MINING REELING CONTROL CABLE · MOBILE MACHINERY | 300/500 V | 4 sizes | CSP rubber

FC-MCR-S 16G 300/500 V

Mining Reeling Control Cable 300/500 V – 16-core reeling control cable, CSP rubber sheath. Complete technical data sheet: construction, dimensions, weights, current ratings, standards and installation guidance for 4 sizes.

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01 Application and Product Overview

FC-MCR-S 16G is a 16-core reeling control cable rated 300/500 V 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: 0.5 – 1.5 mm².

Design

16 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
- Open-pit and surface duty that calls for a rubber sheath with proven weather, ozone and oil resistance

4 sizes	300/500 V	+90 °C	CSP rubber
Cross-section 0.5 – 1.5 mm²	Rated voltage U_0/U	Maximum conductor temperature	Sheath: CSP rubber

Key features

- Fine-wire class 5 copper cores with insulation thickness to 300/500 V 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

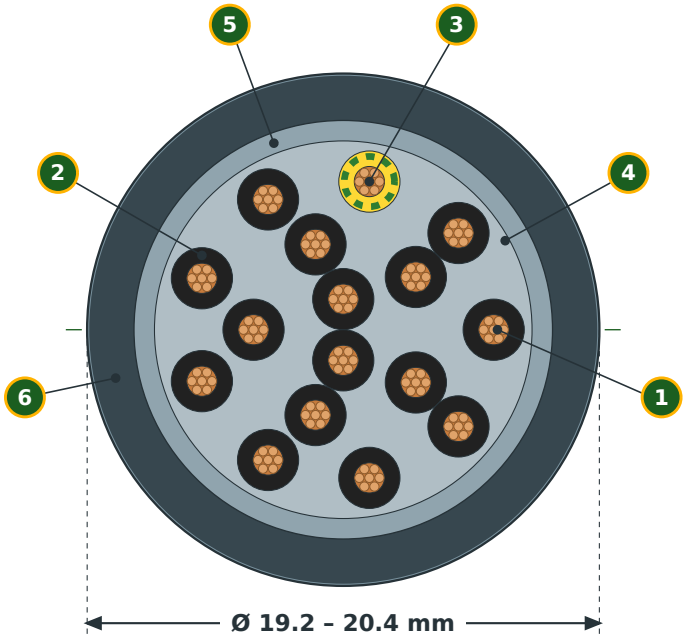
- Strip the outer sheath only as far as required for termination and seal the cable entry against water.
- Mark spare cores at both ends; a broken core in a reeling cable often appears first as an intermittent signal.

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02 Construction

FEICHUN · CROSS-SECTION A-A · 300/500 V

FC-MCR-S
Sample size 16G0.75 · 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 16G0.75. 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	300/500 V AC
Test voltage	2 kV AC, 5 min
Maximum operating voltage, DC	0.45/0.83 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 – 300/500 V (4 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
16G0.5	FC-MC316-001	1.0	17.9	19.0	152	360	120	39.0	6	0.071
16G0.75	FC-MC316-002	1.2	19.2	20.4	204	430	180	26.0	7	0.107
16G1	FC-MC316-003	1.4	20.4	21.6	216	500	240	19.5	9	0.143
16G1.5	FC-MC316-004	1.7	23.5	25.0	250	690	360	13.3	11	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
16G0.5	19.0	152	304	71	36.0
16G0.75	20.4	204	408	107	43.0
16G1	21.6	216	432	142	50.0
16G1.5	25.0	250	500	213	69.0

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.
- 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 16G covers 4 sizes. The smallest, 16G0.5, has an outer diameter of up to 19.0 mm and weighs about 360 kg/km; the largest, 16G1.5, has an outer diameter of up to 25.0 mm and weighs about 690 kg/km, 1.9 times as much. Across the range the rated current per core rises from 6 A to 11 A at 30 °C, and the minimum bending radius from 152 mm to 250 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 16G0.75 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 16G1 with 9 A per core.

Type designation cores × mm²	Total copper mm²	Cable weight kg/100 m	Winding capacity m	Free-hanging length m (vertical)
16G0.5	8	36.0	11,625	33
16G0.75	12	43.0	10,235	42
16G1	16	50.0	8,845	48
16G1.5	24	69.0	6,785	53

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 16G 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).

16G0.5: outer Ø 19.0 mm, about 360 kg/km of which 71 kg/km is copper (20%). Rated current is 6 A in free air at 30 °C; at that current the conductor loss is about 3.6 W per metre and the voltage drop over 100 m is 59.7 V (conductors at 90 °C). Per 100 m, 16G0.5 contains 7.1 kg of copper and 28.9 kg of insulation, filler and sheath material, which sets the scrap value and the recycling split.

Choose 16G0.75 when the load is near 7 A: the conductor resistance is 26.00 Ω/km, the overall size is Ø 20.4 mm and the weight 430 kg/km. The minimum reel core is 408 mm and the 1 s short-circuit rating 0.11 kA. Handling 16G0.75: 43.0 kg per 100 m, bending radius 204 mm; two people can lift a 20 m piece of about 8.6 kg.

16G1: Ø 21.6 mm; bend radius 216 mm; weight 500 kg/km. Voltage drop at rated current (9 A) is 44.8 V per 100 m, loss 4.0 W/m, and the cable can support 48 m of its own length vertically at the rated pull of 240 N. A 500 m length of 16G1 weighs about 250 kg; with a 432 mm minimum core the drum must be sized for that load.

16G1.5: Ø 25.0 mm; bend radius 250 mm; weight 690 kg/km. Voltage drop at rated current (11 A) is 37.3 V per 100 m, loss 4.1 W/m, and the cable can support 53 m of its own length vertically at the rated pull of 360 N. Reel and handling: at 16G1.5 the minimum reel core is 500 mm and the cable weighs 69.0 kg per 100 m, so a 500 m length weighs about 345 kg before the drum.

08 Configuration Guidance and Variant Comparison

Typical case: a machine whose control cabinet needs 16 circuits through the reel. For this case FC-MCR-S 16G is a fit in the 16G0.75 size (Ø 20.4 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 300/500 V, the cable has thin insulation for control circuits up to 500 V; do not use it on power circuits.

In the drawn size 16G0.75 the cores fill 42% 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 2.6 mm around a core bundle of Ø 14.6 mm.

FC-MCR-S 16G 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-S 14G, has an outer Ø of 20.4 mm at 0.75 mm² against 20.4 mm here. The next larger core count, FC-MCR-S 19G, measures 20.1 mm and weighs 450 kg/km (this model: 430 kg/km).

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Element inventory and core layout

Element inventory of the drawn size 16G0.75: 16 elements with 12.0 mm² of copper in total. The 16 cores are stranded in 3 concentric layers (layer 1: 2 cores; layer 2: 5 cores; layer 3: 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 12 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	15	0.75 mm²	2.4	11.2
Protective (PE) conductor	1	0.75 mm²	2.4	0.8

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
16G0.5	19.0	M32	ferrule	12	81	76
16G0.75	20.4	M32	ferrule	12	81	102
16G1	21.6	M40	ferrule	12	81	108
16G1.5	25.0	M40	ferrule	12	81	125

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 16G0.75

Variant	Differs in	Outer Ø / H mm	Weight kg/km	Pull N	Current A
This datasheet FC-MCR-S 16G	–	20.4	430	180	7
FC-MCR-U 16G 300/500 V	sheath	20.4 (+0%)	395 (-8%)	180 (+0%)	7 (+0%)
FC-MCR-S 14G 300/500 V	configuration	20.4 (+0%)	420 (-2%)	158 (-12%)	8 (+14%)
FC-MCR-S 19G 300/500 V	configuration	20.1 (-1%)	450 (+5%)	214 (+19%)	7 (+0%)
FC-MCR-S-C 16G 300/500 V	screen	21.3 (+4%)	520 (+21%)	180 (+0%)	7 (+0%)
FC-MCR-S 16G 0.6/1 kV	voltage class	21.8 (+7%)	480 (+12%)	180 (+0%)	7 (+0%)
FC-MCR-S 12G 300/500 V	configuration	15.4 (-25%)	277 (-36%)	135 (-25%)	8 (+14%)

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): 2 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

- 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.
- 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.

Sheath marking

FEICHUN FC-MCR-S [cross-section] 300/500 V [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 16G0.75 300/500 V – 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 16G 300/500 V – 16-core reeling control cable, PUR
- FC-MCR-S 14G 300/500 V – 14-core reeling control cable, CSP rubber
- FC-MCR-S 19G 300/500 V – 19-core reeling control cable, CSP rubber
- FC-MCR-S-C 16G 300/500 V – 16-core reeling control cable with overall tinned-copper braid screen, CSP rubber
- FC-MCR-S 16G 0.6/1 kV – 16-core reeling control cable, CSP rubber
- FC-MCR-S 12G 300/500 V – 12-core reeling control cable, CSP rubber
- FC-MCR-S 24G 300/500 V – 24-core reeling control cable, CSP rubber
- FC-MCR-S 10G 300/500 V – 10-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 16G 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 16G0.75?
The outer diameter is 19.2 to 20.4 mm and the minimum bending radius in moving or reeling operation is 204 mm (6 to 10 × D depending on diameter).

What minimum reel core diameter is needed for 16G0.75?
At least 408 mm, which is twice the minimum bending radius of 204 mm. A larger core diameter extends cable life.

What current can each core of 16G0.75 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.

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How much tensile load can 16G0.75 take, and how long can it hang freely?
The permissible pull force is 180 N. With a weight of about 430 kg/km this corresponds to a free-hanging vertical length of about 42 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 16G0.75 at rated current?
At 7 A and a conductor temperature of 90 °C the voltage drop is about 46.4 V per 100 m and the conductor loss about 3.2 W per metre (maximum resistance 26.000 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 16G: 0.5, 0.75, 1, 1.5 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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