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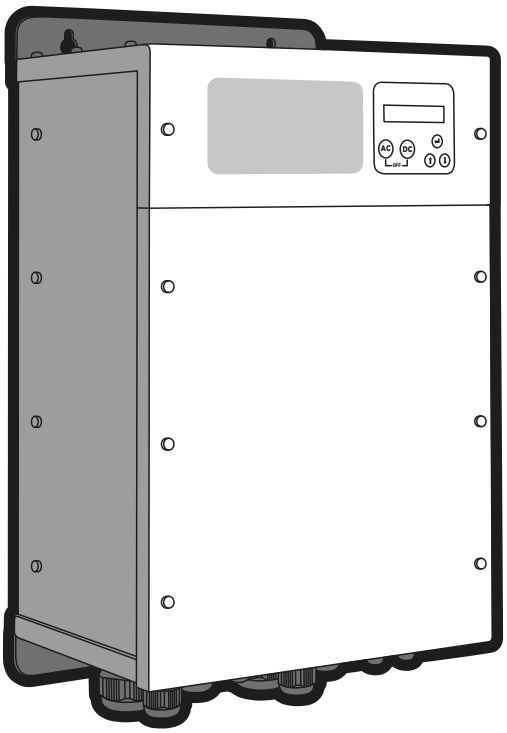
EN



HMA

Installation, use and maintenance manual

V 4.0
24/04/2022

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1. Introduction

1.1. Purpose of the manual

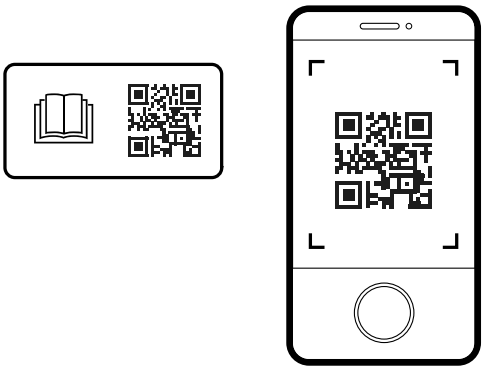
The purpose of this manual is to provide users with detailed information on the installation, operation, and maintenance of the product, with special regard to safety regulations.

WARNING
Read the manual carefully before installing and using the product.

WARNING
Failure to follow the instructions may result in damage to the product, the system in which it is installed and, in the worst cases, damage to property or persons with even fatal consequences.

NOTE
Store the manual in a protected and easily accessible place next to the installation location for possible consultation. A digital copy of this manual can be downloaded from the manufacturer's website or via the QR code shown on the product itself.

The complete installation, use and maintenance manual of the product, constantly updated in its contents, can be downloaded by scanning the QR code shown in the product with the smartphone camera and following the relative link.



1.2. Product overview

HMA It is an electronic device for the switching between power sources which integrates multiple functions:

- **Automatic management of power sources**. HMA, combined with any MultiPower device "HMA ready ", performs the switching between the AC power supply (grid or generator set) and the DC power supply (photovoltaic panels) in a completely automatic way according to the programmed logic.
- **Mechanical isolation between the two power supplies**. Two interlocked contactors guarantee univocal power supply and ensure separation in order to guarantee maximum electrical safety.
- **Auxiliary generator set control**. When the AC power is supplied by the generator set, HMA can start or stop it according to needs. HMA it also monitors any sign of breakdown or low fuel.

Five programmable exchange logics allow meeting every application need:

- **Manual switching**. Use the keyboard to switch from one power supply to another or even cut off the power supply.
- **Timed switching**. The switching from the photovoltaic power source to the grid power supply (or generator set) and vice versa occurs at a time set by the user.
- **Switching via digital input**. The switching is controlled by the opening or closing of a digital input.
- **Switching by flow**. The switch from DC to AC power takes place automatically to meet the desired daily flow rate. It is also possible to set a time after which the switch to AC can take place.
- **Switching by irradiation**. If irradiation falls below a set value or the power generated by the panels is not sufficient to operate the pump, HMA starts the generator set, if present, and switches to AC power. When

irradiation returns above the minimum threshold, the generator set is switched off and the pump is restarted with DC power supply.

2. Safety

2.1. Symbols

TIP
This symbol indicates a TIP or recommendation.

NOTE
This symbol indicates a NOTE or an indication or concept to be emphasised.

CAUTION
This symbol indicates CAUTION, thus an indication which failure to respect can lead to minor or moderate damage.

WARNING
This symbol indicates a WARNING, thus an indication which, in the event of non-compliance, may lead to serious, even fatal damage to persons or things.

DANGER
This symbol indicates an ELECTRICAL HAZARD, which if not avoided will result in death or electrocution.

2.2. Qualified personnel

WARNING
The installation, use and maintenance of the product are strictly for qualified personnel who have undergone appropriate training. Any use by unqualified personnel must be carried out under the approval, responsibility, and close monitoring of the latter.

WARNING
Failure to follow the instructions may result in damage to the product, the system in which it is installed and, in the worst cases, damage to property or persons with even fatal consequences.

WARNING
Failure to comply with the instructions may lead to loss of warranty.

WARNING
Keep out of the reach of children.

2.3. Safety warnings

WARNING
During installation and use of the product, comply with the general safety regulations, working in a clean, dry environment, free of hazardous substances and using the appropriate accident prevention tools (gloves, helmet, goggles, shoes, and whatever else is necessary).

WARNING
The product is suitable for installation in industrial environments. In case of installation in a residential environment, it is recommended to adopt all the safety precautions required by local regulations.

WARNING
The unsuitable use of the product, non-original spare parts or tampering with the hardware and/or firmware of the product may lead to serious damage to property or persons in addition to the loss of warranty. The manufacturer waives all liability due to the improper use of its products.

WARNING
Before commissioning the product, ensure that the installation is safe and in accordance with local regulations.

WARNING
Comply with the provisions to meet EMC requirements.

WARNING
Use cables of the appropriate type and cross-section according to the electrical characteristics of the load, the ambient temperature and local regulations.

WARNING
Any insulation tests may only be performed in accordance with the manufacturer's instructions. Failure to do so may result in damage to the unit.

CAUTION
Electronic boards and components may be damaged by electrostatic discharge. We therefore, recommend to don't touch the components.

CAUTION
Take care during installation and electrical connection that no foreign bodies enter into the device.

DANGER
During the entire period in which the device is powered, regardless of whether it is operated or remains in stand-by (digital shutdown), high voltage is present inside the device and at the input and output terminals.

DANGER
The device, previously in stand-by condition, may suddenly start up following the reset of an alarm or changed system conditions. This may result in serious mechanical and electrical danger to the operator who, upon seeing the device stopped, may have intervened on it, on the load or on the system in which it is installed.

DANGER
Disconnect the device from the power supply, check that the load is completely stopped and wait at least 15 minutes before intervening on it or on the load applied to it.

DANGER
If the motor is of the permanent magnet type, the device may be energized by the passive rotation of the motor. In this case, both the power supply and the load should be disconnected before working on the device itself.

DANGER
Ensure that the device is fully closed and all fixing screws are properly tightened before supplying power. Do not remove the protective parts for any reason while the device is powered on.

DANGER
It is recommended to install the appropriate protection devices upstream of the device, such as a circuit breakers, fuses and a residual current device (RCD).

DANGER
Make sure that the device and the loads connected to it are properly grounded with the appropriate connection terminals before commissioning.
Ensure that the grounding system is compliant and refer to local regulations for grounding devices.
Each load must be fitted with its own earthing cable, the length of which must be as short as possible. Do not make interconnected grounding connections.
Leakage currents may exceed 3.5 mA. It is recommended to use the reinforced ground connection if necessary.

DANGER
Pay attention as the photovoltaic panels exposed to sunlight supply a DC voltage to any connected devices.

2.4. Acoustic emission

The device has an acoustic emission:
<65 dB at a distance of 1 meter with cooling fans at maximum speed.

2.5. Certifications

The product has the following certifications:

- CE

3. Maintenance

3.1. Maintenance

WARNING
Before carrying out any work on the device, carefully read the chapter *Safety [5]* in the manual.

WARNING
Failure to follow the instructions may result in damage to the product, the system in which it is installed and, in the worst cases, damage to property or persons with even fatal consequences.

WARNING
Failure to comply with the instructions may lead to loss of warranty.

The device requires the following maintenance:

Intervention	Interval
Check that the unit is properly cooled, that the fans are functioning and that the cooling surfaces are clean	Every 6 months, or following a temperature alarm
Check for alarms	Every 12 months
Check the correct tightening of the power terminals	Every 12 months
Verify the maintenance of the protection rating (ingress of dust or water) by checking the tightening of the screws in the mechanical closing parts, the gaskets, and the cable glands.	Every 12 months

TIP
For more information contact the dealer or technical support at service@nastec.eu or by opening a support ticket on the portal service.nastec.eu

3.2. Warranty

Nastec guarantees that the products accompanied by this warranty are free from material or workmanship defects. The Company has the right to inspect any product returned under warranty, and confirm that the product contains a material or workmanship defect. The Company has the exclusive right to decide whether to repair or replace

defective equipment, parts or components. To qualify for the warranty coverage, the buyer must return the product to the place of purchase. Subject to the terms and conditions listed below, the Company agrees to repair or replace any part of this product that has material or workmanship defects. The Company will evaluate products under warranty for 24 months from the date of installation (only in case of product registration) but no longer than 36 months from the date of invoice. IN NO EVENT shall the Company be liable for any other costs incurred by the customer in removing and/or fastening any product, part or component thereof. The Company reserves the right to change or improve its products or any part thereof, without being obliged to provide such a change or improvement for products previously sold. THIS WARRANTY DOES NOT APPLY to products damaged by natural events, including lightning, normal wear and tear, normal maintenance services, or any other condition beyond the control of the Company. THIS WARRANTY WILL BE VOIDED if any of the following conditions occurs:

- The product is used for purposes other than those for which it was designed and manufactured.
- The product has not been installed in accordance with applicable codes and rulings.
- The product has not been installed by qualified personnel.
- The item has been damaged due to negligence, abuse, misapplication, tampering, alteration, improper installation, operation, maintenance and storage.

If the customer wishes to make a warranty claim, it is necessary:

- Fill in the warranty claim on the service.nastec.eu portal
- Wait for the result from the Nastec technical support service. The outcome may envisage the following:
  - Absence of warranty based on the information received. A quotation for repair or spare parts may be made upon request.
  - Warranty advanced based on information received. Nastec will decide if the product is to be replaced under warranty. However, Nastec reserves the right to inspect the product.
  - Need to receive the product by the manufacturer in order to establish the potential warranty. Following the analysis of the returned product, Nastec will establish the unquestionable existence or absence of the warranty conditions by providing a detailed report on the damage found and its origins. If the warranty is applicable, Nastec will repair the device. Nastec is willing to refurbish the product upon offer. In the absence of a warranty, Nastec will make an offer to repair and/or refurbish the device. After 60 days from the offer, if no response is received from the buyer, Nastec will scrap the product upon notice. Nastec does not cover any warranties provided by the buyer to third parties, without its prior authorization.

3.3. Product registration

By registering the product on the portal service.nastec.eu, it is possible to activate the manufacturer's warranty valid for 24 months from the registration date up to a maximum of 36 months from the date of manufacture, according to the warranty conditions. Registration must be completed within one month from the date of installation of the product.

The warranty is offered through the distribution chain. It is therefore necessary to specify the official distributor or importer from which the product was purchased. Alternatively, the distributor can register the product in the customer's name.

3.4. Spare parts

The manufacturer provides spare parts for the device. Contact your dealer for more information.

WARNING
It is recommended to use only original spare parts.

WARNING
Failure to follow the instructions may result in damage to the product, the system in which it is installed and, in the worst cases, damage to property or persons with even fatal consequences.

WARNING
Failure to comply with the instructions may lead to loss of warranty.

3.5. Disassembly and repair

If it is necessary to disassemble and repair the device, it is recommended that the safety instructions be strictly observed.

WARNING
The installation, use and maintenance of the product are strictly for qualified personnel who have undergone appropriate training. Any use by unqualified personnel must be carried out under the approval, responsibility, and close monitoring of the latter.

WARNING
Failure to follow the instructions may result in damage to the product, the system in which it is installed and, in the worst cases, damage to property or persons with even fatal consequences.

WARNING
Failure to comply with the instructions may lead to loss of warranty.

TIP
For more information contact the dealer or technical support at service@nastec.eu or by opening a support ticket on the portal service.nastec.eu

3.6. Disposal

Devices marked with this symbol cannot be disposed of in household waste but must be disposed of at appropriate waste drop-off centres. It is recommended to contact the Waste Electrical and Electronic Equipment drop-off centres (WEEE) in the area. If not disposed of properly, the product may have potential harmful effects on the environment and on human health due to certain substances present within. Illegal or incorrect disposal of the product is subject to severe administrative and/or criminal penalties.

4. Transport and storage

4.1. Transport

Avoid subjecting the product to severe shocks or extreme weather conditions during transport. The packaging must remain dry and at a temperature between -20°C (-4°F) and +70°C (+158°F). Do not stack packages without first checking feasibility with the manufacturer.

TIP
It is advisable to always indicate FRAGILE on the packaging

4.2. Inspection on delivery

Upon receipt of the product, check:

- the integrity of the packaging
- the integrity of the content
- the presence of all components

In case of problems, notify the forwarder immediately.

WARNING
The manufacturer declines all responsibility for damage to the product due to transport

4.3. Handling

The product must be handled by hand or using suitable lifting equipment in relation to its weight and the regulations in force.

If necessary, use dedicated handling equipment (cranes, ropes, trolleys), using the lifting points provided in the product.

During handling it is recommended to:

- Handle with care
- keep away from suspended loads
- always wear accident prevention equipment
- be careful not to damage electrical cables

Do not handle the product using electrical cables as lifting gear.

WARNING
Failure to follow the instructions may result in damage to the product, the system in which it is installed and, in the worst cases, damage to property or persons with even fatal consequences.

4.4. Storage

The product must be stored in its packaging in a dry place, without sudden changes in humidity and temperature and protected from mechanical (weights, vibrations), thermal and chemical agents.

The temperature of the storage environment must be between -20°C (-4°F) and 70°C (+158°F) with a maximum relative humidity of 85% (non-condensing).

If the product remains in stock for more than 24 months from the manufacturing date shown on the packaging, it is necessary to check the mechanical integrity of its parts and supply power to it at least once every 12 months.

If the product is put back into storage after it has been used, it is advisable to contact the manufacturer for further information on storage.

TIP
For more information contact the dealer or technical support at service@nastec.eu or by opening a support ticket on the portal service.nastec.eu

5. Technical features

5.1. Name

HMA ABCD

- **A**: Nominal AC supply voltage (2 =1x230 VAC, 3 = 3x230 VAC, 4 = 3x400 VAC)
- **BCD** Rated output current

5.2. Technical Data

Electrical specifications by model:

Model	VDC	VAC]	Max I [A]	Compatibility	Size
HMA 218	90 – 430	1 x 90 - 265	18	4HS MP SUND MIDA Solar 203 MP MIDA Solar 205 MP MIDA Solar 207 MP SUMMAG Solar MP	3

Model	VDC	VAC]	Max I [A]	Compatibility	Size
HMA 430	190 – 850	3 x 190 - 520	30	VS212 MP VS409 MP VS412 MP VS415 MP VS418 MP VS425 MP VS430	3
HMA 485	190 – 850	3 x 190 - 520	85	VS438 MP VS448 MP VS465 MP VS485 MP	3
HMA 4118	190 – 850	3 x 190 - 520	118	VS4100 MP VS4118 MP	3
HMA 4268	190 – 850	3 x 190 - 520	268	VS4158 MP VS4198 MP VS4228 MP VS4268 MP	4

General electrical specifications:

Power supply frequency	50 - 60 Hz (+/- 2%)
Voltage unbalance between the power supply phases	+/- 2%
EMC compliance	EN61800-3 C2

Environmental specifications:

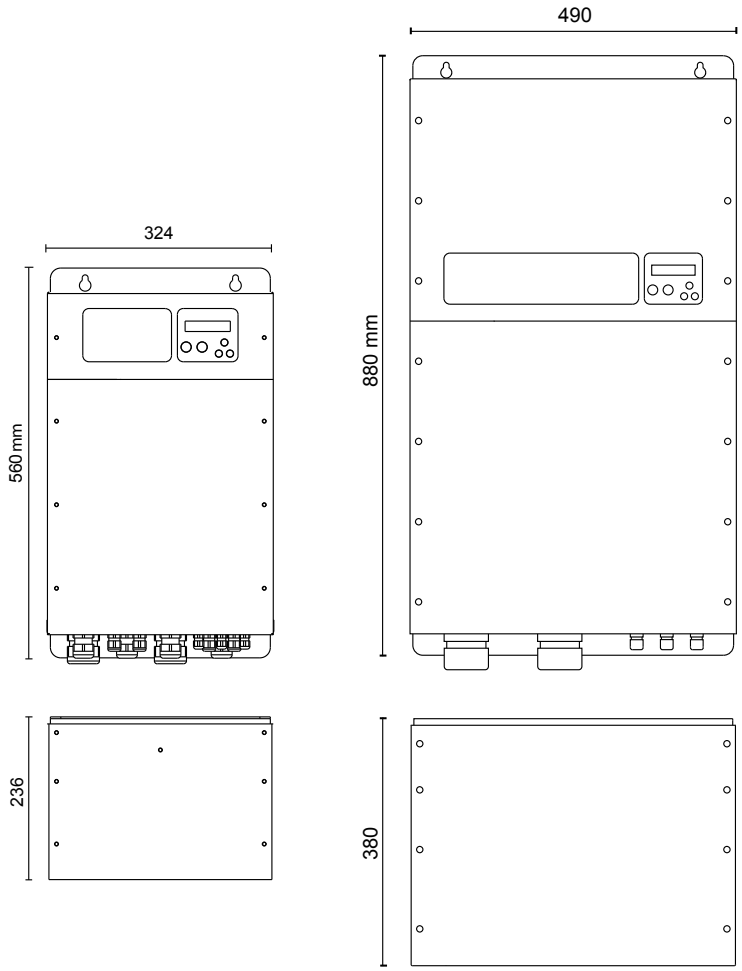
Relative humidity of the operating environment	5 - 95 % non-condensing
Workplace temperature	from -10 °C (14 °F) to 60 °C (140 °F)
Maximum workplace temperature at nominal load	50°C (122 °F)
Power derating beyond maximum temperature	-2.5% every °C (-1.4% every °F)
Maximum altitude at nominal load	1000 m (3280 ft)
Power derating beyond maximum altitude	- 1% every 100 m (328 ft)

Mechanical specifications:

Protection rating	IP54 (NEMA 12)

WARNING
Protect the device from direct exposure to weather and sunlight.

5.3. Dimensions and weight



Size	Maximum weight [kg]
3	22
4	63

5.4. Cables entry

Cable gland	Tightening torque [Nm]	Cable diameter [mm]	HMA 218	HMA 430	HMA 485	HMA 4118	HMA 4268
M12	1,5	3,5-7	6	6	6	6	-
M16	3	5-10	4	4	4	4	6
M25	8	10-17	4	4	4	4	2
M40	13	19 -28	-	-	2	2	-
M75	30	58 – 68	-	-	-	-	2

6. Mechanical installation

WARNING
Read the safety chapter carefully before continuing.

6.1. Installation environment

WARNING
The environmental specifications stated in the technical data of the product must be strictly complied with.

WARNING
Do not install the device in environments at a risk of explosion, flooding, or in the presence of flammable fluids or solids. Ensure sufficient ventilation in the room.

Refer to local regulations when selecting the appropriate installation location.

WARNING
The degree of protection of the device is only ensured if, at the end of the installation, the cover screws and the cable glands have been properly tightened. Close the holes of unused cable glands with the appropriate plugs.

Protect the device from direct exposure to weather and sunlight.

Do not leave the device installed without cover or with the cable glands open, even if not connected to the power supply. The infiltration of dust, water or humidity may irreparably damage the device.

6.2. Cooling

The device is cooled by natural ventilation of the air through its surfaces.

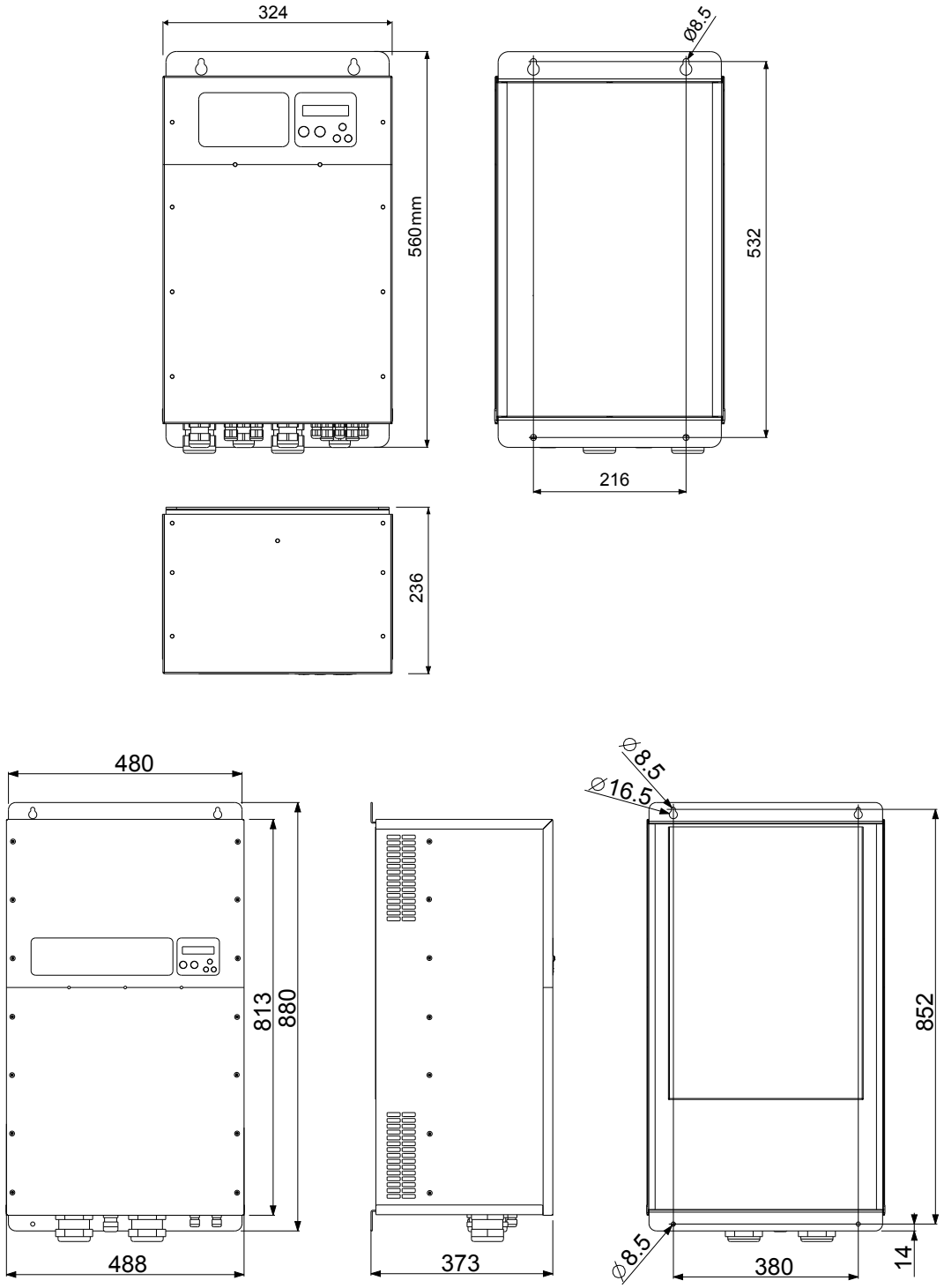
It is therefore necessary to ensure sufficient space around the device during installation.

- 150 mm for current intensity up to 18 A
- 200 mm for current intensity up to 30 A
- 250 mm for current intensity up to 118 A
- 300 mm for current intensity up to 268 A

During operation, the surfaces of the device can become hot enough to cause burns. Do not touch them.

In the case of installation inside electric cabinet, it is necessary to guarantee the appropriate air flow for the heat dissipation of all the components. The heat released by the device may be calculated from its conversion efficiency.

6.3. Wall installation



7. Electrical installation

WARNING
Read the safety chapter carefully before continuing.

7.1. Grounding

DANGER

Make sure that the device and the loads connected to it are properly grounded with the appropriate connection terminals before commissioning.

Ensure that the grounding system is compliant and refer to local regulations for grounding devices.

Each load must be fitted with its own earthing cable, the length of which must be as short as possible. Do not make interconnected grounding connections.

Leakage currents may exceed 3.5 mA. It is recommended to use the reinforced ground connection if necessary.

Use the following minimum cross-sections for ground cables:

- cross-section equal to the mains power cable cross-section up 16 mm^2. (6 AWG)
- 16 mm2 (6 AWG) for mains power cable cross-section between 16 mm^2 (6 AWG) and 35 mm^2 (1 AWG).
- cross-section equal to half the cross-section of the power supply cable when the latter is greater than 35 mm^2 (1 AWG).

7.2. Protection devices

DANGER

It is recommended to install the appropriate protection devices upstream of the device, such as a circuit breakers, fuses and a residual current device (RCD).

Fuses and switches.

The control device can protect the motor from overloads by digitally controlling the absorbed current against the set rated current.

Instead, it is necessary to install overcurrent and short-circuit protection devices, such as fuses and circuit breakers, upstream of the device. These trigger in the event of failure of a component inside the device.

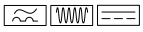
The same protections required for the device connected to HMA should be installed on the AC side and DC side.

Residual Current Devices (RCD)

For inverter devices with single-phase power supply, use AC-sensitive RCD devices of both sine and pulse types. The devices listed are, in order of priority:

- type F, marked with the symbols  capable of detecting high-frequency currents up to 1 kHz.
- type A-APR, marked with the symbols  characterized by a slight intervention delay.
- type A, marked with the symbols 

For inverter devices with three-phase power supply,use RCD devices that are sensitive to both alternating and direct current. The following are suitable devices:

- Type B, marked with the symbols 

7.3. Connecting cables

WARNING

The connecting cables must comply with local regulations, feature the appropriate cross-section, and meet the requirements for voltage, current, and temperature.

7.3.1. Power cables

Model	Maximum cross-section of the input cable with ground	Maximum cross-section of the output cable with ground	Cable tightening torque [Nm]	Ground cable tightening torque
HMA 218	4 x 6 mm^2	4 x 6 mm^2	-	-
HMA 430	4 x 6 mm^2	4 x 6 mm^2	-	-
HMA 485	4 x 16 mm^2	4 x 16 mm^2	-	-
HMA 4118	4 x 16 mm^2	4 x 16 mm^2	-	-
HMA 4268	4 x 50 mm^2	4 x 50 mm^2	-	-

WARNING
Always use cables with appropriate cable lugs, which may be supplied with the product.

7.3.2. Control cables

Model	Maximum cross-section of the control cables	Tightening torque [Nm]
Control terminals of all models	1 mm^2	0,5

WARNING
Use shielded cable for control cables.

WARNING
Always use cables with appropriate cable lugs, which may be supplied with the product.

7.4. Electromagnetic Compatibility (EMC)

The device meets the requirements of electromagnetic compatibility according to the EN61800-3 standard.
However, to ensure the electromagnetic compatibility of the system in which it is installed, it is necessary:

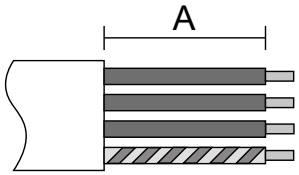
- use ground connection cables that are as short as possible.
- use shielded signal cables with the shield connected at one end only.

WARNING
Install signal, motor, and power cables separately from each other at a distance of at least 30 cm. If the signal cables meet the power cables, cross them perpendicularly.

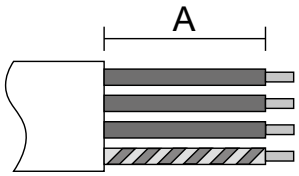
7.5. Electrical connections

7.5.1. Power connections

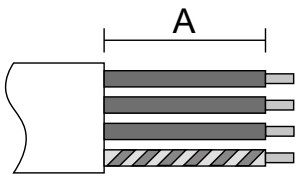
HMA 218

		A [mm]	Pre-insulated cable lug	Stripping diagram
AC input	**T1**	140	Tip	
	T2	140	Tip	
	P.E. ⏚	140	Tip	
DC input	**+**	140	Tip	
	-	140	Tip	
	P.E. ⏚	140	Tip	
AC / DC output	**F1+**	140	Tip	
	F2-	140	Tip	
	P.E. ⏚	140	Tip	

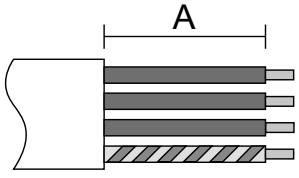
HMA 430

		A [mm]	Pre-insulated cable lug	Stripping diagram
AC input	**T1**	140	Tip	
	T2	140	Tip	
	T3	140	Tip	
	P.E. ⏚	140	Tip	
DC input	**+**	140	Tip	
	-	140	Tip	
	P.E. ⏚	140	Tip	
AC / DC output	**F1+**	140	Tip	
	F2-	140	Tip	
	F3	140	Tip	
	P.E. ⏚	140	Tip	

HMA 485 , HMA 4118

		A [mm]	Pre-insulated cable lug	Stripping diagram
AC input	**T1**	140	Tip	
	T2	140	Tip	
	T3	140	Tip	
	P.E. ⏚	140	Tip	
DC input	**+**	140	Tip	
	-	140	Tip	
	P.E. ⏚	140	Tip	
AC output	**F1**	140	Tip	
	F2	140	Tip	
	F3	140	Tip	
	P.E. ⏚	140	Tip	
DC output	**+**	140	Tip	
	-	140	Tip	
	P.E. ⏚	140	Tip	

HMA 4268

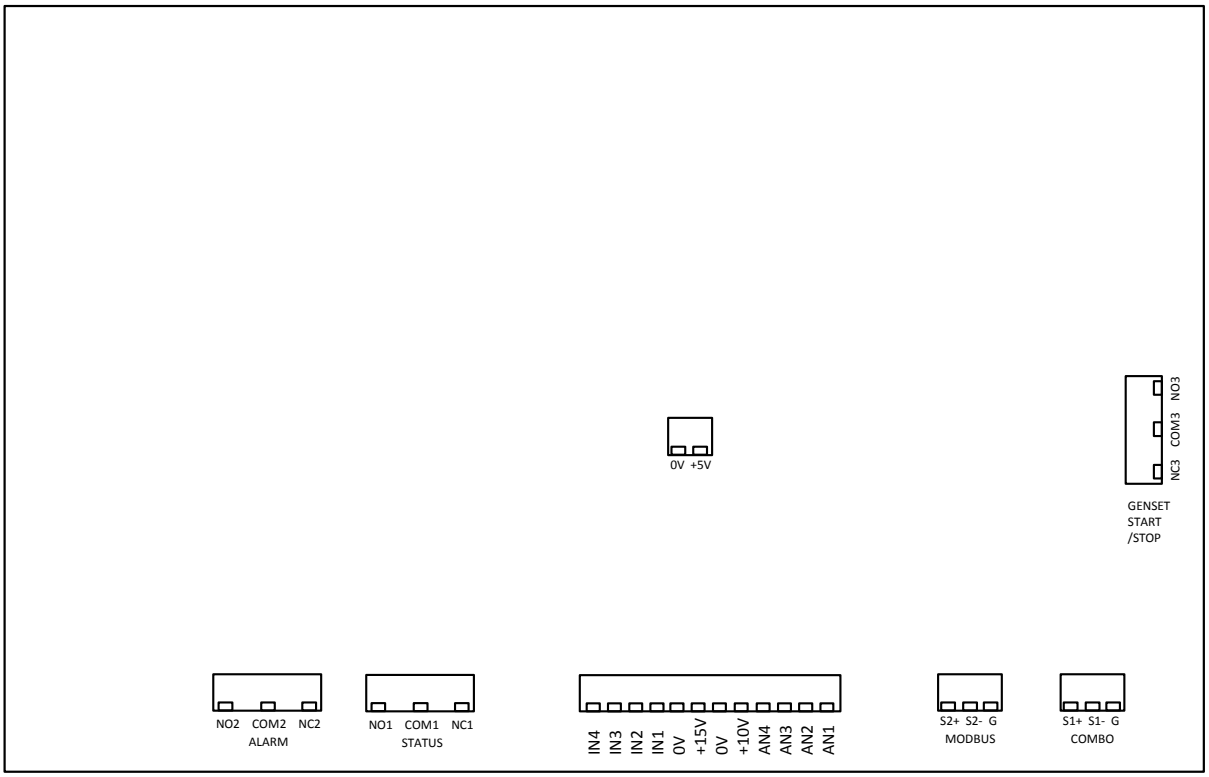
		A [mm]	Pre-insulated cable lug	Stripping diagram
AC input	**T1**	360	Eyelet for M10 screw	
	T2	360	Eyelet for M10 screw	
	T3	360	Eyelet for M10 screw	
	P.E. ⏚	360	Eyelet for M10 screw	
DC input	**+**	360	Eyelet for M10 screw	
	-	360	Eyelet for M10 screw	
	P.E. ⏚	360	Eyelet for M10 screw	
AC output	**F1**	360	Eyelet for M10 screw	
	F2	360	Eyelet for M10 screw	
	F3	360	Eyelet for M10 screw	
	P.E. ⏚	360	Eyelet for M10 screw	
DC output	**+**	360	Eyelet for M10 screw	
	-	360	Eyelet for M10 screw	
	P.E. ⏚	360	Eyelet for M10 screw	

WARNING
Respect the polarity of the connections.

WARNING
Always use cables with appropriate cable lugs, which may be supplied with the product.

7.5.2. Control connections

The control board is common for all models.



Type		Description	Functionality	Comments
Analog inputs	AN1	4-20 mA		-
	AN2	4-20 mA		-
	AN3	4-20 mA 0-10 V		Configurable as 4-20 mA or 0-10V via jumper.
	AN4	4-20 mA 0-10 V		Configurable as 4-20 mA or 0-10V via jumper.
Power Supply	+15V	15 VDC, max 100 mA	Power supply for 4-20 mA analog inputs	Do not use as a power supply for the digital inputs!
Power Supply	+10V	10 VDC, max 3 mA	Power supply for 0-10 V analog inputs	Do not use as a power supply for the digital inputs!
Signal GND	0V	Insulated	Signal GND for analog and digital inputs	-
Digital inputs	IN1	Active low	Motor start and stop	Programmable as Normally Open or Normally Closed.
	IN2	Active low	AC / DC switching	Programmable as Normally Open or Normally Closed.
	IN3	Active low	Generator set alarm signal	Programmable as Normally Open or Normally Closed.
	IN4	Active low	Low fuel warning signal	Programmable as Normally Open or Normally Closed.
Relay outputs	NO1	Normally Open	STATUS relay NO1, COM1: closed contact with motor running. NC1, COM1: closed contact with motor stopped.	Potential-free contacts Max 250 VAC, 2 A Max 30 VDC, 2 A
	COM 1	Common		
	NC1	Normally Closed		
Relay outputs	NO2	Normally Open	ALARM relay	Potential-free contacts Max 250 VAC, 2 A

Type		Description	Functionality	Comments
	COM 2	Common	NO2, COM2: closed contact without alarm.	Max 30 VDC, 2 A
	NC2	Normally Closed	NC2, COM2: closed contact with alarm or without power supply.	
Relay outputs	NO3	Normally Open	NO3, COM3: contact closed to start the generator set.	Potential-free contacts
	COM 3	Common		Max 250 VAC, 2 A
	NC3	Normally Closed	NO3, COM3: contact open to start the generator set.	Max 30 VDC, 2 A
RS485 serial port	S1+	Positive	Communication	-
	S1-	Negative	COMBO	-
	G	Serial GND		The serial GND is isolated from the signal GND
RS485 serial port	S2+	Positive	Communication	-
	S2-	Negative	MODBUS RTU	-
	G	Serial GND		The serial GND is isolated from the signal GND

Communication between HMA and the device to be powered.

Communication between HMA and the device to be powered takes place via the RS485 COMBO serial port. It is sufficient to use a three-pole cable with a minimum cross-section of 0.5 mm2 connected to terminals S1 +, S1-, G of both devices.

8. Commissioning

8.1. Preliminary checks

Before supplying power to the device, carry out the following electrical and mechanical checks:

- Verify proper grounding of the device, of the load, and of the entire system.
- Check the correct connection of the power and signal cables, paying particular attention to any polarity.
- Check that the connection terminals of the power and signal cables are correctly tightened.
- Check the implementation of electromagnetic compatibility (EMC) regulations and the correct connection of cable shields.
- Check that the protective devices are present and correctly installed.
- Check that the mechanical installation is correct, sturdy and complies with environmental and cooling requirements.
- Check that the seals are intact and correctly positioned in their seats.
- Check that the cable glands and screws are properly tightened.
- Check that the device is completely closed and that live parts are not accessible.

8.2. Powering

DANGER

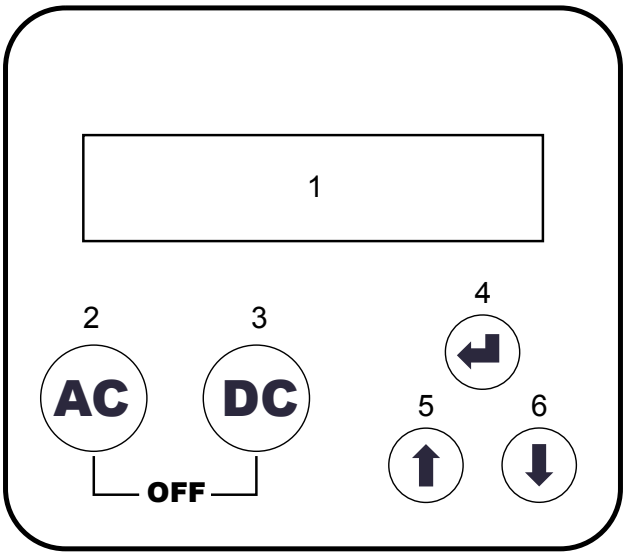
Before supplying power to the device, make sure you have read, understood and implemented all the safety, mechanical, and electrical installation instructions.

At the end, it shall be possible to:

- power up the device.
- perform programming.
- start the motor.

9. Use and programming

9.1. Keyboard and display



1. DISPLAY
2. AC power supply switching
   Exit the menu
3. DC power supply switching
   Exit the menu
4. ENTER: access the menu / edit parameters / confirm parameters
5. +: parameter scrolling / parameter editing
6. -: parameter scrolling / parameter editing

NOTE
When AC and DC buttons are pressed at the same time, the power supply to the device being powered is cut off.

9.2. Initial set-up

The first time the device is switched on, the initial set-up is entered directly, through which it is possible to perform a quick and complete programming of the device in relation to the pump and the system in which it is installed. Failure to complete the initial set-up makes it impossible to use the device. In any case, it is possible to repeat the initial set-up at any time, for example if you decide to install the device in a new system.

The device suggests default values for each parameter. If you wish to modify the basic setting, simply press the ENTER key, wait for the parameter to start flashing and use the scroll keys. Press ENTER again to save the selected value, which therefore stops flashing.

A detailed description of the different parameters encountered during the initial set-up is provided here below.

Parameter	Default	Description
Language XXXXXXX	English	Language of communication with the user
Current Time XX h : XX m		Time setting.
BTLE connection ON / OFF	ON	Enable BTLE communication
INITIAL SETUP COMPLETED		This message informs the user that the initial set-up procedure has been successfully completed. The parameters set during this procedure are saved in the device. These values can be subsequently modified from the appropriate menus.

9.3. Initial display

When the device is switched on, the control firmware version (LCD = X.XX) and the power firmware version (INV = X.XX) are communicated to the user.

Subsequently, or as soon as the first initial set-up has been completed, the initial view opens.
The first line in the display shows the status of the device:

- **In: AC Inv: OFF** if the device AC-powered and the inverter is not enabled for motor control.
- **In: AC Inv: ON** if the device is AC-powered and the inverter is enabled for motor control.
- **In: DC Inv: OFF** if the device DC-powered and the inverter is not enabled for motor control.
- **In: DC Inv: ON** if the device is DC-powered and the inverter is enabled for motor control.

During the switching phases between power sources, the indication **Inv** flashes.

9.3.1. Operating parameters

Parameter	Description
XXX [V]	Measured voltage value.
XX : XX	Current time. In mod In time or flow rate switching mode with AC start time, the switching time from one power source to the other is also indicated.
XXXXXXXX	Device status display: • INV SUPPLY:OFF : both power sources are disabled by simultaneously pressing the AC and DC buttons. • INV SUPPLY: DC : DC power supply. • INV SUPPLY: AC : AC power supply. • DC Input : wait for the DC power supply to stabilize for 5 minutes before attempting to switch to DC. • AC Input : wait for the AC power supply to stabilize before attempting to switch to AC. • Low PV Energy : Not enough energy for DC switching. Press th ENTER key to access the Diagnostics menu. To return to the initial display, simply press the ENTER key.
MENU' ENT to access	Press the ENTER key to access the menu display.

9.3.2. Diagnostics

Parameter	Description
Total hours XXXXX h : XX m	Total hours of AC or DC power supply.
AC hours XXXXX h : XX m	Hours of AC power supply.
DC hours XXXXX h : XX m	Hours of DC power supply.
ALL. XXXXXXXXXXXX XXXXXXX h : XX m	Alarm log (up to 8) in relation to the total hours.
Daily Flow XXXX.X m3	In flow rate switching mode, the daily flow rate is indicated and is automatically reset every day at dawn.

9.4. Menu

To access the Menu section, press the ENTER key on the MENU' / ENT to access screen.
To exit the Menu section, press the AC or DC key until you go back to the Initial View.

Menu	Description	Level	Default password
Control. param.	Menu of parameters for controlling the pump in the hydraulic system in which it is installed.	Installer	001
IN/OUT paramet.	Menu of parameters for analog and digital inputs and outputs	Installer	001
Connect. param.	Menu of parameters for connectivity and external communication.	Installer	001
Change init.set	Initial configuration menu.	Installer	001

CAUTION

Access to this menu Change init.set is recommended only if you intend to completely reprogram the device starting from the factory settings.

The changes to the parameters made from this menu become effective only once the initial configuration has been completed, i.e. when Change init.set / COMPLETEDappears.

All other device parameters will be reset to factory settings.

9.5. Control parameters

Parameter	Default	Description	1	2	3	4	5
Switch Mode 1. Manual 2. Auto 3. Flow 4. Time 5. Ext. Input		The following control modes can be selected: 1. Use the keyboard to switch from one power supply to another or even cut off the power supply. 2. If irradiation falls below a set value or the power generated by the panels is not sufficient to operate the pump, HMA starts the generator set, if present, and switches to AC power. When irradiation returns above the minimum threshold, the generator set is switched off and the pump is restarted with DC power supply. In the absence of a solarimeter, HMAperforms the switch if the DC power supply is no longer sufficient to guarantee the operation at minimum frequency of the pump. 3. The switch from DC to AC power takes place automatically to meet the desired daily flow rate. It is also possible to set a time after which the switch to AC can take place. 4. The switching from the photovoltaic power source to the grid power supply (or generator set) and vice versa occurs at a time set by the user. 5. The switch is controlled by the opening or closing of digital input 2.	x	x	x	x	x
Current Time XX h : XX m		Setting the time.	x	x	x	x	x
DC Start Thresh. XXXX [W/m2]	0	Irradiation value for switching from AC to DC power supply.		x	x		
DC Attend Delay XX [min]	5	In the absence of a solarimeter, HMA will attempt to restart in DC based on this parameter, doubling the time at each restart attempt up to a maximum of 60 minutes.		x	x		
Daily Flow V = XXX.X [m3]		It is the daily flow rate value to be met with the possible switch from DC to AC power supply.			x		
AC Starting Mode Auto / Timed	Auto	In Switch Mode = Flow, the AC Starting Mode = Auto provides for the immediate switch to AC as soon as the DC becomes insufficient. In AC Starting Mode = Timed the switch takes place at a fixed time.			x		
AC Starting Time XX h : XX m		Fixed time for switching from DC to AC.			x	x	
DC Starting Time XX h : XX m		Fixed time for switching from AC to DC.				x	
Change PASS-WORD1 Press ENT		By pressing the ENT key it is possible to change the installer level password (level 1) (default 001).	x	x	x	x	x

9.6. IN / OUT parameters

Parameter	Default	Description
Digital input1 N.O./N.C.	N.O.	Digital input 1 is used to parallelize the signal coming from a floater or pressure switch connected to digital input 1 of the device powered by HMA. The setting must be the same on both devices. The connection polarity must be respected.
Digital input2 N.O./N.C.	N.O.	Digital input 2 is used to switch between the two power sources when Switch Mode = Ext. Input.

Parameter	Default	Description
Digital input3 N.O./N.C.	N.O.	Input 3 can be connected to the alarm signal of the generator set, if present.
Digital input4 N.O./N.C.	N.O.	Input 4 can be connected to the no-fuel signal of the generator set, if present.
Dig.In.1/2 Delay t = XX [s]	1	Delay of digital inputs 1 and 2. Digital inputs 1 and 3 have a fixed delay of 1 second.
Change PASSWORD1 Press ENT		By pressing the ENT key it is possible to change the installer level password (level 1) (default 001).

9.7. Connectivity parameters

Parameter	Default	Description
Language XXXXXXX	English	Language of communication with the user
BTLE connection ON / OFF	ON	Enable BTLE communication
MODBUS address XXX	1	MODBUS address from 1 to 247
MODBUS baudrate XXXXX	9600	MODBUS baudrate from 1200 bps to 57600 bps
MB data format XXXXX	RTU N81	MODBUS data format: RTU N81, RTU N82, RTU E81, RTU O81
EEPROM writing ON/OFF	OFF	Setting the writing mode of the parameters transmitted via MODBUS: ON: the datum is saved in EEPROM OFF: the datum is not saved in EEPROM
Change PASSWORD1 Press ENT		By pressing the ENT key it is possible to change the installer level password (level 1) (default 001).

10. Alarms

When an alarm occurs, the device starts emitting an acoustic signal (if available) and an intermittent warning appears on the STATUS screen indicating the corresponding alarm. By pressing the AC or DC key (only and exclusively on the STATUS screen) an attempt to reset the machine can be made. If the cause of the alarm has not been resolved, the device displays the alarm again and emits an acoustic signal.

WARNING
Immediate remedies must be implemented in case of alarms to safeguard the integrity of the device itself and of the system in which it is installed.

Alarm	Description	Possible solutions
LOW BATTERY	The internal battery voltage is below the minimum allowed threshold.	Keep the device powered by one of the two power sources for at least two hours; contact the technical support service if the alarm persists.
5V OVER CURRENT	5V power supply overload (higher than 1 A).	Remove the load connected to the 5V power supply and check the causes of the excessive absorption.
OVER TEMP. PCB	Overtemperature in the electronic board.	Check that the ambient temperature is below the maximum allowed threshold.
A06 OVER VOLTAGE	Overvoltage in DC power supply.	Investigate the causes of overvoltage.
AC CLOSING FAULT	Failure to detect the closure of the AC contactor.	Check the wiring of the commands to the contactor. Check the contactor.

Alarm	Description	Possible solutions
DC CLOSING FAULT	Failure to detect the closure of the DC contactor.	Check the wiring of the commands to the contactor. Check the contactor.
AC OPEN. FAULT	Failure to detect the opening of the DC contactor.	Check the wiring of the commands to the contactor. Check the contactor.
DC OPEN. FAULT	Failure to detect the opening of the DC contactor.	Check the wiring of the commands to the contactor. Check the contactor.
GENERATOR FAULT	Opening or closing of digital input 3 detected.	Check the correct configuration of digital input 3. Check the wiring to digital input 3. Check the generator set.
GEN. FUEL. LACK	Opening or closing of digital input 4 detected.	Check the correct configuration of digital input 4. Check the wiring to digital input 4. Check the fuel level in the generator set.
NO COMM.INVERTER	Lack of communication between HMA and the powered device.	Check if the device is powered. Check the COMBO serial wiring. Check the power supply wiring of the device.
KEYBOARD FAULT	One of the keys of the keyboard was held down for more than 120 seconds	Check that the keyboard is not accidentally being pressed. Contact our technical support service
GENERAT. TIMEOUT	Failure to detect AC power within 30 seconds of starting the generator set.	Check the wiring of the generator set start signal. Check the wiring of the AC power supply. Check that the generator set is in good working order.

11. Warnings

Warning	Description
INV SUPPLY:OFF	Deactivation of both AC and DC contactors following the simultaneous pressing of both the AC and DC buttons.
INV SUPPLY: DC	Closing of the DC contactor
INV SUPPLY: AC	Closing of the AC contactor
AC Wait	Waiting for AC power (generator set) following request.
DC Wait	Wait for the DC power supply to stabilize for 5 minutes before attempting to switch to DC.
Charging Battery	Battery charging in progress.
Low PV Energy	Not enough energy for DC switching.
Daily Flow OK	Daily flow rate reached.

12. EC Declaration of Conformity

The manufacturer hereby:

Nastec srl

Via della Tecnica, 8, 36048, Barbarano Mossano, Vicenza, Italy

declares under its own responsibility that the product:

HMA

complies with the following directives:

- 2014/53 / EU Radio Equipment Directive (RED)
- 2011/65 / EU - RoHS Directive

and that the following harmonized standards and technical specifications have been applied:

- EN 61000-6-4:2007 + A1:2011
- EN 61000-3-2:2011
- EN 61000-3-3:2000
- EN 61000-6-2:2005 + AC:2005
- ETSI EN 301 489-17 V3.1.1:2017
- ETSI EN 301 489-1 V2.1.1:2017
- ETSI EN 300 328 V2.1.1:2016-11
- EN 60529:1991 + A1:2000 + A2:2013
- EN 63000:2018
- EN62109-1:2010

Barbarano Mossano
30/07/2019
Ing. Marco Nassuato
Managing Director

13. UK Declaration of Conformity

The manufacturer hereby:

Nastec srl

Via della Tecnica, 8, 36048, Barbarano Mossano, Vicenza, Italy

declares, under its own responsibility, that the product:

HMA

complies with the following directives:

- UK SI 2017 No. 1206 Radio Equipment Regulations 2017
- UK SI 2012 No. 3032. Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 (RoHS2)

and that the following harmonised standards and technical specifications have been applied:

- BS EN 61000-6-4:2007 + A1:2011
- BS EN 61000-3-2:2011
- BS EN 61000-3-3:2000
- BS EN 61000-6-2:2005 + AC:2005
- ETSI EN 301 489-17 V3.1.1:2017
- ETSI EN 301 489-1 V2.1.1:2017
- ETSI EN 300 328 V2.1.1:2016-11
- BS EN 60529:1991 + A1:2000 + A2:2013
- BS EN 63000:2018
- BS EN62109-1:2010

Barbarano Mossano

02/03/2022

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Managing Director