

# INSTRUCTION MANUAL



## MICRON 48/110-04 M MICRON 48/110-1 M

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## INTRODUCTION

Enersine is a young and dynamic company based on a professional staff with more than 15 years of experience in the energy conversion field. Projecting and manufacturing know-how achieved in several years turn into the Enersine strength. This feature allows Enersine to become a worldwide reference in the production of energy conversion equipment under 10KVA power, signed by the Made in Italy reliability.

All products are completely projected and manufactured inside the company by high specialized and qualified technical staff allowing the full control of the production processes and the high quality of the equipment.

The well-known skills to face the most critical demands and to implement special products on the customers' requirements, mark out the company core business.

Enersine produces several kind of energy equipment dedicated to different applications and fields:

- HIGH SAFETY uninterruptible power supplies – ERGON series
- MEDICAL uninterruptible power supplies – SINE series
- MEDICAL isolation Transformers – TMed series
- LIGHT uninterruptible power supplies – BLAZE, INTERSINE AND COSMO series
- INDUSTRIAL sine wave inverters – SINE and MICRON series
- EMERGENCY light devices – LIDE series
- DC power supplies – ALGON series
- FREQUENCY converters 50/60Hz – CONV series
- Three-phase ups systems – TRITON series

A skilled, dynamic and above all flexible staff allows the company to give prominence to a direct high-qualified relation able to support any commercial and technical request. Enthusiasm, energy, openness and great availability will be at the basis of the relationship with Enersine staff. A professional after-sale and customer care service will be at full disposal for all customers in order to solve any type of requests skillfully and with high efficiency.

As an independent manufacturer, Enersine is committed to constant technological innovations, in order to implement new complete lines and products to be the right answer to niche and special markets.

## ATTENTION

**Respect all the cautions and safety instructions written in the present manual.**

**Keep the present manual**

**Read carefully the following instructions before installing the unit or carrying out any other operation.**

**Respect all the safety instructions during installation or disinstallation processes since the unit works with dangerous voltages and currents.**

**Any lack on the procedures and the rules non-observance on unit implant set up, automatically dispense the manufacturer with any responsibility in case of damages to persons or properties.**

**The manufacturer declines every responsibilities for unsuitable use or improper installation by the user.**

**All not authorized modifications shall lose the unit safety and warranty.**

**All damages due to improper use, wrong maintenance processes or not authorized interventions will dispense the manufacturer with any responsibility.**



## SYMBOLGY DESCRIPTION



GENERAL DANGER



READ INSTRUCTIONS



DANGEROUS VOLTAGE



DO NOT TOUCH



GROUND CONNECTION



RECYCLING



## SAFETY INSTRUCTIONS



Take care of the following safety instructions before using the unit:

- if the unit is unpacked in a cool place, take care of condensation processes. If condensation is present wait until the unit is totally dry before its use.

Warning: electrical shocks



- Do not touch the unit with wet hands or feet.



Warning: electrical shocks



- Install the unit in a suitable environment, without humidity (0-70% tolerance), with proper temperature (0-35°C tolerance) and with not excessive dust. Do not install the unit with direct sunlight or next to heat source, they can compromise the correct functioning. Do not install the unit to altitude more than 2000mt.
- Do not use the unit in environment with high oxygen concentration (>25% in the air at 1atm)
- To avoid electrical shocks, this unit should be connected to mains supply with ground connection implants.



- Arrange connection cables making attention to leave the way clear without any possibility to tread on them. Do not stretched, bent, pressed or twisted the cables and do not place them over.



Use homologated cable to connect the unit

- Before connecting the plug into the mains socket take care that the cables or the plug are not damaged. In this case please contact the manufacturer for spare parts to avoid any problem. Anyway do not proceed with the unit installation.
- Electrical cables should be periodically checked.  
Take care do not pull the mains supply cable to disconnect the unit.

Warning: cable break risk and electric shock.



- Arrange the Emergency Power Off device where required.
- Do not connected equipment that can overload the units.
- Do not move the unit during normal functioning to avoid cables or devices disconnection.
- Do not open the unit cover. Any intervention on the unit done without authorization can compromise the correct unit functioning and the warranty decline dispensing the manufacturer with any responsibilities.

- Do not obstruct the ventilation holes to avoid unit damages or dangerous short circuits that can compromise the unit functioning.

- To avoid electrical shocks



Take care that in the unit are built in hermetic lead batteries and some internal sections work under voltage also without the mains supply or even if the unit is off.

- The units should not be installed with the following environmental conditions presence:

- high dust level
- lack of ventilation
- extreme humidity or easy flooding
- fumes or corrosive substances
- burner gas
- direct sunlight and heat surfaces
- high temperature level (normal environment temperature 25°C)
- atmospheric agents

### Unit cleaning



To clean the unit is suggested to use dry clothes.

To avoid excessive dust on the ventilation holes from time to time blow through the ventilation openings.

Do not pour liquids into the unit

Do not use spray to clean the unit. If necessary put it on the dry cloth for removing the dust.

### Unit waste

The ups cannot be wasted without consulting Authorized Organizations defined by your country Norms. For more information, please contact the manufacturer.



## EMERGENCY PROCEDURES

Our equipment have a high safety level thanks to the technical characteristics, but even though they can produce dangerous voltages also without mains supply.



When smokes, fire or other dangerous events will occur on the unit or on the connected devices, switch off immediately the unit following these instructions:

- push the EPO button, if present  
or
- switch off the input switch  
or
- switch off the unit through the on/off on the frontal panel

If necessary to totally disconnect the unit, please follow the instructions written in the "INSTALLATION PROCEDURE".

## UNPACKING AND CONTROLS



Unpacking and first unit check should be done by authorized personnel. Unit handling should be managed with extreme caution. In order to avoid any damages or injuries take care that people or things are not standing around the dedicated areas.

During goods receiving, take care that the original packaging is integral and undamaged checking the external box, then verify the internal parts and preserve the original packaging for future uses.

If the packaging is broken or damaged, please collect the unit with reservation and contact the manufacturer.

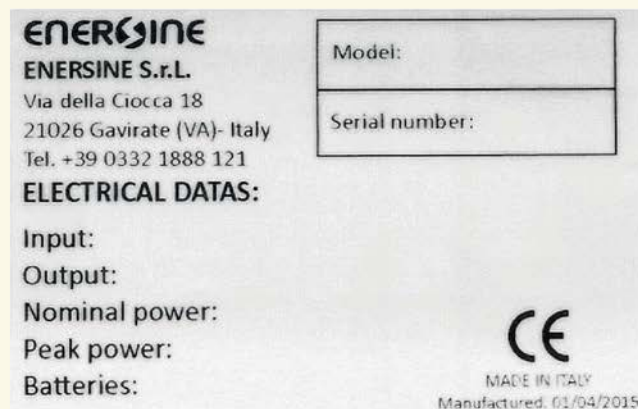
If the unit do not have the original safety features and it has visible defects and/or damages and/or unexpected functioning, disable the unit and contact the manufacturer explaining the problem.

The storage time should be not more than 12 months.

## UNIT MODEL IDENTIFICATION

All the units are provided of an identification label on the rear panel on which it is written the following details:

- company details
- model
- serial number
- electrical data
- manufacturing date





## UNIT TEST REPORT – SAMPLE

| TEST CERTIFICATE         |          |                      |  |                   |
|--------------------------|----------|----------------------|--|-------------------|
| <b>DATE</b>              |          |                      |  | PAGE - 1          |
| <b>MODEL</b>             |          | <b>SERIAL NUMBER</b> |  |                   |
| Tipology                 | Inverter |                      |  |                   |
| GENERAL DETAILS          |          |                      |  |                   |
| DC input voltage         |          | Output Voltage       |  | Output Current    |
| Input Voltage            |          | Output Frequency     |  | Output peak power |
| Input Frequency          |          |                      |  |                   |
|                          |          |                      |  |                   |
| CONTROLS PROVIDED        |          |                      |  |                   |
| DC MODE                  |          |                      |  |                   |
| LOAD 0%                  | LOAD 50% | LOAD 100%            |  |                   |
|                          |          |                      |  |                   |
|                          |          |                      |  |                   |
| AC INPUT MAINS - DETAILS |          | DC INPUT - DETAILS   |  |                   |
| Nominal voltage          |          | DC nominal voltage   |  |                   |
| Minimum voltage          |          | Maximum DC voltage   |  |                   |
| Maximum voltage          |          | Minimum DC voltage   |  |                   |
| Frequency                |          | DC low alarm voltage |  |                   |
|                          |          |                      |  |                   |

## TEST CERTIFICATE

|              |          |                      |  |  |          |
|--------------|----------|----------------------|--|--|----------|
| <b>DATE</b>  |          |                      |  |  | PAGE - 2 |
| <b>MODEL</b> |          | <b>SERIAL NUMBER</b> |  |  |          |
| Tipology     | Inverter |                      |  |  |          |

### CONTROLS PROVIDED

| Controls                     | Checked | NOT available |
|------------------------------|---------|---------------|
| Cables control               |         |               |
| Pilot board calibration      |         |               |
| Battery charger calibration  |         |               |
| Dc mode check                |         |               |
| By-pass mode check           |         |               |
| LED alarms check             |         |               |
| Remote alarms check          |         |               |
| Display check                |         |               |
| Battery test check           |         |               |
| Automatic switches check     |         |               |
| Earth leakage switch check   |         |               |
| Insulation controller check  |         |               |
| Ventilation check            |         |               |
| Electrical datas label check |         |               |
| Identification labels check  |         |               |
| Tropicalization treatment    |         |               |
| Anti-vibration treatment     |         |               |

**TESTED BY**





## UNIT TECHNICAL FEATURES 48V and 110V

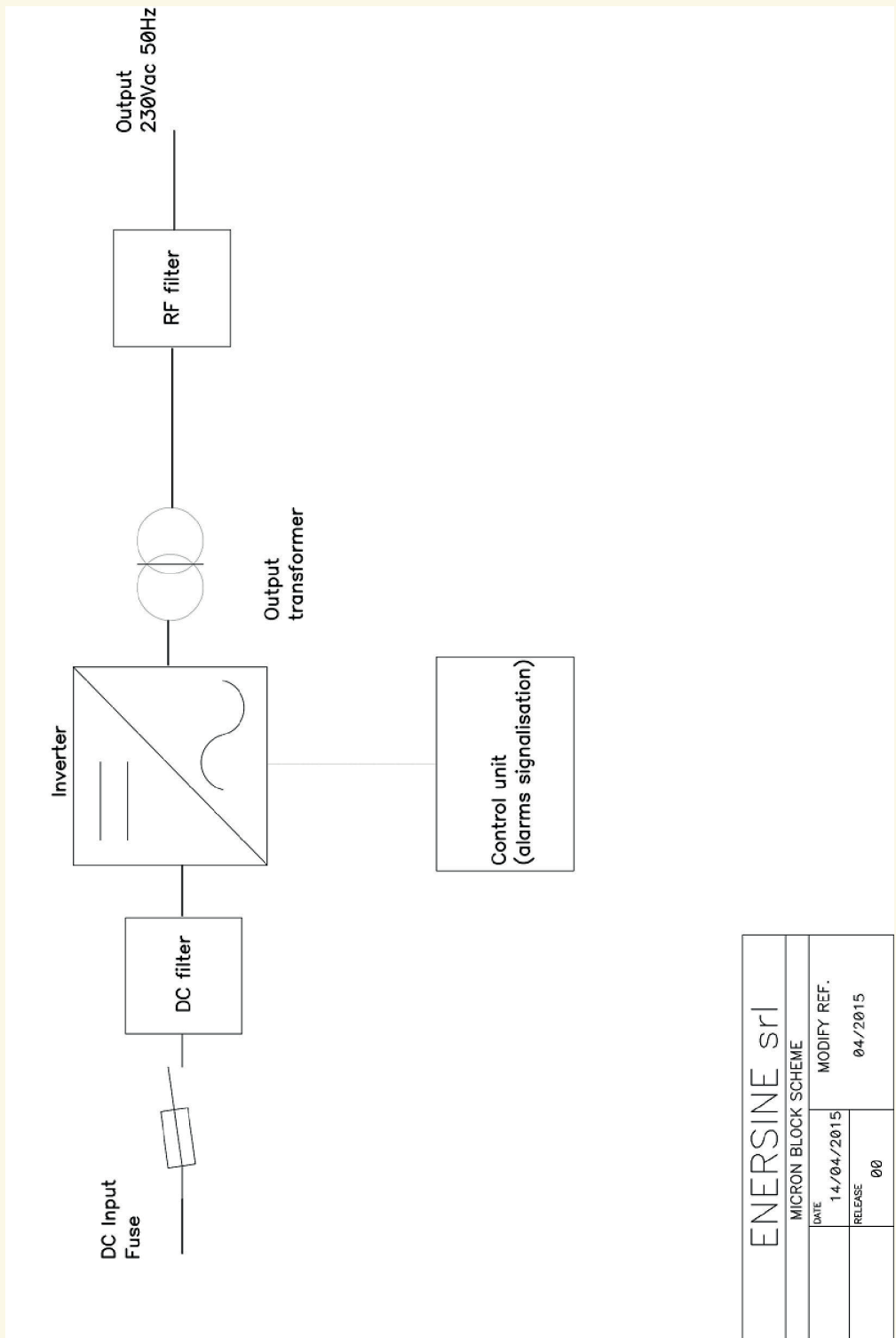
| Technical features / MODEL |                                 | MICRON 48-04  | MICRON 48-1 |
|----------------------------|---------------------------------|---|-------------|
| POWER                      | Peak power for 5"               | 300W  | 600W        |
|                            | Output current (linear load)    | 0.4A  | 1.3A        |
|                            | Active nominal power            | 100W  | 300W        |
| DC INPUT                   | Voltage range                   | 39-70Vdc  | 39-70Vdc    |
|                            | Pre-alarm DC level              | 42.5Vdc   | 42.5Vdc     |
|                            | DC input - AC output separation | 4000V of galvanic isolation with toroidal transformer   |             |
| AC OUTPUT                  | Protections                     | 6.3AT fuse  | 10AT fuse   |
|                            | Connections                     |   | Connectors  |
|                            | Voltage (V)                     | 230Vac single-phase   |             |
|                            | Frequency                       | 50Hz +/- 0,01% (with quartz mains phased)   |             |
|                            | Wave form                       | Sinusoidal, generated by microprocessor   |             |
|                            | Load isolation                  | 4000V galvanic isolation with toroidal transformer  |             |
|                            | Connections                     | Nr. 2 output on terminals; nr. 1 schuko socket (option)   |             |
|                            | Electronic protection           | Overload – Short circuit  |             |
|                            | Linear load distortion          | <5%   |             |
|                            | Not linear load distortion      | <8%   |             |
| TECHNOLOGY                 | Static voltage variation        | <1%   |             |
|                            | Dynamic voltage variation       | +/- 3%  |             |
|                            | Inverter                        | PWM microprocessor  |             |
|                            | Inverter efficiency             | <84%  |             |
|                            | Special treatment - option      | Mechanical treatment IEC60 + Tropicalization treatment (optional)                                   |             |
|                            | Optics and acoustics            | DC mode, DC low, danger temperature, over temperature, overload                                     |             |
|                            | Remote contacts                 | DC mode, DC low<br>(optional: ON/OFF, danger temperature, stop temperature, overload/short circuit) |             |
|                            | Stocking temperature            | -10°C a +60°C   |             |
|                            | Functioning temperature         | 0°C a +45°C (with nominal power until 25°C)   |             |
|                            | Noise level at 1m               | 28db  |             |
| ENVIRONMENT CONDITIONS     | Wall mounted version            | 180x150x377h (mm. – lxdxh)  |             |
|                            | Weight - Kg.                    | 6   | 8           |



| Technical features / MODEL    |                                 | MICRON 110-04  | MICRON 110-1   |
|-------------------------------|---------------------------------|--|--|
| <b>POWER</b>                  | Peak power for 5"               | 300W   | 600W   |
|                               | Output current (linear load)    | 0.4A   | 1.3A   |
|                               | Active nominal power            | 100W   | 300W   |
|                               | Voltage range                   | 110Vdc (89V-145Vdc)  | 110Vdc (89V-145Vdc)  |
| <b>DC INPUT</b>               | Pre-alarm DC level              | 99Vdc  | 99Vdc  |
|                               | DC input - AC output separation | 4000V of galvanic isolation with toroidal transformer  | 4000V of galvanic isolation with toroidal transformer  |
|                               | Protections                     | 4AT fuse   | 6.3AT fuse   |
|                               | Connections                     | Connectors   | Connectors   |
| <b>AC OUTPUT</b>              | Voltage (V)                     | 230Vac single-phase  | 230Vac single-phase  |
|                               | Frequency                       | 50Hz +/- 0,01% (with quartz mains phased)  | 50Hz +/- 0,01% (with quartz mains phased)  |
|                               | Wave form                       | Sinusoidal, generated by microprocessor  | Sinusoidal, generated by microprocessor  |
|                               | Load isolation                  | 4000V galvanic isolation with toroidal transformer   | 4000V galvanic isolation with toroidal transformer   |
|                               | Connections                     | Nr. 2 output on terminals; nr. 1 schuko socket (option)  | Nr. 2 output on terminals; nr. 1 schuko socket (option)  |
|                               | Electronic protection           | Overload – Short circuit   | Overload – Short circuit   |
|                               | Linear load distortion          | <5%  | <5%  |
|                               | Not linear load distortion      | <8%  | <8%  |
|                               | Static voltage variation        | <1%  | <1%  |
|                               | Dynamic voltage variation       | +/- 3%   | +/- 3%   |
| <b>TECHNOLOGY</b>             | Inverter                        | PWM microprocessor   | PWM microprocessor   |
|                               | Inverter efficiency             | <84%   | <84%   |
| <b>TREATMENTS</b>             | Special treatment - option      | Mechanical treatment IEC60 + Tropicalization treatment (optional)  | Mechanical treatment IEC60 + Tropicalization treatment (optional)  |
|                               | Optics and acoustics            | DC mode, DC low, danger temperature, over temperature, overload  | DC mode, DC low, danger temperature, over temperature, overload  |
| <b>SIGNALS</b>                | Remote contacts                 | DC mode, DC low  | DC mode, DC low  |
|                               | Stocking temperature            | (optional): ON/OFF, battery low, DC in use, general alarm (danger temperature, stop temperature, overload/short circuit) | (optional): ON/OFF, battery low, DC in use, general alarm (danger temperature, stop temperature, overload/short circuit) |
| <b>ENVIRONMENT CONDITIONS</b> | Functioning temperature         | -10°C a +60°C  | -10°C a +60°C  |
|                               | Noise level at 1m               | 0°C a +45°C (with nominal power until 25°C)  | 0°C a +45°C (with nominal power until 25°C)  |
|                               | Wall mounted                    | 28db   | 28db   |
| <b>CABINET</b>                | Weight - Kg.                    | 6  | 8  |
|                               |                                 | 180x150x377h (mm. – lxdxh)   | 180x150x377h (mm. – lxdxh)   |



## BLOCK SCHEME



|                     |            |
|---------------------|------------|
| ENERSINE srl        |            |
| MICRON BLOCK SCHEME |            |
| DATE                | 14/04/2015 |
| RELEASE             | 00         |
| MODIFY REF. 04/2015 |            |

## SECTIONS FEATURES

| SECTIONS                                  | DESCRIPTION  |
|---|--|
| <b>INPUT FUSE</b>                         | Dedicated fuse to protect DC input from current increases due to any anomaly.  |
| <b>POWER BOARD<br/>SINE WAVE INVERTER</b> | The power board convert the continuous voltage coming from the input into alternate low voltage. Characterized from really high reliability. Integrated filter to reduce DC input inverter harmonics.  |
| <b>PILOT CONTROL BOARD</b>                | This board is studied for the unit total control. Through a 20 poles flat cable it communicate with the power board from which is controlled the power supply, the mosfet functioning, the MOS and output currents. The pilot board also controls the remote contact boards. |
| <b>OUTPUT TOROIDAL<br/>TRANSFORMER</b>    | Toroidal transformer with 4000V of galvanic insulation. It raised the inverter low voltage, isolating it from the load.  |
| <b>AC OUTPUT FILTER</b>                   | Dedicated filter applied in order to reduce the inverter harmonics.  |
| <b>REMOTE CONTACTS on<br/>terminals</b>   | The remote contact on terminal dedicated to provide remote signals. It is directly controlled by the pilot board. Signals provided: DC mode and DC low   |

## UNIT FRONT VIEW



## SIGNALINGS DETAILS

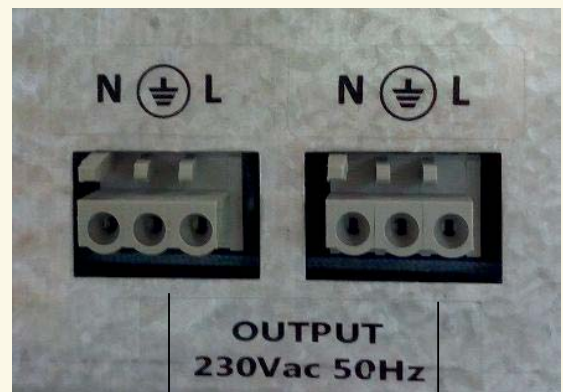
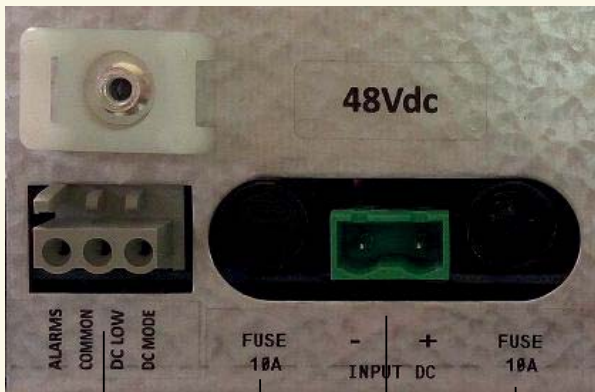
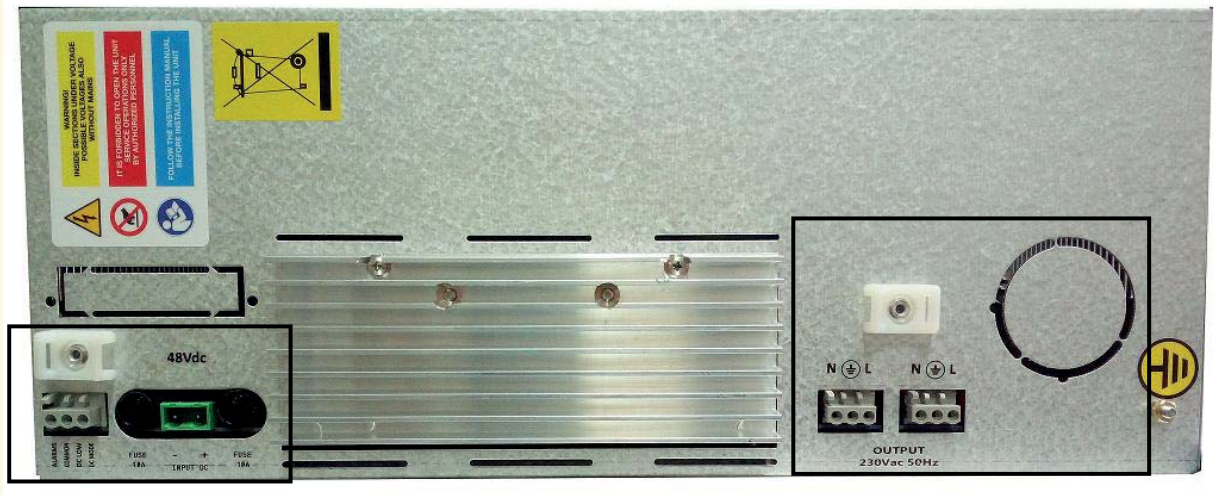


| LED                       | SIGNALINGS  |
|---------------------------|---|
| <b>DC MODE</b>            | YELLOW LED: inverter working  |
| <b>DC LOW</b>             | RED LED: long intermittent sound → DC low indication<br>RED LED: continuous sound → DC voltage lower than the functioning range.                          |
| <b>DANGER TEMPERATURE</b> | YELLOW LED / long intermittent sound: danger temperature or critical level indication. To check the unit ventilation is suggested.                        |
| <b>STOP TEMPERATURE</b>   | RED LED / fix sound<br>High temperature indication due to wrong unit ventilation.<br>The unit will work in by-pass mode, providing continuity to the load |
| <b>OVERLOAD</b>           | RED LED / fix sound<br>Overload indication.<br>The unit will work in by-pass mode, providing continuity to the load                                       |

| BUTTONS       | SIGNALINGS  |
|---------------|---|
| <b>ON/OFF</b> | Inox button with IP67 protection degrees with blue led. Switch on/off the unit; the blue led indicated that the unit is on. |



**UNIT SIDE VIEW 48V**



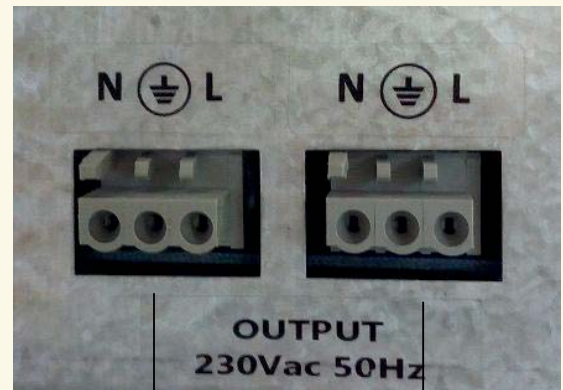
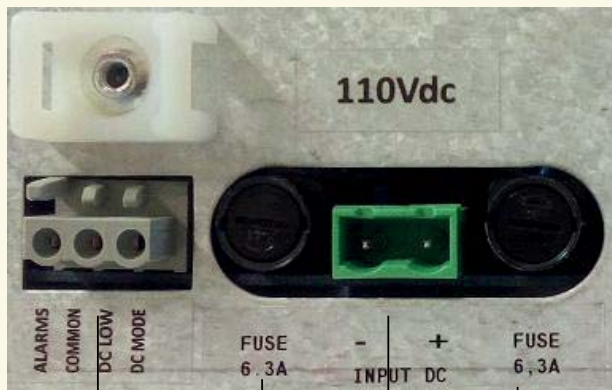
REMOTE ALARMS standard

48VDC INPUT

INPUT PROTECTION FUSES

OUTPUT 1 and 2  
230Vac 50Hz

**UNIT SIDE VIEW 110V**



REMOTE ALARMS standard

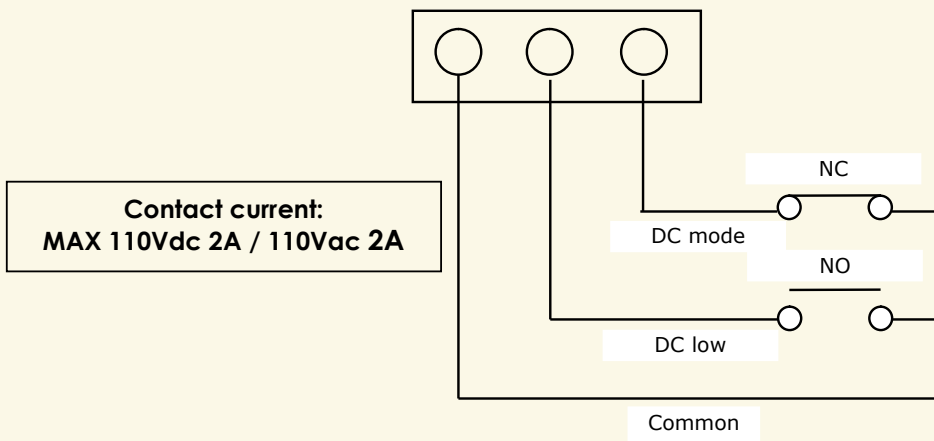
110VDC INPUT

OUTPUT 1 and 2  
230Vac 50Hz

INPUT PROTECTION FUSES



## REMOTE CONTACTS



## CAUTION BEFORE INSTALLING



**WARNING:**  
**DO NOT INSTALL THE UNIT IF VISIBLE DAMAGES ARE PRESENT**



It is required to respect safety caution during implant installation according to in force norms. Before proceeding with unit connection, please assure that technical data on the metallic label are matched with system input and output.

For the unit safety it is obligatory to arrange the ground connection implant. This operation and also the installation should be performed by a qualified technician. When there is a ground connection lack, the manufacturer should not be considered responsible for any damage caused to things and people. Qualified personnel such as technician/installer has to verify the implant electric current capacity moreover, it has to assure correct implant sizing checking if cable section is suitable to the equipment and connected load features.

Take care to keep standard and proper colour and position of the connecting cable.

Our MICRON wiring keep the following features:

|            |                                   |
|------------|-----------------------------------|
| Phase      | Black – Brown indicated with "L1" |
| Neutral    | Blue indicated with "N"           |
| Earth (PE) | Yellow/Green with dedicate symbol |
| Positive   | Red with symbol "+"               |
| Negative   | Black with symbol "-"             |

For not integrated-cable models the input and output identifications, such as other user parts (for example fuses, automatic switch, etc.) are indicated with label put on the rear side (Except for specific and customized versions).

While the input and output position is indicated with a label under the unit connections. The remote contacts are indicated with white labels next to the connections.



**WARNING**  
**PHASE AND NEUTRAL CONNECTIONS MUST BE STRICTLY RESPECTED.**  
**OTHERWISE THE SYSTEM MAY NOT CORRECTLY WORK OR EVEN CAUSE DAMAGES.**

## CABLE SIZING



Here follow the main factors that should condition the cable sizing:

- voltage
- current
- over current
- temperature
- cable placing
- cable length

In any case as general rule is correct to size the cables in order that the voltage drop is lower than 3% of the applied voltage.

| POWER SUPPLY CABLE NOMINAL SECTIONS      |                     |
|--|---------------------|
| NOMINAL CURRENT (I) OF THE DEVICE EM (A) | NOMINAL SECTIONS    |
| $I \leq 6$                               | 1,5 mm <sup>2</sup> |
| $6 < I \leq 10$                          | 2,5 mm <sup>2</sup> |
| $10 < I \leq 16$                         | 4 mm <sup>2</sup>   |
| $16 < I \leq 25$                         | 6 mm <sup>2</sup>   |
| $25 < I \leq 32$                         | 10 mm <sup>2</sup>  |
| $32 < I \leq 40$                         | 16 mm <sup>2</sup>  |

## UNIT INSTALLATION AND START-UP PROCEDURE



**WARNING**  
**THIS PROCEDURE IS ALLOWED ONLY BY TECHNICAL PERSONNEL PROVIDED WITH SPECIALIZED ELECTRIC EQUIPMENT INSTALLATION KNOWLEDGE.**  
**THE "SINE" SHOULD BE INSTALLED ONLY RESPECTING THE IEC 60364-4-42 PRESCRIPTIONS.**

- Set power supply with a protection to be suitable for the MICRON power;
- Verify that the ground connection implant is adequate.
- Connect to the unit the DC input cable through the connectors



**WARNING:** take care of the polarity

- Connect the load through the output connectors or to the schuko socket on the rear panel
- WARNING:** it is suggested to connect a load power not more than the 80% of unit nominal power



- Enable the implant circuit breaker (previously installed)
- Switch ON the unit pushing the ON/OFF button on the frontal panel
- Check that the yellow LED "DC MODE" is ON.

## AFTER-INSTALLATION CHECK AND FUNCTIONING



### After-installation check

In order to check the correct unit functioning after the installation, some controls are suggested:

- The load absorbed current should not be higher than the unit nominal power (check the electrical data on the unit identification label)

### Unit functioning

- DC MODE  
the load is supplied through the unit with an insulation transformer in order to avoid any type of interferences and to allow a stabilized output voltage.

## SWITCHING OFF PROCEDURE AND DISCONNECTION



**WARNING**  
THIS PROCEDURE IS ALLOWED ONLY BY TECHNICAL PERSONNEL PROVIDED WITH SPECIALIZED ELECTRIC EQUIPMENT INSTALLATION KNOWLEDGE.

### Unit switching OFF

- Switch OFF all devices connected to the unit
- Push the ON/OFF button on the unit frontal panel to switch OFF the unit.



**WARNING**  
The unit have still DC internal power!  
Dangerous voltages are present! Electric shock risk!

### Unit disconnection

- Switch OFF all devices connected to the unit
- Switch OFF the implant circuit breaker
- Disconnect the input DC cable  
Please wait 10 seconds for the units total discharge
- Switch OFF the unit pushing the ON/OFF button on the frontal panel
- Disconnect all cables



**WARNING:**  
VERIFY THAT THERE IS NO VOLTAGE ON THE UNIT IMPLANT POWER SUPPLY

## UNIT INPUT/OUTPUT PROTECTIONS

### Input protection

Two dedicated fuses for positive/negative pole protection.  
An internal diode will stop the input fuses if a polarity inversion may occur.

### Output protection

Electronic protection

#### Temporary overload

The load is supplied for 5 seconds through the inverter

#### Fixed overload

The load is supplied for 5 seconds through the inverter.  
After that time if the overload is still present, the unit switches OFF.  
Fix sound and RED led "Overload" ON.  
Till the overload is present the unit tries all the time to supply the load.  
If the overload is solved the unit will start with the normal functioning.

#### Short circuit

The load is supplied for 5 seconds through the inverter.  
After that time if the overload is still present, the unit switches OFF.  
Fix sound and RED led "Overload" ON.  
Till the short circuit is present the unit tries all the time to supply the load.  
If the overload is solved the unit will start with the normal functioning.

#### Over temperature internal protection

If there is an over temperature situation, at 62°C the unit is in pre-alarm through a yellow led "over temperature" and an intermittent sound.  
To verify the correct ventilation is suggested.  
If the alarm persists please take care because at 67°C the unit switches off.  
Fix sound and RED led "stop temperature" ON.  
When the over temperature condition is solved the unit will start with the normal functioning.

## MAINTENANCE



**WARNING**  
**MAINTENANCE OPERATIONS SHOULD BE DONE ONLY BY MANUFACTURER AUTHORIZED PERSONNEL.**

**THE LACK OF THESE PROCEDURES AUTOMATICALLY INVALIDATE THE WARRANTY AND DISPENSE THE MANUFACTURER WITH ANY RESPONSIBILITY.**



**WARNING**  
**UNIT FUNCTIONING INDICATE DANGEROUS VOLTAGES PRESENCE ON THE LOAD.**  
**To avoid electrical shocks, any operation or maintenance should be done only by qualified personnel authorized by the manufacturer.**

**PLEASE CONTACT OUR CUSTOMER SERVICE:**  
**service@enersine.com – phone 0332 1888121**

- When problems may occur or help is needed during unit installation or use, give the following details:
  - Model or unit type
  - Serial number
  - Full description of the problems with all alarms shown by the unit.

- For ordinary maintenance operations and/or eventual information on assistance contracts
- For possible recommendations on the maintenance timing, that it will depend on the unit application.

**PERMITTED CONTROLS BY EXTERNAL QUALIFIED TECHNICAL PERSONNEL:**

- Every 6 months: verify the ventilation holes checking if objects or excessive dust are reducing the air flow through the openings.

## WARRANTY CONDITIONS

Each unit is subjected to accurate tests, both electronic boards and general functioning. A dedicated TEST REPORT will be provided together with each unit.

The warranty is of **24 months** from the delivery date and it is EX WORKS.

All products are guaranteed from material or defects due to manufacturer fault.

The warranty is not valid in these cases:

- Lack of the safety seal
- Any maintenance or assistance operation without authorization
- Breakdowns due to wrong installation and/or careless use
- Removal or missing of manufacturing parts

Units under warranty:

For warranty reparation, the unit should be delivered to the company with a document shipping with all the dates of the unit (model, serial number, short description of the problem). The unit repaired under warranty will be returned with transport costs and risks at the expense of the customer.

**THE PRESENT MANUAL IS EDITED IN AN EASY AND COMPLETE WAY.  
THIS MANUAL CAN BE MODIFIED OR UPDATED ALL TIME IS NEEDED WITHOUT ANY NOTICE FROM THE  
MANUFACTURER AND WITHOUT ANY OBLIGATION TO UPDATE THE MANUALS IN CIRCULATION**