

Electrical Distribution

Earth system

Extract of Catalogue Low Voltage Energy





60 YEARS Expertise

ICHAUD is a French industrial group specialised in energy distribution networks for more than 60 years.

MICHAUD Export, subsidiary dedicated to international markets, develops and sells solutions according to applicable standards thanks to its know-how as well as its relationships with local users.



PRESCRIPTION & DIAGNOSIS

A strong market understanding and a recognised technical knowledge to serve your projects in order to propose suitable solutions.



INNOVATION & QUALITY

Investing near 8% of the turnover in R&D, we develop tomorrow's solutions and guarantee quality and reliability of products thanks to a COFRAC and ASEFA accredited and independent test laboratory (accreditation n°1-0579 / www.cofrac.fr).



FITTERS TRAINING

As preferred technical partner, we encourage learning and knowledge transmission together with product commercialisation.



A ccording to the international standards, Michaud Export designs and develops energy distribution solutions. The product range is focused on two fields of expertise:

- Low Voltage Network: to connect and protect the overhead and underground electrical lines ;

- **Energy Controlling:** to manage and offer easy access to electricity.

+70 PARTNERS IN THE WORLD-WIDE

MICHAUD benefits from a privileged collaboration with many partners around the world. Thanks to an engineering Department dedicated to international business, MICHAUD provides support to Power Utilities in their grid expansion projects,

Besides, MICHAUD supports and works in partnership with power sector organizations.

PRODUCTS BRANDS

21.01















SOLUTIONS FOR EARTH SYSTEM

To meet electrical installations safety requirements, MICHAUD specialised in the earth system field.

The earth system

The role of an electrical installation earth system is to enable the fault current runoff into the soil. When an installation is damaged owing to an insulation fault, the current cannot flow correctly anymore. An electric shock occurs, that is to say an element is charging in electricity. At this stage, the current is trying to come out thanks to a conductive environment. This is the aim of the earth system.

Earth system main functions



PEOPLE PROTECTION AND SAFETY

The earth system enables to protect from the electrocution risk. It limits the potential difference in the close environment in order to avoid contact or step voltage.

HIGH FREQUENCY CURRENTS DISPERSAL

The earth system also has to discharge direct or indirect currents coming from lightning shocks.

GOODS AND EQUIPMENT PROTECTION

It prevents goods and electrical installations from degradation. The earth system ensures the electrical continuity and avoids too important voltage to installations terminals.

Components of an earth terminal

The electrical installation earth system is made by an earth terminal or earth circuit. The earth terminal connects the installation and the soil in which the fault current will be able to flow.

The earth terminal consists of three main components:

Connector Enables connection



Establishes contact with the soil

The electrode establishes a contact with the soil. It is therefore essential to study the soil in order to better adapt the installation.

Soil study

Earth resistance

The current runoff into the soil will meet the earth terminal resistance. This one is partly the consequence of the soil's resistivity itself.

The soil's resistivity depends on several elements:

- Ground nature
- Water content (humidity)
- Soil heterogeneity
- Climatic variations

A stable and wet ground will enable a better electrical conductivity and earth system effectiveness.

Conductor **Discharges current**

Soil resistivity

The soil electrical resistivity (ρ) is its capacity to limit the electrical current passage, it is expressed in ohm meter (Ω m).

| Ground nature | Resistivity ρ (Ωm). |
|---------------------------|------------------------|
| Marshy ground | 10 |
| Clay | 8 to 50 |
| Clay, sand and gravel | 40 to 250 |
| Sand and gravel | 60 to100 |
| Slate, clay and sandstone | 10 to 500 |
| Rock | 200 to 10 000 |

SOLUTIONS FOR EARTH SYSTEM

Earth electrode

The earth electrode has to establish a connection with the soil to allow the current runoff. It must guarantee a good conductivity and be adapted to the ground nature.

Deep earth terminal

It is recommended to go deep to find the weakest and the more stable earth resistance. Top layers are submitted to climatic variations so using an electrode able to go deep guarantees to meet stable and homogeneous soil.

Surface earth terminal

When it is not possible to go deep because of the soil nature or the risk of underground network degradation (gas, water, telecoms, etc...), an electrode on the surface turns out to be the best alternative.





The diversity of technics specifications used for earth systems gives the opportunity to find the best solution for every project.

| | Rod nature | Conductivity | Service life | Corrosion resistance | Competitiveness | Mechanical resistance |
|--------|---------------------|--------------|--------------|-------------------------|-----------------|--------------------------|
| | Copper bonded steel | +++ | ++ | ++ | ++ | ++ |
| | Stainless steel | + | +++ | +++ | + | ++ |
| Part . | Galvanised steel | ++ | + | + | +++ | ++ |

Earth conductor

The conductor is designed to disseminate the fault current from the equipment or the electrical installation up to the electrode. Two kind of conductors are available: round or cabled conductors and flat conductors or tapes.

Copper conductors

Cables remain the most common technology used in earth systems. For a specific installation or desired properties, tapes offer an alternative to cables (mechanical resistance).



Flat conductors

Copper conductors are generally recommended in earth circuits. Other metallic combinations can bring solutions to existing issues in the field.



ECONOMIC SOLUTION Copper bonded steel tape

> THEFT PROTECTION Tinned copper bonded steel tape

Connectors

Connectors must ensure a mechanical bonding between the different elements constituting the earth system to guarantee a good electrical continuity.



Connection conductor/conductor



Connection A.B.C. conductor/connector

19.10



Galvanic corrosion phenomenon

A galvanic phenomenon can happen when two metals with different potential are in contact within a conductive solution (such as water). Electron transfer is run from an anode to a cathode leading to a guick degradation of the less noble metal (the anode).

| Electrode/cor | nnector cor | nbinations a |
|----------------------|-------------|------------------|
| Connector (clamp) | Brass | Galvanised steel |
| Electrode | O | |
| Copper bonded steel | ~ | × |
| Stainless steel | ~ | × |
| Galvanised steel | × | ~ |

 Guarantee the system equipotentiality

- Perform a tap connection
- ✓ Fix the installation up if the conductor has been severed Enable bonding opening to
- measure earth resistance

 Earth system on low voltage A.B.C. network.



SOLUTIONS FOR EARTH SYSTEM

Installation

Tools and accessories

Some tools and accessories can be useful during the earth terminal installation.

Earth rod pushing

For a short rod installation into a wet soil, a hammer can enable pushing into ground.

For rods with more important dimensions, a drill hammer can be used.

Material protection

To protect the rod's copper coat during set up protection, accessories can be placed on both rod ends.

During the rod installation, abrasive elements in the soil can damage the copper coat. On the superior end, hammer blows can lead to copper and rod degradation. A driving spike and a driving head enable to prevent these aggressive effects.



Diverse recommendations



For an effective and reliable earth system:

- Insulate connections
- Watch connections locating them in a pit
- Control regularly the installation and the possible metal corrosion
- Perform the installation far from buried walls, deep foundations and rivers
- Do not use water distribution pipes
- Opt for a substantial depth to reach a stable resistance in a ground not submitted to climatic variations
- Ensure the system equipotentiality \checkmark



Preparation and material

The earth resistance measure is performed by an earth tester. In order to allow measurements, the earth circuit can be opened at the cutting blades or at the earth system disconnection kit.



The resistance value to get varies according to normative standards and installations types. The measure should be repeated over some time as the value might change due to a season, measure conditions or soils evolution.

The resistance measurement through the 3 rods method

The measure

The 3 rods method also called 62% method is a way to measure the earth resistance. The measure consists of injecting a current between a first electrode and the earth rod to check. A third rod enables to measure voltage. Thanks to the ohm's law, it is possible to deduce the earth resistance.



1st case:

The measure is not conclusive, the earth resistance value is too high. The rod must be extended or earth terminals must be multiplied taking care of the system equipotentiality in order to decrease value.



Earth disconnection kit to unbolt

Principle

This method implies to use 3 earth rods. One of them (P1) is that staying in the ground after the installation test. The rod (P2) must be placed in more than 10 meters from (P1) and third rod (P3) 62% of the separation distance of (P1) and (P2) in order to be out of the (P1) and (P2) influence area.

2nd case:

The measure is conclusive and it has to be confirmed. (P3) is going to be moved to 52% then to 72% from D1 respectively in P3' and P3". If the measure does not vary, the value got in the first place is confirmed otherwise please refer to first case.



Low Voltage Energy Earth electrodes

Copper bonded steel rod



Application

This earth rod is used for the power networks earth system.

The copper coating made by electrolytic process gives a resistance to corrosion as well as a good conductivity. The reference standards are **EN 50 164-2** and **EN 62 561-2**.

| SOURTING12020EARTH ROD COPPER SOUR L = IN DIAM 12.71412.711.0251012030EARTH ROD COPPER SOUR L = 1.5m DIAM 12.71412.722.0501012030EARTH ROD COPPER SOUR L = IN DIAM 14.161412.722.0501012044EARTH ROD COPPER SOUR L = IN DIAM 1416141.22.0501012045EARTH ROD COPPER SOUR L = IN DIAM 1416141.22.0501012046EARTH ROD COPPER SOUR L = IN DIAM 14161422.0501012047EARTH ROD COPPER SOUR L = IN DIAM 1416141.51.9001012030EARTH ROD COPPER 100µm L = IN DIAM 1416141.51.9001012031EARTH ROD COPPER 100µm L = IN DIAM 17.21917.212.0001012032EARTH ROD COPPER 100µm L = IN DIAM 17.21917.212.0001012033EARTH ROD COPPER 100µm L = IN DIAM 17.21917.212.0001012034EARTH ROD COPPER 100µm L = IN DIAM 17.21917.212.0001012035EARTH ROD COPPER 100µm L = IN DIAM 17.21917.212.0001012046EARTH ROD COPPER 100µm L = IN DIAM 17.21917.212.0001012047EARTH ROD COPPER 100µm L = IN DIAM 17.21917.212.0001012048EARTH ROD COPPER 254µm L = IN DIAM | Code | Designation | Nominal diameter (mm) | Real diameter (mm) | Length (m) | Weight (kg) | Sales unit |
|---|--------|---|-----------------------------|-----------------------|---------------|----------------|---------------|
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| 254µm COPPER COATING U206 EARTH ROD COPPER 254µm L = 1m DIAM 14 16 14 1 1.250 10 F249 EARTH ROD COPPER 254µm L = 1.5m DIAM 14 16 14 1.5 1.900 10 F227 EARTH ROD COPPER 254µm L = 2m DIAM 14 16 14 2 2.500 10 U207 EARTH ROD COPPER 254µm L = 3m DIAM 14 16 14 3 3.700 10 U208 EARTH ROD COPPER 254µm L = 1m DIAM 17.2 19 17.2 1 2.000 10 U208 EARTH ROD COPPER 254µm L = 1.5m DIAM 17.2 19 17.2 1.5 3.000 10 U208 EARTH ROD COPPER 254µm L = 2m DIAM 17.2 19 17.2 2 4.000 10 U210 EARTH ROD COPPER 254µm L = 3m DIAM 17.2 19 17.2 3 6.000 10 U211 EARTH ROD COPPER 254µm L = 3m DIAM 17.2 19 17.2 3 6.000 10 350µm Comper 254µm L = 1m DIAM 17.2 19 17.2 1.5 3.000 10 <th>U 235</th> <th>EARTH ROD COPPER 100µm L = 2m DIAM 17.2</th> <th>19</th> <th>17.2</th> <th>2</th> <th>4.000</th> <th>10</th> | U 235 | EARTH ROD COPPER 100µm L = 2m DIAM 17.2 | 19 | 17.2 | 2 | 4.000 | 10 |
| U206 EARTH ROD COPPER 254µm L = 1m DIAM 14 16 14 1 1.250 10 F249 EARTH ROD COPPER 254µm L = 1.5m DIAM 14 16 14 1.5 1.900 10 F227 EARTH ROD COPPER 254µm L = 2m DIAM 14 16 14 2 2.500 10 U207 EARTH ROD COPPER 254µm L = 3m DIAM 14 16 14 3 3.700 10 U208 EARTH ROD COPPER 254µm L = 3m DIAM 14 16 14 3 3.700 10 U208 EARTH ROD COPPER 254µm L = 1m DIAM 17.2 19 17.2 1 2.000 10 U209 EARTH ROD COPPER 254µm L = 1.5m DIAM 17.2 19 17.2 2 4.000 10 U210 EARTH ROD COPPER 254µm L = 3m DIAM 17.2 19 17.2 3 6.000 10 U211 EARTH ROD COPPER 350µm L = 1m DIAM 17.2 19 17.2 1 2.000 10 U212 EARTH ROD COPPER 350µm L = 1.5m DIAM 17.2 19 17.2 1.5 3.000 10 U214 | 254µm | COPPER COATING | | | | | |
| F249 EARTH R0D COPPER 254µm L = 1.5m DIAM 14 16 14 1.5 1.900 10 F227 EARTH R0D COPPER 254µm L = 2m DIAM 14 16 14 2 2.500 10 U207 EARTH R0D COPPER 254µm L = 3m DIAM 14 16 14 3 3.700 10 U208 EARTH R0D COPPER 254µm L = 3m DIAM 14 16 14 3 3.700 10 U208 EARTH R0D COPPER 254µm L = 1m DIAM 17.2 19 17.2 1 2.000 10 U209 EARTH R0D COPPER 254µm L = 1.5m DIAM 17.2 19 17.2 1.5 3.000 10 U210 EARTH R0D COPPER 254µm L = 3m DIAM 17.2 19 17.2 2 4.000 10 U211 EARTH R0D COPPER 254µm L = 3m DIAM 17.2 19 17.2 3 6.000 10 350µm COPPER COATING U212 EARTH R0D COPPER 350µm L = 1m DIAM 17.2 19 17.2 1 2.000 10 U213 EARTH R0D COPPER 350µm L = 1.5m DIAM 17.2 19 17.2 1.5 3.000 10 | U206 | EARTH ROD COPPER 254µm L = 1m DIAM 14 | 16 | 14 | 1 | 1.250 | 10 |
| F227 EARTH ROD COPPER 254µm L = 2m DIAM 14 16 14 2 2.500 10 U207 EARTH ROD COPPER 254µm L = 3m DIAM 14 16 14 3 3.700 10 U208 EARTH ROD COPPER 254µm L = 1m DIAM 17.2 19 17.2 1 2.000 10 U209 EARTH ROD COPPER 254µm L = 1.5m DIAM 17.2 19 17.2 1.5 3.000 10 U209 EARTH ROD COPPER 254µm L = 2m DIAM 17.2 19 17.2 1.5 3.000 10 U210 EARTH ROD COPPER 254µm L = 2m DIAM 17.2 19 17.2 2 4.000 10 U211 EARTH ROD COPPER 254µm L = 3m DIAM 17.2 19 17.2 3 6.000 10 U211 EARTH ROD COPPER 350µm L = 1m DIAM 17.2 19 17.2 1 2.000 10 U212 EARTH ROD COPPER 350µm L = 1m DIAM 17.2 19 17.2 1 2.000 10 U213 EARTH ROD COPPER 350µm L = 1.5m DIAM 17.2 19 17.2 2 4.000 10 U21 | F249 | EARTH ROD COPPER 254µm L = 1.5m DIAM 14 | 16 | 14 | 1.5 | 1.900 | 10 |
| U207 EARTH ROD COPPER 254µm L = 3m DIAM 14 16 14 3 3.700 10 U208 EARTH ROD COPPER 254µm L = 1m DIAM 17.2 19 17.2 1 2.000 10 U209 EARTH ROD COPPER 254µm L = 1.5m DIAM 17.2 19 17.2 1.5 3.000 10 U210 EARTH ROD COPPER 254µm L = 2m DIAM 17.2 19 17.2 2 4.000 10 U210 EARTH ROD COPPER 254µm L = 2m DIAM 17.2 19 17.2 3 6.000 10 U211 EARTH ROD COPPER 254µm L = 3m DIAM 17.2 19 17.2 3 6.000 10 U211 EARTH ROD COPPER 350µm L = 1m DIAM 17.2 19 17.2 1 2.000 10 U212 EARTH ROD COPPER 350µm L = 1m DIAM 17.2 19 17.2 1 2.000 10 U213 EARTH ROD COPPER 350µm L = 1.5m DIAM 17.2 19 17.2 1.5 3.000 10 U214 EARTH ROD COPPER 350µm L = 2m DIAM 17.2 19 17.2 2 4.000 10 | F227 | EARTH ROD COPPER 254µm L = 2m DIAM 14 | 16 | 14 | 2 | 2.500 | 10 |
| U208 EARTH ROD COPPER 254µm L = 1m DIAM 17.2 19 17.2 1 2.000 10 U209 EARTH ROD COPPER 254µm L = 1.5m DIAM 17.2 19 17.2 1.5 3.000 10 U210 EARTH ROD COPPER 254µm L = 2m DIAM 17.2 19 17.2 2 4.000 10 U210 EARTH ROD COPPER 254µm L = 2m DIAM 17.2 19 17.2 3 6.000 10 U211 EARTH ROD COPPER 254µm L = 3m DIAM 17.2 19 17.2 3 6.000 10 350µm COPPER COATING U212 EARTH ROD COPPER 350µm L = 1m DIAM 17.2 19 17.2 1 2.000 10 U212 EARTH ROD COPPER 350µm L = 1.5m DIAM 17.2 19 17.2 1 2.000 10 U213 EARTH ROD COPPER 350µm L = 1.5m DIAM 17.2 19 17.2 1.5 3.000 10 U214 EARTH ROD COPPER 350µm L = 2m DIAM 17.2 19 17.2 2 4.000 10 | U207 | EARTH ROD COPPER 254µm L = 3m DIAM 14 | 16 | 14 | 3 | 3.700 | 10 |
| U209 EARTH ROD COPPER 254µm L = 1.5m DIAM 17.2 19 17.2 1.5 3.000 10 U210 EARTH ROD COPPER 254µm L = 2m DIAM 17.2 19 17.2 2 4.000 10 U211 EARTH ROD COPPER 254µm L = 3m DIAM 17.2 19 17.2 3 6.000 10 U211 EARTH ROD COPPER 254µm L = 3m DIAM 17.2 19 17.2 3 6.000 10 350µm COPPER COATING U212 EARTH ROD COPPER 350µm L = 1m DIAM 17.2 19 17.2 1 2.000 10 U213 EARTH ROD COPPER 350µm L = 1.5m DIAM 17.2 19 17.2 1.5 3.000 10 U214 EARTH ROD COPPER 350µm L = 2m DIAM 17.2 19 17.2 2 4.000 10 | U208 | EARTH ROD COPPER 254µm L = 1m DIAM 17.2 | 19 | 17.2 | 1 | 2.000 | 10 |
| U210 EARTH ROD COPPER 254µm L = 2m DIAM 17.2 19 17.2 2 4.000 10 U211 EARTH ROD COPPER 254µm L = 3m DIAM 17.2 19 17.2 3 6.000 10 350µm COPPER COATING U212 EARTH ROD COPPER 350µm L = 1m DIAM 17.2 19 17.2 1 2.000 10 U213 EARTH ROD COPPER 350µm L = 1.5m DIAM 17.2 19 17.2 1.5 3.000 10 U214 EARTH ROD COPPER 350µm L = 2m DIAM 17.2 19 17.2 2 4.000 10 | U209 | EARTH ROD COPPER 254µm L = 1.5m DIAM 17.2 | 19 | 17.2 | 1.5 | 3.000 | 10 |
| U211 EARTH ROD COPPER 254µm L = 3m DIAM 17.2 19 17.2 3 6.000 10 350µm COPPER COATING U212 EARTH ROD COPPER 350µm L = 1m DIAM 17.2 19 17.2 1 2.000 10 U213 EARTH ROD COPPER 350µm L = 1.5m DIAM 17.2 19 17.2 1.5 3.000 10 U214 EARTH ROD COPPER 350µm L = 2m DIAM 17.2 19 17.2 2 4.000 10 | U210 | EARTH ROD COPPER 254µm L = 2m DIAM 17.2 | 19 | 17.2 | 2 | 4.000 | 10 |
| 350µm COPPER COATING U212 EARTH ROD COPPER 350µm L = 1m DIAM 17.2 19 17.2 1 2.000 10 U213 EARTH ROD COPPER 350µm L = 1.5m DIAM 17.2 19 17.2 1.5 3.000 10 U214 EARTH ROD COPPER 350µm L = 2m DIAM 17.2 19 17.2 2 4.000 10 | U211 | EARTH ROD COPPER 254µm L = 3m DIAM 17.2 | 19 | 17.2 | 3 | 6.000 | 10 |
| U212 EARTH ROD COPPER 350µm L = 1m DIAM 17.2 19 17.2 1 2.000 10 U213 EARTH ROD COPPER 350µm L = 1.5m DIAM 17.2 19 17.2 1.5 3.000 10 U214 EARTH ROD COPPER 350µm L = 2m DIAM 17.2 19 17.2 2 4.000 10 | 350µm | COPPER COATING | | | | | |
| U213 EARTH ROD COPPER 350µm L = 1.5m DIAM 17.2 19 17.2 1.5 3.000 10 U214 EARTH ROD COPPER 350µm L = 2m DIAM 17.2 19 17.2 2 4.000 10 | U212 | EARTH ROD COPPER 350µm L = 1m DIAM 17.2 | 19 | 17.2 | 1 | 2.000 | 10 |
| U214 EARTH ROD COPPER 350μm L = 2m DIAM 17.2 19 17.2 2 4.000 10 | U213 | EARTH ROD COPPER 350µm L = 1.5m DIAM 17.2 | 19 | 17.2 | 1.5 | 3.000 | 10 |
| | U214 | EARTH ROD COPPER 350µm L = 2m DIAM 17.2 | 19 | 17.2 | 2 | 4.000 | 10 |

Nota: Other dimensions are available, please enquire.

Clamp





Connection clamp <u>F234</u>



| Code | Designation | Nominal rod diameter (mm) | Conductors sections (mm²) | C A |)imer B | isions C | s (mm D | ι) Ε | Screw | Weight (kg) | Sales unit |
|--------|--|---------------------------------|---------------------------------|--------|------------|-------------|------------|---------|-------|----------------|---------------|
| F234 | CONNECTION CLAMP ROD DIAM 12.7 + 14 UNTHREADED | 14 - 16 | 35 | 35 | 3 | 21 | 30 | 17.5 | M8 | 0.050 | 50 |
| F234-B | CONNECTION CLAMP ROD DIAM 12.7 + 14 UNTHREADED – BRONZE | 14 - 16 | 50 | 36.5 | 3 | 23 | 30 | 13 | M8 | 0.050 | 50 |
| F246 | CONNECTION CLAMP ROD DIAM 17.2 UNTHREADED | 19 | 50 | 38 | 3 | 23 | 32 | 17.5 | M8 | 0.050 | 10 |
| F233 | "U" BOLT CONNECTION CLAMP 50 ² ROD DIAM 12.7 + 14 UNTHREADED | 14 - 16 | 16 - 50 | 25 | 41 | 26 | 8.7 | - | - | 0.095 | 20 |
| F224 | "U" BOLT CONNECTION CLAMP 150 ² Rod Diam 12.7 to 17.2 Unthreaded | 14 to 19 | 150 | 44 | 52 | 38 | 10.2 | 64 | - | 0.230 | 25 |

Accessory



| Code | Designation | Nominal rod diameter (mm) | Weight (kg) | Sales unit |
|------|---|---------------------------------|----------------|---------------|
| F229 | DRIVING SPIKE FOR ROD DIAM 12.7 + 14 UNTHREADED | 14-16 | 0.115 | 10 |
| F239 | DRIVING SPIKE FOR ROD DIAM 17.2 UNTHREADED | 19 | 0.145 | 10 |
| F238 | DRIVING HEAD FOR ROD DIAM 12.7 + 14 UNTHREADED | 14-16 | 0.115 | 10 |
| F237 | DRIVING HEAD FOR ROD DIAM 17.2 UNTHREADED | 19 | 0.145 | 10 |
| L267 | TAPER COUPLING FOR ROD DIAM 5/8" | 16 | 0.340 | 25 |

"U" bolt connection clamp F224



Application

This **brass clamp with stainless steel bolts** is designed to establish a connection between the earth rod and the conductor.

The cable can be fixed radially or axially through the "U" bolt clamp.

The round connection clamp can be in bronze.



Application

These **brass driving spikes and heads** are designed to protect the earth rod during the installation. They enable to preserve the copper coating and its technical features. The taper coupling is made of brass. It allows the junction between two unthreaded earth rods with nominal diameter 16mm.

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| | | | |



Low Voltage Energy Earth electrodes

Threaded copper bonded steel rod



Application

This earth rod is used for the power networks earth system. The thread on both ends makes the earth

rod lengthening possible. The copper coating made by electrolytic process gives a resistance to corrosion as well as a good conductivity. The reference standards are EN 50 164-2 and EN 62 561-2.

| Code | Designation | Nominal diameter (mm) | Real diameter (mm) | Length (m) | Weight (kg) | Sales unit |
|-------|--|-----------------------------|--------------------------|---------------|----------------|---------------|
| 50µm | COPPER COATING | | | | | |
| U215 | EARTH ROD COPPER 50µm L = 1m DIAM 12.7 - 2 THREADS 9/16" | 14 | 12.7 | 1 | 1.025 | 10 |
| F296 | EARTH ROD COPPER 50µm L = 1.5m DIAM 12.7 - 2 THREADS 9/16" | 14 | 12.7 | 1.5 | 1.537 | 10 |
| U216 | EARTH ROD COPPER 50µm L = 2m DIAM 12.7 - 2 THREADS 9/16" | 14 | 12.7 | 2 | 2.050 | 10 |
| U217 | EARTH ROD COPPER 50µm L = 1m DIAM 14 - 2 THREADS 5/8" | 16 | 14 | 1 | 1.250 | 10 |
| F235 | EARTH ROD COPPER 50µm L = 1.5m DIAM 14 - 2 THREADS 5/8" | 16 | 14 | 1.5 | 1.900 | 10 |
| F223 | EARTH ROD COPPER 50µm L = 2m DIAM 14 - 2 THREADS 5/8" | 16 | 14 | 2 | 2.500 | 10 |
| 100µm | COPPER COATING | | | | | |
| U236 | EARTH ROD COPPER 100µm L = 1m DIAM 14 - 2 THREADS 5/8" | 16 | 14 | 1 | 1.250 | 10 |
| F216 | EARTH ROD COPPER 100µm L = 1.5m DIAM 14 - 2 THREADS 5/8" | 16 | 14 | 1.5 | 1.900 | 10 |
| F217 | EARTH ROD COPPER 100µm L = 2m DIAM 14 - 2 THREADS 5/8" | 16 | 14 | 2 | 2.500 | 10 |
| U237 | EARTH ROD COPPER 100µm L = 1m DIAM 17.2 - 2 THREADS 3/4" | 19 | 17.2 | 1 | 2.000 | 10 |
| U238 | EARTH ROD COPPER 100µm L = 1.5m DIAM 17.2 - 2 THREADS 3/4" | 19 | 17.2 | 1.5 | 3.000 | 10 |
| U239 | EARTH ROD COPPER 100µm L = 2m DIAM 17.2 - 2 THREADS 3/4" | 19 | 17.2 | 2 | 4.000 | 10 |
| 254µm | COPPER COATING | | | | | |
| U218 | EARTH ROD COPPER 254µm L = 1m DIAM 14 - 2 THREADS 5/8" | 16 | 14 | 1 | 1.250 | 10 |
| F222 | EARTH ROD COPPER 254µm L = 1.5m DIAM 14 - 2 THREADS 5/8" | 16 | 14 | 1.5 | 1.900 | 10 |
| F221 | EARTH ROD COPPER 254µm L = 2m DIAM 14 - 2 THREADS 5/8" | 16 | 14 | 2 | 2.500 | 10 |
| U219 | EARTH ROD COPPER 254µm L = 3m DIAM 14 - 2 THREADS 5/8" | 16 | 14 | 3 | 3.700 | 10 |
| U220 | EARTH ROD COPPER 254µm L = 1m DIAM 17.2 - 2 THREADS 3/4" | 19 | 17.2 | 1 | 2.000 | 10 |
| F262 | EARTH ROD COPPER 254µm L = 1.5m DIAM 17.2 - 2 THREADS 3/4" | 19 | 17.2 | 1.5 | 3.000 | 10 |
| U221 | EARTH ROD COPPER 254µm L = 2m DIAM 17.2 - 2 THREADS 3/4" | 19 | 17.2 | 2 | 4.000 | 10 |
| U222 | EARTH ROD COPPER 254µm L = 3m DIAM 17.2 - 2 THREADS 3/4" | 19 | 17.2 | 3 | 6.000 | 10 |
| 350µm | COPPER COATING | | | | | |
| U223 | EARTH ROD COPPER 350µm L = 1m DIAM 17.2 - 2 THREADS 3/4" | 19 | 17.2 | 1 | 2.000 | 10 |
| U224 | EARTH ROD COPPER 350µm L = 1.5m DIAM 17.2 - 2 THREADS 3/4" | 19 | 17.2 | 1.5 | 3.000 | 10 |
| U225 | EARTH ROD COPPER 350µm L = 2m DIAM 17.2 - 2 THREADS 3/4" | 19 | 17.2 | 2 | 4.000 | 10 |

Nota: Other dimensions are available, please enquire.

Clamp





Connection clamp <u>F234</u>





| Code | Designation | Nominal rod diameter (mm) | Conductors sections (mm ²) |] م | Dimer B | nsions | s (mm | ı) ⊑ | Screw | Weight (kg) | Sales unit |
|------|--|---------------------------------|--|--------|------------|----------|-------|---------|-------|----------------|---------------|
| | | () | () | | | <u> </u> | | | | | |
| F234 | CONNECTION CLAMP ROD DIAM 12.7 THREADED | 14 | 35 | 35 | 3 | 21 | 30 | 17.5 | M8 | 0.050 | 50 |
| F246 | CONNECTION CLAMP ROD DIAM 14 + 17.2 THREADED | 16 - 19 | 50 | 38 | 3 | 23 | 32 | 17.5 | M8 | 0.050 | 10 |
| F233 | "U" BOLT CONNECTION CLAMP 50 ² ROD DIAM 12.7 + 14 THREADED | 14 - 16 | 16 - 50 | 25 | 41 | 26 | 8.7 | - | - | 0.095 | 20 |
| F224 | "U" BOLT CONNECTION CLAMP 150 ² Rod Diam 12.7 to 17.2 threaded | 14 to 19 | 150 | 44 | 52 | 38 | 10.2 | 64 | - | 0.230 | 25 |

Accessory



| Code | Designation | Nominal rod diameter (mm) | Weight (kg) | Sales unit |
|------|---|---------------------------------|----------------|---------------|
| F229 | DRIVING SPIKE FOR ROD DIAM 12.7 THREADED | 14 | 0.115 | 10 |
| F239 | DRIVING SPIKE FOR ROD DIAM 14 THREADED | 16 | 0.145 | 10 |
| U226 | DRIVING SPIKE FOR ROD DIAM 17.2 THREADED | 19 | 0.155 | 10 |
| F238 | DRIVING HEAD FOR ROD DIAM 12.7 THREADED | 14 | 0.115 | 10 |
| F237 | DRIVING HEAD FOR ROD DIAM 14 THREADED | 16 | 0.145 | 10 |
| U227 | DRIVING HEAD FOR ROD DIAM 17.2 THREADED | 19 | 0.155 | 10 |
| F298 | THREADED COUPLING FOR ROD DIAM 12.7 THREAD 9/16" | 14 | 0.090 | 10 |
| F236 | THREADED COUPLING FOR ROD DIAM 14 THREAD 5/8" | 16 | 0.115 | 25 |
| F265 | THREADED COUPLING FOR ROD DIAM 17.2 THREAD 3/4" | 19 | 0.155 | 10 |
| U228 | SCREW FOR COUPLING FOR ROD DIAM 12.7 THREAD 9/16" | 14 | 0.085 | 10 |
| F228 | SCREW FOR COUPLING FOR ROD DIAM 14 THREAD 5/8" | 16 | 0.100 | 25 |
| U229 | SCREW FOR COUPLING FOR ROD DIAM 17.2 THREAD 3/4" | 19 | 0.135 | 10 |



"U" bolt connection clamp F224



Application

This brass clamp with stainless steel bolts is designed to establish a connection between the earth rod and the conductor.

The cable can be fixed radially or axially through the "U" bolt clamp.

Application

F238



These brass driving spikes and heads are designed to protect the earth rod during the installation. They enable to preserve the copper coating and its technical features.

These brass threaded couplings enable to join two rods and get a deeper earth system.



Other earth electrode

Galvanised steel rod







Tubular profile

Application

This galvanised steel earth rod is used for the power networks earth system. The corrosion protection is ensured thanks to a hot dip galvanisation surface treatment.

The reference Standard is EN 50 164-2.

| Designation | Diameter (mm) | Profile | Length (m) | Weight (kg) | Sales unit |
|--------------------------------------|---|--|--|---|---|
| EARTH ROD GALVA L = 1m DIAM 16 | 16 | Solid | 1 | 1.70 | 10 |
| EARTH ROD GALVA L = 1.5m DIAM 16 | 16 | Solid | 1.5 | 2.55 | 10 |
| EARTH ROD GALVA L = 2m DIAM 16 | 16 | Solid | 2 | 3.40 | 10 |
| EARTH ROD GALVA L = 1.5m DIM 50x50x3 | 50x50x3 | Cross-shaped | 1.5 | 2.10 | 10 |
| EARTH ROD GALVA L = 1m DIAM 25 | 25 | Tubular | 1 | 1.60 | 10 |
| EARTH ROD GALVA L = 1.5m DIAM 25 | 25 | Tubular | 1.5 | 2.40 | 10 |
| EARTH ROD GALVA L = 2m DIAM 25 | 25 | Tubular | 2 | 3.20 | 10 |
| | DesignationEARTH ROD GALVA L = 1m DIAM 16EARTH ROD GALVA L = 1.5m DIAM 16EARTH ROD GALVA L = 2m DIAM 16EARTH ROD GALVA L = 1.5m DIM 50x50x3EARTH ROD GALVA L = 1m DIAM 25EARTH ROD GALVA L = 1.5m DIAM 25EARTH ROD GALVA L = 2m DIAM 25 | DesignationDiameter (mm)EARTH ROD GALVA L = 1m DIAM 1616EARTH ROD GALVA L = 1.5m DIAM 1616EARTH ROD GALVA L = 2m DIAM 1616EARTH ROD GALVA L = 1.5m DIM 50x50x350x50x3EARTH ROD GALVA L = 1m DIAM 2525EARTH ROD GALVA L = 1.5m DIAM 2525EARTH ROD GALVA L = 2m DIAM 2525 | DesignationDiameter (mm)ProfileEARTH ROD GALVA L = 1m DIAM 1616SolidEARTH ROD GALVA L = 1.5m DIAM 1616SolidEARTH ROD GALVA L = 2m DIAM 1616SolidEARTH ROD GALVA L = 1.5m DIM 50x50x350x50x3Cross-shapedEARTH ROD GALVA L = 1m DIAM 2525TubularEARTH ROD GALVA L = 1.5m DIAM 2525Tubular | DesignationDiameter (mm)ProfileLength (m)EARTH ROD GALVA L = 1m DIAM 1616Solid1EARTH ROD GALVA L = 1.5m DIAM 1616Solid1.5EARTH ROD GALVA L = 2m DIAM 1616Solid2EARTH ROD GALVA L = 1.5m DIM 50x50x350x50x3Cross-shaped1.5EARTH ROD GALVA L = 1m DIAM 2525Tubular1EARTH ROD GALVA L = 1.5m DIAM 2525Tubular1.5EARTH ROD GALVA L = 2m DIAM 2525Tubular2 | DesignationDiameter (mm)ProfileLength (m)Weight (kg)EARTH ROD GALVA L = 1m DIAM 1616Solid11.70EARTH ROD GALVA L = 1.5m DIAM 1616Solid1.52.55EARTH ROD GALVA L = 2m DIAM 1616Solid23.40EARTH ROD GALVA L = 1.5m DIM 50x50x350x50x3Cross-shaped1.52.10EARTH ROD GALVA L = 1m DIAM 2525Tubular11.60EARTH ROD GALVA L = 1.5m DIAM 2525Tubular1.52.40EARTH ROD GALVA L = 2m DIAM 2525Tubular23.20 |

Nota: Other dimensions are available, please enquire

Clamp



Application

This clamp dedicated to galvanised earth rods is designed to establish a connection between the earth rod and the conductor.

| Code | Designation | Rod diameter (mm) | Metal | Conductors section (mm²) | Weight (kg) | Sales unit |
|------|--|-------------------------|------------------|--------------------------------|----------------|---------------|
| U191 | CONNECTION CLAMP GALVA ROD DIAM 16 | 16 | Galvanised steel | 50mm ² | 0.054 | 20 |
| U192 | CONNECTION BOLT AND NUT ROD CROSS-SHAPED | | Zamac / nickel | 50mm ² | 0.072 | 100 |
| U193 | CONNECTION CLAMP 25mm ² ZINC BRASS ROD CROSS-SH | APED | Zinc brass | 25mm ² | 0.032 | 10 |
| U194 | CONNECTION CLAMP 50mm ² ZINC BRASS ROD CROSS-SH | APED | Zinc brass | 50mm ² | 0.077 | 10 |

The connection between the conductor and the tubular earth rod is made by the actual ear on the top end of the rod. It receives a bolt and nut as well as a tubular lug.

Bolt and nut, please enquire.

SEE SHEET OVERHEAD / LV ending fitting / Bare lug



| Code | Designation | Diameter (mm) | Length (m) | Weight (kg) | Sales unit |
|------|--|------------------|---------------|----------------|---------------|
| F230 | EARTH ROD STAINLESS STEEL SELF-EXTENDABLE L = 1m DIAM 16 | 16 | 1 | 1.50 | 10 |
| F231 | EARTH ROD STAINLESS STEEL SELF-EXTENDABLE L = 1.5m DIAM 16 | 16 | 1.5 | 2.30 | 10 |
| F232 | EARTH ROD STAINLESS STEEL SELF-EXTENDABLE L = 2m DIAM 16 | 16 | 2 | 3.20 | 10 |

Nota: Other dimensions are available, please enquire

Stainless steel earth rod

Clamp





Connection clamp F234





| Code | Designation | Rod diameter (mm) | Condi sect (m |
|------|---|-------------------------|---------------------|
| F234 | CONNECTION CLAMP ROD STAINLESS Steel | 16 | 16· |
| F233 | "U" BOLT CONNECTION CLAMP 50 ² ROD Stainless Steel | 16 | 16 |
| F224 | "U" BOLT CONNECTION CLAMP 150 ² Rod Stainless Steel | 16 | 70- |

Application

This stainless steel earth rod is used for the power networks earth system. It gives a huge resistance to corrosion and can be implemented into hard grounds.

The rod has a hammered end and a boring respectively to lower and upper ends, giving it the possibility to be self-extendable.

The reference Standard is **EN 50 164-2**.

Application

This brass clamp with stainless steel bolts is designed to establish a connection between the stainless steel earth rod and the conductor. The cable can be fixed radialy or axialy through the "U" bolt clamp.

uctors Dimensions (mm) Screw Weight ions m²) В C D E Α 3 21 30 17.5 M8 -35 35 0.050 50 -50 0.095 20 25 41 26 8.7 --25 150 44 52 38 10.2 64 0.230



Copper earth plate and grid

U188



Application

This copper earth electrode is used for the power networks earth system. When a deep installation is not possible, it gives an important contact area with the soil to discharge fault currents. The reference Standard is EN 50 164-2.

| Code | Designation | Length (mm) | Width (mm) | Thickness (mm) | Weight (kg) | Sales unit |
|------|-------------------------------|----------------|---------------|-------------------|----------------|---------------|
| J184 | COPPER EARTH PLATE 500x500x2 | 500 | 500 | 2 | 4.5 | 1 |
| J185 | COPPER EARTH PLATE 500x500x3 | 500 | 500 | 3 | 6.8 | 1 |
| J186 | COPPER EARTH PLATE 500x1000x2 | 500 | 1000 | 2 | 9.0 | 1 |
| 1187 | COPPER EARTH PLATE 500x1000x3 | 500 | 1000 | 3 | 13.6 | 1 |
| J188 | COPPER EARTH GRID 1000x1000x2 | 1000 | 1000 | 2 | 3.0 | 1 |
| 1189 | COPPER EARTH GRID 2000x1000x2 | 2000 | 1000 | 2 | 4.0 | 1 |
| J190 | COPPER EARTH GRID 3000x1000x2 | 3000 | 1000 | 2 | 5.0 | 1 |
| | | | | | | |

Clamp

Description

- Earth plates are delivered with a "U" bolt connection clamp enabling to perform the connection with the conductor.
- Earth grids can receive a "U" bolt connection clamp to perform the connection with the copper conductor.
- The earth grid connection can also be performed thanks to twin-saddle installed on the grid lateral tape.

If you need more informations, please contact us.





Earth resistance measure -**Earth tester**



Description

- This earth tester is installed in a anti-shock briefcase including three green, yellow and red cords respectively of 5m, 10m and 15m length.
- Cords are provided with a clamp to be placed on rod enabling the measure.
- The tester supply is possible thanks to batteries.
- The recommended surrounding temperature for use is between 0 and 40°C.
- The device is adapted to "2 rods" and "3 rods" measure methods. These methods require the use of backup rods. It is necessary to enable the current circulation between rods in order to perform an earth resistance measure thanks to the earth tester.
- The device keeps in memory the last measure.

The earth tester meets the criteria of IEC 348 and IEC 1010 standards.

| Code | Designation | Measure range (Ω) | Measure current | Dimensions (mm) | Weight (kg) | Sales unit |
|------|--------------|----------------------|----------------------|--------------------|----------------|---------------|
| F439 | EARTH TESTER | 0 to 2k | Constant 2mA @ 820Hz | 205x90x55 | 0.550 | 1 |

Installation

Measure with the 3 rods method.



Application

This earth tester is used as part of the earth system installation. It enables to perform the earth resistance measurements to control the system effectiveness.



Earth connector

"C" shape connector and jumper clamp





These connectors are designed to connect two conductors. The mechanical and electrical connection is ensured thanks to crimping (U009) or thanks to a mechanical tightening wich can be remove (U020).

| Code | Designation | Main conductor (mm²) | Tap conductor (mm²) | Weight (kg) | Sales unit |
|---------------------|------------------------------------|-------------------------|------------------------|----------------|---------------|
| "C" SHAPE CONNECTOR | | | | | |
| U001 | C CONNECTOR 4-4 | 2.5-4 | 2.5-4 | 0.010 | 10 |
| U002 | C CONNECTOR 10-6 | 6-10 | 2.5-6 | 0.010 | 10 |
| U003 | C CONNECTOR 25-6 | 10-25 | 4-6 | 0.012 | 10 |
| U004 | C CONNECTOR 25-10 | 16-25 | 4-10 | 0.012 | 10 |
| U005 | C CONNECTOR 25-25 | 16-25 | 16-25 | 0.017 | 10 |
| U006 | C CONNECTOR 35-25 | 35 | 4-25 | 0.017 | 10 |
| U007 | C CONNECTOR 35-35 | 35 | 16-35 | 0.034 | 10 |
| U008 | C CONNECTOR 70-35 | 50-70 | 4-35 | 0.034 | 10 |
| U009 | C CONNECTOR 70-70 | 50-70 | 35-70 | 0.034 | 10 |
| U010 | C CONNECTOR 95-35 | 70-95 | 16-35 | 0.072 | 10 |
| U011 | C CONNECTOR 95-70 | 70-95 | 35-70 | 0.072 | 10 |
| U012 | C CONNECTOR 95-95 | 95 | 95 | 0.131 | 10 |
| U013 | C CONNECTOR 120-120 | 120 | 25-120 | 0.109 | 10 |
| U014 | C CONNECTOR 185-95 | 150-185 | 50-95 | 0.109 | 10 |
| U015 | C CONNECTOR 150-150 | 150 | 70-150 | 0.109 | 10 |
| U016 | C CONNECTOR 185-185 | 120-185 | 95-185 | 0.131 | 10 |
| JUMP | ER CLAMP | | | | |
| U020 | JUMPER CLAMP 6-16mm ² | 6-16 | 6-16 | 0.028 | 100 |
| U021 | JUMPER CLAMP 16-50mm ² | 16-50 | 16-50 | 0.061 | 100 |
| U022 | JUMPER CLAMP 50-70mm ² | 50-70 | 50-70 | 0.112 | 10 |
| U023 | JUMPER CLAMP 70-95mm ² | 70-95 | 70-95 | 0.263 | 10 |
| U024 | JUMPER CLAMP 95-150mm ² | 95-150 | 95-150 | 0.443 | 10 |

Copper connector



Application

This copper connector is designed to fix up an installation in case the conductor has been severed. The stainless steel fastening allows the product to be buried. The connector L260 is equipped with a shear head.

| Code | Designation | Main conductor (mm²) | Tap conductor (mm²) | Weight (kg) | Sales unit |
|------|------------------------------|-------------------------|------------------------|----------------|---------------|
| L260 | CONNECTOR Cu 10-70 (SF + SH) | 10-70 | 10-70 | 0.120 | 50 |
| L261 | CONNECTOR Cu 10-70 (SF) | 10-70 | 10-70 | 0.110 | 50 |

Earth system disconnection kit



| Code | Designation | Conductor section min (mm²) | Conductor section max (mm²) | Weight (kg) | Sales unit |
|------|--------------------------------------|--------------------------------|-----------------------------|----------------|---------------|
| U030 | TUBULAR LUG 25-29 | 25 | 29 | 0.020 | 50 |
| U031 | EARTH SYSTEM DISCONNECTION KIT 25-29 | 25 | 29 | 0.060 | 20 |

Ground cutting blade



| Code | Designation | Conductor section min (mm²) | Conductor section max (mm²) | Weight (kg) | Sales unit |
|------|--------------------------------|--------------------------------|--------------------------------|----------------|---------------|
| U034 | "T" SHAPE GROUND CUTTING BLADE | 10 | 35 | 0.180 | 10 |
| U035 | HIGH GROUND CUTTING BLADE | 16 | 35 | 0.3300 | 3 |
| U036 | LOW GROUND CUTTING BLADE | 16 | 35 | 0.160 | 3 |

Round terminal lug

Code

U018



U019 STRAIGHT CABLE AND ROUND TERMINAL LUGS 25-120

Non-contractual photos and drawings. MICHAUD Export reserves the right to modify characteristics without any prior notice. 19.10 20

Application



This stainless steel kit comprises two tubular lugs (**U030**) as well as a nut and a bolt. It is designed to disconnect the earth system in order to perform earth resistance measurements.

Application

This cutting blade is designed to open the earth system during earth resistance measurements. It is rather used inside for a residential installation.

<u>U036</u>

Application

This copper round terminal lug is used to connected bare copper conductors to copper terminals.

| ble compatibility (mm²) | Drill hole compatibility (mm) | Weight (kg) | Sales unit |
|----------------------------|----------------------------------|----------------|---------------|
| 10 to 70 | 13 | 0.180 | 10 |
| 25 to 120 | 13 | 0.330 | 3 |



Low Voltage Energy

Earth connectors

Surge protection device connector



Application

The surge protection device connector (SPD IPC) is designed to protect low voltage overhead lines and electric equipment against over-voltages. It enables the current from the lightning to be led to the ground.

The surge protection device connector includes the following elements:

- An insulation piercing connector,
- A terminal outlet inserted in the end cap of the connector.
- A surge protection device (metal oxide overmoulded with silicone) screwed into the terminal outlet.
- An earth system tail welded to the surge protection device.
- The surge protection device reacts:
- After a certain number of overvoltages, when the current passing through the surge protection device increases by more than 1mA,
- In the case of atmospheric discharge (lightning strike), the current exceeding 65mA.

After the surge protection device has performed, the earth system tail physically separates from the connector. The surge protection device then should be replaced with an available spare part (comprising the surge protection device and the earth system tail).

Description

- The connector is used outside only.
- The maximum use altitude is 2000m.
- The connector can be used at a temperature going from -40°C to +70°C.
- The use frequency is 48-62Hz.
- The connector, the terminal outlet, the surge protection device and the tail are made of UV and flame resistant materials.
- The connector is equipped with a 0.5m long, 6mm² insulated black multi-stranded tail.
- The connector protection degree is IP67.
- The connector has a response time <25ns.

The surge protection devise is Class II as defined in the IEC 61643-1 standard.



Installation

- The location of the surge protection device connection is decided according to the technical specifications and guidelines of the electrical regulatory authorities. These connectors must be installed on all overhead service and network line conductors, the phase(s) and neutral being linked by earth system tails.
- 500 metres.
- Check that the terminal outlet is inserted into the connector fully and correctly.
- Do not use it to re-tighten.
- earth system tail is automatically disconnected from the base of the silicone cylinder. A new surge protection device, available as a spare part, must replace the old one. To do this, unscrew the old part of the silicone surge protection device from the terminal end and screw in a spare surge protection device, join all of the earth system tails together and link them to the earth.

Characteristics:

| Code | Designation | I _{max} Maximal discharge current (kA) | U _c Continuous operating voltage V(AC) | I _n Nominal discharge current (kA) | U _p Protection level at In |
|------|---------------------------------|---|---|---|--|
| K241 | SPD IPC 15kA/275VAC 0.5m | 40 | 275 | 15 | < 1.86 |
| K243 | SPD SPARE PART 15kA/275VAC 0.5m | 40 | 275 | 15 | < 1.86 |
| K242 | SPD IPC 15kA/440VAC 0.5m | 40 | 440 | 15 | < 2.24 |
| K244 | SPD SPARE PART 15kA/440VAC 0.5m | 40 | 440 | 15 | < 2.24 |

| Code | Designation | Main line insulated Al-Cu (mm²) | Weight (kg) | Sales unit |
|------|---------------------------------|---------------------------------------|----------------|---------------|
| K241 | SPD IPC 15KA/275VAC 0.5m | 16-95 | 0.300 | 30 |
| K243 | SPD SPARE PART 15KA/275VAC 0.5m | | 0.170 | 30 |
| K242 | SPD IPC 15KA/440VAC 0.5m | 16-95 | 0.300 | 30 |
| K244 | SPD SPARE PART 15KA/440VAC 0.5m | | 0.170 | 30 |

Upon request, the earth system tails can be delivered in different colours and lengths, and can be assembled with a terminal lug at their end. Please contact us.



- To protect long sections of overhead lines, it is recommended to use at least one surge protection device connector every

- Position the connector on the conductor so that the surge protection device and its tail are directed towards the ground. - Tighten the shear head until it breaks using a 13mm spanner. The 17mm head is only provided for an eventual dismantling.

- When the surge protection device connector has been used, protecting the power line against high voltages, the



Low Voltage Energy

Earth connectors

Insulation piercing connector for measure and short-circuiting



Application

This I.P.C. (Insulation Piercing Connector) is designed for short-circuiting or earthing the low voltage A.B.C. (Aerial Bundled Conductors). It is also used for taking voltage measures.

It comprises the connector and the socket.

Description

- Connection is established through the insulation piercing technology.
- Dielectric strength in water is greater that 6kV.
- Tightening screw is the only accessible metal part and is potential free.
- Tightening efficiency is ensured by shear head screw.
- The end socket is protected by an integral cap preventing the water penetration and corrosion.

This connector meets the criteria of the NF C 33-020 and EN 50-483 standards.



| Code | Designation | Capacities Main insulated Al-Cu (mm [®]) | Weight (kg) | Sales unit |
|------------|--------------------------|--|----------------|---------------|
| VISSERIE A | CIER ZINGUÉ (VZ) | | | |
| K362 | CONNECTOR CMCC/CT 25 ZF | 16-25 | 0.230 | 10 |
| K363 | CONNECTOR CMCC/CT 70 ZF | 16-70 | 0.230 | 10 |
| K361 | CONNECTOR CMCC/CT 95 ZF | 16-95 | 0.230 | 10 |
| K364 | CONNECTOR CMCC/CT 150 ZF | 16-150 | 0.230 | 10 |

The connector K362 is adapted from a connector K322 (CBS/CT 25), the connector K363 from a connector K323 (CBS/CT 70) and the connector K364 from a connector K324 (CBS/CT 150) It comprises the connector and the socket.

Option:

The short-circuiting and earth system socket (PMCC) can be sold separately. This tap socket can be used with the entire range of the 6kV CBS/CT and RDP/CN connectors of MICHAUD brand.

| Code | Designation | Weight (kg) | Sales unit |
|------|---|----------------|---------------|
| K368 | SHORT-CIRCUITING AND EARTH SYSTEM SOCKET (PMCC) | 0.100 | 25 |

Variant:

The earthing bracket allows a twist and a parallel groove jaw to be connected via a connector. It is compatible with an insulation-piercing connector on one side and a bare connector on the other.

| Code | Designation | Diameter (mm) | Weight (kg) | Sales unit |
|------|------------------|------------------|----------------|---------------|
| U248 | EARTHING BRACKET | 9.65 | 0.100 | 25 |
| | | · · · · · · | | |









Low Voltage Energy Earth conductors

Earth system and short-circuiting device

Earth system equipment

Short-circuiting device



This device is designed for shortcircuiting and earthing the low voltage A.B.C. (Aerial Bundled Conductors). It is connected to a connector for measures and short-circuiting (type CMCC).

Description

- This device comprises 6 or 7 insulated sockets closing with a bayonet system on the CMCC connector tap socket. Connection between the sockets is established with a 25mm² flexible copper conductor for the K008, K009 references
- and 16mm² for the K016 references.
- The electrical characteristics are:
- Short-circuiting capacity: 4 000A during 1 second.
- Permanent current capacity: 200A.
- The device is packed in a carrying case.

| Code | Designation | Weight (kg) | Sales unit | | | | |
|------------------------------|---|----------------|---------------|--|--|--|--|
| 16 mm ² EQUIPMENT | | | | | | | |
| K016-5 | SHORT-CIRCUITING EQUIPMENT 5 SOCKETS – 16 mm ² | * | 1 | | | | |
| K016-6 | SHORT-CIRCUITING EQUIPMENT 6 SOCKETS – 16 mm ² | * | 1 | | | | |
| K016-7 | SHORT-CIRCUITING EQUIPMENT 7 SOCKETS – 16 mm ² | * | 1 | | | | |
| 25 mm² E | QUIPMENT | | | | | | |
| K008 | SHORT-CIRCUITING EQUIPMENT 6 SOCKETS | 2,490 | 1 | | | | |
| K009 | SHORT-CIRCUITING EQUIPMENT 7 SOCKETS | 3,000 | 1 | | | | |

Nota: the K009 (7 sockets) is used for street light.





Description

- This equipment comprises the following elements:
- Earth clamp,
- 10m long 25mm² copper insulated flexible conductor,
- · Insulated socket closing with a bayonet system on CMCC connector tap socket
- The flexible copper conductor is available in lenght 10m for the section of 16mm² (K006-16_10) or 25mm² (K006) and 15m for the section of 16mm² (K006-16_15)
- The electrical characteristics are:
- Short-circuiting capacity : 4 000A during 1 second.
- Permanent current capacity: 200A.
- The equipment is packed in a carrying case.

| Code | Designation | Weight (kg) | Sales unit | | | | | |
|------------------------------|---|----------------|---------------|--|--|--|--|--|
| 16 mm ² EQUIPMENT | | | | | | | | |
| K006-16_10 | EARTHING EQUIPMENT 16mm ² - 10 m | - | 1 | | | | | |
| K006-16_15 | EARTHING EQUIPMENT 16mm ² - 15 m | - | 1 | | | | | |
| 25 mm ² EQUIPMENT | | | | | | | | |
| K006 | EARTHING EQUIPMENT 25mm ² - 10 m | 4.000 | 1 | | | | | |

Nota: the earth clamp has to be fixed on a rod. Contact us.



Application

This equipment is used for earth system a low voltage A.B.C. (Aerial Bundled Conductor). It is connected on shortcircuiting device linked to CMCC connectors (for measures and shortcircuiting).



K006



Switch earth system and short-circuiting device for Gang FSD



Application

This device is designed for shortcircuiting and earthing the low voltage A.B.C. (Aerial Bundled Conductor). It is connected to the MICHAUD 3-poles type pole-mounted Gang Fuse Switch Disconnector (Gang FSD).

Installation

Fuse switch disconnector earthing



Replacement of the copper cable

The copper cable with transparent insulation and earth system clamp can be damaged during careless handling. Therefore, it should be replaced to ensure correct use of the device in complete safety. For this, dismount the existing cable and replace it with a new MICHAUD model by screwing the terminal lug on the metal bar of the device.

| Code | Designation | Weight (kg) | Sales unit |
|------|---|----------------|---------------|
| K010 | GANG FSD EARTH SYSTEM DEVICE 3 POLES | 2.500 | 1 |
| K012 | GANG FSD EARTH SYSTEM DEVICE COPPER CABLE (2.5m / 35mm ²) | 1.400 | 1 |



Description

- The short-circuiting of the Gang Fuse Switch Disconnector poles is carried out using a tinned metal comb bar. This bar can be seen from the bottom of the pole which constitutes a visual indicator of the short-circuiting of the poles.
- A safety hook made of synthetic material ensures correct closing of the bar holder on the body of the Gang fuse switch disconnector. The load related to the weight of the copper cable is offset towards the bar rotational axis via the presence of a metal bar. This assembly prevents the device from being opened when the operator pulls on the cable.
- A 2.5m long 35mm² copper cable with transparent insulation is fixed to the metal bar using a terminal lug. The other end of the cable is linked to the earth system clamp.
- The short-circuiting capacity is 9kA maximum over 500V.
- The device is delivered in a case ensuring safe transport and storage.

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Low Voltage Energy

Earth conductors





Application

This cable is designed for the earth systems. It is resistant to a temperature range of -15°C / +70°C and its flame behaviour meets the criteria of IEC 60332-1.

Description

- Nominal voltage: 600/1000V
- Short-circuit temperature: +250°C
- Annealed Copper Cable



- From 10mm² up to 25mm² (3x external Ø)
- From 29mm² up to 300mm² (6x external Ø)
- This cable meets the criteria of the EN 60228 standard.

| Code | Designation | Section (mm²) | Number of strands | Strand diameter (mm) | External Ø (mm) | Weight (kg/km) | Sales unit |
|------|--|------------------|-------------------|-------------------------|--------------------|-------------------|---------------|
| U050 | BARE COPPER CABLE 10mm ² - 500m drum | 10 | 7 | 1.31 | 4 | 85 | 1 |
| U051 | BARE COPPER CABLE 16mm ² - 500m drum | 16 | 7 | 1.67 | 5.1 | 138 | 1 |
| U052 | BARE COPPER CABLE 25mm ² - 500m drum | 25 | 7 | 2.09 | 6.3 | 216 | 1 |
| U053 | BARE COPPER CABLE 29mm ² - 500m drum | 29 | 19 | 1.40 | 7 | 250 | 1 |
| U054 | BARE COPPER CABLE 35mm ² - 500m drum | 35 | 7 | 2.48 | 7.5 | 304 | 1 |
| U055 | BARE COPPER CABLE 50mm ² - 500m drum | 50 | 19 | 1.76 | 8.2 | 415 | 1 |
| U056 | BARE COPPER CABLE 70mm ² - 500m drum | 70 | 19 | 2.13 | 9.8 | 608 | 1 |
| U057 | BARE COPPER CABLE 95mm ² - 500m drum | 95 | 19 | 2.48 | 11.4 | 825 | 1 |
| U058 | BARE COPPER CABLE 120mm ² - 500m drum | 120 | 37 | 2.01 | 12.8 | 1055 | 1 |
| U059 | BARE COPPER CABLE 150mm ² - 500m drum | 150 | 37 | 2.21 | 14.4 | 1275 | 1 |
| U060 | BARE COPPER CABLE 185mm ² - 500m drum | 185 | 37 | 2.48 | 16.2 | 1606 | 1 |
| U061 | BARE COPPER CABLE 240mm ² - 500m drum | 240 | 37 | 2.84 | 18.8 | 2106 | 1 |
| U062 | BARE COPPER CABLE 300mm ² - 500m drum | 300 | 61 | 2.48 | 21 | 2661 | 1 |

Insulated copper

Description

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- Nominal voltage: 450/750V
- Test voltage: 2500V

- Short circuit temperature: +150°C
- Minimum bending radius: 5x external Ø
- This copper cable is covered by a PVC insulation.
- This cable meets the criteria of the EN 50525-2-31 standard.

U069

| Code | Designation | Section (mm²) (Nb strands x strand Ø) | Insulation thickness (mm) | Conductor resistance at 20°C | External Ø (mm) | Weight (kg/km) | Sales unit |
|------|---|---|---------------------------------|------------------------------------|-----------------------|-------------------|---------------|
| U063 | INSULATED COPPER CABLE 6mm ² - 500m drum | 6 (30x0.5) | 1 | 3.30 | 5.3 | 63 | 1 |
| U064 | INSULATED COPPER CABLE 10mm ² - 500m drum | 10 (7x1.34) | 1 | 1.83 | 6,1 | 103 | 1 |
| U065 | INSULATED COPPER CABLE 16mm ² - 500m drum | 16 (7x1.67) | 1 | 1.15 | 7.01 | 164 | 1 |
| U066 | INSULATED COPPER CABLE 25mm ² - 500m drum | 25 (7x2.09) | 1.20 | 0.727 | 8.67 | 257 | 1 |
| U068 | INSULATED COPPER CABLE 35mm ² - 500m drum | 35 (7x2.46) | 1.20 | 0.524 | 9.78 | 347 | 1 |
| U069 | INSULATED COPPER CABLE 50mm ² - 500m drum | 50 (19x1.80) | 1.40 | 0.387 | 11.8 | 479 | 1 |
| U070 | INSULATED COPPER CABLE 70mm ² - 500m drum | 70 (19x2.12) | 1.40 | 0.268 | 13.4 | 669 | 1 |
| U071 | INSULATED COPPER CABLE 95mm ² - 500m drum | 95 (19x2.49) | 1.60 | 0.193 | 15.65 | 920 | 1 |
| U072 | INSULATED COPPER CABLE 120mm ² - 500m drum | 120 (37x2.00) | 1.60 | 0.153 | 17.2 | 1130 | 1 |
| U073 | INSULATED COPPER CABLE 150mm ² - 500m drum | 150 (37x2.21) | 1.80 | 0.124 | 19.07 | 1395 | 1 |
| U074 | INSULATED COPPER CABLE 185mm ² - 500m drum | 185 (37x2.46) | 2.00 | 0.0991 | 21.22 | 1712 | 1 |
| U075 | INSULATED COPPER CABLE 240mm ² - 500m drum | 240 (37x2.82) | 2.20 | 0.0754 | 24.14 | 2260 | 1 |
| U076 | INSULATED COPPER CABLE 300mm ² - 500m drum | 300 (37x3.20) | 2.40 | 0.0601 | 27.2 | 2872 | 1 |

Non-contractual photos and drawings. MICHAUD Export reserves the right to modify characteristics without any prior notice. 19.10

Tape

Copper



The copper gives an important electrical conductivity.

| Code | Designation | Section (mm²) | Width (mm) | Thickness (mm) | | |
|--|-------------------------|------------------|---------------|-------------------|--|--|
| U077 | COPPER TAPE 20x3 L=100m | 60 | 20 | 3 | | |
| U078 | COPPER TAPE 25x3 * | 75 | 25 | 3 | | |
| *Tape delivered in roll or drum. Consult us. | | | | | | |

Copper bonded steel

The copper bonded steel offers a good economical alternative to copper.

| Code | Designation | Section (mm²) | Width (mm) | Thickness (mm) | Length (m) |
|------|-------------------------------------|------------------|---------------|-------------------|---------------|
| U080 | COPPER BONDED STEEL TAPE 20x3 L=60m | 60 | 20 | 3 | 60 |
| U081 | COPPER BONDED STEEL TAPE 25x3 L=40m | 75 | 25 | 3 | 40 |
| U082 | COPPER BONDED STEEL TAPE 25x4 L=30m | 100 | 25 | 4 | 30 |
| U083 | COPPER BONDED STEEL TAPE 30x3 L=40m | 90 | 30 | 3 | 40 |
| U084 | COPPER BONDED STEEL TAPE 30x4 L=30m | 120 | 30 | 4 | 30 |
| U085 | COPPER BONDED STEEL TAPE 40x4 L=20m | 160 | 40 | 4 | 20 |

Tinned copper bonded steel

The tinned coating protects from theft thanks to the non visible copper coating.

| Code | Designation | Section (mm²) | Width (mm) | Thickness (mm) | Length (m) |
|------|--|------------------|---------------|-------------------|---------------|
| U086 | TINNED COPPER BONDED STEEL TAPE 20x3 L=60m | 60 | 20 | 3 | 60 |
| U087 | TINNED COPPER BONDED STEEL TAPE 25x3 L=40m | 75 | 25 | 3 | 40 |
| U088 | TINNED COPPER BONDED STEEL TAPE 25x4 L=30m | 100 | 25 | 4 | 30 |
| U089 | TINNED COPPER BONDED STEEL TAPE 30x3 L=40m | 90 | 30 | 3 | 40 |
| U090 | TINNED COPPER BONDED STEEL TAPE 30x4 L=30m | 120 | 30 | 4 | 30 |
| U091 | TINNED COPPER BONDED STEEL TAPE 40x4 L=30m | 160 | 40 | 4 | 30 |

Galvanized steel

Galvanized steel is an economical solution to coppered tinned steel and protect from the theft too. It has a good conductivity.

| Code | Designation | Section (mm²) | Width (mm) | Thickness (mm) | Length (m) |
|--------|----------------------------------|------------------|---------------|-------------------|---------------|
| U100-4 | GALVANIZED STEEL TAPE 30×4 L=50m | 120 | 30 | 4 | 50 |
| U101-4 | GALVANIZED STEEL TAPE 40×4 L=38m | 160 | 40 | 4 | 38 |

Stainless steel cruciform clamp



| Code | Designation | Nominal rod diameter (mm) | Tape length (mm) | Cable section (mm²) | Screw | Weight (kg) | Sales unit |
|------|--|---------------------------------|------------------------|---------------------------|-------|----------------|---------------|
| U092 | STAINLESS STEEL CRUCIFORM CLAMP ROD DIAM 12.7 AND 14 | 14-16 | ≤ 40 | 28-78 | M10 | 0.315 | 2 |
| U093 | STAINLESS STEEL CRUCIFORM CLAMP ROD DIAM 17.2 | 19 | ≤ 40 | 28-78 | M10 | 0.400 | 2 |
| U093 | STAINLESS STEEL CRUCIFORM CLAMP ROD DIAM 17.2 | 19 | ≤ 40 | 28-78 | M10 | 0.400 | 2 |



Application

This tape is designed to conduct the electricty into the earth system and to guarantee the default current runoff.

Application

This cruciform clamp is designed to perform a connection between the earth rod and the conductor or between two conductors.

MICHAUD

Low Voltage Energy

Earth conductors

Aluminium earth cable and accessory





| Code | Designation | Sales unit |
|------|--|---------------|
| N106 | GROUND CUTTING BLADE ALUMINIUM WITH BOX | 1 |
| N107 | GROUND CUTTING BLADE BARE AL | 1 |
| Q979 | EARTH DISTRIBUTOR AL 6 TAPS | 1 |
| Q984 | ALUMINIUM EARTH CABLE 25 ² 100M | 1 |
| Q985 | ALUMINIUM EARTH CABLE 35 ² 100M | 1 |
| Q986 | ALUMINIUM EARTH CABLE 50 ² 50M | 1 |
| P340 | AL/CU EARTH ADAPTOR 35-25 | 10 |

Variants: Stripping technology

These products using the stripping technology require a brushing with neutral grease during installation.

| Code | Designation | Sales unit |
|-------|-----------------------------------|---------------|
| ED001 | EARTH DISTRIBUTOR STRIP AL 5 TAPS | 1 |
| ED002 | EARTH DISTRIBUTOR STRIP AL 8 TAPS | 1 |
| ED003 | GROUND CUTTING BLADE AL STRIP | 1 |

| Acces | sories | |
|-------|--------|--|
| | | |
| Code | | |

| Accessories | | | | |
|--|------------------------------|---------------|--|--|
| Code | Designation | Sales unit | | |
| BOX FOR CUTTING BLADE ALONE The box can be sold alone to receive for example a ground cutting blade for copper, Ref U036 | | | | |
| N108 | BOX FOR GROUND CUTTING BLADE | 1 | | |
| LABELS AL CABLE These labels enable to identify aluminium cable | | | | |
| N109 | BOX OF 25 LABELS AL CABLE | 1 | | |





MICHAUD

These products must be implemented and used in compliance with the applicable regulations with a skilled, qualified professional undertaking to do so following the generally accepted rules of the trade.

For live-line implementation or handling, the electrician must comply with the requirements for live-line work conditions and must be equipped with the necessary personal protection equipment. The implementation temperature limits are: -10°C to +40°C.

Live-line work is carried out under the responsibility of the ordering customer in compliance with the applicable rules.

Before powering up the equipment, all the required verifications must be carried out.



The installation instructions must be read carefully before using the product.

The product must be used and implemented in compliance with these recommendations for use and installation instructions. It must be used for the applications for which it was defined by the operator/ manager of the network and on an electrical installation that is compliant and compatible with the product.

Never exceed the capacities indicated on the device and in the instructions sheet.

Unless explicitly indicated, products are designed for no-load connection.

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The product should be installed and used with suitable tools.

The screw heads should be tightened with the appropriate tool: Spanner for hexagonal cap screws, flat screwdriver for slotted screw heads of the right size, Phillips screwdriver for cruciform screw heads, HSHC screw head (awis) for hollow hexagonal screw heads, etc. The screw heads with no torque-limiting device must be tightened to the recommended torque and must not be tightened again.



Please group your waste together and follow the recycling and destruction instructions before leaving the worksite.

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