Load shedding contactor
single and three phase

CONFIGURATION HANDBOOK

DLB105BIN
DLB105/R

DLB105BIN REV 0.6 - 09/03/16 / DLB105R REV 0.3 06/04/18

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LOREME

Device presentation

LOREME

The DLB105BIN is a power load shedding. It allow to measure the power consumed in a electrical network and transmit, with the binary output, the power level remaining available to a control system who can modulate the load powered.

The DLB105/R is a power load shedding with 3 outputs A,B C. This outputs work in cascade:
When overconsumption is detected, the relay A is deactivated at first.
- if the total active power is less than the low limit, the relay A is reactivated.
- if the overconsumption is still present, it's the relay B who's fall and finally the relay C.
The relays are deactivated in the way A, B, C and activated (by default) in the way C, B, A.

The datasheet can be downloaded at : http://www.loreme.fr/fichtech/DLB105_eng.pdf

USER INTERFACE

DLB105BIN: 3 bits binary output:
A (LSB), B, C (MSB)

DLB105/R: A, B, C outputs relays

DLB105BIN: Remote BOOST button

DLB105/R: Remote BOOST button or dry contact to select the power threshold ECO/MAX.

Time slot output contact

Open : ECO,
Close : MAX

2 lines / 16 char
LCD display

Push buttons

Current transformer
input terminals
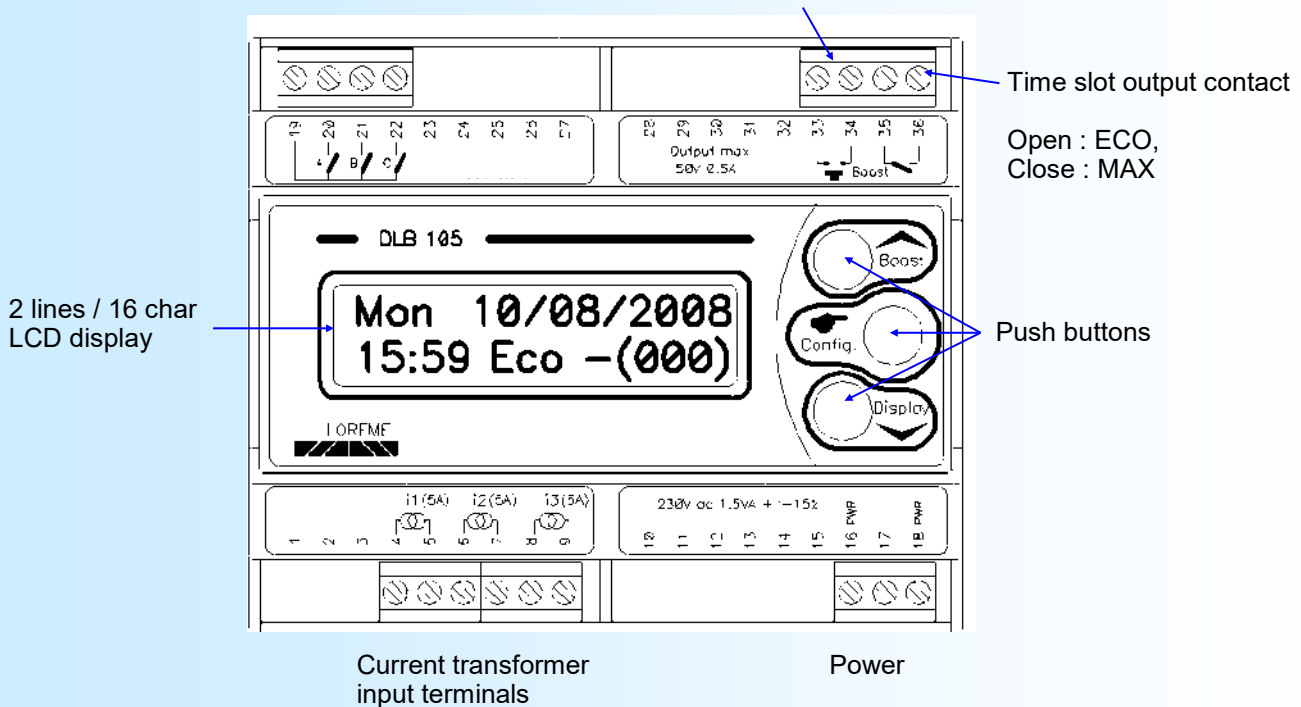
Power

Use of push buttons:

- ▲ When the time slot 'ECO' is use, an action on this button forces the device to use the 'MAX' power limits. The next action revalidate the 'ECO' power limits.
- ▼ Change the display.

- ☞ Access to the configuration.

DLB105BIN

LOREME

Operating

The device measure the total active power and compares it with the Power Limit of the time slot (ECO or MAX). It monitors the 3 currents and compares the highest value to the current limit « threshold breaker »

1st case: If the total power come to exceed the Power limit, the output is adjust according to this difference after a period of « POWER DOWN TIME ».
Output value = Output value + [(Total Power - Power Limit) / Output Step] + 1.
The output value is 7 at maximum.

2nd case: There is a dead band between the Power Limit and (Power Limit - Output Step). As long as the Total Power is in this dead band, the output value doesn't evolve.

3rd case: If the total power is lower than (Power Limit - Output Step), the output is adjust according to this difference after a period of « POWER UP TIME ».
Output value = Output value - [(Total Power - Power Limit) / Output Step].
The output value is 0 at minimum.

4th case: If the highest current i1,i2,i3 exceed the « threshold breaker » current, the output is adjust according to this difference after a period of « POWER DOWN TIME ».
Output value = Output value + [(Apparent Power - Apparent Power Limit) / Output Step] + 1.
Apparent power = Irms x Urms x 3 and Apparent power limit = I threshold x Urms x 3

5th case: if the power and the current are exceeded, the output will be adjusted with the greatest overflow.

The output value monitor the power available: 0: 000 : 100% of power is available
7: 111 : 0% of power is available

Visualization

Display #1

| Day of week | `Thu 16/09/2008` | Date |
| Hour | `10:32 ECO   111` | Output state (A, B, C) |

Display #2

| RMS current values | `(A)  I1   I2    I3`
`   40.2 40.3 40.1` |

Display #3

| Total active power
Cos phi U / I1
(Power Factor) | `P: 28KW ECO 36KW`
`COS: 0.99 / 231V` | Timeslot and power limit
RMS voltage value |

Configuration

The DLB105BIN can be setup with the front panel push button and LCD. Push the '**Config**' button to access the configuration.

```
CONFIGURATION
Rev x.y
```
A temporarily message is displayed. This message show the device revision (Hard.Soft).

Note: *At configuration access, the outputs falls to 000!!*

1) Type of configuration

```
USER SETUP    >
```
Allow the user to modify the date, hours and timeslot.
```
ADVANCE SETUP>
```
Allow the user to modify the electrical parameters.

2) <u>User setup</u>

2.1) <u>Date, time configuration</u>

```
YEAR:   2008
MONTH:    09

DAY:  14
HRS: 15:18
```

A blinking cursor shows the parameter which can be modify. The buttons ⋏ and ⋎ permits to increment / decrement the value.
The '**Config**' button validate the parameter's value and select the next one.

2.2) <u>ECO and MAX timeslot configuration</u>

```
MON ECO: 07:00
    MAX: 23:00
    ...
SUN ECO: 07:00
    MAX: 23:00


OK
```

Setup the starting hour for the 'ECO' slot time and for the 'MAX' slot time for the displayed day (ex: MON : Monday).

Timeslot setup for Sunday.

This message indicates the end and the saving of the new configuration.

3) <u>Advanced setup</u>
3.1) <u>Security code</u>

```
CODE:    456
```

The ⋏ and ⋎ buttons allows to increment / decrement the code. The '**Config**' button validates the code (if it is not correct, the device access's the user setup).

3.2) <u>Message language</u>

```
LANGUAGE?
FRENCH
```

Choose one language among these 3 possibilities : French, English, Italian.

3.3) <u>Electricals parameters</u>

```
CT RATIO
150/5
```

Enter the primary current transformer value.
The secondary value of the transformer is fixed and equal to 5 A.

```
ECO POWER LIMIT?
36KW
```

Enter the power limit for the ECO time slot.

```
MAX POWER LIMIT?
36KW
```

Enter the power limit for the MAX time slot.

```
OUTPUT STEP
3KW
```

Enter the value corresponding to a variation of one bit of the binary output.

```
POWER DOWN TIME?
1sec
```

It is the output refresh period when the power is greater than the limit.

```
POWER UP TIME?
5sec
```

It is the output refresh period when the power is lower then the limit.

```
THRESH. BREAKER?
60A
```

It's the breaker installation limit value, the currents are compared to this threshold in order to activated or not the load shedding.

```
CALCULATE COS.?
YES
    COS PHI:
    0.95
```

By default, the cosines is calculated (it is the phase shift between the voltage and the I1 current). If 'NO', the cosines phi is not calculated but has a fixed value.

Enter the fixed value for the phase shift.

PWR WITH NEUTRAL?   By default, the 230 V module supply is between a phase and a neutral lines. But if this
YES   230 V supply is between two phases, the answer should be 'NO'. In this case the
                           voltage measurement will be divide by a factor of square root of 3.

DST ?   Define if the device manage the Daylight Saving Time.
ON

OK   This message indicates the end and the saving of the new configuration.

Note:
The device exit the configuration mode if no action was made on buttons within a 30 seconds delay. It's only at the end of configuration menus that the parameter's values are store in the internal memory.

DLB105/R

LOREME

Operating

The device measure the total active power and compares it with the high and low power limits of the timeslot (ECO or MAX). It monitors the three currents and compares the highest value to the current limit « threshold breaker ».

1st case: If the total power is higher than the high power limit, an output relay is deactivated (first relay A and relay B and relay C for ending) after a delay of « POWER DONW TIME ».

2nd case: If the total power is between the high and low limits, the outputs relay are unchanged.

3rd case: If the total power is lower than the low power limit, an output relay is activated (first relay C, and B, and A) after a delay of « POWER UP TIME ».

4th case: If the higher of i1, i2, i3 exceed the « THRESHOLD BREAKER », a relay is deactivated after the « POWER DOWN TIME » delay.

Note: *The sequence of relays during a reloading may be configured ('C,B,A' or 'A,B,C').*

Visualization

Display #1

| Day of week | `Thu 16/09/2008` | Date |
| Hour | `10:32 ECO   111` | Output relays state (A, B, C) |

Display #2

| RMS current values | `(A)  I1   I2    I3`
`    40.2 40.3 40.1` | |

Display #3

| Total active power
Cosines phi U / I1
(Power Factor) | `P: 28KW ECO 36KW`
`COS: 0.99 / 231V` | Timeslot and power limit
RMS voltage value |

Configuration

The DLB105/R can be setup with the front panel push button and LCD. A push in '**Config**' button access to the menu:

```
CONFIGURATION
Rev x.y
```
A temporarily message is displayed. This message show the device revision.

Note: *At access to the configuration, the 3 outputs relays are deactivated!*

1) Type of configuration

```
USER SETUP    >
ADVANCE SETUP>
```
Allow the user to modify the date, hours and timeslot.
Allow the user to modify the electrical parameters.

2) User setup
2.1) Date, time configuration

```
YEAR:   2008
MONTH:   09
```
A blinking cursor shows the parameter which can be modify. The buttons ⋀ and ⋁ permits to increment/decrement the value.
The '**Config**' button validate the parameter's value and select the next one.

```
DAY:   14
HRS: 15:18
```

2.2) ECO and MAX timeslot configuration *(if external BOOST function = BP_BOOST)*

```
MON ECO: 07:00
    MAX: 23:00
    ...
SUN ECO: 07:00
    MAX: 23:00
```
Setup the starting hour for the 'ECO' slot time and for the 'MAX' slot time for the displayed day (ex: MON : Monday).

Timeslot setup for Sunday.

```
OK
```
This message indicates the end and the saving of the new configuration.

3) Advanced setup
3.1) Security code
```
CODE:    456
```
The ∧ and ∨ buttons allows to increment / decrement the code. The '**Config**' button validate the code (if it is not correct, the device access's the user setup).

3.2) Message language
```
LANGUAGE?
FRENCH
```
Choose one language among the 3 possibilities: French, English, Italian.

3.3) Electricals parameters
```
CT RATIO
150/5
```
Enter the primary current transformer value.
The secondary value of the transformer is fixed and equal to 5 A.

```
ECO HIGH POWER ?
36KW
```
Enter the value for the high threshold for ECO time period.

```
ECO LOW POWER ?
30KW
```
Enter the value for the low threshold for ECO time period.

```
MAX HIGH POWER ?
36KW
```
Enter the value for the high threshold for MAX time period.

```
MAX LOW POWER ?
30KW
```
Enter the value for the low threshold for MAX time period.

```
POWER DOWN TIME
1sec
```
It is the delay before deactivate an output relay.
(value limited to 32767 seconds).

```
POWER UP TIME
5sec
```
It is the delay before activate an output relay.
(value limited to 32767 seconds).

```
SEUIL DISJONCT.?
60A
```
It's the breaker installation limit value, the currents are compared to this threshold in order to activated or not the load shedding.

```
CALCULATE COS. ?
YES
    COS PHI:
    0.95
```
By default, the cosines phi is calculated (it is the phase shift between the voltage and I1 current). If 'NO', the cosines is not calculated but have a fixed value.

Enter the fixed value for the cosines phi.

```
PWR WITH NEUTRAL?          By default, the 230 V module supply is between a phase and a neutral lines. But if this
YES                        230 V supply is between two phases, the answer should be 'NO'. In this case the
                           voltage measurement will be divide by a factor of square root of 3.
```

3.4) Operating mode parameters

```
DST ?                      Define if the device manage the Daylight Saving Time.
YES


EXT. FUNCTION?             Choose the operating mode for the external input BOOST.
BP BOOST                   Show the active mode. Change with ▲ and ▼ buttons.
or SWITCH E/M: NO          Confirm the choice with 'Config' button.
or SWITCH E/M: NC
```

Operating mode of the BOOST input:
- **BP BOOST**:
Allows to remote the BOOST button. In time slot ECO, pressing this button forces to use the MAX power limit instead of ECO limits. The next pressing returns the limits to ECO (the BOOST button has no effect if the device is in the MAX time slot).

- **SWITCH E/M: NO** or **SWITCH E/M: NC** : (see wiring on page 13).
This operating mode allows wiring a dry contact on the BOOST input, to choose manually the ECO or MAX power limits.
In this mode the device does not manage the time slot anymore. It is the input state who control the power limits used.
The ECO limits when the BOOST input is in standby or the MAX limits when the input is working.
The used contact can be NO (normally open) or NC (normally closed).

```
RELOADING SEQ.?           Choose the sequence of relay when reloading (after shedding).
SEQ. <C,B,A>              Show the active mode first. Change with ▲ and ▼ buttons.
or SEQ. <A,B,C>           Confirm the choice with 'Config' button (by default, the sequence is <C,B,A>).


OK                        This message indicates the end and the saving of the new configuration.
```

Note:
The device exit the configuration mode if no action was made on buttons within a 30 seconds delay. It's only at the end of configuration menus that the parameter's values are store in the internal memory.

RS232 link setting

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The device can be updated in terminal mode via an RS232 link.

Step 1: Driver installation for USB / RS232 adapter

- download driver at www.loreme.fr:
    http://www.loreme.fr/aff_produits.asp?rubid=53&langue=fr

- Click on executable file to install the driver,
- Plug the cable on a USB port, Windows install a new serial communication port **COMx** (x >= 4).

Note :
The use of the cable on another USB port don't generates a new communication port.
Use of another adapter generates another communication port number (COMx) and requires the reconfiguration of the HyperTerminal.

Step 2: Setting of terminal emulation software (PC with Windows).

1 The terminal emulation software for PC « HyperTerminal » is resident in windows up to XP version. For later versions, it is downloadable on : **www.loreme.fr in download part** (http://www.loreme.fr/HyperTerm/htpe63.exe)

=> Run the downloaded software to install it.

2 Start a "hyper Terminal" connection :
- Click on **"START"** button
Up to XP version
- Go to **"Programs \ Accessories \ Communication \ Hyper Terminal"**
- Click on **"Hypertrm.exe"**
Or if the software was downloaded
- Go to **"All programs \ HyperTerminal Private Edition"**
- Click on **"HyperTerminal Private Edition"**

3 Enter name for the new connection

4 Choose the communication port related to the adapter.

5

Choose:
- 9600 bauds
- 8 DATA bits
- no parity
- 1 stop bit
- **XON/XOFF**

6 The PC is now in terminal mode, connect it to the device by plugging the RS232 cable.

7 When leaving Hyper terminal, the following window will appear. By saving, the terminal session will start with the same configuration.

Thus, the shortcut LOREME.ht will permit to communicate with all LOREME devices.

Note: to modify the parameters of terminal mode whereas this one is already started, it is necessary, after having carried out the modifications, to close the terminal and to open it again so that the modifications are effective.

FIRMWARE update

To access to the firmware update function, you must first open an HyperTerminal session on a PC, connect the device to the PC with the RS232 link cable and then power on the device.

The following character is send to the terminal:

>   <───────────── The device sends this character then it waits the « F » key during 0.5 s.

If the user has pressed the « F » key in the allowed time, the following message is displayed in the HyperTerminal windows:

```
FIRMWARE LOADER Rev2
READY TO TRANSFER...
```

The device is now in the firmware load mode and is waiting for the firmware file. This file is provide by LOREME and contain the firmware code in Intel HEX format.

Select the « Transfer », « Send a text file ... » in the HyperTerminal menu.
Select the directory and open the file. The HyperTerminal program begins to send the file to the device.

FIRMWARE LOADER Rev3
READY TO TRANSFER
********** <───────────── The star characters appears to show the progress of the uploading.

At the end, the message « **PROGRAMMING OK !** » is display if no errors occurs. Otherwise, these following message could be displayed:

     - **SERIAL COM ERROR !**   Error during receipt.
     - **SERIAL TIMEOUT !**   Waiting time of receipt elapsed (60 s).
     - **PROGRAMMING FAILED !**   Programming error in the internal flash memory.

Attention
If an error occurs during the programming process, it is necessary to start again the whole procedure.
A bad programming leads to an inoperative device.

EMC Consideration

LOREME

1) Introduction

To meet its policy concerning EMC, based on the Community directives **2014/30/EU** & **2014/35/EU**, the LOREME company takes into account the standards relative to this directives from the very start of the conception of each product.

The set of tests performed on the devices, designed to work in an industrial environment, are made in accordance with **IEC 61000-6-4** and **IEC 61000-6-2** standards in order to establish the EU declaration of conformity. The devices being in certain typical configurations during the tests, it is impossible to guarantee the results in every possible configurations. To ensure optimum operation of each device, it would be judicious to comply with several recommendations of use.

2) Recommendations of use

2.1) General remarks

- Comply with the recommendations of assembly indicated in the technical sheet (direction of assembly, spacing between the devices, ...).
- Comply with the recommendations of use indicated in the technical sheet (temperature range, protection index).
- Avoid dust and excessive humidity, corrosive gas, considerable sources of heat.
- Avoid disturbed environments and disruptive phenomena or elements.
- If possible, group together the instrumentation devices in a zone separated from the power and relay circuits.
- Avoid the direct proximity with considerable power distance switches, contactors, relays, thyristor power groups, ...
- Do not get closer within fifty centimeters of a device with a transmitter (walkie-talkie) of a power of 5 W, because the latter can create a field with an intensity higher than 10 V/M for a distance fewer than 50 cm.

2.2) Power supply

- Comply with the features indicated in the technical sheet (power supply voltage, frequency, allowance of the values, stability, variations ...).
- It is better that the power supply should come from a system with section switches equipped with fuses for the instrumentation element and that the power supply line be the most direct possible from the section switch.
- Avoid using this power supply for the control of relays, of contactors, of electrogates, ...
- If the switching of thyristor statical groups, of engines, of speed variator, ... causes strong interferences on the power supply circuit, it would be necessary to put an insulation transformer especially intended for instrumentation linking the screen to earth.
- It is also important that the installation should have a good earth system and it is better that the voltage in relation to the neutral should not exceed 1V, and the resistance be inferior to 6 ohms.
- If the installation is near high frequency generators or installations of arc welding, it is better to put suitable section filters.

2.3) Inputs / Outputs

- In harsh conditions, it is advisable to use sheathed and twisted cables whose ground braid will be linked to the earth at a single point.
- It is advisable to separate the input / output lines from the power supply lines in order to avoid the coupling phenomena.
- It is also advisable to limit the lengths of data cables as much as possible.
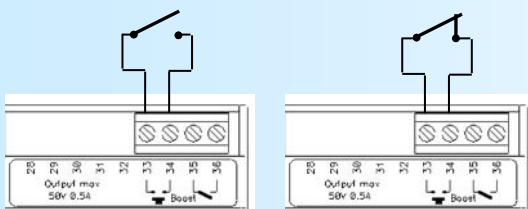
Wirings

LOREME
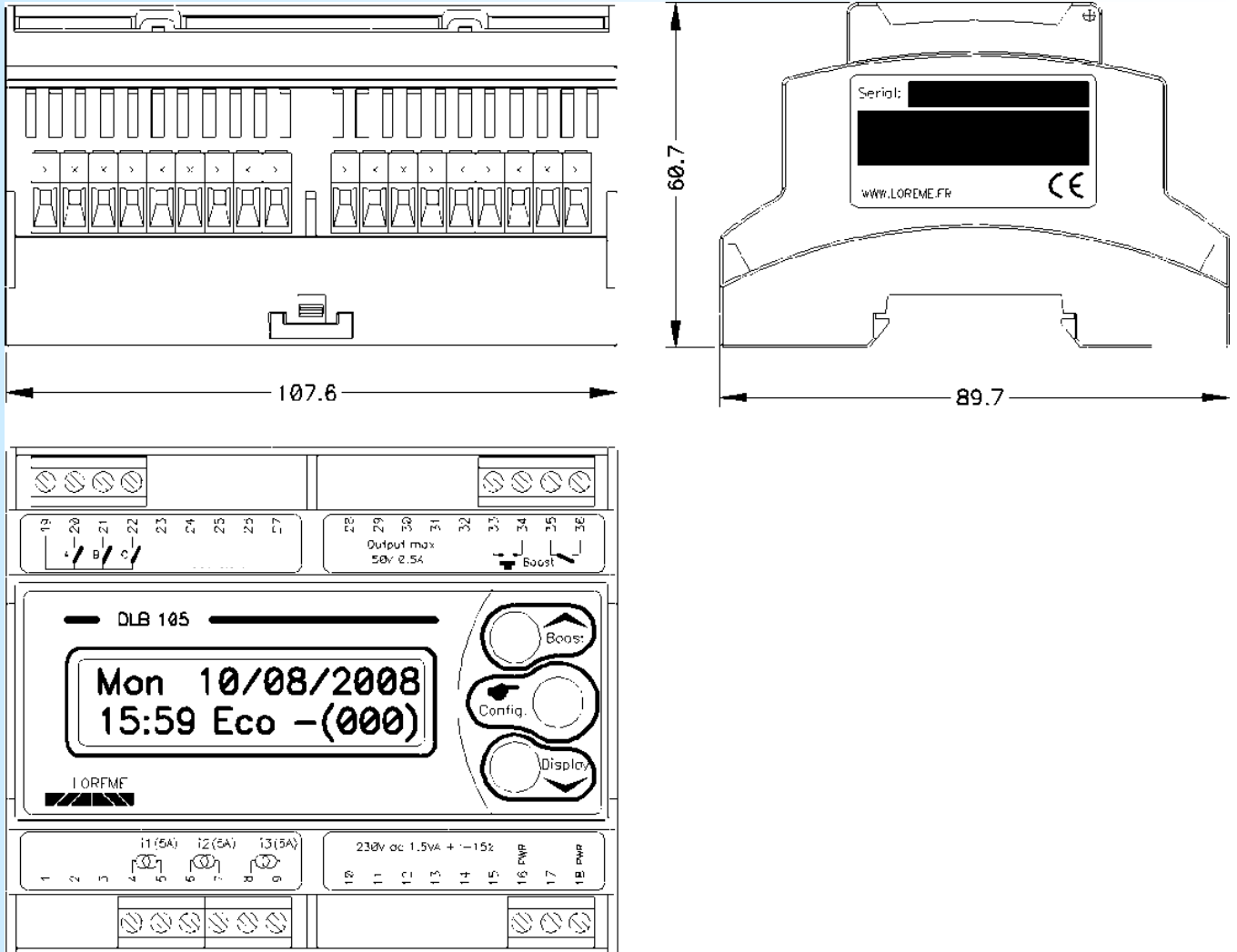
WIRING OF BOOST INPUT

DLB105R
Operating mode: SWITCH Eco/Max

- The ECO power limit is selected when the contact is standby.
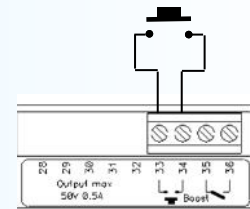- The MAX power limit is selected when the contact is working.

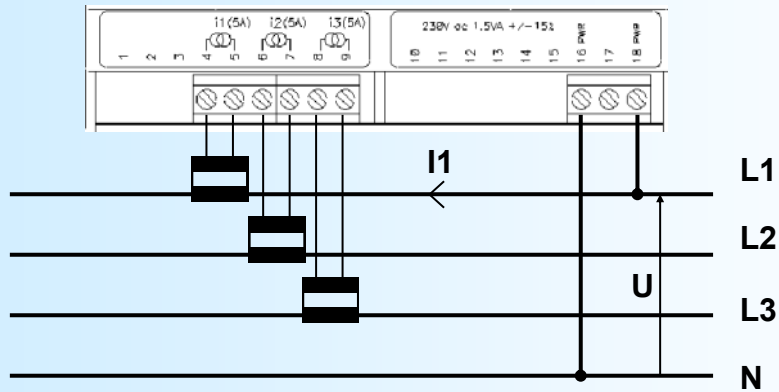SWITCH E/M : NO   SWITCH E/M : NC

DLB105BIN and DLB105R
Operating mode: BP BOOST

In ECO time slot, pressing the button allows to switch the ECO limits to MAX limits and reversely.

BP BOOST

DIAGRAM OF CONNECTION

WARNING:

The phase shift is calculated from the voltage power and the I1 current. It is therefore important to ensure that the phase of the I1 current match to the phase of voltage U.