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

FC-MCR-A 12G 0.6/1 kV

Mining Reeling Control Cable 0.6/1 kV – 12-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 12G is a 12-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

12 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.

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

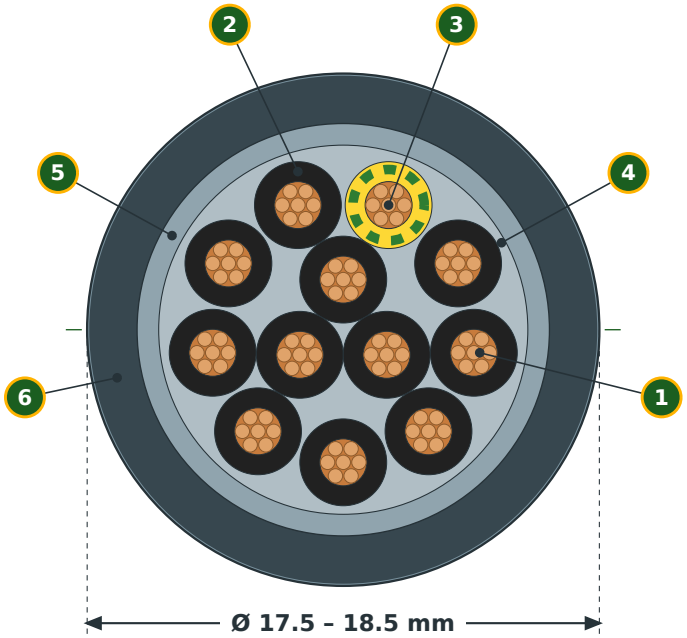
- Route control cables on the reel in a separate channel from MV or unscreened power cables, or use the screened version.
- Strip the outer sheath only as far as required for termination and seal the cable entry against water.

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02 Construction

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

FC-MCR-A
Sample size 12G1.5 · 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 12G1.5. 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
12G0.75	FC-MC026-001	1.2	15.3	16.3	130	270	135	26.0	8	0.107
12G1	FC-MC026-002	1.4	16.1	17.1	136	314	180	19.5	10	0.143
12G1.5	FC-MC026-003	1.7	17.5	18.5	148	395	270	13.3	12	0.214
12G2.5	FC-MC026-004	2.2	19.6	20.8	208	550	450	7.98	17	0.357
12G4	FC-MC026-005	2.7	22.0	23.4	234	770	720	4.95	23	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
12G0.75	16.3	130	260	80	27.0
12G1	17.1	136	272	107	31.4
12G1.5	18.5	148	296	160	39.5
12G2.5	20.8	208	416	267	55.0
12G4	23.4	234	468	430	77.0

Reel design guidance

- 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.

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06 Selection Guide and Sizing Aid

FC-MCR-A 12G covers 5 sizes. The smallest, 12G0.75, has an outer diameter of up to 16.3 mm and weighs about 270 kg/km; the largest, 12G4, has an outer diameter of up to 23.4 mm and weighs about 770 kg/km, 2.9 times as much. Across the range the rated current per core rises from 8 A to 23 A at 30 °C, and the minimum bending radius from 130 mm to 234 mm.

Example 1. A circuit carries 8 A per core at an ambient temperature of 40 °C. Required table current = 8 / 0.91 = 9 A per core. The smallest suitable size is 12G1 with 10 A per core.

Example 2. A circuit carries 15 A per core at an ambient temperature of 35 °C. Required table current = 15 / 0.96 = 16 A per core. The smallest suitable size is 12G2.5 with 17 A per core.

Type designation cores × mm²	Total copper mm²	Cable weight kg/100 m	Winding capacity m	Free-hanging length m (vertical)
12G0.75	9	27.0	16,050	50
12G1	12	31.4	14,745	58
12G1.5	18	39.5	12,500	69
12G2.5	30	55.0	9,880	83
12G4	48	77.0	7,530	95

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 12G 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).

Size 12G0.75 has a maximum conductor resistance of 26.00 Ω/km, a copper content of 80 kg/km and a minimum bending radius of 130 mm (reel core 260 mm). Short-circuit capability for 1 s is 0.11 kA. Expect 53.0 V of drop per 100 m at 8 A. Reel and handling: at 12G0.75 the minimum reel core is 260 mm and the cable weighs 27.0 kg per 100 m, so a 500 m length weighs about 135 kg before the drum.

At 12G1 the cable measures Ø 17.1 mm and weighs roughly 314 kg/km. It carries 10 A at 30 °C ambient, which produces 5.0 W/m of heat and a 49.7 V drop per 100 m. The permissible pull is 180 N, so a vertical length of 58 m can hang from its own weight before that limit is reached. Per 100 m, 12G1 contains 10.7 kg of copper and 20.7 kg of insulation, filler and sheath material, which sets the scrap value and the recycling split.

12G1.5: outer Ø 18.5 mm, about 395 kg/km of which 160 kg/km is copper (41%). Rated current is 12 A in free air at 30 °C; at that current the conductor loss is about 4.9 W per metre and the voltage drop over 100 m is 40.7 V (conductors at 90 °C). Handling 12G1.5: 39.5 kg per 100 m, bending radius 148 mm; two people can lift a 20 m piece of about 7.9 kg.

12G2.5: outer Ø 20.8 mm, about 550 kg/km of which 267 kg/km is copper (49%). Rated current is 17 A in free air at 30 °C; at that current the conductor loss is about 5.9 W per metre and the voltage drop over 100 m is 34.6 V (conductors at 90 °C). A 500 m length of 12G2.5 weighs about 275 kg; with a 416 mm minimum core the drum must be sized for that load.

Choose 12G4 when the load is near 23 A: the conductor resistance is 4.95 Ω/km, the overall size is Ø 23.4 mm and the weight 770 kg/km. The minimum reel core is 468 mm and the 1 s short-circuit rating 0.57 kA. Reel and handling: at 12G4 the minimum reel core is 468 mm and the cable weighs 77.0 kg per 100 m, so a 500 m length weighs about 385 kg before the drum.

08 Configuration Guidance and Variant Comparison

Typical case: a crusher with a remote station that is cabled over 69 m of free span. For this case FC-MCR-A 12G is a fit in the 12G1.5 size (Ø 18.5 mm).

The low-temperature PUR grade is for cables that must be moved below −30 °C, for example at portals and open pits in winter.

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

In the drawn size 12G1.5 the cores fill 66% of the circle inside the inner sheath, the inner sheath is 0.8 mm thick and the outer sheath 1.8 mm, giving a total wall of 2.5 mm around a core bundle of Ø 13.0 mm.

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FC-MCR-A 12G 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 10G, has an outer Ø of 18.0 mm at 1.5 mm² against 18.5 mm here. The next larger core count, FC-MCR-A 14G, measures 25.0 mm and weighs 600 kg/km (this model: 395 kg/km).

Element inventory and core layout

Element inventory of the drawn size 12G1.5: 12 elements with 18.0 mm² of copper in total. The 12 cores are stranded in 2 concentric layers (layer 1: 3 cores; layer 2: 9 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 9 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	11	1.5 mm²	3.1	16.5
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
12G0.75	16.3	M32	ferrule	12	61	65
12G1	17.1	M32	ferrule	12	61	68
12G1.5	18.5	M32	ferrule	12	61	74
12G2.5	20.8	M32	ferrule	12	61	104
12G4	23.4	M40	ferrule	12	90	117

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 12G1.5

Variant	Differs in	Outer Ø / H mm	Weight kg/km	Pull N	Current A
This datasheet FC-MCR-A 12G	–	18.5	395	270	12
FC-MCR-U 12G 0.6/1 kV	sheath	18.5 (+0%)	395 (+0%)	270 (+0%)	12 (+0%)
FC-MCR-S 12G 0.6/1 kV	sheath	18.5 (+0%)	430 (+9%)	270 (+0%)	12 (+0%)
FC-MCR-A 10G 0.6/1 kV	configuration	18.0 (-3%)	356 (-10%)	225 (-17%)	14 (+17%)
FC-MCR-A 14G 0.6/1 kV	configuration	25.0 (+35%)	600 (+52%)	315 (+17%)	12 (+0%)
FC-MCR-A-C 12G 0.6/1 kV	screen	19.5 (+5%)	470 (+19%)	270 (+0%)	12 (+0%)
FC-MCR-A-HT 12G 0.6/1 kV	tensile braid	20.0 (+8%)	450 (+14%)	1,960 (+626%)	12 (+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.

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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.

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.
- Do not exceed the tensile load in the table; relieve the cable of tension at the reel hub and at the machine.
- Keep control cables away from unscreened power cables running in parallel where possible.
- Inspect the sheath regularly for abrasion and mechanical damage.

Sheath marking

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FEICHUN FC-MCR-A [cross-section] 0.6/1 kV [year] [serial no.] [metre mark]
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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 12G1.5 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 12G 0.6/1 kV – 12-core reeling control cable, PUR
- FC-MCR-S 12G 0.6/1 kV – 12-core reeling control cable, CSP rubber
- FC-MCR-A 10G 0.6/1 kV – 10-core reeling control cable, PUR low-temp
- FC-MCR-A 14G 0.6/1 kV – 14-core reeling control cable, PUR low-temp
- FC-MCR-A-C 12G 0.6/1 kV – 12-core reeling control cable with overall tinned-copper braid screen, PUR low-temp
- FC-MCR-A-HT 12G 0.6/1 kV – 12-core reeling control cable, with aramid tensile support braid, PUR low-temp

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- FC-MCR-A 8G 0.6/1 kV – 8-core reeling control cable, PUR low-temp
- FC-MCR-A 16G 0.6/1 kV – 16-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 12G 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 12G1.5?
The outer diameter is 17.5 to 18.5 mm and the minimum bending radius in moving or reeling operation is 148 mm (6 to 10 × D depending on diameter).

What minimum reel core diameter is needed for 12G1.5?
At least 296 mm, which is twice the minimum bending radius of 148 mm. A larger core diameter extends cable life.

What current can each core of 12G1.5 carry?
The table gives 12 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 12G1.5 take, and how long can it hang freely?
The permissible pull force is 270 N. With a weight of about 395 kg/km this corresponds to a free-hanging vertical length of about 69 m before the rated pull is reached; apply your own safety factor for hoisting or suspended installations.

What is the voltage drop and heat loss of 12G1.5 at rated current?
At 12 A and a conductor temperature of 90 °C the voltage drop is about 40.7 V per 100 m and the conductor loss about 4.9 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 12G: 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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