USER GUIDE

Pre-identify LV and MV off line Cables and feeders

JUPITER *X*

CAUTION: Read this manual before using the device

GU_JUPITER-X_V3_00EN

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FQ 47B-EN - V1.12 - 14/10/2020

MODIFICATION'S DIRECTORY

Rév.	Subject of Amendments	Date	Author
1.00	Creation	2021/04/28	T.Hubert
1.01	§4 Size and Weight, TX Battery access	2021/06/22	T Hubert
1.02	Correction §4	2022/01/27	T Hubert
1.03	Add special use cases	2022/03/23	L. Zomero
2.00	Correction §3.2.3	2022/05/16	T Hubert
2.01	Correction §3.2.3.2 & 3.2.3.3	2022/06/30	L. Zomero
3.00	Add security info+ESC	2022/10/14	T Hubert

This manual is important for your safety. Read it carefully in its entirety before using the equipment and keep it for future reference.

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This document is the JUPITER X User's Guide. It describes the implementation of the device, as well as the different modes of operation to facilitate its use.

1. SAFETY INFORMATION

1.1. Safety recommendations

Please read this guide carefully before unpacking, configuring or using this equipment. Note all indications of danger and other warnings. Failing to observe these recommendations could result in serious injury to the operator or could damage the equipment. To ensure that the protection provided by this equipment is appropriate, do not use or install it other than in accordance with the conditions indicated in this manual.
Dismantling the cases is forbidden. This operation is limited exclusively to personnel qualified by MADE.

1.2. Following the safety recommendations

DANGER: Indicates a dangerous or potentially dangerous situation which, if not avoided, could cause serious or deadly injuries.

WARNING: Indicates a potentially dangerous situation which could cause superficial to moderate injuries.

Remark*:* Information requiring particular attention.

1.3. Warning labels

Read all labels and wordings shown on the instrument. Injuries or equipment damage could occur if these instructions are not respected.

	Symbol requiring reference to the instruction manual for instructions concerning operation or safety recommendations.
	Dangerous Voltage
	Ac current
IP XX	IP standard – Protection against dust and water
	Do not throw away with household waste

1.4. Intended use

JUPITER X is an equipment allowing:
• Pre-identification of de-energized cables in excavations, gutters and cable trays, with short-circuited ends.
• Identification of dead conductors and continuity test to the transmitter called S1.

- shorted end (closed circuit)
- open circuit end

The device/system described in this documentation should only be operated by qualified personnel for each specific task. The documentation relating to this task must be observed, in particular the safety instructions and warnings. Qualified persons are, due to their training and experience, able to recognize the risks associated with the handling of this product / system and to avoid them.

JUPITER X is intended for personnel authorized to work on electrical networks.
The documentation relating to each function must be observed, in particular the safety instructions and warnings. Qualified persons are, due to their training and experience, able to recognize the risks associated with the handling of this product and to avoid them.

All safety instructions imposed by the network operating company must be scrupulously respected.
The user of the material must have been trained in the handling of the material.

⚠ Its use is exclusively reserved for de-energized networks.
The cable to be identified must be consigned by an authorized agent and the 2 ends must be short-circuited and earthed.
A verification of the absence of voltage (VAT) must imperatively be carried out before use.
Wearing personal protective equipment (PPE) is mandatory (class 00 or higher electrical insulating gloves, helmet with protective face shield)
⚠ The material should not be used when at least one of its constituent parts is damaged.

2.1. Working Principle

- **Identification** of cables in a trench, gutter and in cable shelf.
  ➔ **With short-circuited ends**

- **Identifying the phases and checking cable continuity to transmitter S1**

➔ **With short-circuited ends** (closed circuit)
➔ **With open-circuit ends**.

The configuration required for each of these modes is described in this document.

Each of the functions is usually carried out on unpowered MV & LV cables (customer loads Off-line).

The signals and the physical principles used are common for each function.

The **JUPITER** system is made up of a Transmitter and a Receiver.

The removable transmitter is in a trolley case which also contains the various accesories.

The Receiver is in a soft carrying case which fits into the Transmitter case. This also contains the 3 sensors used for cable and conductor/phase identification:

- **Cable identification**
- **Continuity and core identification in open circuit.**
- **Continuity and core identification in short circuit**

Option:

- **Core identification in short circuit adapted for LV 4 conductor cables, with visually unidentifiable neutral**

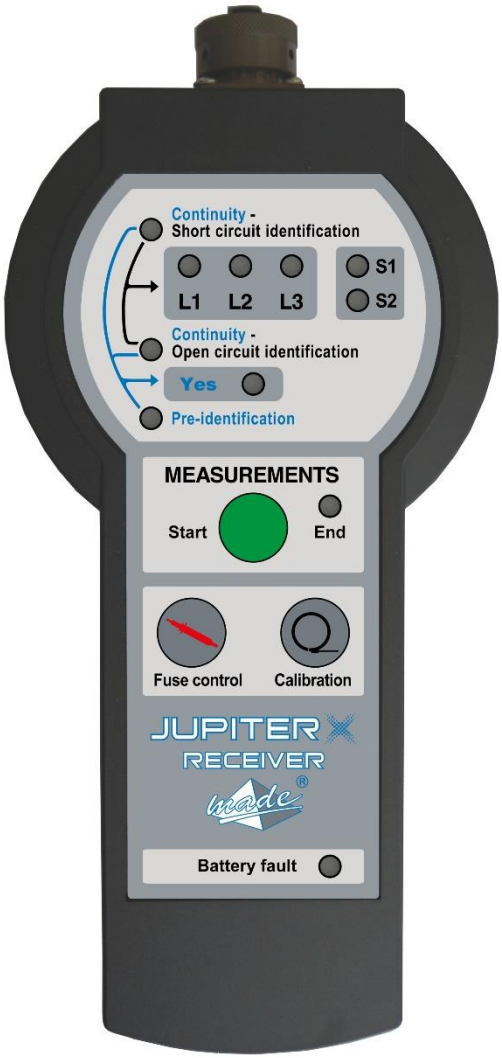
2.2.Composition

2.2.1.Transmitter

- 3 current clamps with their connecting cable (ref JPR_PAI_320)
- 220V~ supply cable (ref JPRX_CHA_110)
- 1 Short-Circuiting cable (ref JPR_PCC_101)
- 1 transmitter (ref JPRX_EME_110)

Attention: the transmitter must only be operated with the accessories supplied by the company MADE

2.2.2.Receiver



Attention: the receiver must only be operated with the sensors supplied by the company MADE

2.2.2.1.Standard Sensors

- **Sensor for « Core identification, short-circuited ends » :**

Ref: JPRX_CAP_410

- **Sensor for « Core identification, open circuit ends » :**

Ref: JPRX_CAP_220

- **Sensor for identification :**

Ref: JPRX_SAB_100

2.2.2.2.Optional Sensor

- **Sensor for core identification, short-circuited ends, adapted for LV 4 conductor cables, with unidentifiable neutral visually**.

Ref: JPR_CAP_120

3.1. JUPITER X TRANSMITER

From turn-on by the operator, the Transmitter is activated and generates the frequency signals necessary for identifying unpowered MV & LV cables.

It is possible to turn the **JUPITER X** Transmitter on S2 mode (with different frequencies) for a utilization with two Transmitters at the same time at the ends of a cable, one in S1 mode and the second on S2 mode.

The type of utilization allows cores identification in open circuit once the cable is cut at both ends without moving the Transmitter (useful operation with replacing a joint for example).This Transmitter allows only an utilization in S1 mode, or S2 mode with another Transmitter in S1 mode.

Only one JUPITER X Transmitter in S2 mode does not allow core identification in open and short circuit function!

The possible operations are:

- **Identification of cables** (Short-circuited ends)
- **Continuity and identifying the cores with open circuit ends (after cutting the cable)**
- **Identifying the cores with short circuited.**

Once the Transmitter is started, no further action by the operator is necessary to activate the functions described below.

When turned-on, the Transmitter is on S1 mode. A press on S1/S2 button activates S2 mode. Another press turn the Transmitter back to S1 mode.

These functions are possible on an unpowered MV or LV network and for all types of cables:

HN, Paper, PE.

When used on an LV network, it is not necessary to disconnect the customer loads.

3.1.1.Overview of the Transmitter

3.1.2. Transmitter general functioning

3.1.2.1. Power supply

The JUPITER X Transmitter runs on 7,2Ah 12V DC batteries.

When turned on, the charge level of the battery is indicated on the front face. The minimum autonomy of the transmitter is 8h.

The transmitter can run on internal batteries or during the charge when using the external charger connected on the side of the case.

To charge the transmitter, please refer directly to the instruction on the charger

The continuous use of this type of charger enables the long term storage of the Transmitter, whilst maintaining the battery in optimum charged condition (charger connected).

Warning: when using the transmitter while charging the battery, the charger must be placed indoors, away from any splashing water and flammable agents.

The charger must be connected to an overvoltage category II mains socket.

During recharging, the charger plug serves as a disconnect device, it must remain easily accessible

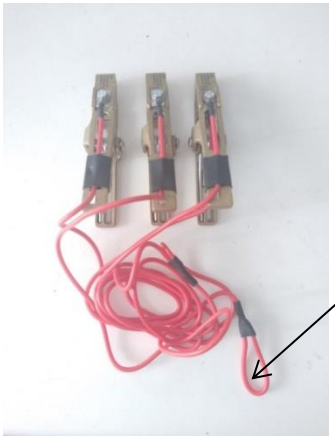
3.1.2.2. Transmitter functions

The JUPITER X Transmitter consists of:

- Three synthesized power generators
- A monitoring unit for the internal components which :
  - Detects any faults in the transmission circuits (over-currents or low currents) and indicates which clamp is concerned.
  - Monitors the discharge level of the battery – the transmission is automatically stopped if the battery reaches a discharge level that could affect its life time.
- A front face – instrument panel with 4 different zones:
  - Faults zone
  - S1 or S2 signal selection button
  - ON/OFF button
  - Battery zone : Battery charge indicator and protection fuse
- A plug for charging the battery

3.1.2.3. Transmitter connection

- The transmitter is connected on the near end of the cables using the current clamps on the connection case. Both cable ends are short-circuited and can be earthed (Do not include the cable screen).
- Ensure that both cable ends are short-circuited, using the appropriate connection wires.

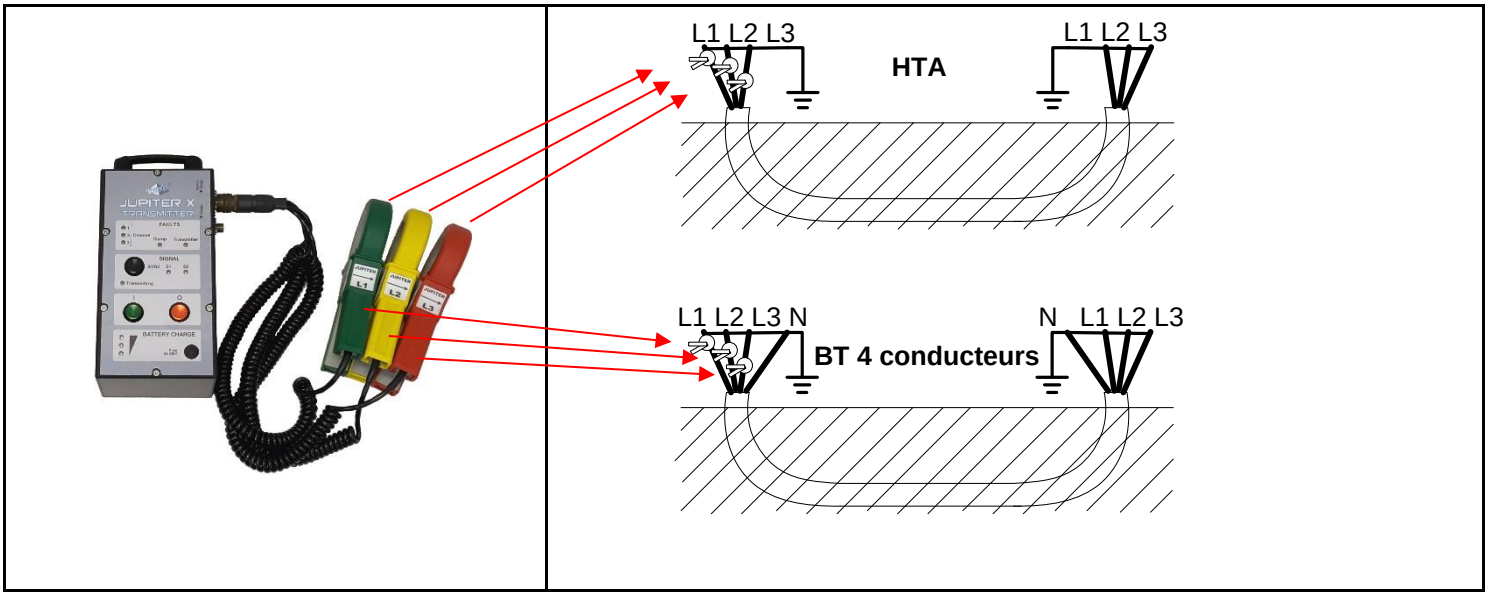


The loop located at the end of the short circuit must be connected to the security padlock

- Turn on the transmitter.

It is better to place the current clamps before starting the transmitter.

If not, opening the clamps during transmitter causes the clamp fault lights to illuminate.



So as to enhance the continuity, the end user needs to use the two accessories, one inside the transmitter and one inside the receiver. (Additional short circuit included in the product, ref JPR_PCC_101):

This will ensure that the balancing of the injected signal is perfect. Note that the quality of the contact can be altered by corrosion or dirt, typically on Medium Voltage.

3.1.3. Precautions for using the transmitter

THE CURRENT CLAMPS MUST ALL HAVE THE SAME ORIENTATION WITH RELATION TO THE CABLE END (Indicated by the arrows on the clamps).

CHECK THAT THE CLAMPS ARE ON AN UNSCREENED LENGTH OF CABLE. IF NECESSARY, USE WOODEN CLAMPS OR TAPE TO HOLD THEM IN POSITION.

TO AVOID RISK OF ERROR IN CABLE DESIGNATION, USE ONLY ONE JUPITER X TRANSMITTER ON A SITE.

AFTER TURN-ON, CHECK ON THE FRONT FACE:

- **THAT THERE ARE NO TRANSMISSION CIRCUIT FAULTS**
- **THE BATTERY CHARGE LEVEL**

3.1.4. Battery

The transmitter is powered by a 12 Volt battery.

The replacement of the battery must be carried out by an authorized and trained person

To Change the Batteries: remove the protective cover, unscrew the battery compartment on the bottom of the transmitter and replace the battery with similar one.

Pay attention to the direction

3.1.5.Fuse

The protection fuse is located on the underside of the housing.
In case of deterioration, it must be replaced by a strictly identical fuse: 5A 250VAC fast 5x20mm (breaking capacity >= 50A) or the transmitter unit must be returned to after-sales service.

3.2.JUPITER X RECEIVER

The JUPITER X Receiver assembly consists of:

- **The Receiver to which are connected the sensors**
- **Inductive sensor for identification**
- **Probes for core identification and continuity with open circuit.**
- **Flexible Identifying loops for short-circuited core identification**
- **On option: a double flexible loop for core identification on a 4 conductor LV cable.**

The Receiver and its sensors are supplied in a carrying case, which itself fits into the lid of the Transmitter case.

The JUPITER X Receiver is used to **identify** a cable of which the extremities are in short-circuit and earthed, to **identify the cores** in an **open or closed circuit** cable.

This is done in normal operation on **unpowered** HV & LV networks.

The JUPITER X Receiver is equipped with sensors dedicated to each function to « extract » the signals emitted by the JUPITER X Transmitter.

The results obtained, by the Receiver, require no interpretation, the detection

Receiver with its various sensors

Socket for sensor connection

Indication of the transmitter source of the signal

Measurement display in core identification mode

Measurement display in identification and continuity mode

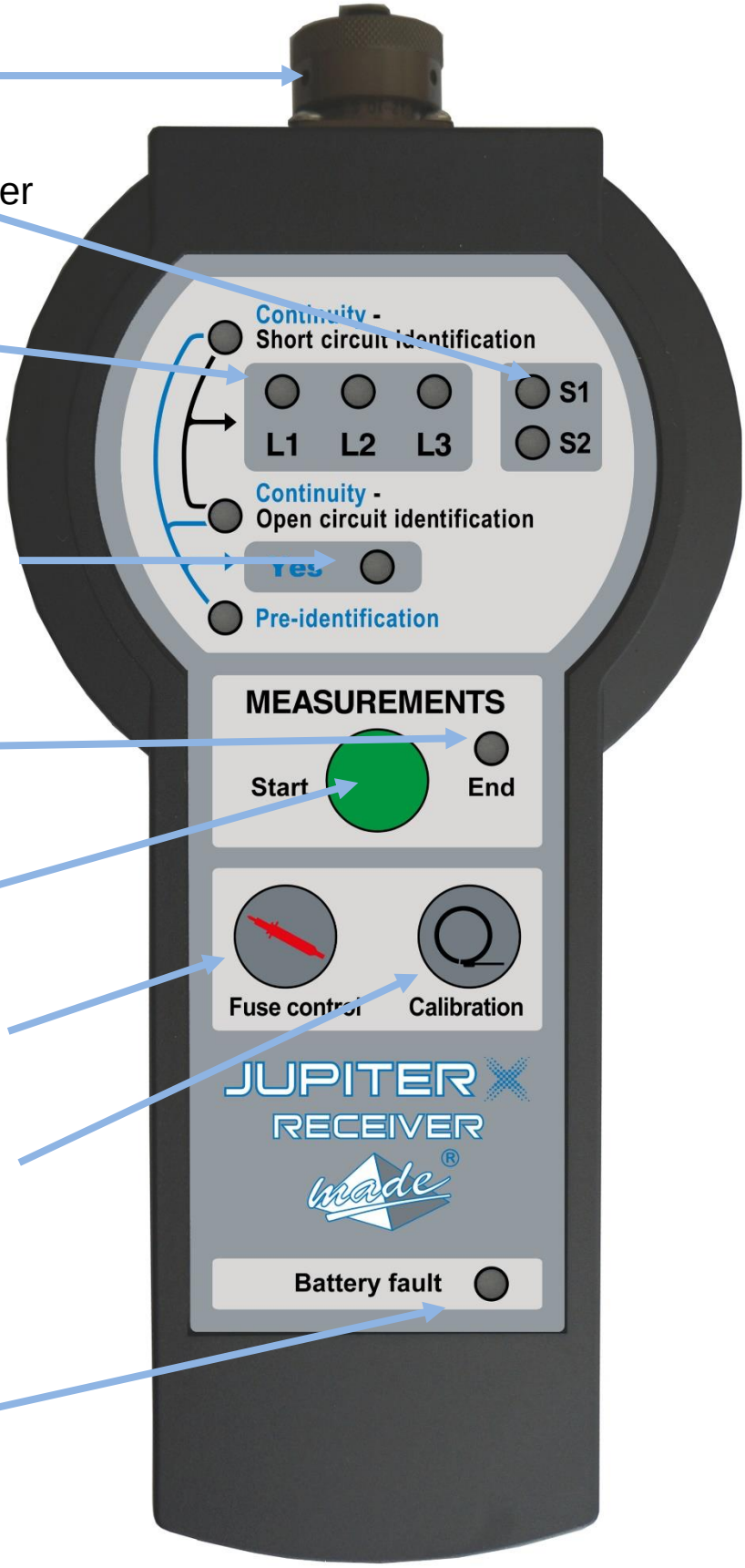
End of measurement indicator

On and measurement initiation button

Fuse testing

Calibration mode on short cable

Battery fault indication



Ref: JPRX_RXE-300

3.2.1. Use of receiver

The receiver must be handled with electrically insulating gloves. The shape of the receiver housing allows the hand to be positioned as far as possible from the contact area of the sensors

Connecting a sensor to the Receiver automatically sets the operating mode which is indicated by a LED.

These modes are:

- Continuity and Identification in short-circuit
- Continuity and Identification in open-circuit
- Pré-identification

One press of the « **Measurements** » button turns on and illuminates the LED corresponding to the mode selected by the chosen sensor, which confirms to the operator the type of measurement to carry out.

After 30 seconds with no press of the « **Measurements** » button, the Receiver switches off until a new button press.

If there is no sensor connected, one press on « **Measurements** » button illuminates during 1 second all LEDs to be sure they are all operational.

Certain modes are only available when the Transmitter is in S1 mode or when two Transmitters, one in S1 mode and the second on S2 mode are connected to the ends of the same cable. A transmitter in S2 mode only does not allow core identification in open-circuit or short-circuit. This kind of utilization automatically appears when two transmitters in S1 and S2 mode are connected to the same cable and that this cable is cut after pre-identification.

3.2.1.1. Pre-identification mode

A pre-identification sensor for all type of cable (JPRX_SAB_100)

.

Mode only usable with a transmitter in S1 mode or two transmitters in S1 and S2 mode.

- Connect the sensor to the receiver, the pre-identification light illuminates.
- Place the sensor on the cable, so that the groove under the sensor fits around the cable.
- Press the « measurement » button, the « **end of measurement** » light turns off.
- Wait for the result (6 seconds) without moving the sensor, the « **end of measurement** » light illuminates and if the cable is pre-identified, then the YES LED illuminates.
- If the cable is not pre-identified, repeat the operation on other points of the cable with 10cm of distance between them.

- If the answer is YES, it is always good to confirm this by repeating the measurement at several points along the cable.

The receiver indicates by « YES » the identification of the cable.

3.2.1.2. Core identification in open circuit and continuity to S1 Transmitter mode

JPRX_CAP_220

A voltage absence check is required before using this mode

- Connect the red probes to the receiver, press the « Start » button, the "**Open circuit identification**" LED illuminate.

Don't forget to test the fuse

- Before each use, touch the 2 test probes and press the « Fuse control » button.
  - If the fuse is good, the YES and END of measurements LED illuminates.
  - If the fuse is blown, the YES LED remains off and the END of measurements LED illuminates

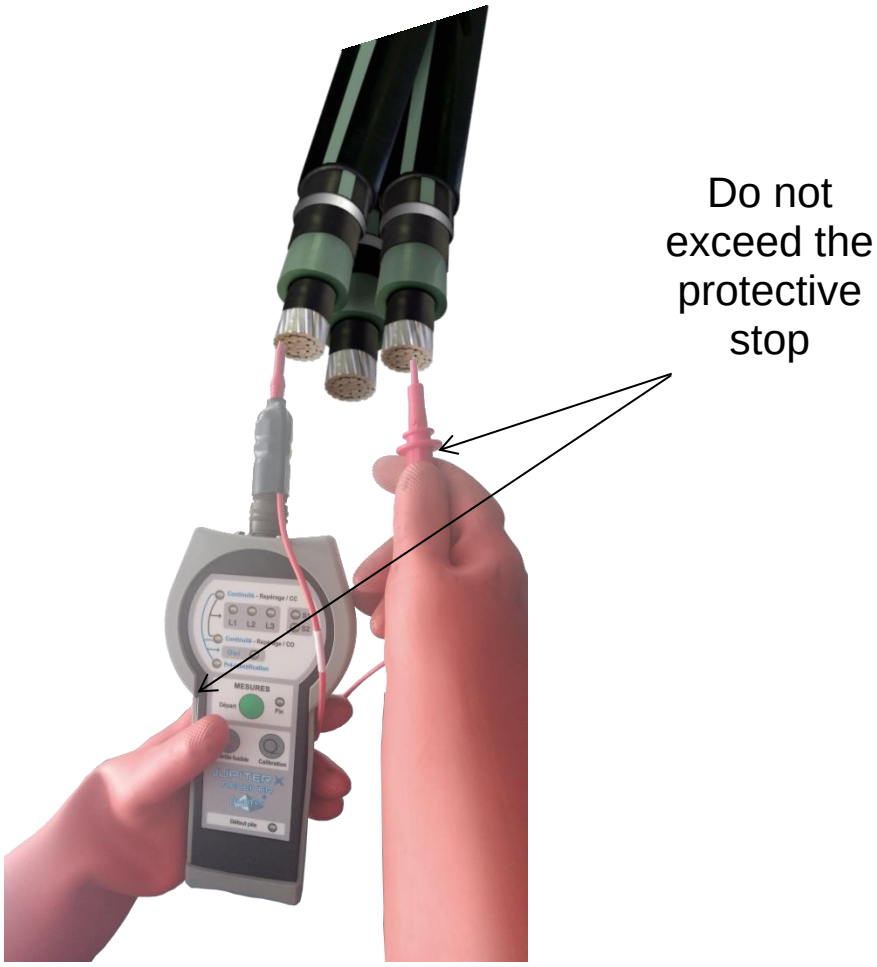
In this case replace the fuse.

Unscrew the test probes and replace the fuse with an identical one (2A 500VAC / HPC 50KA)

Mode usable in all cases.

- The cable being cut, probe any 2 cores of the 3.
- Press the « measurement » button, the « end of measurement » LED turns off.
- Wait for the result (3 seconds), the « end of measurement » LED turns on.
- The result will depend on the probed cores and on the cable extremity they are connected to :
  - If the probe is connected towards S1, the LED “YES” for the S1 continuity turns on.
  - If the phase is identified, the **L1**, **L2** or **L3** LED illuminates.
- Repeat the operation to identify the other cores.

The receiver designates the free conductor.



3.2.1.3. Core identification and continuity in short circuit mode

JPRX_CAP_410

Mode usable in all cases

- Connect the loop for core identification in short circuit to the receiver, press the « measurement » button, the "**Short circuit identification and S1 continuity**" LED switches on.
- Put the loop around the core to identify, and close it.
- Press the « measurement » button, the « end of measurement » turns off.
- Wait for the result (3 seconds), the « end of measurement » turns on.
- If the core is identified, the L1, L2 or L3 and the **YES** LED illuminates.
- Repeat the operation to identify the other cores.

The receiver designates the core within the loop.

3.2.1.4. Location in short circuit for 4 drivers of identical section mode (option)

JPR_CAP_120

Mode usable in all cases

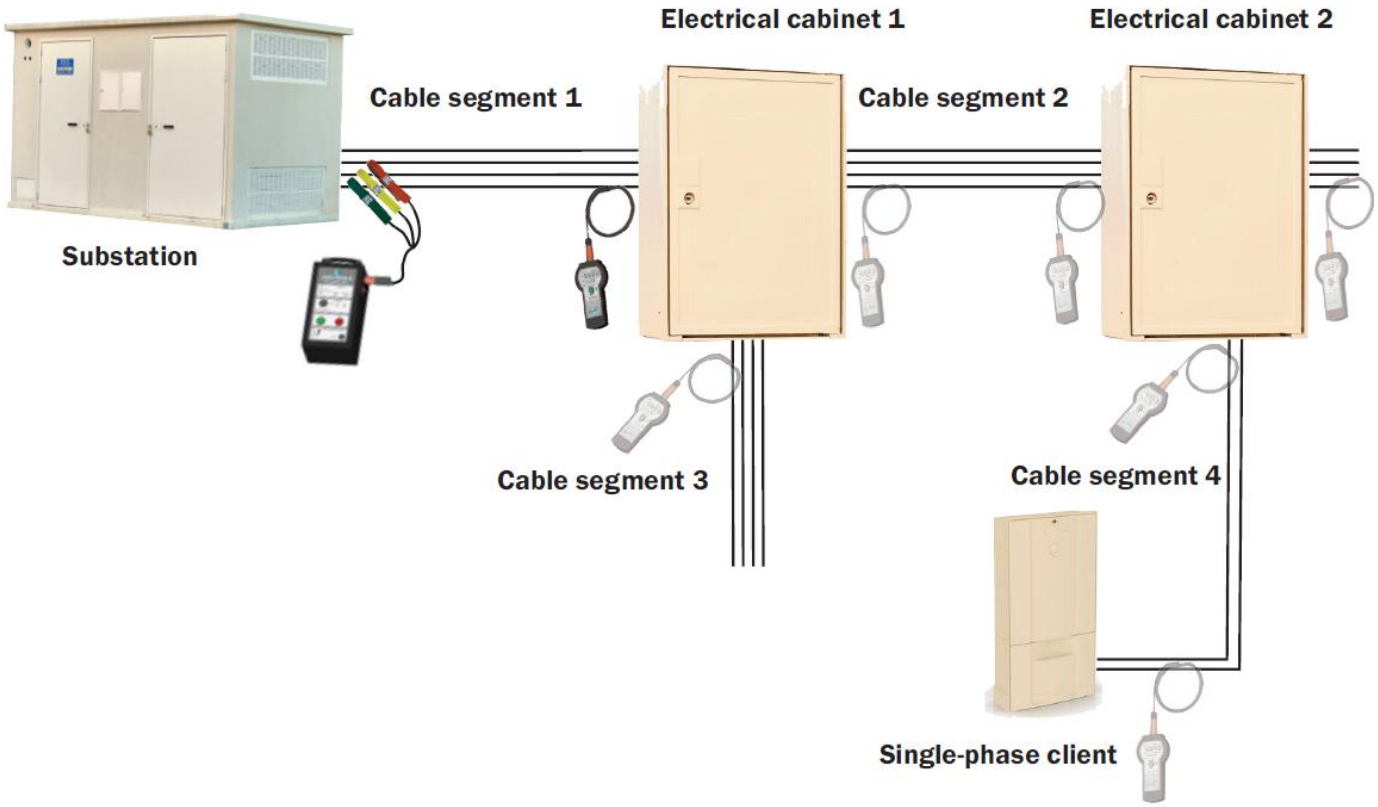
The sensor intended for this function has two flexible loops, of which one serves as a reference and the other for the measurement (marked **red**).

- Connect the short circuit for 4 drivers to the end of the cable
- Connect the double loop to the Receiver; a press of the « measurements » button lights the LED which indicates the mode
- Put the loop marked **red** around the core to identify, and close it
- Put the unmarked loop around any other core and close it. This core serves as a reference during the identification of the other cores. This reference core will then be identified by the **red** loop using one of the previously identified cores as reference
- Press the « measurements » button
- Wait for the result (3 seconds), either L1, L2 or L3 or NEUTRAL (**blue** LED on the connector), **THE IDENTIFIED CORE IS THE ONE PASSING THROUGH THE LOOP MARKED RED**
- Repeat the operation to identify the other two cores

- Switch the loops after the last core has been identified, to be able to identify the core which has served as reference.
-
- **The receiver designates the core within the measurement loop marked with red**.

3.2.2.ESC Mode Receiver Special Case

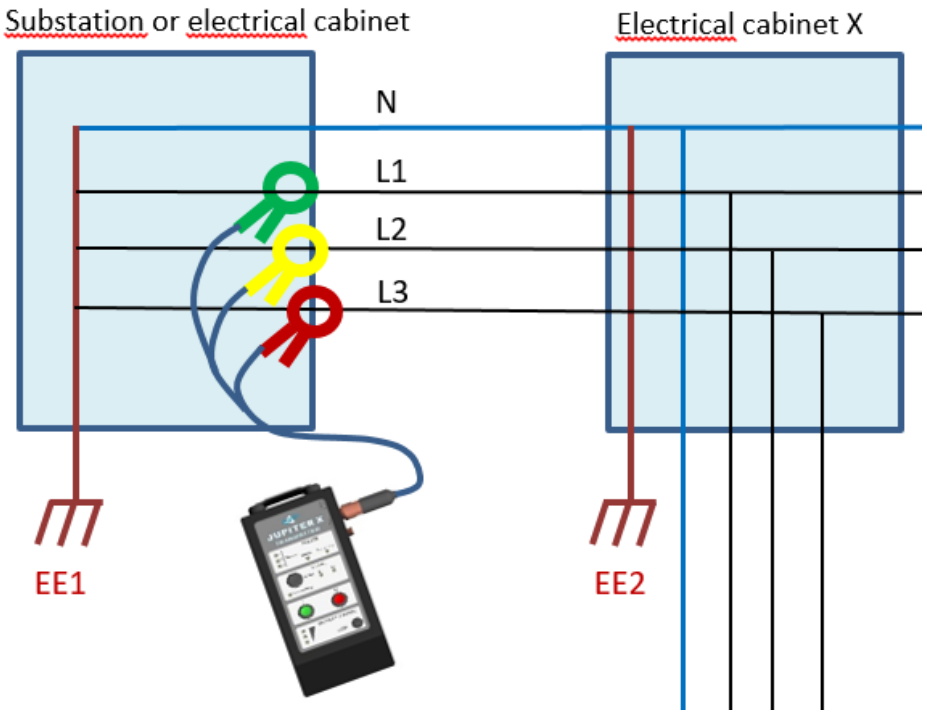
DE-ENERGISED ELECTRICAL DIAGRAM CHECK



Control of the inputs and outputs of an electrical cabinet using the Rogowski coil

3.2.2.1.Connecting the earthing equipement (EE1) and the transmitter

- Connecting the Earthing equipment on the transmitter end:
- Connect the earthing equipment in the substation (or in the upstream electrical cabinet).
- Connecting the injection clamps :
- Connect clamps L1, L2 and L3 on the respective upstream phases while respecting the direction of the arrows (all in the same direction)

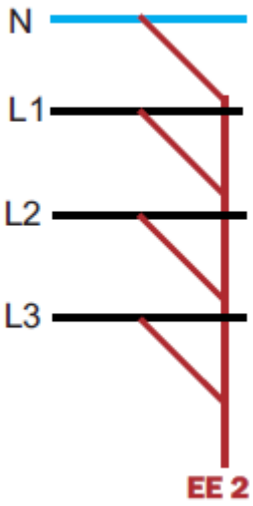


- Connect the transmitter and press the button

3.2.2.2. Connecting the earthing equipment (EE2) and calibration

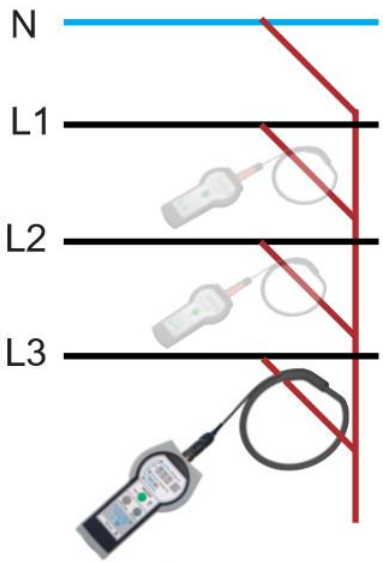
Perform a calibration operation with each new installation of a EE and before taking the measurements.

Connecting the Earthing equipment on the receiver end :



Connect the earthing equipment in the electrical cabinet to be controlled

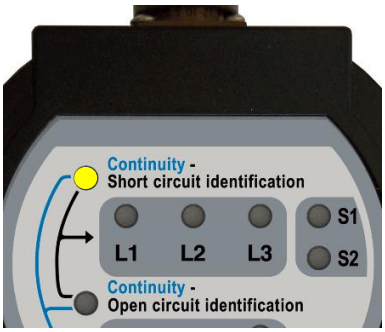
Place the coil around any of the phase strand of the EE, not on the neutral.



EE2

Press the calibration button

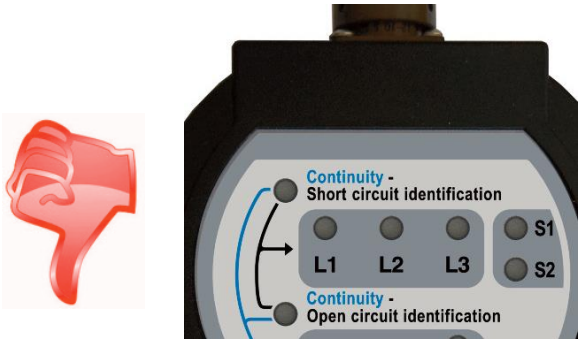
The LED “Continuity / Short circuit identification” blinks



The LED “Continuity / Short circuit identification” does not blink

No calibration: none signal detected.

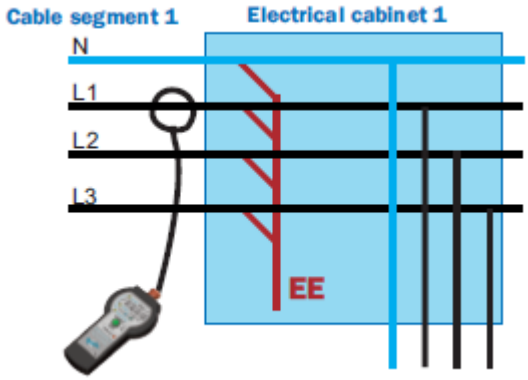
Cause: Loop incorrectly positioned. Calibration on the wrong Earthing strand.



No measurement possible.

3.2.2.3. Phase and cable identification

Place the coil around the phase to identify and lock it.



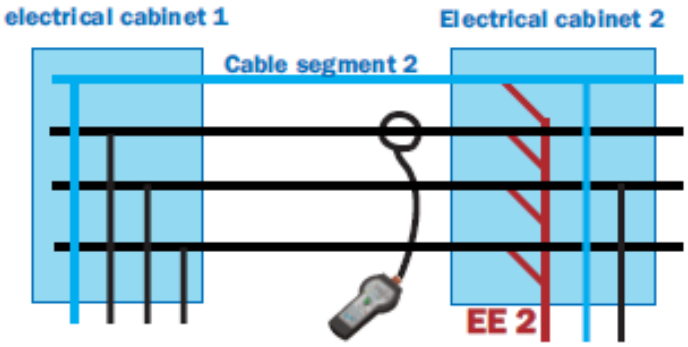
Press START. Wait for the result (3 seconds). The LED “End of Measurement” lights up.

If the phase is identified, LED L1, L2 or L3, and LED “YES” light up.

If the phase is not identified, no other LEDs light up

Repeat steps for other phases to identify

Move the EE2 to the next electrical cabinet and start again at step 1: calibration, then measurements upstream and downstream of the cable segment.



3.2.3.Batteries

The Receiver is powered by two 9 Volt batteries.

When the battery charge level is insufficient for correct operation of the Receiver, a LED indicates the fault.

To Change the Batteries: Unscrew the battery compartment on the bottom of the receiver and replace the 2 batteries with similar ones.

Be careful to the direction

Warning: replace the batteries with equivalent models, of the 6LR61, 9V alkaline type.

Do not replace batteries with Lithium types

4. TECHNICAL FEATURES

Characteristic.	Transmitter	Receiver
Size Weight	320mm x 160mm x 120 mm 4.500 Kg	228mm x 117mm x 41mm 0,450 Kg
Total size	555mm x445mm x258mm	
Total weight	**Transmitter and receiver in the trolley case:** 18 kg	
Supply	**Battery** : 12V - 7,2Ah, lead type **Minimum autonomy** : 8h for continuous use **Charger** : 100 - 240 V AC 50/60 Hz Overvoltage category II Output: 14.6V 2A Use of the transmitter is possible while the battery is recharging, provided the charger is positioned away from any risk of water spray and flammable agents.	2 PP3 9V batteries **Minimum autonomy** : 2000 measurements
IP standard	• IP54 transmitter box with injection pliers connected (outdoor use possible). • IP20 injection pliers	• IP54 receiver box with cap on the connector or a connected sensor. • The JPRX_SAB_200 sensor is IP20
Operating temperature	-15°C / + 50°C	-15°C / + 55°C -20°C / + 60 °C
Storage temerature	-20°C / + 60°C	
Relative Humidity	Max. 85% RH at 40 °C, without condensation	
Degree of environmental pollution	3	
Altitude	Up to 2000 m.	
Fuses	5A 250VAC 50A Fast 5x20mm	2A 500V 50KA Fast 6.3 x 32 mm
Batteries	Consumption during injection: up to 1.5 A depending on the length of the cable to be identified (with or without charger) Contact MADE SA for battery replacement. The replacement must be carried out by an authorized and trained person	Alcaline 6LR61 9V Consumption : 25mA under 9V

Name	Part number	Insulation
Equipment	JPRX_STD_100	1000V CAT II
Transmitter clams and cables	JPRX_PAI_320	600V CAT III
Receiver probe and cable	JPRX_SAB_100	1000V CAT II
Loop for core identification	JPRX_CAP_410	600V CAT IV

Transmitter fuse: fast fuse fast fuse 5A 250VAC

Receiver probe fuse: 2A 500VAC / HPC 50KA

Characteristic of the signal injected into the cable:

- Operating voltage: 1V
- Min/max current: Between 10mA and 20A, depending on the cable impedance and the quality of the short circuits.
- Frequency range: 420Hz –to 610Hz

Marks : CE

Standards applied : NF EN 61000-6-2 et NF EN 61000-6-4

5. MAINTENANCE, WARRANTY AND COPYRIGHT

5.1. Maintenance

Dismantling systems is forbidden. This operation is limited exclusively to personnel qualified by MADE.
Never use solvent, or a solvent-based product, to clean the system and / or its accessories.
For cleaning and maintenance of JUPITER X, it is sufficient to:

- Check that the **sensors** are clean : wipe off with a dry cloth
- Do not use corrosive products to clean the instrument faces
- Use only the accessories delivered with the system
- Follow a training programme by a qualified person

5.2. Warranty

Our warranty and general sales are available and sent by MADE-SA at the customer's request

5.3. Copyright

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