum bending radius; keep the cable free of loops and kinks while winding.
- 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-A [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-A 4G1.5 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-U 4G 0.6/1 kV – 4-core reeling control cable, PUR
- FC-MCR-S 4G 0.6/1 kV – 4-core reeling control cable, CSP rubber
- FC-MCR-A 3G 0.6/1 kV – 3-core reeling control cable, PUR low-temp
- FC-MCR-A 5G 0.6/1 kV – 5-core reeling control cable, PUR low-temp
- FC-MCR-A-C 4G 0.6/1 kV – 4-core reeling control cable with overall tinned-copper braid screen, PUR low-temp
- FC-MCR-A-HT 4G 0.6/1 kV – 4-core reeling control cable, with aramid tensile support braid, PUR low-temp
- FC-MCR-A 2× 0.6/1 kV – 2-core reeling control cable, PUR low-temp
- FC-MCR-A 7G 0.6/1 kV – 7-core reeling control cable, PUR low-temp

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

Frequently asked questions

What is FC-MCR-A 4G 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 4G1.5?
The outer diameter is 12.1 to 12.8 mm and the minimum bending radius in moving or reeling operation is 102 mm (6 to 10 × D depending on diameter).

What minimum reel core diameter is needed for 4G1.5?
At least 204 mm, which is twice the minimum bending radius of 102 mm. A larger core diameter extends cable life.

What current can each core of 4G1.5 carry?
The table gives 18 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 4G1.5 take, and how long can it hang freely?
The permissible pull force is 90 N. With a weight of about 173 kg/km this corresponds to a free-hanging vertical length of about 53 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 4G1.5 at rated current?
At 18 A and a conductor temperature of 90 °C the voltage drop is about 61.0 V per 100 m and the conductor loss about 11.0 W per metre (maximum resistance 13.300 Ω/km at 20 °C).

Is this cable halogen-free?
Yes. The insulation and all sheaths are halogen-free; see section 03 for flame-retardancy and temperature data.

Which cross-sections are available?
FC-MCR-A 4G: 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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