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

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

Mining Reeling Control Cable 0.6/1 kV – 40-core reeling control cable, 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 40G is a 40-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 chlorinated polyethylene (CPE) rubber, resistant to weather, ozone and oil. Core cross-sections: 0.75 – 1.5 mm².

### 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.

### 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

| 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)
- CPE rubber sheath with proven weather, ozone and oil resistance
- Flame retardant to IEC 60332-1-2

### Service notes for mining duty

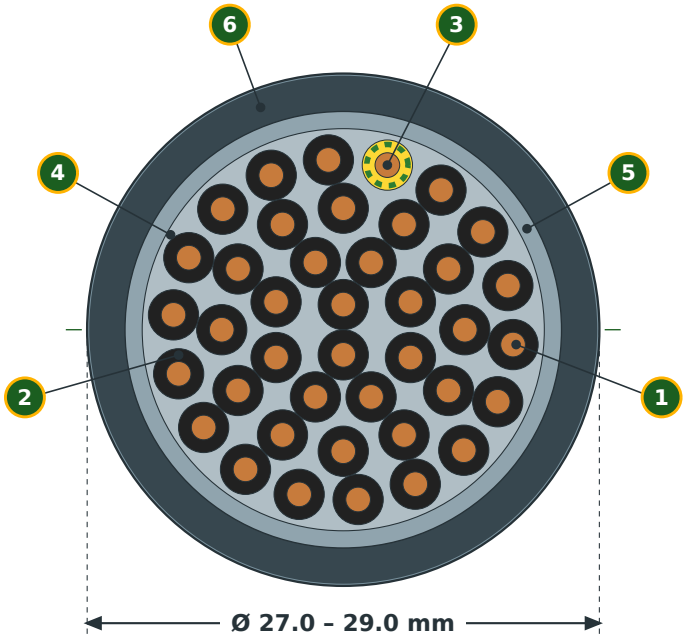
- Route control cables on the reel in a separate channel from MV or unscreened power cables, or use the screened version.
- Strip the outer sheath only as far as required for termination and seal the cable entry against water.


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## 02 Construction

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

**FC-MCR-R**
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 | 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 |
| **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.

## 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 (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-MC071-001 | 1.2 | 25.5 | 27.0 | 270 | 840 | 450 | 26.0 | 5 | 0.107 |
| **40G1** | FC-MC071-002 | 1.4 | 27.0 | 29.0 | 290 | 980 | 600 | 19.5 | 6 | 0.143 |
| **40G1.5** | FC-MC071-003 | 1.7 | 29.5 | 31.5 | 316 | 1,260 | 900 | 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. 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 |
|---|---|---|---|---|---|
| **40G0.75** | 27.0 | 270 | 540 | 267 | 84.0 |
| **40G1** | 29.0 | 290 | 580 | 356 | 98.0 |
| **40G1.5** | 31.5 | 316 | 632 | 530 | 126.0 |

### 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.


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## 06 Selection Guide and Sizing Aid

FC-MCR-R 40G covers 3 sizes. The smallest, 40G0.75, has an outer diameter of up to 27.0 mm and weighs about 840 kg/km; the largest, 40G1.5, has an outer diameter of up to 31.5 mm and weighs about 1,260 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 270 mm to 316 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 | 84.0 | 5,695 | 54 |
| **40G1** | 40 | 98.0 | 4,875 | 62 |
| **40G1.5** | 60 | 126.0 | 3,930 | 72 |

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-R 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).

40G0.75: outer Ø 27.0 mm, about 840 kg/km of which 267 kg/km is copper (32%). Rated current is 5 A in free air at 30 °C; at that current the conductor loss is about 1.7 W per metre and the voltage drop over 100 m is 33.1 V (conductors at 90 °C). Reel and handling: at 40G0.75 the minimum reel core is 540 mm and the cable weighs 84.0 kg per 100 m, so a 500 m length weighs about 420 kg before the drum.

Choose 40G1 when the load is near 6 A: the conductor resistance is 19.50 Ω/km, the overall size is Ø 29.0 mm and the weight 980 kg/km. The minimum reel core is 580 mm and the 1 s short-circuit rating 0.14 kA. Per 100 m, 40G1 contains 35.6 kg of copper and 62.4 kg of insulation, filler and sheath material, which sets the scrap value and the recycling split.

40G1.5: Ø 31.5 mm; bend radius 316 mm; weight 1,260 kg/km. Voltage drop at rated current (8 A) is 27.1 V per 100 m, loss 2.2 W/m, and the cable can support 72 m of its own length vertically at the rated pull of 900 N. Handling 40G1.5: 126.0 kg per 100 m, bending radius 316 mm; two people can lift a 20 m piece of about 25.2 kg.

## 08 Configuration Guidance and Variant Comparison

Typical case: a machine whose control cabinet needs 40 circuits through the reel. For this case FC-MCR-R 40G is a fit in the 40G1 size (Ø 29.0 mm).

Select CPE where weather and oil resistance are needed at a lower cost than CSP or PUR and where the cable is not dragged over sharp rock.

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 and the outer sheath 2.1 mm, giving a total wall of 3.0 mm around a core bundle of Ø 22.0 mm.

FC-MCR-R 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 37G, has an outer Ø of 29.5 mm at 1 mm² against 29.0 mm here. The next larger core count, FC-MCR-R 48G, measures 29.5 mm and weighs 1,090 kg/km (this model: 980 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 |


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| Element | Quantity | Cross-section | Ø over insulation mm | Copper mm² |
|---|---|---|---|---|
| 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 | 27.0 | M40 | ferrule | 12 | 203 | 135 |
| 40G1 | 29.0 | M40 | ferrule | 12 | 203 | 145 |
| 40G1.5 | 31.5 | M50 | ferrule | 12 | 203 | 158 |

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 40G | – | 29.0 | 980 | 600 | 6 |
| FC-MCR-S 40G 0.6/1 kV | sheath | 29.0 (+0%) | 1,000 (+2%) | 600 (+0%) | 6 (+0%) |
| FC-MCR-A 40G 0.6/1 kV | sheath | 29.0 (+0%) | 910 (-7%) | 600 (+0%) | 6 (+0%) |
| FC-MCR-R 37G 0.6/1 kV | configuration | 29.5 (+2%) | 970 (-1%) | 560 (-7%) | 6 (+0%) |
| FC-MCR-R 48G 0.6/1 kV | configuration | 29.5 (+2%) | 1,090 (+11%) | 720 (+20%) | 6 (+0%) |
| FC-MCR-R-C 40G 0.6/1 kV | screen | 30.0 (+3%) | 1,100 (+12%) | 600 (+0%) | 6 (+0%) |
| FC-MCR-R-HT 40G 0.6/1 kV | tensile braid | 30.5 (+5%) | 1,080 (+10%) | 3,760 (+527%) | 6 (+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

- 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.

### Sheath marking

FEICHUN FC-MCR-R [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 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.

## 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-S 40G 0.6/1 kV – 40-core reeling control cable, CSP rubber
- FC-MCR-A 40G 0.6/1 kV – 40-core reeling control cable, PUR low-temp
- FC-MCR-R 37G 0.6/1 kV – 37-core reeling control cable, CPE rubber
- FC-MCR-R 48G 0.6/1 kV – 48-core reeling control cable, CPE rubber
- FC-MCR-R-C 40G 0.6/1 kV – 40-core reeling control cable with overall tinned-copper braid screen, CPE rubber
- FC-MCR-R-HT 40G 0.6/1 kV – 40-core reeling control cable, with aramid tensile support braid, CPE rubber
- FC-MCR-R 36G 0.6/1 kV – 36-core reeling control cable, CPE rubber
- FC-MCR-R 30G 0.6/1 kV – 30-core reeling control cable, 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 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 27.0 to 29.0 mm and the minimum bending radius in moving or reeling operation is 290 mm (6 to 10 × D depending on diameter).

**What minimum reel core diameter is needed for 40G1?**
At least 580 mm, which is twice the minimum bending radius of 290 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.


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**How much tensile load can 40G1 take, and how long can it hang freely?**
The permissible pull force is 600 N. With a weight of about 980 kg/km this corresponds to a free-hanging vertical length of about 62 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 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 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.

## 13 Trademark Notice and Intellectual Property

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