MINING REELING CONTROL CABLE · MOBILE MACHINERY | 0.6/1 kV | 3 sizes | CPE rubber

HIGH TENSILE · ARAMID BRAID

FC-MCR-R-HT 40G 0.6/1 kV

Mining Reeling Control Cable 0.6/1 kV – 40-core reeling control cable, with aramid tensile support braid, 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-MCR-R-HT 40G is a 40-core reeling control cable, with aramid tensile support braid 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 chlorinated polyethylene (CPE) rubber, resistant to weather, ozone and oil. Core cross-sections: 0.75 – 1.5 mm². An aramid tensile support braid between the inner and outer sheath carries the axial load; the permissible pull of the largest size is 4,490 N.

Design

40 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. With 40 cores this cable replaces several smaller control cables on a single reel channel. A braid of aramid yarn is applied between the inner and outer sheath. The braid is a high-modulus, low-elongation element: it takes the axial load that would otherwise stretch the copper conductors, keeps the stranded cores from lengthening and from forming loops (“bird-caging”) when the cable is released from tension on a reel, and raises the permissible working load well above the 20 N/mm² (power) or 15 N/mm² (control) copper-based rating. The permissible pull in the tables includes the braid.

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
- Steep declines, ramps, raises and shaft installations where the cable weight or the reel tension would otherwise load the conductors; the aramid braid carries the axial load

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
- 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)

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- Aramid tensile support braid: permissible pull up to 4,490 N in the largest size
- CPE rubber sheath with proven weather, ozone and oil resistance
- Flame retardant to IEC 60332-1-2

Service notes for mining duty

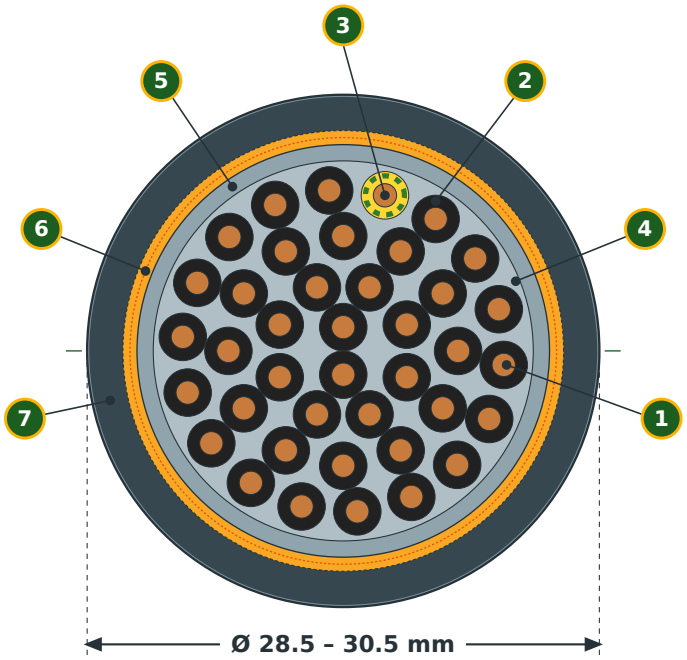
- Route control cables on the reel in a separate channel from MV or unscreened power cables, or use the screened version.
- Strip the outer sheath only as far as required for termination and seal the cable entry against water.

02 Construction

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

FC-MCR-R-HT

Sample size 40G1 · 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	Tensile support braid	Aramid yarn braid between inner and outer sheath; carries the axial load
7	Outer sheath	Chlorinated polyethylene (CPE) rubber, resistant to weather, ozone and oil

The drawing shows size 40G1. 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
Tensile support braid	Aramid yarn braid, 0.81 mm thick, between the inner and the outer sheath; the braid carries the axial load
Outer sheath	Chlorinated polyethylene (CPE) rubber, resistant to weather, ozone and oil

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.

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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 on the copper cross-section plus the permissible load of the aramid support braid; the pull force of each size is in section 04 and in the tensile table
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

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
40G0.75	FC-MC143-001	1.2	27.0	29.0	290	930	3,360	26.0	5	0.107
40G1	FC-MC143-002	1.4	28.5	30.5	304	1,080	3,760	19.5	6	0.143
40G1.5	FC-MC143-003	1.7	31.5	33.5	336	1,370	4,490	13.3	8	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 plus the permissible load of the aramid support braid (split out in the tensile table). 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).

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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
40G0.75	29.0	290	580	267	93.0
40G1	30.5	304	608	356	108.0
40G1.5	33.5	336	672	530	137.0

Reel design guidance

- Minimum reel core diameter = 2 × minimum bending radius = 2 × minimum bending radius (outer diameter D).
- 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 Tensile Performance of the Aramid Support Braid

The aramid braid adds its own permissible working load to the copper-based rating. The table splits the permissible pull of every size into the copper part (15 N/mm² × copper cross-section) and the braid part, and shows how long a length of cable can hang vertically before its own weight reaches the rated pull. The braid part is a design value: aramid yarn strength 2,900 N/mm², braid efficiency 0.70 and a safety factor of 15 on the yarn strength. Introduce the load only through a cable grip or strain-relief clamp that holds the sheath and the braid.

Type designation cores × mm²	Pull, copper only N	Pull, aramid braid N	Total permissible pull N	Factor × standard	Free-hanging length m (vertical)
40G0.75	450	2,910	3,360	7.5	368
40G1	600	3,160	3,760	6.3	354
40G1.5	900	3,590	4,490	5.0	334

Free-hanging length = permissible pull ÷ (weight × 9.81). For hoisting, shaft suspension or lifting applications apply the safety factor required by the applicable regulations and confirm the arrangement with FeiChun.

07 Selection Guide and Sizing Aid

FC-MCR-R-HT 40G covers 3 sizes. The smallest, 40G0.75, has an outer diameter of up to 29.0 mm and weighs about 930 kg/km; the largest, 40G1.5, has an outer diameter of up to 33.5 mm and weighs about 1,370 kg/km, 1.5 times as much. Across the range the rated current per core rises from 5 A to 8 A at 30 °C, and the minimum bending radius from 290 mm to 336 mm.

Example 1. A circuit carries 5 A per core at an ambient temperature of 40 °C. Required table current = 5 / 0.91 = 6 A per core. The smallest suitable size is 40G1 with 6 A per core.

Example 2. A circuit carries 7 A per core at an ambient temperature of 35 °C. Required table current = 7 / 0.96 = 8 A per core. The smallest suitable size is 40G1.5 with 8 A per core.

Type designation cores × mm²	Total copper mm²	Cable weight kg/100 m	Winding capacity m	Free-hanging length m (vertical)
40G0.75	30	93.0	4,875	368
40G1	40	108.0	4,355	354
40G1.5	60	137.0	3,490	334

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.

08 Engineering Profile by Size

Each size of FC-MCR-R-HT 40G 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 40G0.75 has a maximum conductor resistance of 26.00 Ω/km, a copper content of 267 kg/km and a minimum bending radius of 290 mm (reel core 580 mm). Short-circuit capability for 1 s is 0.11 kA. Expect 33.1 V of drop per 100 m at 5 A. Handling 40G0.75: 93.0 kg per 100 m, bending radius 290 mm; two people can lift a 20 m piece of about 18.6 kg.

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At 40G1 the cable measures Ø 30.5 mm and weighs roughly 1,080 kg/km. It carries 6 A at 30 °C ambient, which produces 1.8 W/m of heat and a 29.8 V drop per 100 m. The permissible pull is 3,760 N, so a vertical length of 354 m can hang from its own weight before that limit is reached. A 500 m length of 40G1 weighs about 540 kg; with a 608 mm minimum core the drum must be sized for that load.

40G1.5: outer Ø 33.5 mm, about 1,370 kg/km of which 530 kg/km is copper (39%). Rated current is 8 A in free air at 30 °C; at that current the conductor loss is about 2.2 W per metre and the voltage drop over 100 m is 27.1 V (conductors at 90 °C). Reel and handling: at 40G1.5 the minimum reel core is 672 mm and the cable weighs 137.0 kg per 100 m, so a 500 m length weighs about 685 kg before the drum.

09 Configuration Guidance and Variant Comparison

Typical case: a machine whose control cabinet needs 40 circuits through the reel. For this case FC-MCR-R-HT 40G is a fit in the 40G1 size (Ø 30.5 mm).

CPE suits moderate-duty surface equipment and pumps; it contains halogen.

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

In the drawn size 40G1 the cores fill 63% of the circle inside the inner sheath, the inner sheath is 0.9 mm thick, the aramid braid 0.81 mm and the outer sheath 2.1 mm, giving a total wall of 3.8 mm around a core bundle of Ø 22.0 mm.

The aramid braid adds 3,160 N of permissible pull in the 40G1 size (3,760 N total instead of 600 N), at the cost of about 1.6 mm more diameter and 22 kg/km more weight than the standard design.

FC-MCR-R-HT 40G 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-R-HT 37G, has an outer Ø of 31.0 mm at 1 mm² against 30.5 mm here. The next larger core count, FC-MCR-R-HT 48G, measures 31.5 mm and weighs 1,190 kg/km (this model: 1,080 kg/km).

Element inventory and core layout

Element inventory of the drawn size 40G1: 40 elements with 40.0 mm² of copper in total. The 40 cores are stranded in 4 concentric layers (layer 1: 2 cores; layer 2: 8 cores; layer 3: 12 cores; layer 4: 18 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 33 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	39	1 mm²	2.7	39.0
Protective (PE) conductor	1	1 mm²	2.7	1.0

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
40G0.75	29.0	M40	ferrule	12	203	145
40G1	30.5	M50	ferrule	12	203	152
40G1.5	33.5	M50	ferrule	12	203	168

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 40G1

Variant	Differs in	Outer Ø / H mm	Weight kg/km	Pull N	Current A
This datasheet FC-MCR-R-HT 40G	–	30.5	1,080	3,760	6
FC-MCR-S-HT 40G 0.6/1 kV	sheath	30.5 (+0%)	1,100 (+2%)	3,760 (+0%)	6 (+0%)
FC-MCR-A-HT 40G 0.6/1 kV	sheath	30.5 (+0%)	1,000 (-7%)	3,760 (+0%)	6 (+0%)
FC-MCR-R-HT 37G 0.6/1 kV	configuration	31.0 (+2%)	1,070 (-1%)	3,790 (+1%)	6 (+0%)
FC-MCR-R-HT 48G 0.6/1 kV	configuration	31.5 (+3%)	1,190 (+10%)	4,000 (+6%)	6 (+0%)
FC-MCR-R-C-HT 40G 0.6/1 kV	screen	31.5 (+3%)	1,200 (+11%)	3,870 (+3%)	6 (+0%)
FC-MCR-R 40G 0.6/1 kV	tensile braid	29.0 (-5%)	980 (-9%)	600 (-84%)	6 (+0%)

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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.

10 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)
- Tensile test of the finished cable including elongation at the rated pull, and inspection of the aramid braid coverage (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.

11 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.
- Inspect the sheath regularly for abrasion and mechanical damage.
- Terminate the tensile braid: fix the cable with a cable grip or strain-relief clamp that holds the sheath and braid at both ends, so the braid, not the conductors, carries the load.

Sheath marking

FEICHUN FC-MCR-R-HT [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-R-HT 40G1 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.

12 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.

13 Related Datasheets

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

- FC-MCR-S-HT 40G 0.6/1 kV – 40-core reeling control cable, with aramid tensile support braid, CSP rubber
- FC-MCR-A-HT 40G 0.6/1 kV – 40-core reeling control cable, with aramid tensile support braid, PUR low-temp
- FC-MCR-R-HT 37G 0.6/1 kV – 37-core reeling control cable, with aramid tensile support braid, CPE rubber
- FC-MCR-R-HT 48G 0.6/1 kV – 48-core reeling control cable, with aramid tensile support braid, CPE rubber

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- FC-MCR-R-C-HT 40G 0.6/1 kV – 40-core reeling control cable with overall tinned-copper braid screen, with aramid tensile support braid, CPE rubber
- FC-MCR-R 40G 0.6/1 kV – 40-core reeling control cable, CPE rubber
- FC-MCR-R-HT 36G 0.6/1 kV – 36-core reeling control cable, with aramid tensile support braid, CPE rubber
- FC-MCR-R-HT 30G 0.6/1 kV – 30-core reeling control cable, with aramid tensile support braid, CPE rubber

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

Frequently asked questions

What is FC-MCR-R-HT 40G 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 40G1?
The outer diameter is 28.5 to 30.5 mm and the minimum bending radius in moving or reeling operation is 304 mm (6 to 10 × D depending on diameter).

What minimum reel core diameter is needed for 40G1?
At least 608 mm, which is twice the minimum bending radius of 304 mm. A larger core diameter extends cable life.

What current can each core of 40G1 carry?
The table gives 6 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 40G1 take, and how long can it hang freely?
The permissible pull force is 3,760 N (including the aramid braid; 600 N on the copper alone). With a weight of about 1,080 kg/km this corresponds to a free-hanging vertical length of about 354 m before the rated pull is reached; apply your own safety factor for hoisting or suspended installations.

What does the tensile support braid add compared with the standard design?
It raises the permissible pull of 40G1 from 600 N to 3,760 N, a factor of 6.3, and keeps the conductors from stretching and the cores from forming loops. The cable is somewhat larger and heavier than the standard version because of the braid layer.

What is the voltage drop and heat loss of 40G1 at rated current?
At 6 A and a conductor temperature of 90 °C the voltage drop is about 29.8 V per 100 m and the conductor loss about 1.8 W per metre (maximum resistance 19.500 Ω/km at 20 °C).

Is this cable halogen-free?
No. The CPE 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-R-HT 40G: 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.

14 Trademark Notice and Intellectual Property

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