USER GUIDE

# LIVE LV CABLE and CORE IDENTIFIER


# LCI-400

GU_LCI400_V1_07UK

CAUTION: Read this manual before using the device

**M A D E**
167, Impasse de la garrigue
F 83210 LA FARLEDE
Phone : +33 (0) 494 083 198
E-mail : contact@made-sa.com - Web : www.made-sa.com
FQ 47B-EN - V1.11 - 28/10/2019

# MODIFICATION'S DIRECTORY

| Rév. | Subject of Amendments | Date and Author |
|---|---|---|
| 1.00 FR | CREATION | 12/12/2017 P. COSTE |
| 1.00 UK | English Version | 07/02/2018 P. PICON |
| 1.01 UK | Minor corrections | 03/04/2018 E.Vann/P.Picon |
| 1.02 UK | Modes & cable type | 14/06/2018 P.Coste / P. Picon |
| 1.03 UK | MV levels addition | 04/07/2018 P. Picon |
| 1.04 UK | Details about Auto & Expert modes | 12/07/18 P.Picon |
| 1.05 UK | Specification change : removing Expert mode | 29/10/18 P.Picon |
| 1.06 UK | Pictures update | 16/09/19 L. ZOMERO |
| 1.07UK | Layout of the document | 18/11/19 T HUBERT |

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

# SUMMARY

This document is the LCI-400 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 21 | IP standard – Protection against dust and water : TRANSMITTER |
| IP 54 | IP standard – Protection against dust and water : RECEIVER |
|  | Do not throw away with household waste |

# 2.OVERVIEW

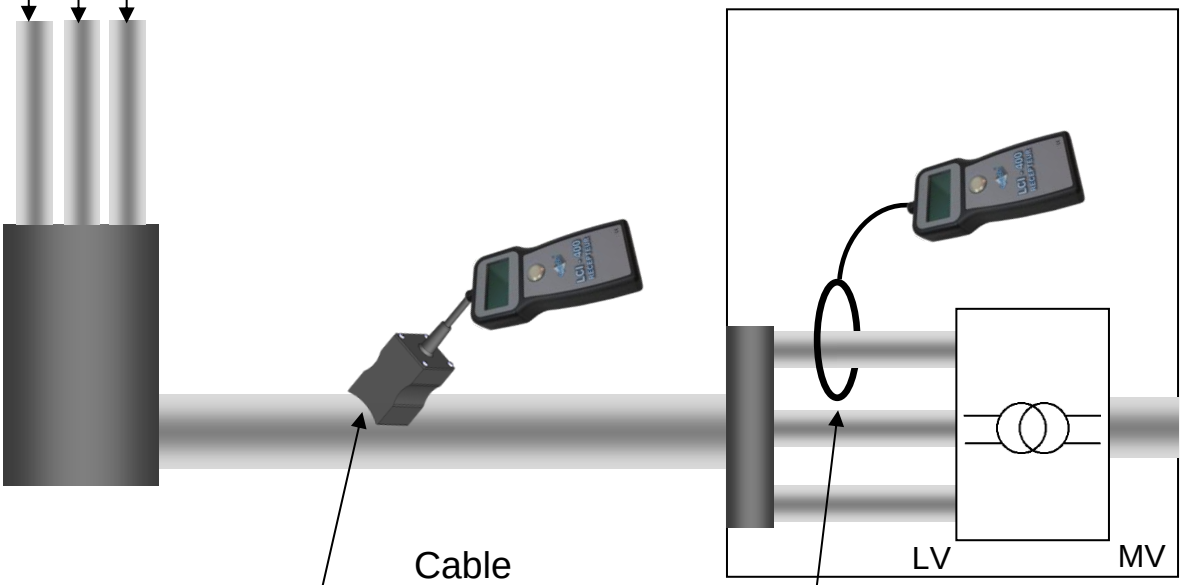
The LCI-400 is intended for live cable and core identification on a LV distribution network. It can operate in single-phase or three-phase mode on 50 or 60Hz networks at 115V, 230V, or 400V. It is composed of two elements, a transmitter and a receiver.
Very few operations are necessary for its use:
Simply connect the transmitter to the network downstream of the point of intervention, press the current load button, and use the receiver at the location where the identification operation is to be carried out.

## 2.1.Operating principle

The operating principle of LCI-400 is the cadenced connection of an electrical load on an LV feeder, causing no disturbances for the connected loads. The receiver digitally analyses the signals detected in the cables and cores using either of the separate detection sensors.
With a three-phase connection, the receiver requires no operator interpretation to show that the correct cable is detected, and the cores in it.
With a two-phase or phase to phase connection, the signal levels are displayed to enable the user to discriminate between cables and phases.
The generation and analysis of the signals used draws on MADE-SA's wide experience of signal analysis. These signal generation and analysis principles are patented.

## 2.2.Implementation overview


Transmitter connection




Cable identifying

Phase identifying

## 2.3.Composition


1. Transmitter case
2. Connection cables
3. Receiver
4. Cable identification sensor
5. Phase identification sensor
6. Storage bag
7. Spare fuses
8. L shaped plug in terminal connector
9. Current load button
10. Fault indicators
11. Network information
12. Voltage presence
13. Cable storage area
14. Receiver operating button

# 3.DETAILED IMPLEMENTATION

## 3.1.Transmitter

**CAUTION**: When using in the rain, be sure to observe the following guidelines:

② Rest the lid on the locks

① Fold down the locks

③ Take care not to pinch the cables

The transmitter is connected to the network using the cables integrated into the transmitter's case. The color code is as follows:

L1 : Brown

L2/Neutral : Black

L3 : Grey

### 3.1.1. Three-phase connection

**This mode is preferred when possible because it can identify a cable without interpretation on the part of the operator**. The receiver clearly indicates the result: “Cable detected” or “not detected” during the identification operation, and name of the phase during the phase identifying operation.

In this case, the connection is made on the inputs L1 / L2 / L3. It is strongly recommended to respect the order of the phases on the network when connecting the clamps, as a phase will be marked according to the input to which it is connected. Moreover the device makes it possible to establish the direction of rotation of the phases and this information is also conditioned to the connection.

### 3.1.2. Single-phase connection

If the access point is single-phase or if only two phases are accessible, the transmitter must be connected to inputs L1 / L2, input L3 being unused.
In this mode, the receiver will not indicate “Cable detected” or “not detected”, but it will display a current measure normalized in dB. The operator will then need to compare all the cables concerned to decide which one is the wanted cable. The wanted cable is the one giving the greatest signal.

Note: the neutral is often earthed. Due to those interconnections between neutral and earth, a small part of the signature current may flow on other cables, which makes it difficult to proceed with an automatic interpretation. Human interpretation is then required, as explained above, by comparing all cables concerned.

### 3.1.3. Drawing current

Once the inputs are connected, simply press the current load button (item 9). The device will automatically detect the single-phase /

three-phase mode and the mains voltage 115/230/400 V, and will display their status *by* the LEDs on the front panel (item 11).
The network frequency (50 or 60 Hz) is of course taken into account, but it is not indicated like the other parameters.
The direction of rotation is also displayed by the indicators "123" for the forward direction and "132" for the opposite direction.

## 3.2. Receiver

The receiver has a sensor dedicated to each of the two functions:
• Cable identification
• Phase identification
They *must be* connected according to the operation to be performed. A button (item 14) triggers the measures and a display allows viewing the results.

### 3.2.1. Power ON/OFF

- **Power on**

  Press the button. The sensor type is automatically recognized.

- **Power off**

  The receiver is automatically powered off after 3 minutes of inactivity.

  It is possible to force a power off using the power on/off menu: press the button during at least 4 seconds. Then the menu appears. Choose the yes or no option by quickly pressing the button and validating using a long press.

## 3.2.2.Cable indentification

The purpose is to identify a cable, alone or among others. The cable identification sensor (item 4) must be connected to the receiver, it will be automatically recognized. Once the sensor is connected, it will jump directly to the CABLE SEARCHING step:


Then put the sensor on the cable to be investigated. Wait for the Bargraph to become stable, and check for signal. Presence of signal will appear as follows:

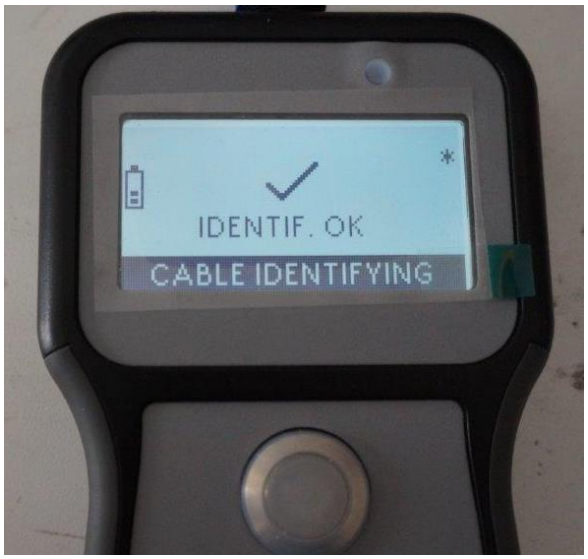

To confirm cable identification, start measurement by pressing the button, while holding the sensor still until a result is shown:

Before proceeding with the measurement, it is requested to select the cable type, impregnated paper or Synthetic; press the button briefly to change the type, press for more than 1 second and release to validate and start the measurement.

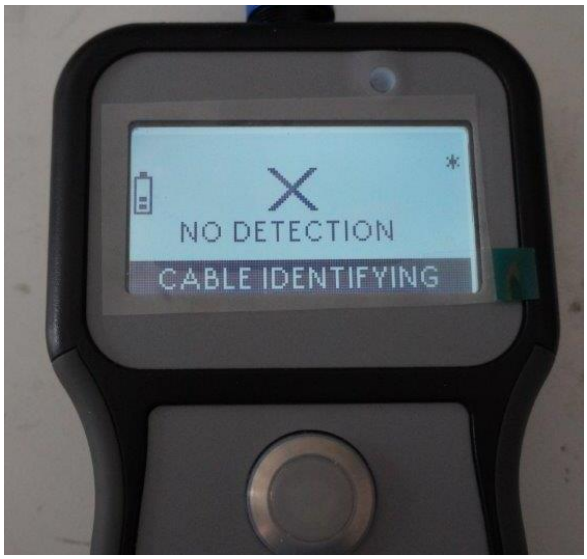

Repeat the operation until a positive identification is obtained, be sure to test all cables present in the investigation area.

### 3.2.2.1. Three-phase case

It is recalled here that this mode is to be preferred when possible. In this mode, the signature current drawn by the transmitter cannot flow to another cable. Simply probe the cables to test in sequence until you get identification:




or




Cable identified

No identification

### 3.2.2.2. Single-phase case

As previously stated, the correct method in this case is to compare the signal intensities obtained on each cable. It is required to systematically test every cable, then to select the maximum level obtained which designates the cable to be identified:


## 3.2.3.Phase identification

In Three-phase mode, the measurement leads to a direct interpretation. In single phase or two-phase mode, several steps will be required.

Connect the flexible Rogowski coil (item 5) to the receiver, it will be automatically recognized. The text PHASE SEARCHING will appear on the display.
Close the Rogowski coil around the selected phase.


Wait for the Bargraph to become stable, and check for signal. Presence of signal will appear as shown above.

Pressing the button will start the measurement.

### 3.2.3.1.Three-phase case

Each phase is identified by a distinct current. Probe each core sequentially and press the measurement button. Phases are designated by their respective number L1, L2 or L3:


Note that probing the neutral will give no result, since this core is not identified by any current.

### 3.2.3.2.Single-Phase case

The same signal flows on the phase and the neutral. The receiver therefore only enables indicating its level in dB. If several cables are present, only one of them will have signal on two cores and will be identified, as well as one of its phases. In order to identify all the phases, it will be necessary to proceed as follows:

- First step: identify the first phase and the neutral
- Second step: Connect the transmitter to another phase and the neutral and proceed as above to identify a second phase.

The third phase is identified by deduction.

### 3.2.3.3. Two-phase case:

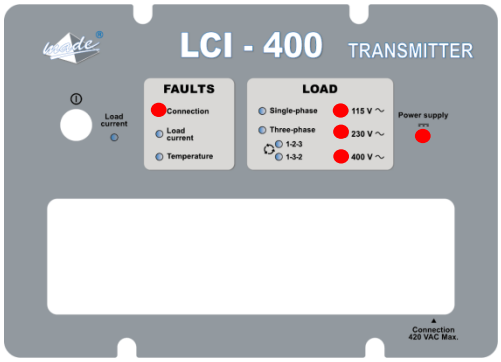
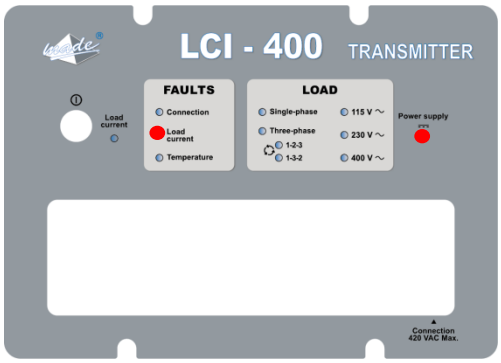
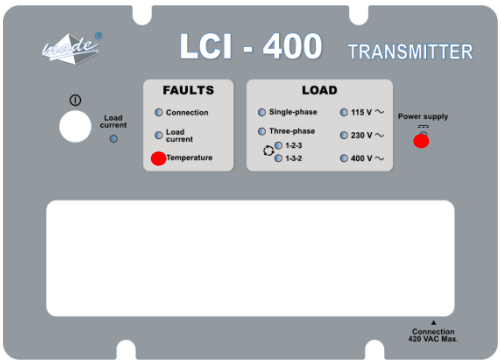
The same signal flows on the 2 phases. The receiver therefore only enables indicating a level in dB. If several cables are present, the signals will appear only on one of them, nothing will be detected elsewhere. To identify the phases, proceed as follows :

- Connect the transmitter between two phases and perform the core identification.
- Connect the transmitter between two other phases, one being common with the previous measurement. After probing with the receiver, identify a first core by deduction considering the one in common. Then, identify the two other cores by deduction considering the two measures performed.

Example :
Connect the transmitter between L1 and L2, then between L1 and L3, perform measurement in both cases. L1 can be identified and marked because it is common. Then L3 is identified, considering the second measurement, as the core left. L2 is the last one to be identified by deduction.

 If no signal at all is detected, the receiver will only display 2 hyphens ( **- -** ). The display of a value in dB necessarily means that a signal has been detected

# 4.FAULT INTERPRETATION

| Fault | Display | Cause/solution |
|---|---|---|
| CONNECTION |  | - Voltages between phases are not the same (for example neutral has been connected instead of a phase), or a level change occurred during the load phase.<br>- A connection change occurred during the load phase: loss or reconnection of a phase during the cycle.<br><br>**Check connections** |
| CURRENT |  | The current drawn is too weak or too strong compared to its nominal value (it is usually the sign of a failure, it should never happen in normal operation).<br><br>**Return the device for troubleshooting** |
| TEMPERATURE |  | Overheating of the device (internal temperature > 80 ° C) or the built-in fan broke down.<br><br>**Check that the side vents are not obstructed**<br><br>**Check that the fan rotates when load cycle is on.**<br><br>**Otherwise, return the unit for troubleshooting.** |

In any case, the transmitter will stop drawing power and will emit a warning sound. Pressing the current load button again will resume operations if the fault has disappeared.

# 5.TECHNICAL FEATURES

| Characteristic | Transmitter | Receiver |
|---|---|---|
| Dimensions | 410x340x205 (mm) | 225x100x31 (mm) |
| Weight | 8.5 Kg | 0,450 Kg |
| Power supply | Self-powered when connected to the network: from 115 to 400 VAC ± 10% between L1 & L2 | 2 x 9V batteries, type 6LR61 |
| Water and dust protection rating | IP21 | IP64 |
| Electrical safety protection rating | IP2X | IP2X |

# 6.MAINTENANCE, RECYCLING AND GARANTEE

## 6.1.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 **LCI-400**, 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

## 6.2. Replacing fuses

The fuses on the end of the network connection cables can be replaced by observing the following instructions:

Make sure all cables are disconnected from the network before working on any of the cables
Replace the damaged fuse with a fuse equivalent to that recommended by the manufacturer:

Fuse HPC 30KA (3.3x32) 2A A000V

## 6.3.Recycling

In accordance with the decree n° 2005-829 of July 20, 2005 relating to the waste disposal of electrical equipment and electronic (WEEE), the user ensures and takes responsibility for the collection and the elimination of the WEEE under the conditions of the articles 21 and 22 of this decree.

## 6.4.Garantee

MADE guarantees this product, to the initial purchaser, against all material or functional failure during a period of one year from the date of delivery, unless otherwise indicated in the product manual. If a defect is discovered during the period of the guarantee, MADE agrees, at its choice, to either repair or replace the deficient part, excluding the expenses of handling and of initial delivery. All parts repaired or replaced under the terms of this agreement will be guaranteed only for the remainder of the period of initial guarantee of the system.

### 6.4.1.Limitations

This guarantee does not cover:

• Damage caused by a "cause beyond control", natural disasters, strikes, wars (declared or not), terrorism, social conflicts or any acts under governmental jurisdiction
• Damage due to misuse, to carelessness, to any accident or an unsuitable application or installation
• Damage caused by a repair or an attempted repair not authorized by MADE
• Any product that is not used in accordance with the instructions provided by MADE
• Cost of transport back to MADE
• Cost of transport by express delivery of parts or products under guarantee
• Cost travel for a repair on site under guarantee

This guarantee constitutes the unique explicit guarantee established by MADE for its products. All implied guarantees, including, but not limited

to, guarantees on the commercial value of the product and its suitability for a particular use are positively rejected.
The present guarantee confers certain rights: the legislation of the country or jurisdiction can grant others. This guarantee constitutes the final declaration, complete and exclusive, of the terms of the guarantee and nobody is allowed to give other guarantees or promises on MADE's account.

## 6.4.2. Claims limitations

Claims having for object repair or replacement are the only allowable claims in case of the breaking of this guarantee. The MADE Company cannot be held responsible, whether on the basis of strict responsibility or any other legal basis, of any incidental or consecutive damage resulting from a violation of the guarantee or from carelessness.

## 6.5.Copyright



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