



Fraud preventing

Solutions to simplify and secure
electrical distribution

Catalogue
Energy controlling

MICHAUD



60 YEARS EXPERTISE

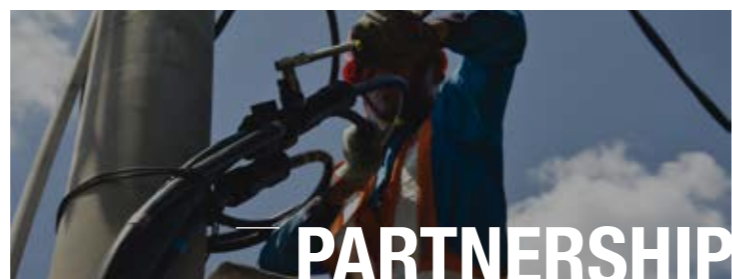
MICHAUD is a French industrial group specialised in energy distribution networks for more than 60 years.

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.

-  60 Million €
-  + 70 countries
-  70 protected innovations yearly
-  10 locations
-  + 250 employees
-  + 8 000 references
-  10 million € stock value
-  20 million products leaving factories yearly

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.



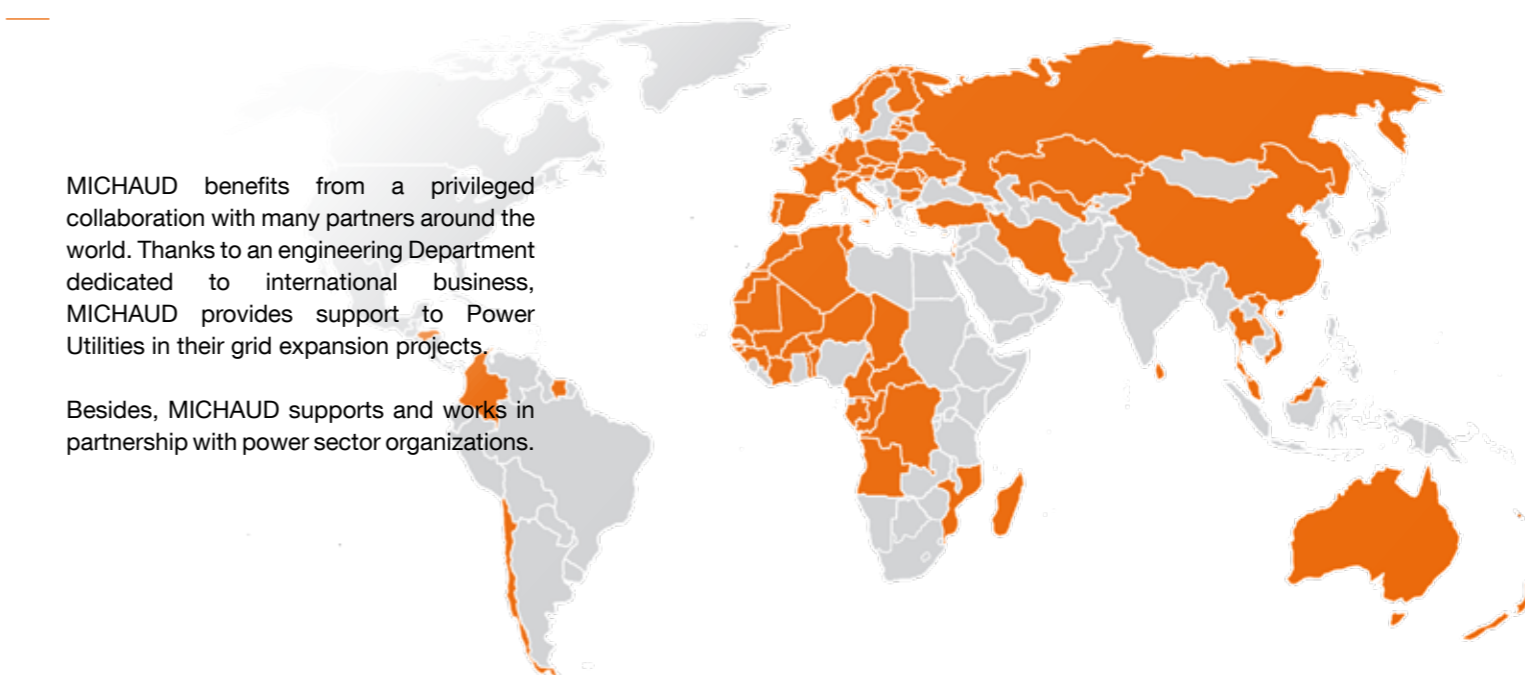
According to the international standards, Michaud Export designs and develops energy distribution solutions. The product range is focused on two fields of expertise:

- **Low Voltage Network:** to connect and protect the overhead and underground electrical lines ;
- **Energy Controlling:** to manage and offer easy access to electricity.



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

MICHAUD
HABITAT ET RÉSEAU ÉLECTRIQUE

MIPROTEC
PROTECTION ET INSTALLATION



QUALITY

With a growing consumption in electricity consumption in the coming years, the major challenge for utilities is **to be able to meet the increase of the demand** while maintaining an objective profitability. However, electrical networks suffer high losses, impacting the financial resources of companies.

To compensate this lack of bailout resources, public bailouts and price increases are sometimes applied. These very unpopular decisions tend to encourage the development of fraud and thus fuel the vicious circle of non-technical losses. **Securing facilities is a better strategy for achieving a positive financial impact.**

To create a control and cut-off spot outside the premise



To remove illegal connections on the lines

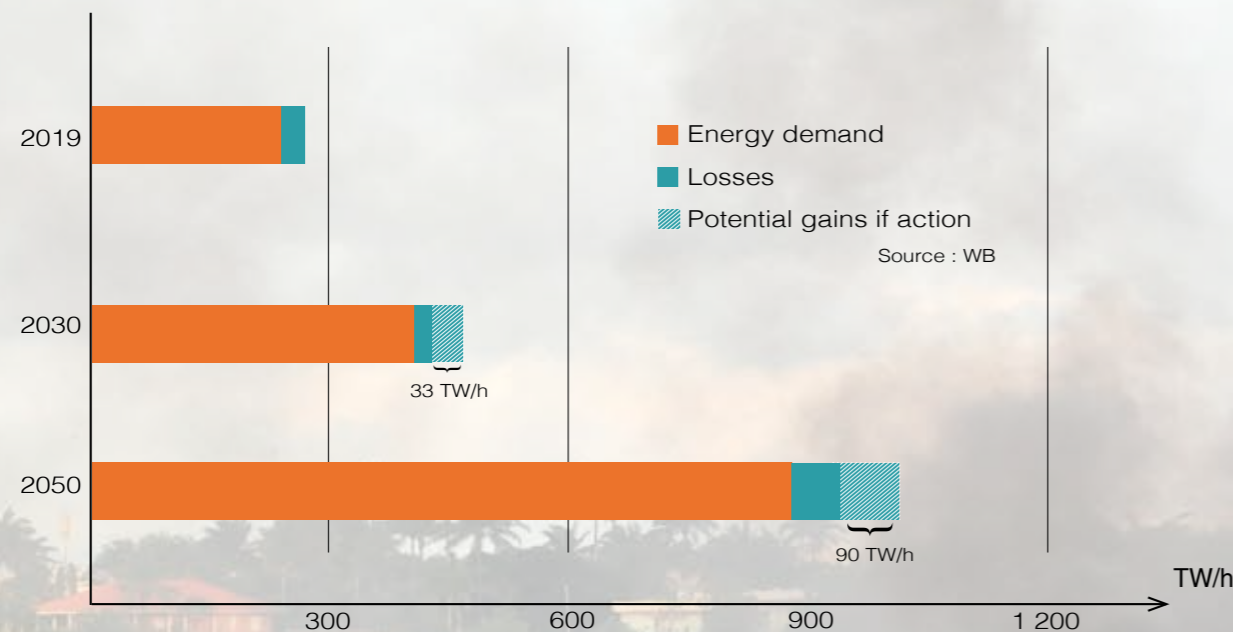


Use theft-proof products



Case of the Sub-Saharan Africa

Evolution of electricity production



On this graph enlightens that in 2018, about 260 TWh were generated by the various electricity companies in the region. Of this amount, more than 33 TWh were lost during the production, transmission and distribution of energy, or 12.7% of the loss. Following current trends, by 2050, no less than 160 TWh should be produced in pure financial loss. This is the equivalent of 23 nuclear reactors. By optimizing transmission and distribution networks, over a 30-year period, **the annual gains could be close to 90 TWh, or 13 nuclear reactors.**

Technical losses

Any electrical network is subjected to a normal operating loss rate, due to the transformer efficiency rate or line losses on the cable. If reducing these phenomenon is difficult, **work on the proper use** of the equipment can help eliminate malfunctions:

- Material not adapted to the expected use
- Aging and deficient material

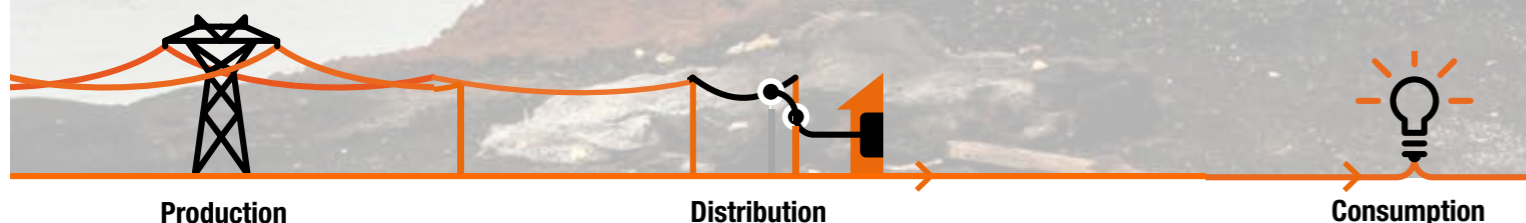
With better training of teams on the field, as well as a proper use of the product adapted to the environment, utilities could extend the service life of the facilities. **Improving the quality of the network** is the first step to realise savings.

Non-technical losses

The second cause very expensive for power companies, is the fraud on the electrical networks at the level of the connections. Through its experience and thanks to a close collaboration with the utilities, Michaud has identified **four sources to non-technical losses**:

- Subscriber's manipulation on the meter and circuit breaker
- Pricking out upstream from the meter
- Illegal connection
- Equipment theft

With equipment designed to reduce this phenomenon, savings can be made very quickly and allow companies to become profitable and thus enter **a virtuous circle of development.**



« It is 3 times less expensive to save 1 kWh of electricity by improving the electricity grid efficiency rather than to invest in new production means for the same 1 kWh. »



Zoom on pre-payment

Protecting the facilities against fraud becomes essential especially in a context where prepaid meters are more and more present. This efficient payment solution for the power company makes it difficult to manipulate the meter, and **tends to deport fraudulent operations on the service cable.** It is therefore necessary to support the expansion of pre-payment with equipment to prevent non-technical losses.

SOLUTIONS FOR NETWORK EXTENSION

Secure new connections

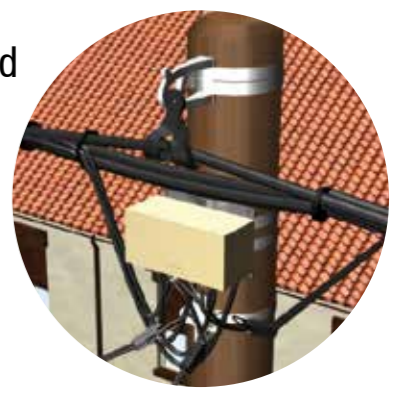
Issues ?

In the case of new electrification projects, electricity companies must be able to anticipate the installations security in order to prevent non-technical losses. By integrating the **fight against fraud** as soon as the specifications are defined, utilities opt for reliable solutions which are difficult to bypass and facilitate installation and maintenance.

Working in collaboration with African and Asian national power companies, Michaud has identified several key points to protect on new installations, from the network to the meter. The use of innovative technologies, to make connections, paired with automatic control systems ensure a **tamper-proof connection.**

Benefits ?

- + Meters shunt limited
- + Pirate connections restricted
- + Connectors theft for selling avoided
- + Fraudulent manipulations of the circuit breaker reduced



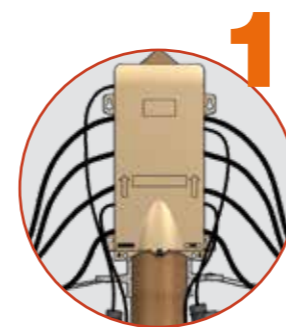
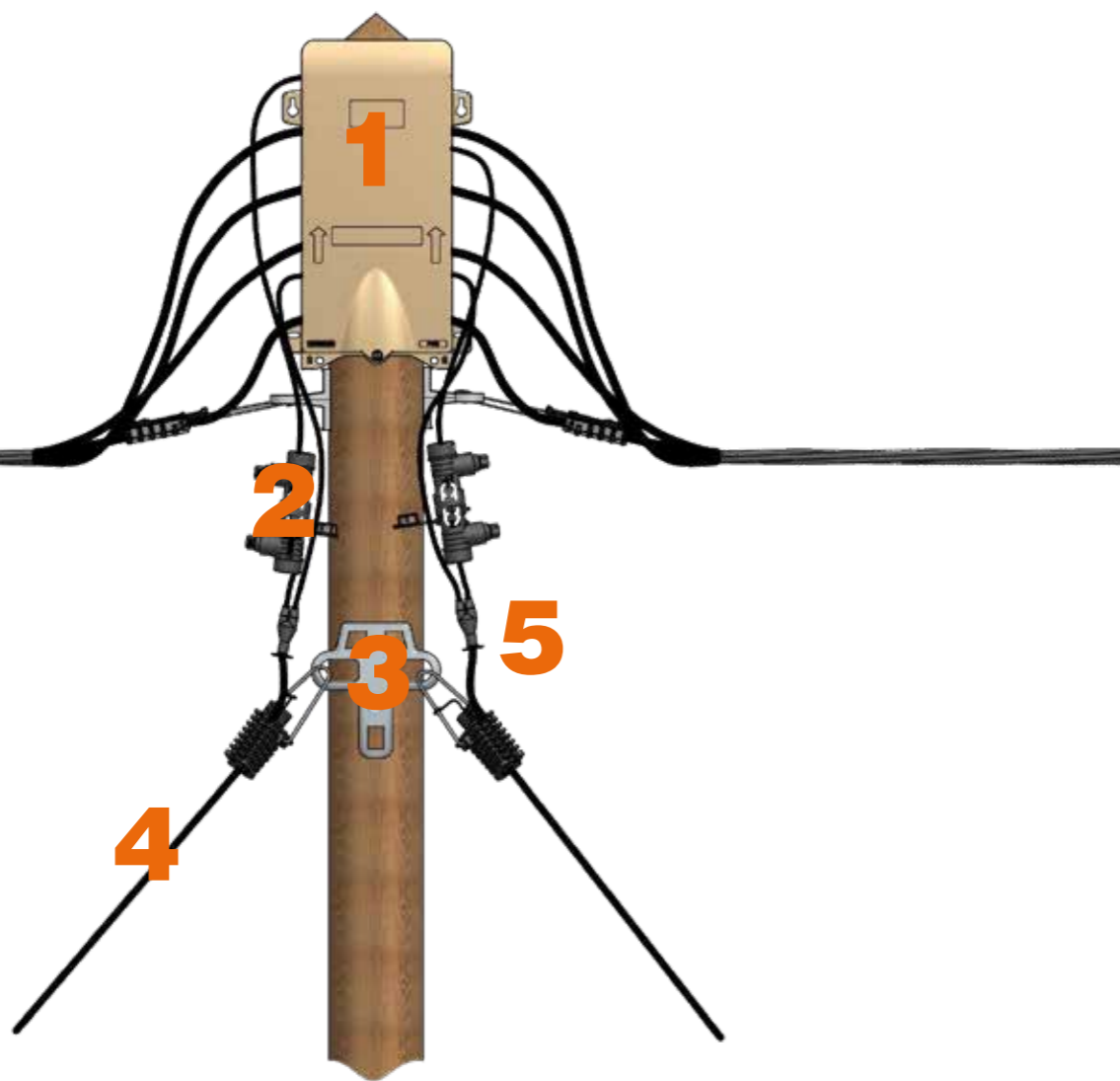
Solution for network extension

To **secure the network**, an **overhead service box** limits the use of connectors. Thus, the network is cleaner, more readable and frauds become easily detectable.

To **secure the connections**, the use of a **peripheral neutral cable** from the service connection box to the meter box, prevents illegal connections. In case of attempted fraud on this cable, a short circuit is created.

The fuse located in the **cutout sleeve** ensures the safety of the installation.

Located at the top of the pole, the cutout sleeve also creates a cutoff point. In needed, the customer can be disconnected from the network without modification of the connection and without tools.



1 Service distribution box 8 outlets

The box allows to create a false cut and to tap up to 8 connections.

- + Connections protected from weather
- + Suppression the connectors and therefore less stress on the conductors
- + Network readability

VOIR FICHE
FRAUD PREVENTING/ Extension/ Aerial connection box 8 outletsp20



2 Cutout sleeve + fuse cartridge

The cutout sleeve makes it possible to secure the connection by creating a break point at the top of the pole in case of a short circuit due to illegal tap connections.

- + Cut-off spot and protection at the top of the pole

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FRAUD PREVENTING/ Extension/ Accessories for fraud preventing aerial cablep18



3 6-points anchoring bracket

A 6-points bracket makes it possible to limit the fixing points on the pole.

- + Network readability
- + Mutualization of equipment

VOIR FICHE
FRAUD PREVENTING/ Extension/ Fulfilment kitp17

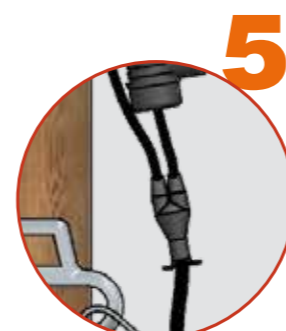


4 Peripheral neutral cable

Protects against illegal connections with an inaccessible phase, surrounded by a peripheral neutral.

- + Protection against illegal connections
- + Decrease of non-technical losses

VOIR FICHE
FRAUD PREVENTING / Extension/ Fraud preventing service cablep16



5 Fraud preventing cable fulfilment kit

Restores the neutral to make the connection to the network and to the meter.

- + Ensured watertightness

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FRAUD PREVENTING/ Extension/ Mechanical fixingp19

Fraud preventing service cable



Michaud Exclusivity
Eliminate fraudulent connections

Application

The concentric insulated service cable is used for the connection between the low-voltage network and the premise. It is designed to limit fraud and thus to reduce non-technical losses thanks to a peripheral-neutral cable. Any unauthorised connection to this cable will create a short-circuit and will automatically cut off electricity supply. It is stretched overhead to a maximum range of 40m.

Description

- The single phase or three phases cable comprises :
 - One or three phase conductor(s) insulated in the central part
 - 1 peripheral insulated neutral conductor.
- Service voltage rate: is 600V.
- The conductor's core is made of aluminium.
- The insulation is made of cross-linked polythene.

The cables meet the criteria of the **IEC 60502** and **NFC 33 209** standard.

	U301	U307	U302	U308
Phase conductors section (mm ²)	1 x 13	1 x 16	3 x 20	3 x 25
Cable diameter (mm)	11.1	11.6	24.5	24.2
Material of the phase insulation	XLPE	XLPE UV	XLPE	XLPE UV
Insulation phase thickness (mm)	≥0.8	1.2	≥0.8	1.2
Neutral conductor section (mm ²)	13	16	20	25
Material of neutral insulation	UV PE	XLPE UV	UV PE	XLPE UV
Insulation thickness of neutral (mm)	≥0.8	1.4	≥0.8	1.8
Operating voltage (V)	600	600 / 1000	600	600 / 1000
Maximum intensity (A)	45	60	60	90
Resistivity at 20°C (Ω/km) ≤2.5	0.045	1.91	0.045	1.2
Breaking strength (daN)	> 150	> 150	> 150	> 150

Code	Designation	Conditioning	Weight (kg)	Sales unit
U301	AERIAL SERVICE CONCENTRIC CABLE 13mm ² SINGLE PHASE	500m ring	80	1
U307	AERIAL SERVICE CONCENTRIC CABLE 16mm ² SINGLE PHASE	500m ring	100	1
U302	AERIAL SERVICE CONCENTRIC CABLE 20mm ² THREE PHASES	3000m ring	200	1
U308	AERIAL SERVICE CONCENTRIC CABLE 25mm ² THREE PHASES	750m ring	250	1

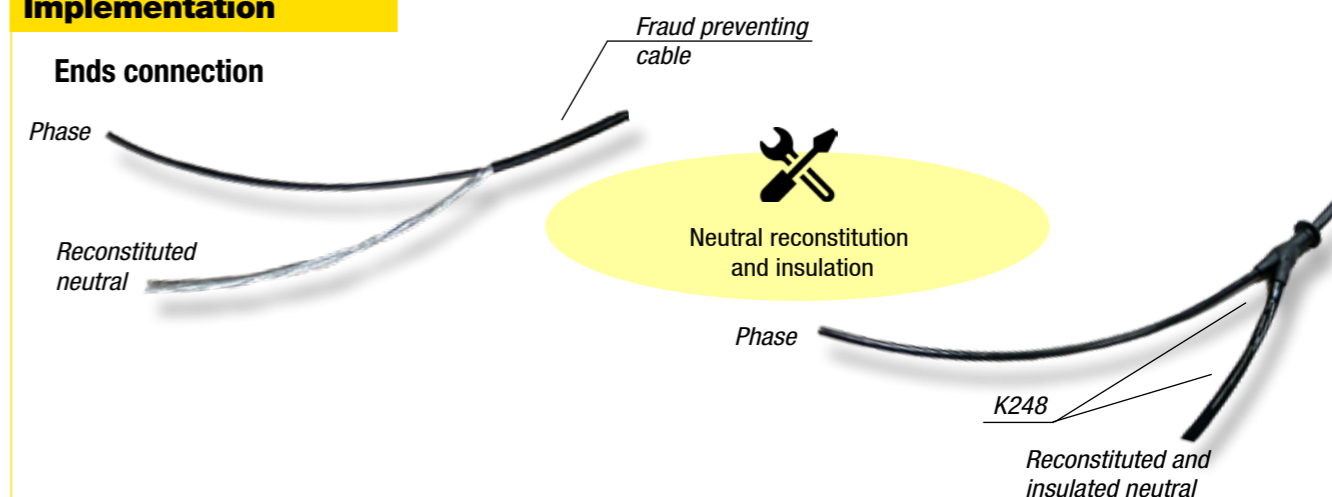
Fulfilment kit



Application

These fulfilment kits enable to ensure the insulation and the sealing of the anti-fraud conductor, mainly for the neutral by reconstituting its insulation for the connection (the sheath has a socket at its end).

Implementation



Code	Désignation	Match with	Weight (kg)	Sales unit
K248	FRAUD-PREVENTING CABLE FULFILMENT KIT	U301 and U307	0.040	1
K249	FRAUD-PREVENTING CABLE FULFILMENT KIT	U302 and U308	0.040	1

Tool for stripping



Application

This tool is used to strip the cable in order to reconstitute and isolate the neutral for connection.

Code	Designation	Sales unit
K311	CONCENTRIC STRIPPING PLIERS*	1

* The tool is available in several sizes to suit the cable section. Consult us.

Accessories for fraud preventing aerial cable

Cutout sleeve



Application

This cutout sleeve makes it possible to secure the connection of the phase conductor and to protect the installation against electrical faults that may occur during illegal connections on the concentric cable. This cutout sleeve can receive a 22x58 fuse up to 100A or a neutral tube.

Description

- The cutout sleeve is installed on the customer service conductor.
 - The sleeve uses insulation piercing technology.
 - The sleeve receives 6-35mm² Al/Cu insulated conductor on both sides.
 - At the opening of the sleeve, the elastic tightening of the cartridge ensures that this fuse remains on the customer side, out of potential.
 - The single tightening is ensured by two shear head screws sealable after breaking.
 - The sleeve has a very good resistance to climatic conditions (humidity, temperature...).
 - The cutout function is sealable.
- This sleeves meets the criteria of ErDF French **specification 69 40 070**.

Code	Designation	Weight (kg)	Sales unit
K221	CUTOUT SLEEVE 63A (22x58) PIERCING 6-35	0.235	70

SEE SHEET
ACCESS TO ENERGY/Protection/Fuses



Mechanical fixing



Application

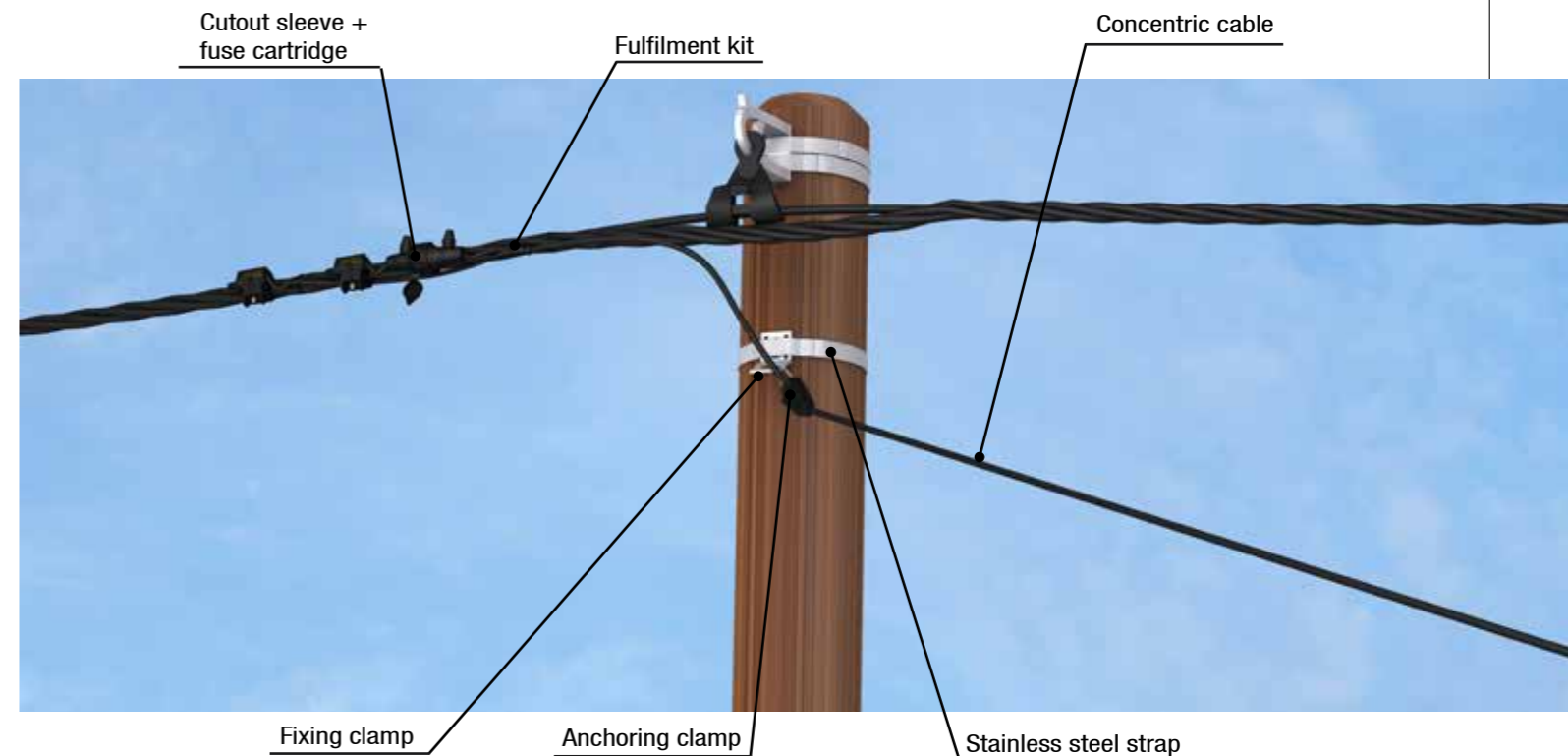
These accessories allow the concentric cable to be anchored both at the top of the pole and at the foot of the meter. The anchoring clamp U508 is made for single and three-phase cable whereas the anchoring clamp K310 is made only for single-phase cable.

Code	Designation	Weight (kg)	Sales unit
K310	ANCHORING CLAMP CONCENTRIC CABLE SINGLE PHASE	0.100	25
U508	ANCHORING CLAMP CONCENTRIC CABLE THREE PHASES	0.180	1
L304	FIXING CLAMP - PF25	0.010	100
F305	MULTIPLE ANCHORING BRACKET - CAM 25	0.220	100

Option :

Stainless steel strap is available for the mechanical fixing on a pole.

SEE SHEET
ACCESS TO ENERGY / Distribution / Tape



Service distribution box 8 outlets



P429



Application

The box 8 outlets is designed to establish the junction of 2 overhead networks and the tap contact of 8 single phase or 4 three phase connections maximum. The box can be installed on a facade or a pole. It can also be used at the end of the network.



Michaud Exclusivity

The benefits:

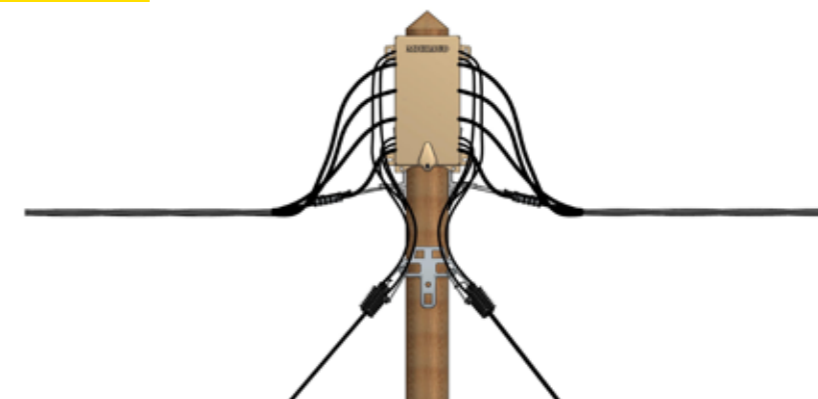
- + Perform single phase or three phases connections
- + Better spread charges on the network, thanks to the connections visibility
- + Reduce the number of connectors (safer network organisation, strengthened fraud-prevention)
- + Improve the network readability (removal of the "spider's web" effect)
- + Check the potential at the connection terminals (with a test probe)
- + Guarantee the network durability (better resistance to corrosion and humidity)
- + Make the operation easier (sliding cover with stop when used in open mode)
- + Guarantee a better fitters safety (electric shock risk limited)
- + Remove junctions between cables (making false regular cuts)

Description

- The 8 outlets box is equipped with 4 connection blocks. The network and connection terminals use insulation piercing technology.
- Each connection block is accessible at the touch of a voltage tester.
- The inlet and outlet of the conductors are realised by elastomer seals.
- The cover is closed by 1 captive stainless steel screw with spring to facilitate the release. An integrated device allows the sealing of all and possibly padlocked.
- The terminal separators in the box allow the connection of the conductors in any order.
- The degree of protection of the enclosure is IP33. The lid open, the degree of protection of the active parts is IP2X.
- The box can be delivered (optional) with a non-corrodible metal fixing plate. The rigidity of this plate allows laying on non-flat surfaces.
- The connection can be realised under voltage but without load.

This box meets the criteria of **HN 62-S-33** and **EN 50483-5** standards.

Installation



	INLET	OUTLET	
	Network	Network	Service
Capacities	16-95 mm ² Al	16-95 mm ² Al	6 Cu - 25 mm ² Al/Cu
Technology	Insulation piercing	Insulation piercing	Insulation piercing

Code	Designation	Weight (kg)	Sales unit
P429	SERVICE DISTRIBUTION BOX 8S + 1N OUTLETS	2.000	1

Variant

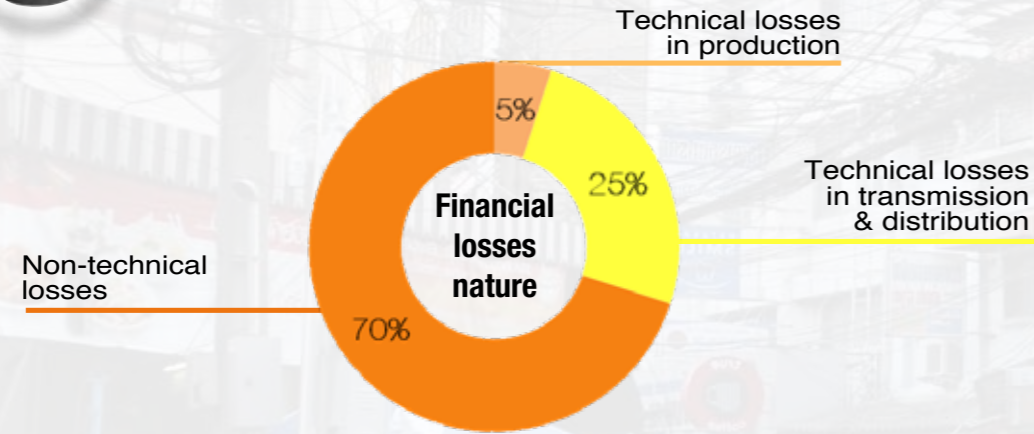
The aerial connection box is also available with 3 outlets.



P431
3 outlets
4 connection blocks

SEE SHEET
FRAUD PREVENTING / Rehabilitation / Aerial connection box

Zoom on the financial losses of the utilities



Stabilize the existing network

SOLUTIONS FOR NETWORK REHABILITATION

Issues ?

When a fraud preventing policy is launched for network improvement in order to reduce energy losses during transmission and distribution, the first step is to **rehabilitate existing facilities**.

With fraud preventing solutions installed on existing equipment, such as cable, **investments are minimized and benefits observed quickly**.

These solutions provide means to fight against some problems often encountered such as overconsumption not invoiced due to fraud upstream from meters and illegal connections on the lines.

Benefits ?

- + Network cleaned at a lower cost
- + Invoicing conform to consumption
- + Increase of the power companies incomes
- + Significant decrease of non-technical losses





A cut-off and control point at the top of the pole for existing connections

Cutout sleeve + MINI-SWITCH

The sleeve associated to the mini-switch allows to control of the energy consumption of the customer while creating a cut-off point at the top of the pole.

- + Utility intervention facilitated
- + Limitation of the current that can flow in the connection
- + Cut-off point in case of over-consumption



A distribution point to connect new customers on an existing network

Aerial connection box

The box secures the network by limiting the use of service connectors. It also makes the network cleaner making frauds more easily detectable.

- + Reduce the number of connectors
- + Protection of connections against bad weather
- + Network readability

Power regulator



Application

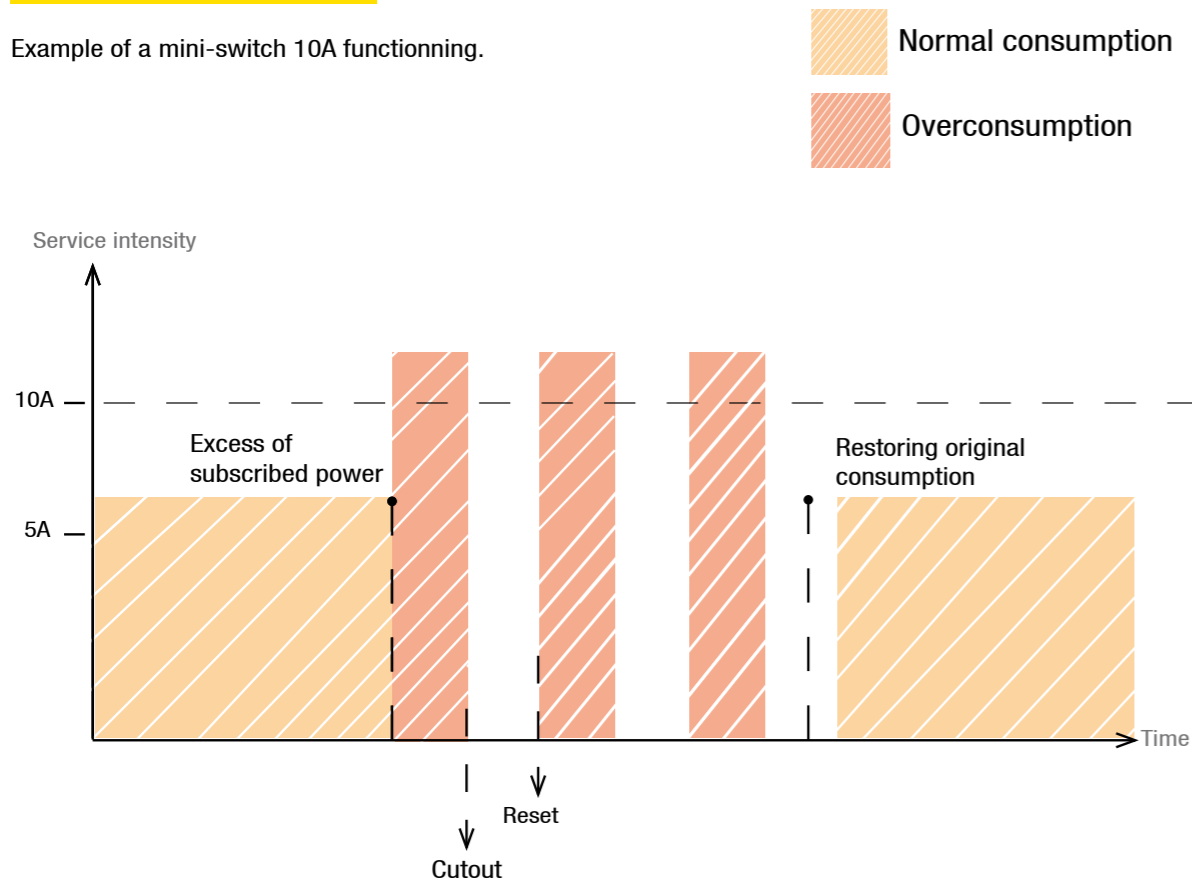
This mini-switch limits the current that can flow permanently through the connection to a certain intensity. It enables the customer's energy consumption to be controlled and limited to the subscribed power, providing excellent protection against fraud, mainly in the event of meter by-pass / shunt. Massive overconsumption due to fraud is significantly reduced.

Description

- The mini-switch is integrated in a fuse cartridge. It limits the current that can flow permanently through the connection thanks to a rating intensity function on the principle of bimetal (thermal bimetallic strip):
 - Caliber: 5A, 10A, 15A, 20A
 - Size: 14x51mm, 22x58mm, T00
 - Reversibility threshold: 45A or 60A depending on gauge.
- It possesses a circuit breaker fuse function (AD) : power of cut: 20kA.
- Its endurance goes from 5,000 to 15,000 cycles according the rating.
- Its installed before the meter. Two options are possible for utilities :
 - At the top of poles, out of the customer reach, to better secure the device;
 - In the meter cabinet, for an easier installation.

Principle of use

Example of a mini-switch 10A functioning.



Code	Designation	Gauge (A)	Weight (kg)	Sales unit
Size 14x51				
P135	MINI-SWITCH 5A 14x51	5	0.030	10
P125	MINI-SWITCH 10A 14x51	10	0.030	10
P142	MINI-SWITCH 15A 14x51	15	0.030	10
Size 22x58				
P136	MINI-SWITCH 5A 22x58	5	0.040	10
P126	MINI-SWITCH 10A 22x58	10	0.040	10
P143	MINI-SWITCH 15A 22x58	15	0.040	10
P146	MINI-SWITCH 20A 22x58	20	0.040	10
Size 00				
P137	MINI-SWITCH 5A T00	5	0.110	10
P144	MINI-SWITCH15A T00	15	0.120	10

Installation



K220



U607

Shell	Top of pole		Meter cabinet		
	Cutout sleeve		Cutout cabinet		
Technical characteristics	- To be installed at the top of a pole outside. - To be installed on the phase conductor of the customer connection. - When the sleeve is opened, an elastic tightening keeps the cartridge on the customer side, with no load. - Single tightening ensured by to shear head screws sealable after breaking. - Very good resistance to weather conditions (humidity, temperature...). - Possibility to seal the opening.		- To be installed nearby the meter, in the house, enabling maintenance at man level. - To be installed on the phase and neutral conductors of the customer connection. - Very good resistance to weather conditions (humidity, temperature...). - Possibility to seal the opening.		
References	K220	K221	U605	U607	P053
Connection	Stripping	Insulation piercing	Stripping	Stripping	Stripping
Capacities	2,5-16 mm ² Al/Cu	6-35 mm ² Al/Cu	6-25mm ² Al/Cu	6-35 mm ² Al/Cu	6-35 mm ² Al/Cu
Fuse sizes	14x51	22x58	14x51	22x58	T00

Nota : A three phases version is available.



SEE SHEET
ACCESS TO ENERGY / Protection / LV network fuse protection

Aerial connection box



P431



Michaud Exclusivity



Application

The box makes it possible to establish up to 6 single phase connections or up to 3 three phases connections at one point of the low voltage aerial bundled network.

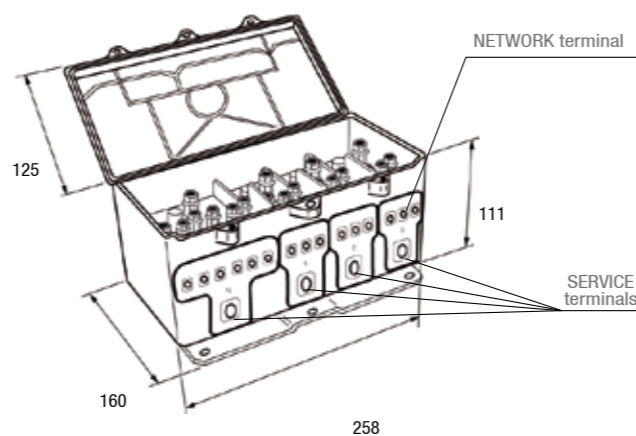
It can be installed on a façade or a pole.
It can also be used at the network end.

Description

- The colour of the enclosure is ivory.
- The box is equipped with 4 connection blocks (1 neutral + 3 phases). The "neutral block" comprises one inlet and 6 outlets: each "phase box" comprises one inlet and 3 outlets. Network and Service terminals use either the insulation piercing technology or the stripping technology. The connection blocks are linked 2 by 2 by linking bars.
- Each connection block is accessible with the contact pin of a test probe.
- The inlet and outlet of the conductors in the lower part are performed through elastomer seal sockets.
- The box is delivered with an integrated anti corrosion metal fixing plate. The rigidity of this plate allows it to be installed on uneven surfaces.
- The cover is closed using 2 stainless steel screws.
- An integrated device enables the assembly to be sealed and possibly padlocked.
- The terminal separators inside the box enable the conductors to be connected in any order.
- The degree of protection of the enclosure is IP43 (according to **NF EN 60529**).
- When the cover is opened, the degree of protection of the live parts is IP2X.
- This box meet the acceptance criteria of the **HN 62-S-33** standard.

The benefits :

- + **Perform multiple single phase or three phases connections**
- + **Better spread charges** on the network, thanks to the connections visibility
- + **Guarantee the network durability** (better resistance to corrosion and humidity)
- + **Remove the connectors** (safer network organized, fraud-preventing strengthened)
- + **Disconnect subscribers easily** (network cable unimpacted, possibility to re-use connectors)
- + **Check the potential at the connection terminals** (with a test probe)
- + **Guarantee a better fitters safety** (electric shock risk limited)



Implementation

Caution: the connection is not designed to withstand a mechanical strength on the conductors, which must be anchored. The maximum flow power is 110kVA.

	P 431	P 432
"NETWORK" terminals	<ul style="list-style-type: none"> • "NETWORK" terminals : Insulation piercing Capacity: 35mm² - 150mm² Al or Cu <ul style="list-style-type: none"> - Insert the conductor fully through the corresponding seal socket up to the stop. - Tighten the screw until the shear head breaks. - Use a wrench with 17mm hexagonal socket only. 	<ul style="list-style-type: none"> • "NETWORK" terminals : Stripping Capacity: 35mm² - 150mm² Al or Cu <ul style="list-style-type: none"> - Strip the conductor over a length of 90mm. - Brush the conductor with neutral grease. - Insert the conductor fully through the corresponding seal socket up to the stop. - Tighten the screw until the shear head breaks. - Use a wrench with 17mm hexagonal socket only.
"SERVICE" terminals	<ul style="list-style-type: none"> • "SERVICE" terminals : Insulation piercing Capacity: 10mm² - 35mm² Al or Cu 16M - 50M Al <ul style="list-style-type: none"> - Insert the conductor fully through the seal socket up to the stop. - Tighten the screw until the shear head breaks. - Use a wrench with 10mm hexagonal socket only. 	<ul style="list-style-type: none"> • "SERVICE" terminals : Stripping Capacity: 6mm² - 35mm² Al or Cu 16M - 50M Al <ul style="list-style-type: none"> - Strip the conductor to be connected over a length of 30mm. - Brush it with neutral grease. - Insert it fully through the seal socket up to the stop. - Tighten the screw until the shear head breaks. - Use a wrench with 10mm hexagonal socket only. - If reused, the conductor must be cut and stripped again. The recommended torque is 10Nm with an adapted spanner.

Code	Designation	Network terminals	Service terminals	Weight (kg)	Sales unit
P431	INSULATION PIERCING AERIAL CONNECTION BOX 3 OUTLETS	Insulation piercing	Insulation piercing	2.880	1
P432	STRIPPING AERIAL CONNECTION BOX 3 OUTLETS	Stripping	Stripping	2.780	1



Video implementation available on the website www.michaud-export.com





Single phase

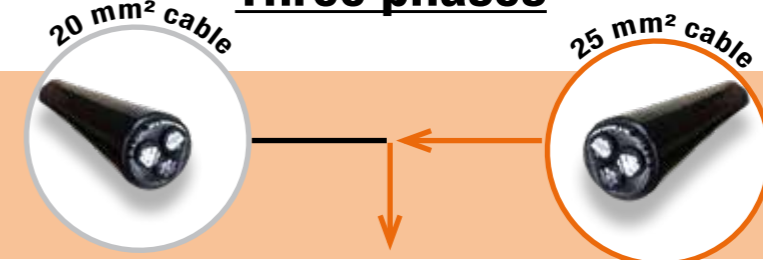
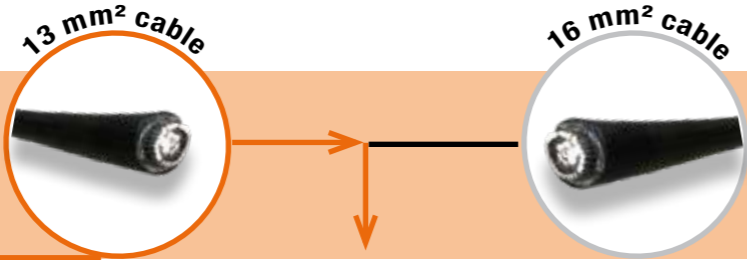


Three phases

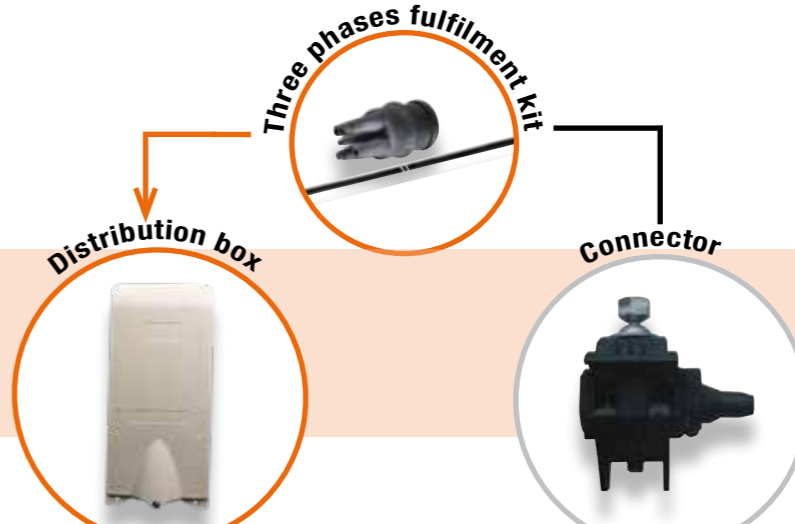
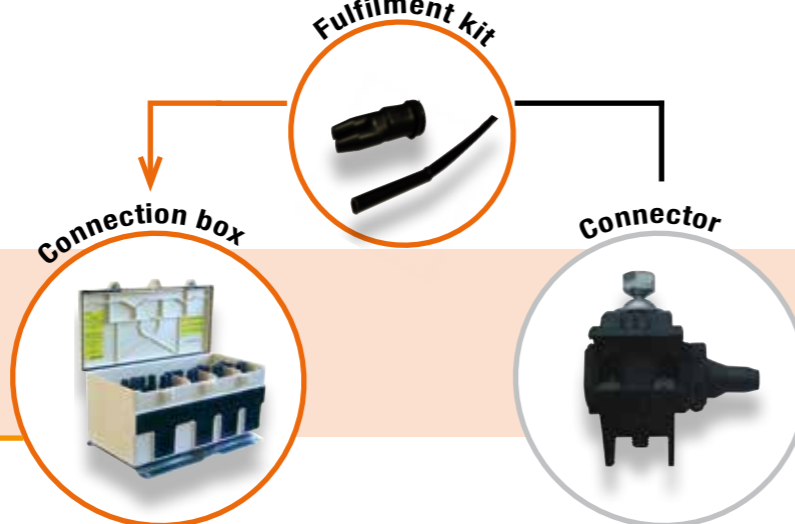
Fraud preventing

Fraud preventing

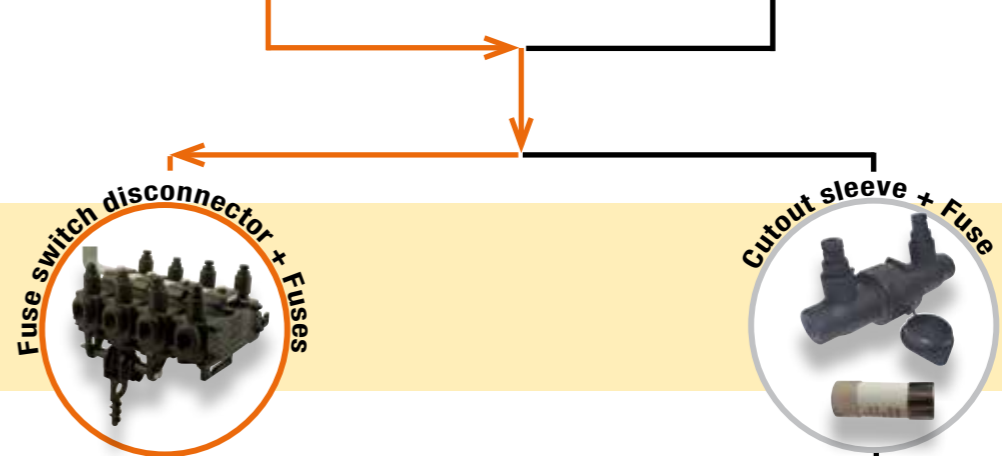
1 Cable



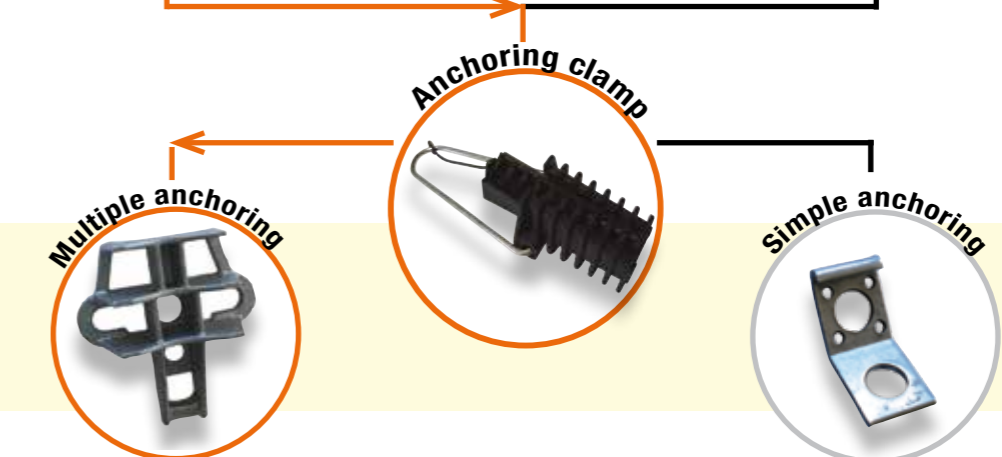
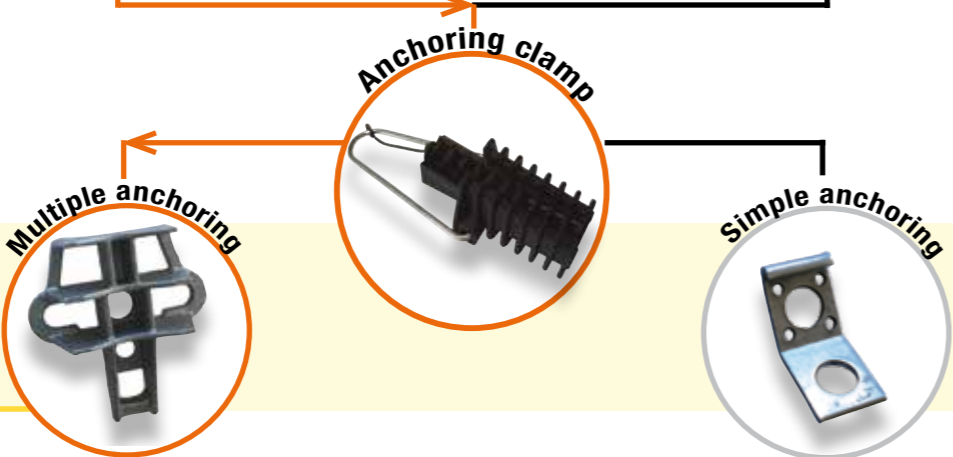
2 Connectors

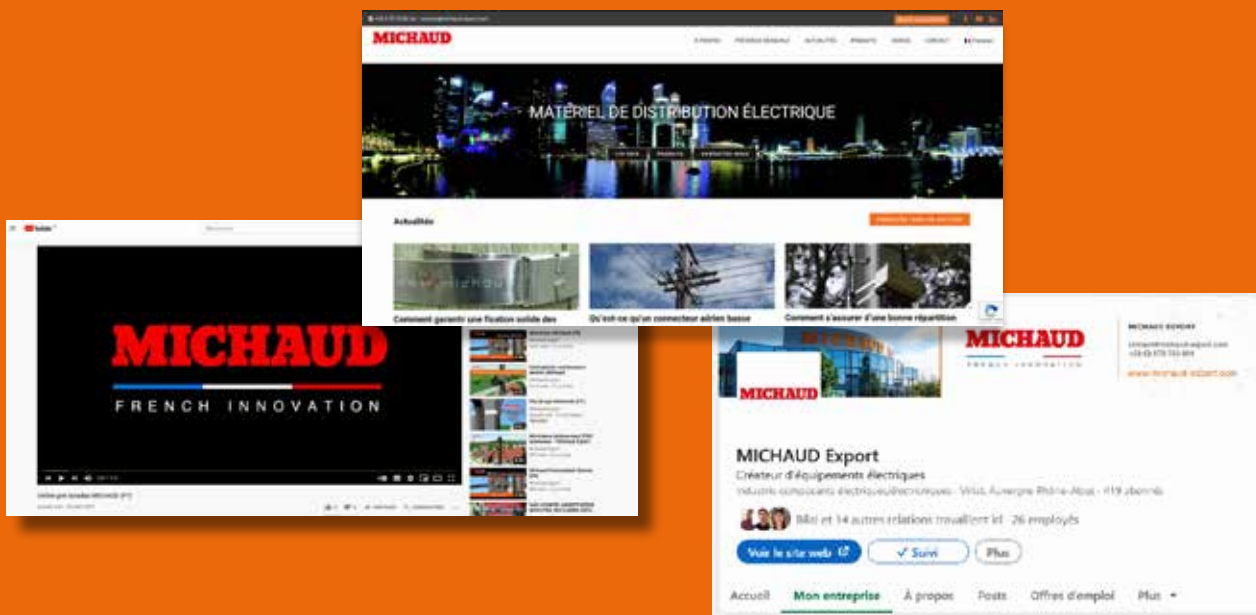


3 Protection



4 Anchoring





Découvrez notre site Internet
www.michaud-export.com

Expert international de la distribution électrique, **MICHAUD** conçoit, développe et met en place des systèmes fiables réduisant les opérations de maintenance sur les réseaux de distribution.

En architecte de votre solution, l'entreprise s'appuie sur l'innovation perpétuelle et le savoir-faire reconnu des 250 collaborateurs du **Groupe MICHAUD**, spécialiste des appareillages électriques et éléments de raccordement.

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