

AN ELECTRICAL DISCONNECTOR DEVICE FOR A POLYPHASE ELECTRICITY METER

The present invention relates to the field of
electricity meters, and more particularly to operations
5 of calibrating such electricity meters.

In conventional manner, an electricity meter
comprises at least a current circuit and a voltage
circuit. For a single-phase electricity meter, there is
only one pair or assembly constituted by a current
10 circuit and a voltage circuit, whereas for a polyphase
meter, the meter has as many current and voltage circuit
pairs or subassemblies as there are phases.

When the electricity meter is in its normal
operating mode, i.e. connected to the general electricity
15 network, the current and voltage circuits in a given pair
or subassembly need to be connected together
electrically.

In contrast, during testing prior to installation or
following a repair on an electricity meter, it is
20 necessary to calibrate the voltage and current circuits
within a given pair, and do so independently.
Consequently, in a calibration mode, the voltage and
current circuits of a given pair or subassembly need to
be electrically isolated from each other.

25 The feature that enables the current and voltage
circuits of a given pair being connected or disconnected
is known as an "I/P link" meaning that an electrical link
can exist or not exist between the current circuit (I)
and the voltage or phase circuit (P).

30 The description below relates more particularly to
specific means for implementing this "I/P link" feature.
These means need to operate as a switch enabling
connection and disconnection operations to be performed,
and consequently they are referred to below more
35 generally as electrical connector/disconnector means.

A first known solution for implementing electrical
connection/disconnection consists in fitting the meter

with a metal strip, e.g. made of brass, that is held by two screws between the current terminal and the voltage terminal of the voltage and current circuits within a given pair, and with a metal part forming an electrical bridge having one end screwed to the current terminal and the other end suitable for being screwed either to the metal strip or to the voltage terminal, depending on whether it is desired to disconnect or connect the circuits. The metal part has an oblong opening so as to enable said parts to be moved in translation between the two above-mentioned positions. It is found firstly that that implementation is expensive given the number of elements it requires. Secondly, it needs a special tool to be available, i.e. a special screwdriver, in order to be able to operate the electrical connection depending on whether it is desired to connect or disconnect the circuit. Furthermore, user manipulation is not simple, since for each connection or disconnection to be undertaken, it is necessary to loosen three screws, to move the part in translation, and then to tighten the three screws. If the meter is also a polyphase meter, e.g. a three-phase meter, then the operation needs to be repeated three times. Also, if the user does not reclose all three bridges correctly, the meter will remain either completely or partially in calibration mode and the main metering function of the meter in normal mode is not provided.

Another known solution has been provided for simplifying the above-mentioned connection, both in terms of the number of parts required, and in terms of the amount of manipulation. In that solution, e.g. as implemented in the electricity meter referenced ACE 3000 type 260 sold by the Applicant, the electrical connection takes place via a spring blade having ends that, in a rest position of the blade, come into contact firstly with the current terminal and secondly with the voltage terminal, so that the current and voltage circuits are

electrically interconnected. For calibration mode, the user can use a special tool, typically a plunger, that is inserted through an opening provided in the housing of the meter so as to act on the blade and deform it
5 elastically to move one of the ends of the blade away from one of the terminals, thereby disconnecting the circuits.

Although that solution provides a certain amount of simplification, the user still needs to have a special
10 tool, and above all, with a polyphase meter, the operations still need to be performed in succession for each of the subassemblies of the meter.

An object of the present invention is to mitigate the above drawbacks by providing special tooling enabling
15 the operations of connecting and disconnecting N pairs or subassemblies of current and voltage circuits in a polyphase electricity meter to be performed simultaneously and in simple manner.

More precisely, in a first aspect, the present
20 invention provides an electrical disconnecter device for use together with an electricity meter, said electricity meter being of the polyphase type having a number, N, of subassemblies each constituted by a current circuit and by a voltage circuit, where the number N is greater than
25 one, each subassembly being provided with a spring blade acting in a rest position to make an electrical connection between a terminal of the current circuit and a terminal of the voltage circuit, and the meter being also provided, in a terminal box, with N openings giving
30 access from outside the meter to each of the blades, the device being characterized in that it comprises a support carrying a number N of extensions extending parallel to one another, each presenting a free end, and disposed along the support in such a manner that the extensions
35 can be inserted simultaneously into each of the N openings by a single operation of manipulating the support, each free end acting simultaneously on the

corresponding spring blade to disconnect each of the electrical connections.

In this way, the operations performed by the user are considerably simplified since, in a single action, the user can either disconnect all of the current and voltage circuits in all of the subassemblies simultaneously while inserting the device, or else can reconnect the same circuit while withdrawing the device.

The present invention also provides a polyphase type electricity meter comprising a number N of subassemblies, where N is greater than one, each subassembly being constituted by a current circuit and by a voltage circuit, each subassembly being provided with a spring blade acting in a rest position to make an electrical connection between a terminal of the current circuit and a terminal of the voltage circuit, and the meter being also provided, in a terminal box, with N openings giving access from outside the meter to each of the blades, the meter being characterized in that it is also fitted with a removable disconnecter device comprising a support carrying a number N of extensions extending parallel to one another, each presenting a free end, and disposed along the support in such a manner that the extensions can be inserted simultaneously into each of the N openings by a single operation of manipulating the support, each free end acting simultaneously on the corresponding spring blade to disconnect each of the electrical connections.

Thus, by making provision to equip a meter with the disconnection device in accordance with the present invention, the user is prevented from performing the disconnection operations incompletely.

Advantageously, holder means are provided on the meter for holding the disconnecter device in a non-use position.

Advantageously, holder means are also provided for holding the disconnecter device in an in-use position.

The present invention can be better understood in the light of the following description made with reference to the accompanying figures, in which:

• Figures 1A and 1B are two perspective views of a device constituting a first possible embodiment for use with a three-phase electricity meter;

• Figure 2 is a partially cut-away perspective view showing co-operation between the Figure 1 device and one of the three pairs of a three-phase electricity meter;

• Figure 3 is an enlargement of a portion of Figure 2;

• Figure 4 shows an embodiment of a spring blade;

• Figures 5A and 5B are two perspective views of a device constituting a second possible embodiment, likewise for use with a three-phase electricity meter;

• Figure 5C is an elevation view of the device of Figures 5A and 5B; and

• Figures 6A to 6E show the succession operations to be performed when using the device of the invention.

With reference initially to accompanying Figures 1 to 4, the electrical disconnecter device 1 in accordance with the invention is for use together with a three-phase electricity meter having three subassemblies, each constituted by a current circuit and by a voltage circuit. Naturally, the invention can be generalized to any polyphase meter, regardless of the number, N, of subassemblies actually present in the meter. As can be seen in Figure 2, and in Figure 3, which is an enlargement of a portion of Figure 2, each subassembly is designed to be connected via an input terminal 2e, 3e, and 4e and an output terminal 2s, 3s, and 4s to the general electricity network (not shown). These input and output terminals are located in a portion of the meter known as a terminal box, and generally located in the bottom portion of the electricity meter. Each subassembly conventionally comprises a current circuit 5 and a voltage circuit with a reference 6 being given

merely to a terminal thereof. As described above, during normal operation of the meter, these two circuits within a single subassembly need to be electrically connected together. The electrical connection between the terminal
5 5 of the current circuit and the terminal 6 of the voltage circuit is advantageously provided by a spring blade 7 of a shape that can be seen clearly in Figure 4. When in the rest position, the two ends 7a and 7b of the blade come into contact respectively with the terminals 6
10 and 5. Nevertheless, the end 7a is a free end on which it is possible to act in order to deform the blade elastically and move the end 7a away from the terminal 6. It should be observed that the terminal 5 of the current circuit may be constituted by any metal portion of the
15 primary current circuit, for example the primary winding of the current sensor.

In accordance with the invention, the disconnecter device comprises a support 10 carrying a number, N, of extensions, in this case three extensions referenced 11a,
20 11b, and 11c. The extensions extend parallel to one another, and each presents a free end 12a, 12b, 12c. In its terminal box, the meter is provided with three openings (referenced 13 in Figures 6B and 6C) giving access from the outside of the meter to each of the
25 blades of each of the subassemblies. The extensions 11a, 11b, and 11c of the device of the invention are disposed along the support 10 so that the extensions can be inserted simultaneously into each of the three openings 13 by a single operation of manipulating the support.
30 Each free end 12a, 12b, 12c then acts simultaneously on the corresponding spring blade 7 to disconnect each of the electrical connections. The action of the end 12a of the extension 11a on one of the blades 7 is visible in Figure 3.

35 In the embodiment shown, the support 10 is in the form of a longitudinal strip, and the extensions 11a, 11b, and 11c extend perpendicularly relative to the

longitudinal axis of the strip. For the user, the longitudinal strip 10 constitutes an element for holding while putting the device 1 into place or removing it, depending on whether it is desired to disconnect the circuits, or on the contrary to connect them.

Preferably, the device is made as a single piece of insulating material, with the extensions 11a, 11b, and 11c being integrally molded with the support 10.

Figures 5A, 5B, and 5C show a second possible embodiment of a disconnection device in accordance with the invention. As in the above-described first embodiment, this device comprises a longitudinal strip 10 forming a support for three extensions 11a, 11b, and 11c that are to act simultaneously on respective blades as explained above. The difference compared with the device of the first embodiment lies essentially in the shape of the extensions that are intended to perform additional functions as explained below with reference to Figures 6A to 6D.

Figure 6A shows the starting point of a disconnection operation during which a user makes use of the disconnector device for simultaneously disconnecting the various circuits. In this starting configuration, the disconnector device 1 is advantageously held in a rest or non-use position close to the meter, e.g. close to the terminal box. For this purpose, the meter has holder means e.g. implemented in the form of a stud 14 co-operating, e.g. by snap-fastening, with an opening 15 (see Figures 1 and 5A to 5C) of the disconnector device in order to hold the device in this non-use position. To reinforce the holding of the device in this position, and in particular to avoid any movement of the support in longitudinal translation, the holding means may also comprise, on the device, holder tabs 16 and 17 (see Figures 5B and 5C) that are inserted in corresponding housings 18, 19 of the meter (see Figure 6B), a

configuration commonly referred to as an "internal" I/P link since it requires the meter enclosure to be opened.

When the user seeks to use the device, it is withdrawn as shown in Figure 6B. It should be observed in passing that withdrawing the device 1 reveals the access openings 13 leading to the blades. Consequently, the non-use position of the device as shown in Figure 6A also serves advantageously to protect the access to the openings by placing the support in such a manner that it covers the openings. In this non-use position, the extensions preferably extend in a plane that is substantially parallel to the plane of the openings, so as to optimize compactness.

The user can then pivot the disconnecter device 1 through 90°, as shown in Figure 6C so as to bring the extensions into a plane that is substantially perpendicular to the plane of the openings 13, thus enabling each of the extensions to be inserted into the associated opening. This insertion is performed merely by moving the device in the direction of the arrow as shown in Figure 6D. Finally, the user must impart a final translation movement to the support 1 in a direction parallel to its longitudinal axis, as represented by the arrow in Figure 6E, in order to cause the ends of the extensions 11a to 11c to disconnect the corresponding blades.

In order to release the hands of the user so that the user can perform other operations, and in particular operations specific to calibration, the device is preferably capable also of being held in its in-use position. To do this, holder means are also provided for holding the device in its in-use position. In the example shown, these means are formed by a step or shoulder 20a, 20b, 20c situated on each extension (see Figure 5C) that co-operate with a groove (not shown) in the meter.

By comparing the non-use position of the device as shown in Figure 6A with the in-use position as shown in Figure 6E, it can be seen that in the in-use position, an end portion of the support 1 (on the left in Figure 6E) projects from the terminal box. This precaution serves advantageously to prevent the user from forgetting to remove the disconnecter device from its in-use position. The projecting portion prevents the user from replacing the terminal cover or lid (not shown) of the housing back onto the terminal box.

CLAIMS

1. An electrical disconnecter device (1) for use together with an electricity meter, said electricity meter being of the polyphase type having a number, N, of
5 subassemblies each constituted by a current circuit and by a voltage circuit, where the number N is greater than one, each subassembly being provided with a spring blade (7) acting in a rest position to make an electrical connection between a terminal (5) of the current circuit
10 and a terminal (6) of the voltage circuit, and the meter being also provided, in a terminal box, with N openings (13) giving access from outside the meter to each of the blades, the device being characterized in that it comprises a support (10) carrying a number N of
15 extensions (11a-11c) extending parallel to one another, each presenting a free end (12a-12c), and disposed along the support (10) in such a manner that the extensions can be inserted simultaneously into each of the N openings (13) by a single operation of manipulating the support,
20 each free end (12a-12c) acting simultaneously on the corresponding spring blade to disconnect each of the electrical connections.
2. A device according to claim 1, characterized in that
25 said support (10) comprises a longitudinal strip and in that said extensions extend perpendicularly relative to the longitudinal axis of the strip.
3. A device according to either preceding claim,
30 characterized in that the device is made as a single piece of insulating material, the extensions (11a-11c) being integrally molded with the support (10).
4. A device according to any preceding claim,
35 characterized in that the support (1) presents an opening (15) suitable for co-operating with a stud (14) on the meter for holding the device in a non-use position.

5. A device according to any preceding claim,
characterized in that each extension presents a step
(20a-20c) for co-operating with a groove in the meter in
5 order to hold the device in an in-use position.

6. A polyphase type electricity meter comprising a number
N of subassemblies, where N is greater than one, each
subassembly being constituted by a current circuit and by
10 a voltage circuit, each subassembly being provided with a
spring blade (7) acting in a rest position to make an
electrical connection between a terminal (5) of the
current circuit and a terminal (6) of the voltage
circuit, and the meter being also provided, in a terminal
15 box, with N openings (13) giving access from outside the
meter to each of the blades, the meter being
characterized in that it is also fitted with a removable
disconnecter device (1) comprising a support (10)
carrying a number N of extensions (11a-11c) extending
20 parallel to one another, each presenting a free end (12a-
12c), and disposed along the support in such a manner
that the extensions can be inserted simultaneously into
each of the N openings (13) by a single operation of
manipulating the support, each free end (12a-12c) acting
25 simultaneously on the corresponding spring blade to
disconnect each of the electrical connections.

7. An electricity meter according to claim 6,
characterized in that it includes holder means (14-18)
30 for holding the disconnecter device (1) in a non-use
position.

8. An electricity meter according to claim 7,
characterized in that said holder means (14-18) are
35 disposed in such a manner that when the device is in its
non-use position, the support (10) covers each of the N
openings (13).

9. An electricity meter according to claim 7 or claim 8,
characterized in that, when the device is in its non-use
position, the extensions extend in a plane that is
5 substantially parallel to the plane of the openings (13).

10. An electricity meter according to any one of claims 6
to 9, characterized in that it further comprises holder
means (20a-20c) for holding the disconnecter device (1)
10 in an in-use position.

11. An electricity meter according to claim 10,
characterized in that said holder means for holding the
device in the in-use position comprise steps (20a-20c) in
15 each extension (11a-11c) of the device (1), co-operating
with a groove in the meter.