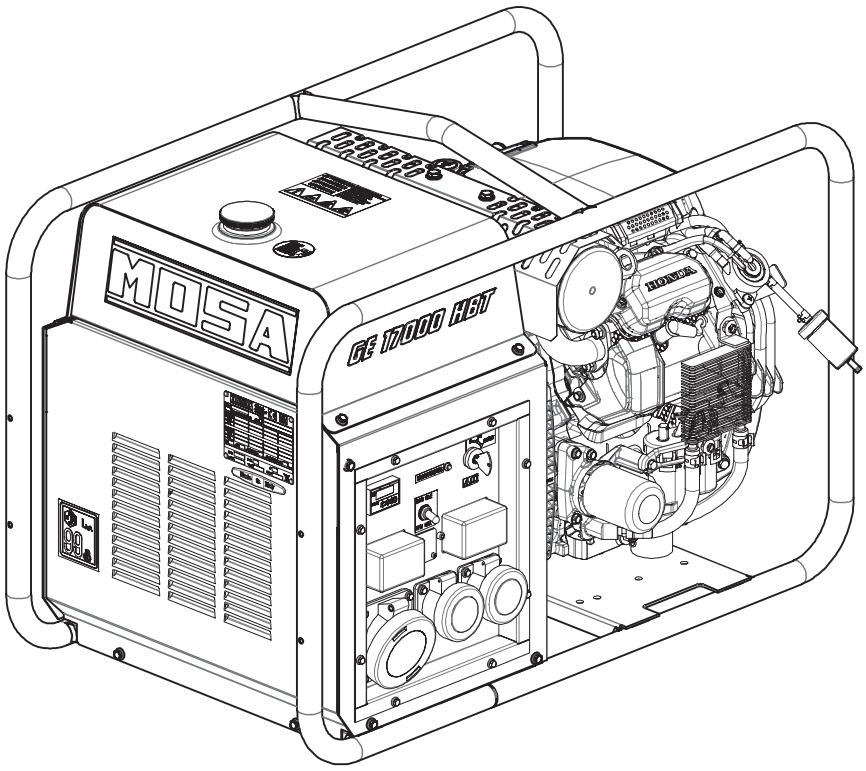
MOSA Energy

CL4W60019003_EN
01-2024

Use and Maintenance Manual



D5264380

Generating set

GE 15000 HBM
GE 17000 HBT
GE 17054 HBT

CE UKCA

Original instructions

Contents

1. Introduction

1.1 Foreword

This manual supplies the Operator and qualified and authorised Technicians with technical information on the GE 15000 HBM, GE 17000 HBT and GE 17054 HBT generating sets (hereinafter also referred to as the "machine") produced by MOSA Div. of BCS S.p.A. (hereinafter also referred to as the "manufacturer").

In this manual, the Operator in charge and the qualified Technicians will find the indications for:

- Getting familiar with the safety measures and basic standards to be adopted, to prevent hazards and damage to people, to the generating set and to the environment.
- Getting to know the main components of the generating set and its operation.
- Performing the installation before start the machine.
- Performing the programmed routine maintenance.
- Getting to know any extraordinary maintenance operation.

This manual is an integral part of the generating set and must follow it in any changes of ownership, until the final dismantling.

The manual and all the publications attached to it must be kept with care, in an easily accessible place, known to the operator and to the qualified technicians authorized for maintenance; read the descriptions carefully before starting to work or carrying out the required adjustments or maintenance.

If the manual is lost, damaged or becomes illegible, request a copy to MOSA, indicating the model of the generating set, the serial number and the year of construction.

If the generating set is transferred, the transferor must deliver this manual to the new owner.

The generating set is subject to updates to improve its performance; this manual summarises the information regarding the current state of technology at the moment of the supply.

MOSA reserves the right to make improvements and modifications to parts and accessories of the generating set, without promptly updating this manual, except in exceptional cases of fundamental integrations concerning safe operation.

CAUTION

- **Improper use or maintenance can cause serious damage to people and shorten the "useful life" of the generating set.**
- **The Operator and the qualified Technicians must be familiar with all the indications given in this manual before using the generating set or carrying out maintenance operations on it.**
- **The procedures contained in this manual are intended to be applicable to generating sets only for permitted uses, and with all safety devices in function.**
  If the generating set is used for purposes other than those indicated or in safety conditions other than those indicated, the Customer becomes directly responsible for any person possibly involved in accidents or injuries and for abnormal wear and tear of the machine.

1.2 Supplied documentation

The documentation supplied with the generating set includes this Use and Maintenance Manual and the main component manuals (e.g. engine).

1.3 Customer service

The Technical Assistance and Spare Parts Service are available to the Customers.
MOSA recommends that you contact the nearest authorised service centre for specialised intervention for all control and overhaul operations.
In order to obtain quick and effective responses, indicate the Model and Serial Number shown on the identification plate (see “1.8 Identification data”).

1.4 Spare parts

Only original spare parts that guarantee functionality and durability must be used.
The use of non-original spare parts will void all warranty and Technical Support obligations.

1.5 Declaration of conformity

The manufacturer:
MOSA Div. of BCS S.p.A.
Viale Europa, 59 20047 Cusago (Milano) Italy

Declares that the machine:
GE 15000 HBM
GE 17000 HBT
GE 17054 HBT

Complies with the requirements of the following EC/EU Directives:

- Machine Directive 2006/42/EC
- Low Voltage Directive 2014/35/EU
- Electromagnetic Compatibility Directive 2014/30/EU

and with the requirements of the following UK regulations:

- The Supply of Machinery (Safety) Regulations 2008/1597
- The Electrical Equipment (Safety) - Regulations 2016/1101
- Electromagnetic Compatibility - Regulations 2016/1091

1.6 Unauthorized changes

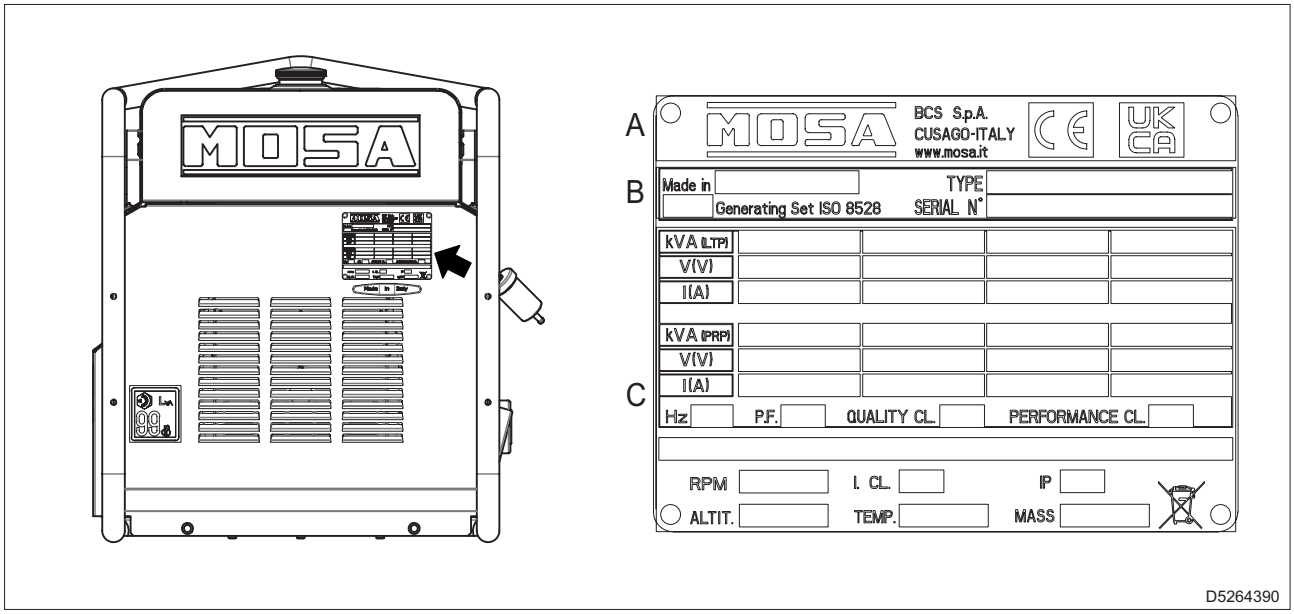
No changes can be made to the machine without MOSA'S authorization.
Unauthorized changes void any form of warranty on the machine and any civil and/or criminal liability in case of accidents or injuries

1.7 Allowed and non-allowed use

This generating set is used to generate electrical current in accordance with the specifications of the declared electrical system.
Combined with a EAS MAINS/GENERATOR switchboard, it forms a complex for the supply of electricity within a few seconds from the sudden absence of the commercial electricity grid.
For the EAS MAINS/GENERATOR connection, see “4.3.3 EAS mains/generator switchboard”.

1.8 Identification data

The data identifying the generating set are given on the EC plate applied in the area indicated in the figure. They are necessary for spare parts requests and communications with the Customer Service Department.



A - Manufacturer 's data

B - Machine data
- *Made In*: Country and year of manufacture
- *TYPE*: Model
- *SERIAL N°*: Serial number
- *Generating Set ISO 8528*: Technical standard reference

C - Machine technical data
- KVA: LTP and PRP Power (kVA/kW)
- V: Rated voltage
- A: Rated current
- Hz: Rated frequency
- P.F.: Rated cosφ (power factor)
- QUALITY CL.: Quality class - Output
- PERFORMANCE CL: Performance class - Output
- Additional technical data:
  RPM: Number of engine revolutions
  I. CL.: Insulation class
  IP: IP protection degree
  ALTIT.: Rated altitude (above the sea level)
  TEMP.: Rated ambient temperature
  MASS: Dry weight (kg)

NOTES:

2. Safety

2.1 Safety information

Always respect the warnings contained in this manual and present on the decal applied to the machine.
This allows the machine to be used safely, avoiding damage to property and injury or death to people.
The following words and symbols were used to identify important safety messages.

Symbol ⚠ identifies important safety messages on the machine, in the manual and elsewhere. When you see this symbol, follow the instructions in the safety messages.

⚠ DANGER

- **This word indicates a situation of imminent risk that, if not avoided, could cause serious injury or even death to people and serious damage to property.**

⚠ WARNING

- **This word indicates a potential risk situation which, if not avoided, could result in serious injury or even death to people and serious damage to property.**

⚠ CAUTION

- **This word indicates a potential risk situation that, if not avoided, could cause minor or moderate injuries.**
  It can also be used to prevent dangerous operations that can cause damage to the machine.

The following terms are used to transmit the information to be followed to the user, to avoid damage to the machine.

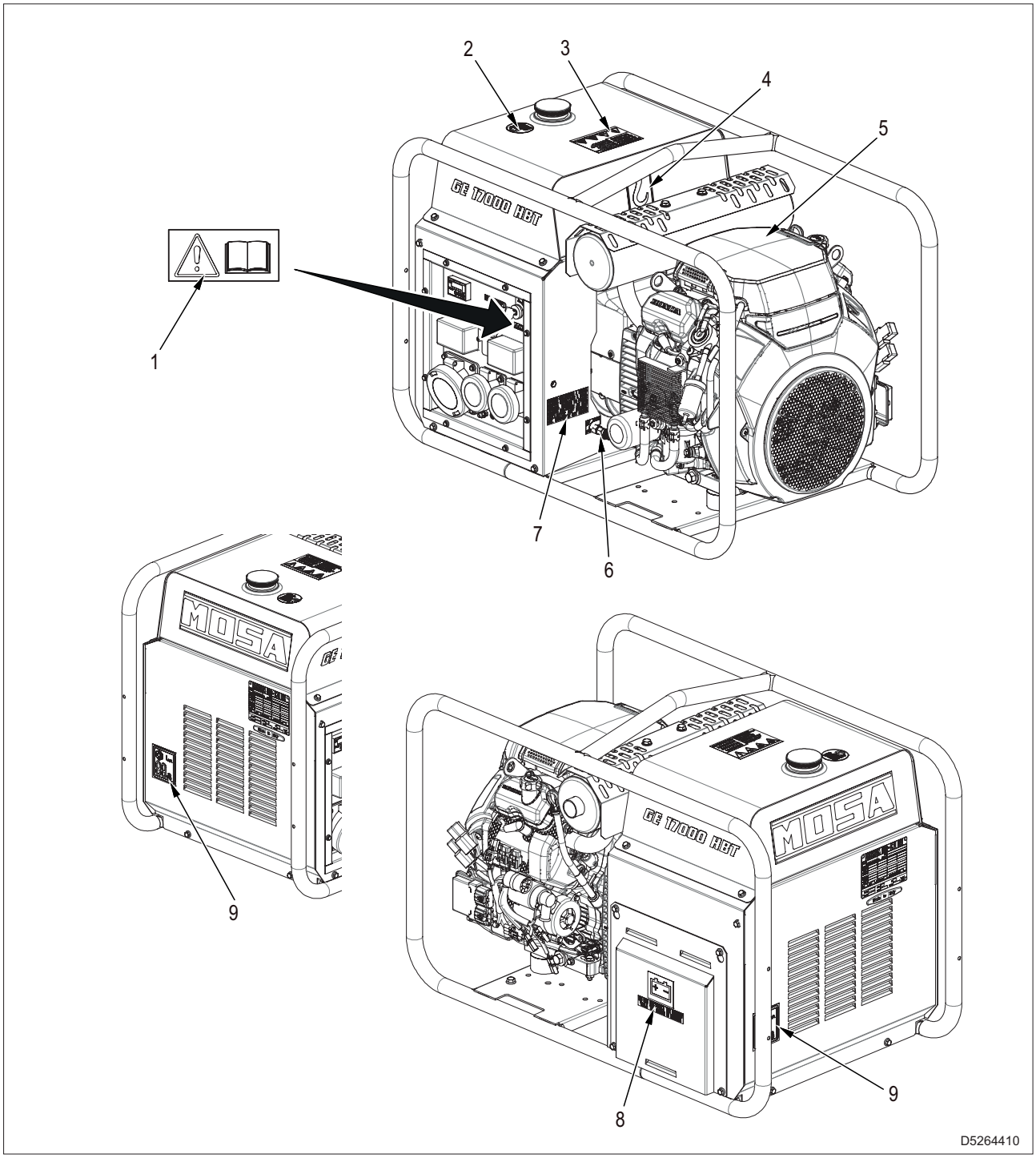
☛ Important

- If the precautions described are not observed, the machine could be damaged and its useful life reduced.

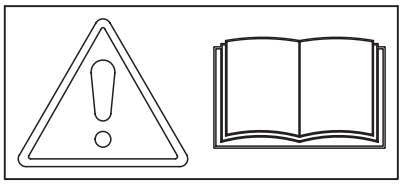
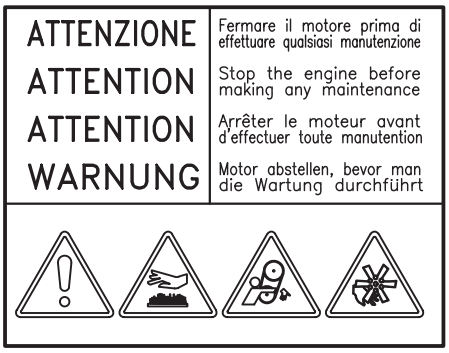
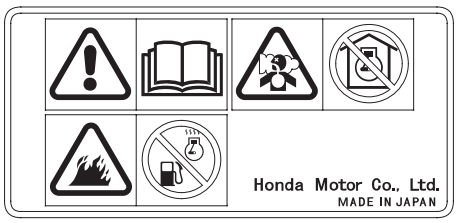
Note

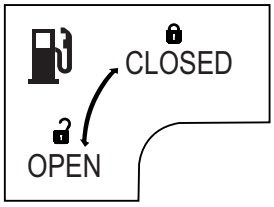
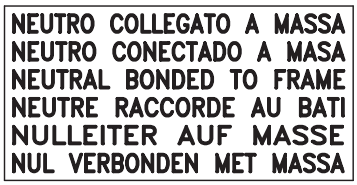
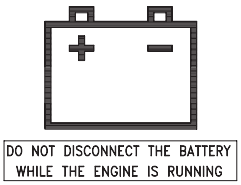
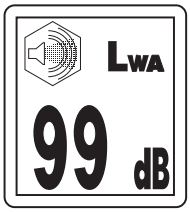
- This word is used to indicate further useful information.

2.2 Positioning of safety decal and information



2.2.1 Decal explanation

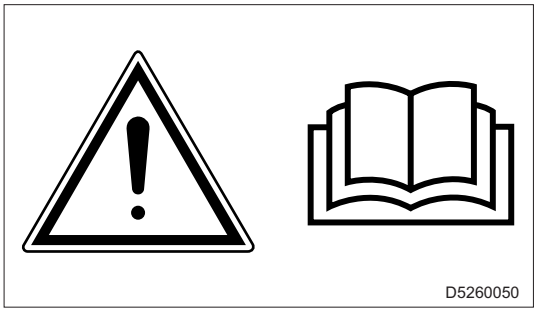
 MLC1Q90010253	• **Pos. 1 Consult the manual** Read the contents of the manual carefully before using the machine or carrying out maintenance operations on it.
 M354500261	• **Pos. 2 - Fuel filling neck**
 MCP2T50G10250	• **Pos. 3 - Stop the engine before servicing** To avoid burns due to contact with hot parts, before carrying out checks or servicing of the machine, stop the engine and wait until they have cooled sufficiently. To avoid serious injury, do not insert limbs near the rotating parts without stopping the engine.
 M209710202	• **Pos. 4 - Lifting hooking point**
 D5260950	• **Pos. 5 - Fire and exhaust gas inhalation hazard** Fuel is highly flammable. Turn the engine off and allow it to cool before fuelling. Engine carbon monoxide emissions are highly toxic and poisonous. Use the machine in outdoor and ventilated places.

 M259100201	• **Pos. 6 - Fuel valve**
 M212020225	• **Pos. 7 - Neutral connected to earth** Indicates that the generator's star centre (Neutral) is connected to the earth system If there is no decal on the machine, this means that the star centre of the generator (Neutral) is floating.
 M259100227	• **Pos. 8 - Battery warning** Do not disconnect the battery while the engine is running.
 D5260820	• **Pos. 9 - Sound power level** Unit of measurement dB(A); represents the amount of acoustic energy emitted in the unit of time, regardless of the distance of the measuring point.

2.3 General precautions

Any errors during use, checks or maintenance could cause the risk of injury, even serious

- Before performing the operations, read this manual and the decals applied to the machine and follow the warnings.
  If you don't understand any part of the manual, ask your Safety Officer for explanations.
- The machine can only be used and repaired by trained and authorized personnel.
- Do not work if you feel unwell, have drunk alcohol or take medicines that impair your ability to work safely or repair the machine.
- Before starting the operations, check the machine. If anomalies are detected, do not operate on the machine before having completed the necessary repairs.
- Comply with the provisions and laws in force in the country in which you work.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2.3.1 Personal protective equipment

- Do not wear clothes that are too loose or accessories, to prevent them from becoming entangled, causing personal injury.
- Always wear the personal protective equipment prescribed for the place where you work, such as a protective helmet, safety footwear, safety glasses, gloves and noise protection headphones.
- Before using personal protective equipment, check that it is in perfect condition.


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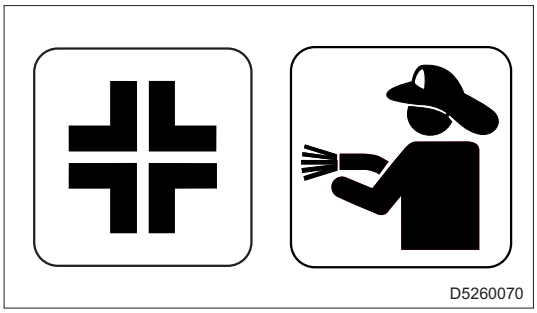
2.3.2 Check the work area

- Ask the site safety manager for information on the regulations to be observed.
- Understand the signs and indications on site.
- Make sure that fire extinguishers and first aid kit are available on site and inquire about where they are located.
- Check that the area is clear of materials that may be hazardous during the operation of the generating set (such as flammable materials or liquids).
- Make sure that there are no unauthorized persons in the area.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2.4 Fire prevention

2.4.1 Fire due to fuel, oil

- Avoid approaching any flame to flammable substances such as fuel and oil.
- Do not smoke or use open flames near flammable substances.
- Stop the machine before refuelling.
- Make sure not to spill flammable substances on overheated surfaces or on parts of the electrical system.
- After refuelling, remove any spills and tighten all filling caps tightly.
- For safety in the workplace, store the cloths soaked in flammable materials in a container.
- Store oil and fuel in pre-established and well-ventilated locations and prohibit the entry of unauthorised personnel.
- When cleaning the machine, do not use flammable substances such as diesel or gasoline.

2.4.2 Fires caused by flammable material build-up

- Remove dry leaves, chips, pieces of paper, carbon dust, or other flammable materials accumulated from the engine, exhaust manifold, muffler, battery, or inside the bottom guards.

2.4.3 Fire caused by electrical wiring

- Always keep the electrical wiring clean and tightened.
- Periodically check that there are no loose or damaged parts. Tighten loose wiring connectors or terminals.
- Repair or replace any damaged cables.

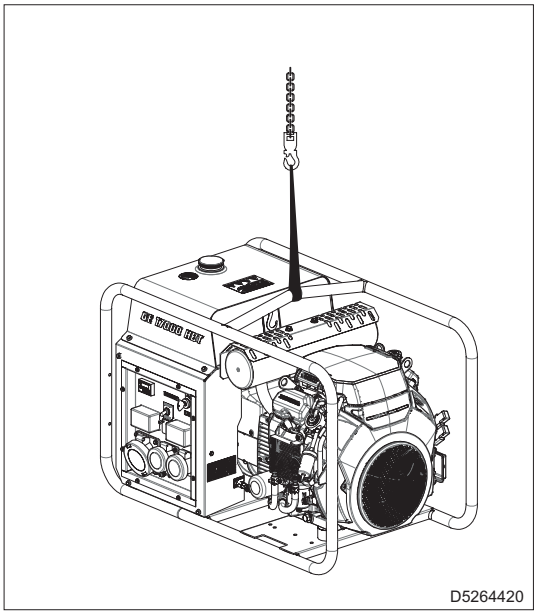
2.4.4 Fire caused by piping

- Periodically check that the hose clamps are firmly fixed.
- If loosened, they may vibrate during machine operation and cause leakage of liquids, provoking fires and serious injuries, including fatalities.

2.5 Handling precautions

2.5.1 Lifting by chains or ropes

- Make sure that the handling area is clear of obstacles and people.
- Handle the machine with the engine off, the electrical cables disconnected and the fuel tank empty.
- Lift the machine using only the central point on the frame.
- Check the condition of the frame. If it is damaged, replace it before lifting the machine.
- Always use lifting equipment adequately sized and controlled by authorized bodies.
- Do not subject the generating set and the lifting equipment used to undulating or abrupt movements that transmit dynamic stresses to the structure.
- Do not lift the generating set at a height higher than that necessary for handling.
- Do not leave the machine suspended for longer than necessary for handling.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2.5.2 Transport with towing carriages

- Handle the machine with the engine off, the electrical cables disconnected and the fuel tank empty.
- On request, the machine can be equipped with an optional trolley that facilitates handling.


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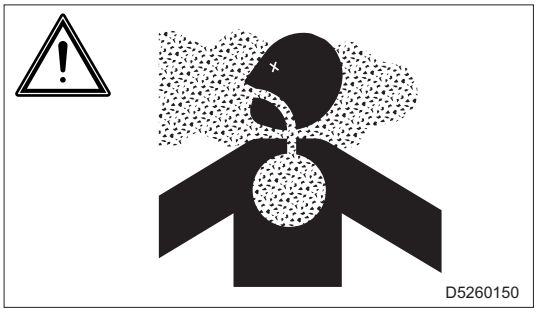
2.6 Precautions for positioning the machine

2.6.1 Positioning site precautions

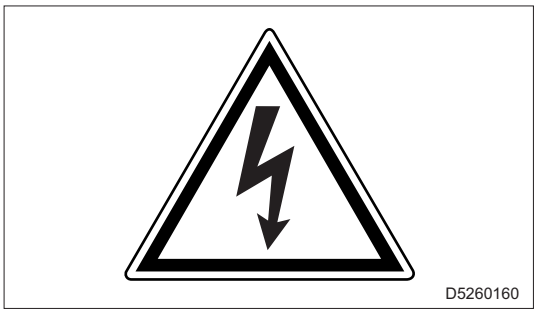
- This machine has been designed for outdoor use and can therefore be positioned outdoors.
  In case of meteorological precipitation (rain, snow, etc.), place the machine in an adequately sheltered place. If this is not possible, do not use the machine.
- Do not place machines or equipment near heat sources, in areas at risk with explosion hazard or fire hazard.
  Place the machine at a safe distance from fuel tanks, from flammable material (rags, paper, etc.), from chemicals.
  Follow the instructions of the competent authorities.
- To limit potentially dangerous situations, isolate the area around the machine, thus preventing any unauthorized personnel from getting close to it.
- Although the machines produced comply with the regulations on electromagnetic compatibility, do not place the machine near equipment influenced by the presence of magnetic fields.
- Make sure that the area immediately surrounding the machine is clean and free of debris.
- Always place the machine on a flat, solid surface that is not subject to failure in order to avoid tipping, slipping or falling during operation.
  Avoid using the machine on land with a slope greater than 10°.

- The machine must always be positioned so that exhaust gases disperse into the air without being inhaled by people or animals.
  The exhaust gases of an engine contain carbon monoxide: this substance is harmful to health and, in high concentration, can cause poisoning and death.
- If the machine is used indoors, make sure that the area is well ventilated.



2.6.2 Precautions for electric connections

- Use appropriate electrical plugs at the machine output sockets and make sure that the electrical cables are in good condition.
- Do not use the machine with wet or damp hands and/or clothing.



2.7 Precautions during operation

- Keep the doors closed during normal operation.
- Access to the internal parts of the generating set must only be carried out for maintenance purposes.
- Keep the area near the muffler free from objects such as rags, paper, cartons.
  The high temperature of the muffler could cause the objects to burn and cause a fire.
- Immediately stop the machine in case of malfunctions.
  Do not restart the machine without first identifying and solving the problem.
- Do not wrap or cover the generating set with cloths while it is running.
  Before covering the machine, make sure that the engine parts are cold
  If the engine parts are still warm, there is a risk of damage to the machine and fire.
- Do not place objects or obstacles near the air suction and expulsion windows; a possible overheating of the generator could cause a fire.

2.8 Precautions for generating sets with automatic or remote start-up

Take the precautions illustrated for generating sets with automatic/remote starting, including:

- Generators in emergency service to the mains.
- Generators with programmable automatic test function.
- Generators with remote control via PC, via telephone modem or GSM modem and other communication systems.
- Generators with remote contact start-up: timer, float, etc.
- Generators with TCM remote control.

- Place the generating set in an enclosed area to prevent unauthorised persons from approaching the machine during start-up and to avoid dangerous situations.
- If it is not possible to install the generating set indoors, ensure that the surrounding area is cordoned off and clearly marked to prevent access by unauthorised persons.
- Make sure that the generating set does not start during routine maintenance or repair operations by deactivating the automatic or remote start-up function. For details, see “4.3.2 TCM6 remote control” and “4.3.3 EAS mains/ generator switchboard”.
- The generating set may be connected to a system where a power failure could generate critical circumstances. For this reason, the automatic operation of the generating set should be restored immediately after maintenance has been completed.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2.9 Precautions during fuel and engine oil filling

- Fuel and engine oil are flammable.
  Refill with the engine off.
- Refuel only outdoors or in well-ventilated environments.
- Do not smoke or use naked flames during refuelling.
- Do not fuel with the engine running or hot.
- Clean and dry any leaks of engine oil and fuel before restarting the machine.
- After refuelling, fully tighten the tank caps.
- Do not fill the fuel tank completely to allow expansion of the fuel inside it.
- Do not exceed the MAX level line of the engine oil level dipstick.

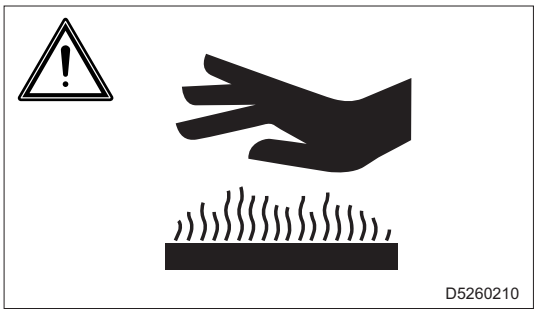
2.10 Precautions against noise

- Excessive noise can cause temporary or permanent hearing problems.
  The actual risk arising from the use of the machine depends on its use conditions.
- There is a decal on the machine that declares the sound power level dB(A) emitted by it. The value provides an indication of the noise level emitted by the machine when used, in order to assess the noise in the workplace.
- The adoption of specific measures (such as headphones or earplugs) must be assessed by the operator.

2.11 Maintenance precautions

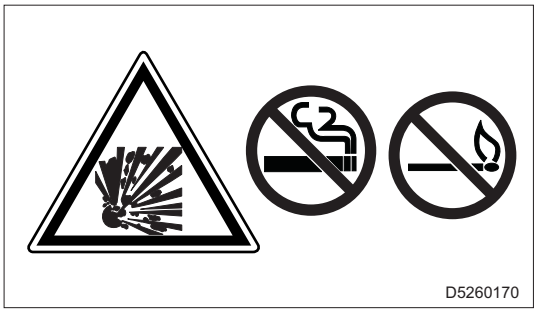
- Maintenance must be performed by qualified personnel.
- During maintenance, if unauthorized persons start the machine, there is a danger of serious personal injury or death. Do not allow unauthorized persons to approach the machine.
- To avoid injury, do not perform maintenance with the engine running, if it is not necessary.
  - Rotating parts, such as the fan, are dangerous and can get entangled on body parts or a worn object. When performing maintenance, be careful to approach rotating parts.
  - Make sure not to drop or insert tools or other objects in the fan or other rotating parts. They can touch the rotating parts and be projected.

- Do not touch the engine, pipes and muffler during operation or immediately after shut-off. Allow the engine to cool before performing any operation.
- When discharging the engine oil, the engine must be hot. Engine oil may come into contact with the skin and cause burns.



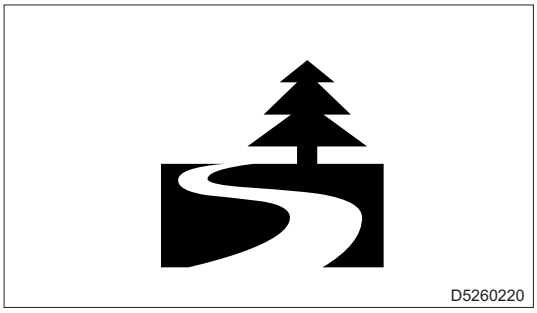
- Do not remove the guards and safety devices.
  If it is necessary to remove them, after completing the maintenance, install the removed guards and restore the safety devices.
- Use work tools in good condition and suitable for the work to be performed.
  If you use a damaged or deformed tool or if you use a tool for a purpose other than its intended purpose, there is a danger of causing serious personal injury or death.
- Do not operate the battery without using protective gloves.
  The battery liquid contains corrosive sulphuric acid.

- Do not smoke, avoid open flames and sparks near the battery; exhaled vapours may cause the battery to explode.



2.12 Precautions for disposal of waste material

- Be sure to store the waste liquid in containers or tanks.
- Do not discharge the oil directly into the soil or sewage system, rivers, seas or lakes.
- When disposing of harmful waste such as oil, fuel, coolant, solvents, filters and batteries, follow current laws and regulations.
- Entrust the authorized companies with the disposal of rubber material, plastic and components that contain them (hoses, cables, wiring, etc.) in accordance with the applicable laws and regulations.



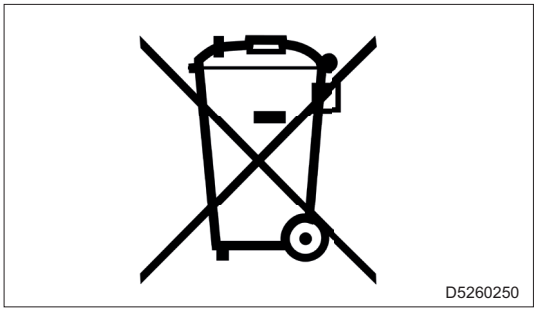
2.13 Disposing of the generating set

This generating set is classified as Electrical Equipment.

For disposal, comply with *Directive 2012/19/EU* on waste of electric and electronic equipment (WEEE).

The symbol affixed to the product or to the documentation states that, at the end of its useful life, the generating set must be disposed of separately.

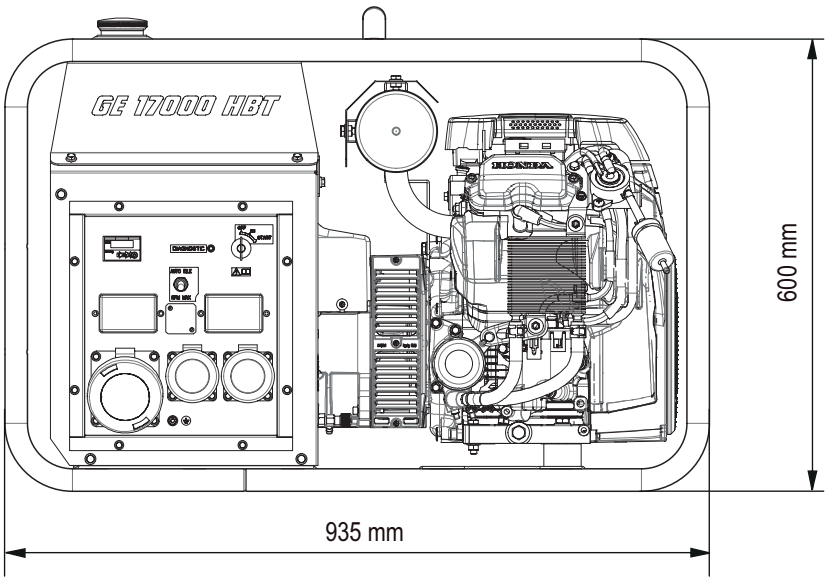
Adequate separate collection helps avoid possible negative effects on the environment and health and promotes the reuse and/or recycling of the materials that make up the equipment.

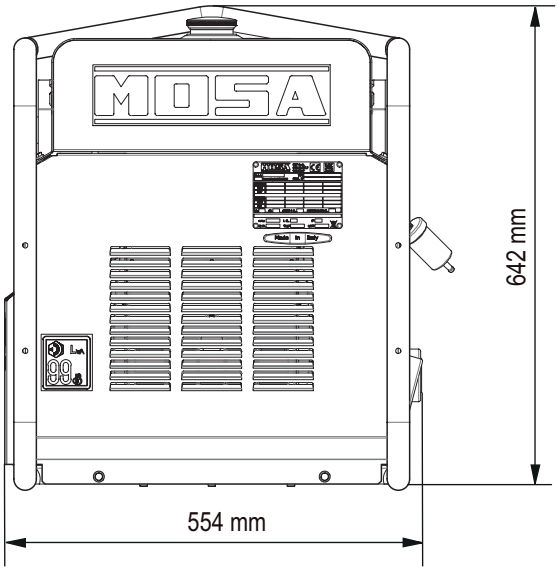


NOTES:

3. Technical data

3.1 Machine dimensions (mod. GE 15000 HBM - GE 17000 HBT)





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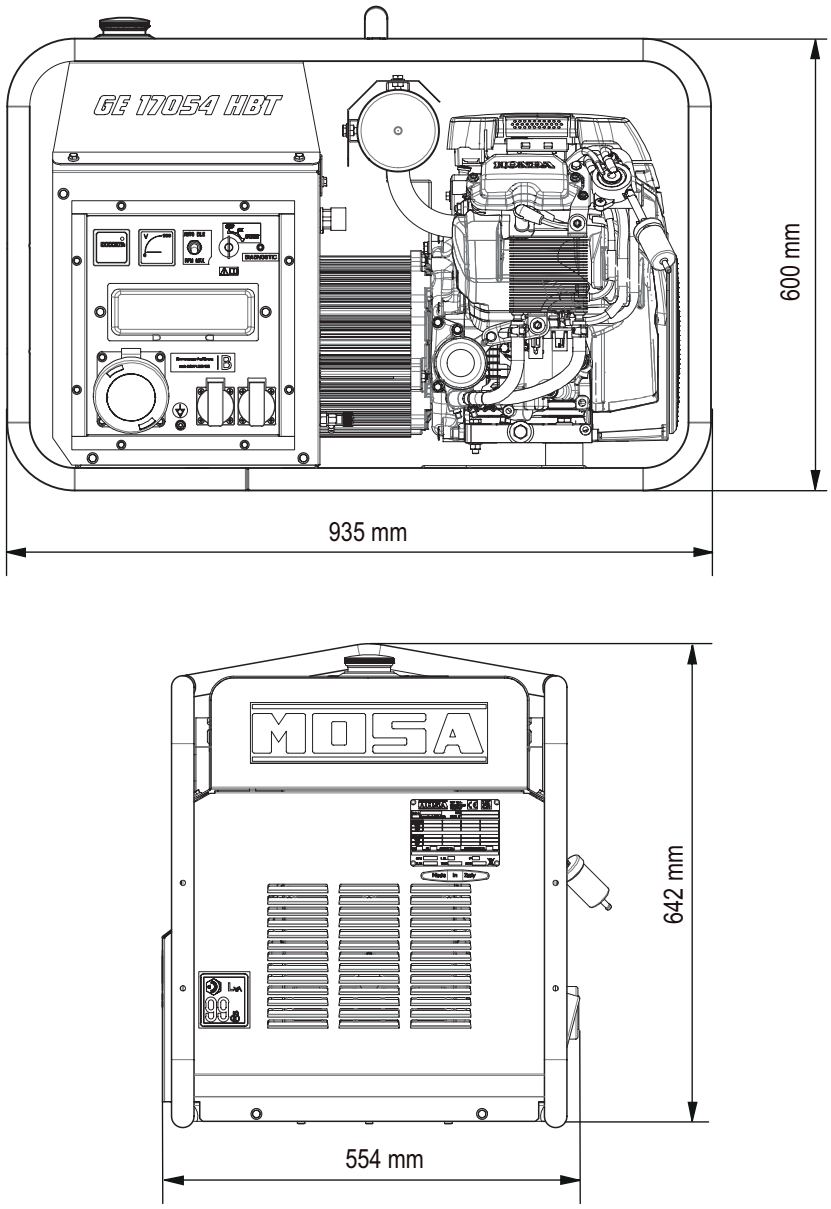
3.2 Machine dimensions (mod. GE 17054 HBT)



3.3 Technical data (mod. GE 15000 HBM)

Rated power

Single-phase stand-by power (1)	14 kVA (12.6 kW) / 230V / 60.9A
Single-phase PRP power (2)	12.5 kVA (11.3 kW) / 230V / 54.3A
Frequency	50 Hz
Cosφ	0.9

General specifications

Fuel tank capacity	18 ℓ
Autonomy (75% PRP)	3.8 h
Protection	IP 23
Maximum dimension on base (LxWxH)	935x554x642 mm
Weight (Dry)	152 kg
Measured sound power L_{WA}	99 dB(A)
Measured sound level L_{pA}	74 dB(A) at 7m

Engine

Brand/Model	HONDA iGX 800
Cooling system/type	Petrol OHV 4-stroke / air
Cylinders / Displacement	2 / 0.779 l (799 cm^3)
Net stand-by power (1)	16.8 kWm (22.8 hp)
Net PRP power (2)	13.3 kWm (18.0 hp)
Speed	3000 rpm
Fuel consumption (75% PRP)	4.7 ℓ/h
Oil sump capacity (max.)	2.0 ℓ
Starter	electric

Alternator

Type	Single-phase synchronous - AVR - brush
Insulation class	H

Power declared according to ISO 8528-1 (temperature 25°C, relative humidity 30%, altitude 100 m above sea level).

(1) Stand-by = maximum power available for use at variable loads for a number of hours/year limited to 500h. Overloading is not allowed.

(2) Prime power PRP = maximum power available for use at variable loads for an unlimited number of hours/year.

The average power withdrawable during a 24h period must not exceed 80% of the PRP.

An overload of 10% is allowed for one hour every 12 hours.

Approximately it is reduced: by 1% for every 100 m of altitude and by 2.5% for every 5°C above 25°C.

3.4 Technical data (mod. GE 17000 HBT)

Rated power

Three-phase stand-by power (1)	16.5 kVA (13.2 kW) / 400V / 23.8A
Three-phase PRP power (2)	14.5 kVA (11.2 kW) / 400V / 20.9A
Single-phase PRP power (2)	7.5 kVA (kW) /230V / 32.6A
Frequency	50 Hz
Cosφ	0.8

General specifications

Fuel tank capacity	18 ℓ
Autonomy (75% PRP)	3.8 h
Protection	IP 23
Maximum dimension on base (LxWxH)	935x554x642 mm
Weight (Dry)	155 kg
Measured sound power L_{WA}	99 dB(A)
Measured sound level L_{pA}	74 dB(A) at 7m

Engine

Brand/Model	HONDA iGX 800
Cooling system/type	Petrol OHV 4-stroke / air
Cylinders / Displacement	2 / 0.779 l (799 cm^3)
Net stand-by power (1)	16.8 kWm (22.8 hp)
Net PRP power (2)	13.3 kWm (18.0 hp)
Speed	13000 rpm
Fuel consumption (75% PRP)	4.7 ℓ/h
Oil sump capacity (max.)	2.0 ℓ
Starter	electric

Alternator

Type	Three-phase synchronous - AVR - brush
Insulation class	H

Power declared according to ISO 8528-1 (temperature 25°C, relative humidity 30%, altitude 100 m above sea level).
(1) Stand-by = maximum power available for use at variable loads for a number of hours/year limited to 500h. Overloading is not allowed.
(2) Prime power PRP = maximum power available for use at variable loads for an unlimited number of hours/year.
The average power withdrawable during a 24h period must not exceed 80% of the PRP.
An overload of 10% is allowed for one hour every 12 hours.
Approximately it is reduced: by 1% for every 100 m of altitude and by 2.5% for every 5°C above 25°C.

3.5 Technical data (mod GE 17054 HBT)

Rated power

Three-phase stand-by power (1)	17.0 kVA (13.6 kW) / 400V / 24.5A
Three-phase PRP power (2)	15.0 kVA (12.0 kW) / 400V / 21.6A
Single-phase PRP power (2)	7.0 kVA (kW) /230V / 30.4A
Frequency	50 Hz
Cosφ	0.8

General specifications

Fuel tank capacity	18 ℓ
Autonomy (75% PRP)	3.8 h
Protection	IP 54
Maximum dimension on base (LxWxH)	935x554x642 mm
Weight (Dry)	175 kg
Measured sound power L_{WA}	99 dB(A)
Measured sound level L_{pA}	74 dB(A) at 7m

Engine

Brand/Model	HONDA iGX 800
Cooling system/type	Petrol OHV 4-stroke / air
Cylinders / Displacement	2 / 0.779 l (799 cm^3)
Net stand-by power (1)	16.8 kWm (22.8 hp)
Net PRP power (2)	13.3 kWm (18.0 hp)
Speed	13000 rpm
Fuel consumption (75% PRP)	4.7 ℓ/h
Oil sump capacity (max.)	2.0 ℓ
Starter	electric

Alternator

Type	Three-phase synchronous IP54-AVR - brushless
Insulation class	H

Power declared according to ISO 8528-1 (temperature 25°C, relative humidity 30%, altitude 100 m above sea level).
(1) Stand-by = maximum power available for use at variable loads for a number of hours/year limited to 500h. Overloading is not allowed.
(2) Prime power PRP = maximum power available for use at variable loads for an unlimited number of hours/year.
The average power withdrawable during a 24h period must not exceed 80% of the PRP.
An overload of 10% is allowed for one hour every 12 hours.
Approximately it is reduced: by 1% for every 100 m of altitude and by 2.5% for every 5°C above 25°C.

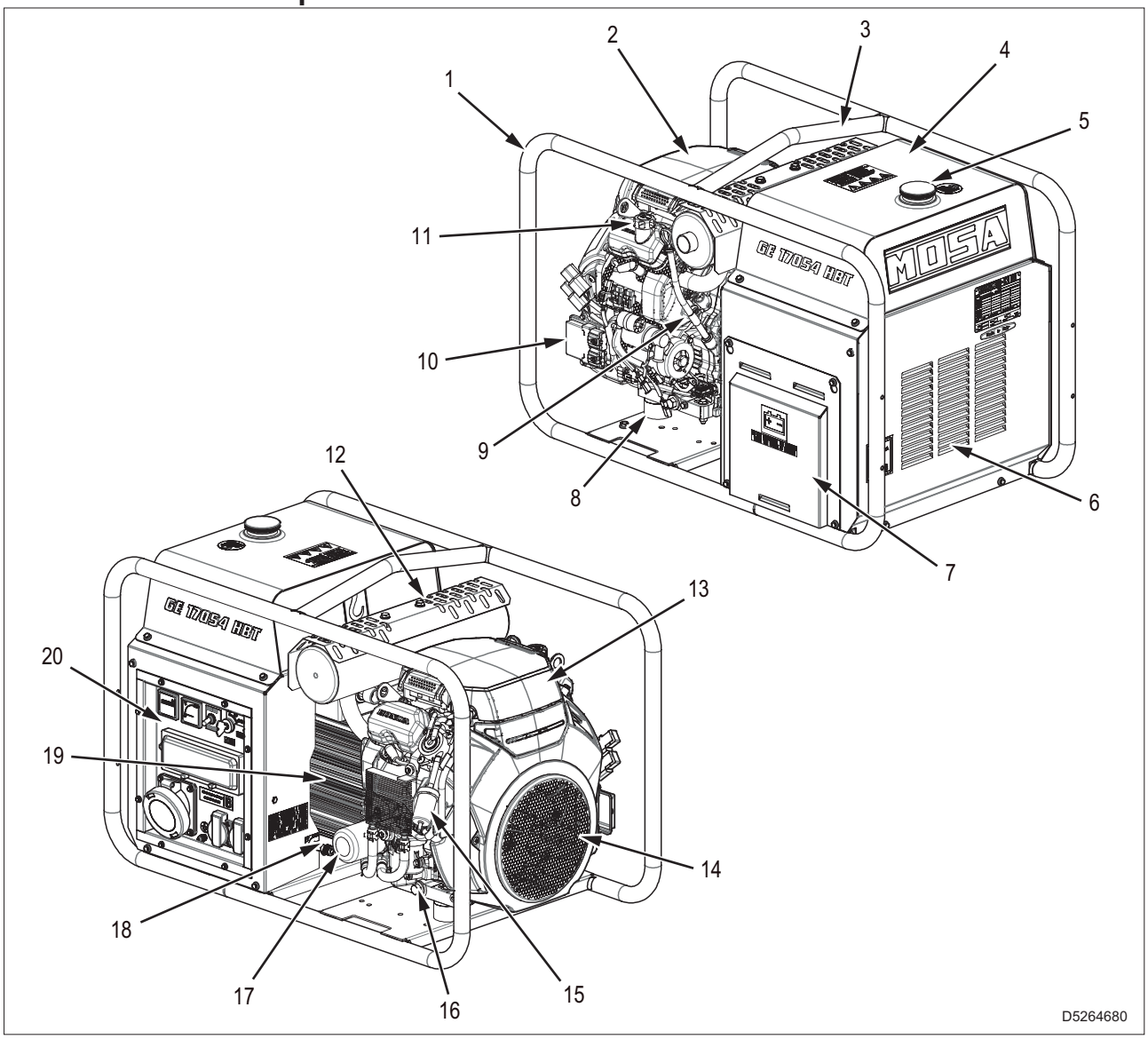
NOTES:

4. Description

The Generating Set is a machine that transforms mechanical energy, generated by an engine, into electrical energy through an alternator.

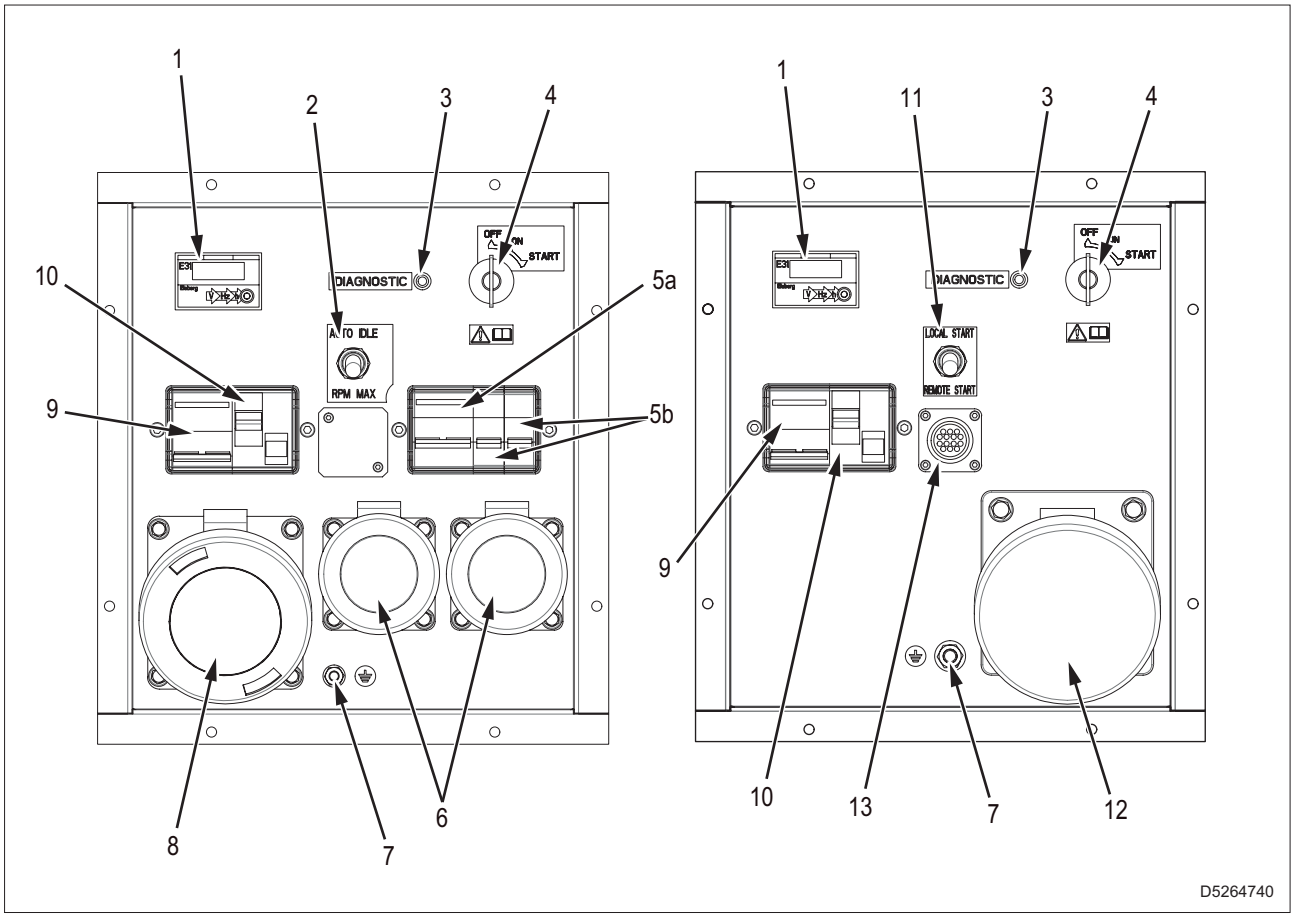
4.1 Main components

4.1.1 External components



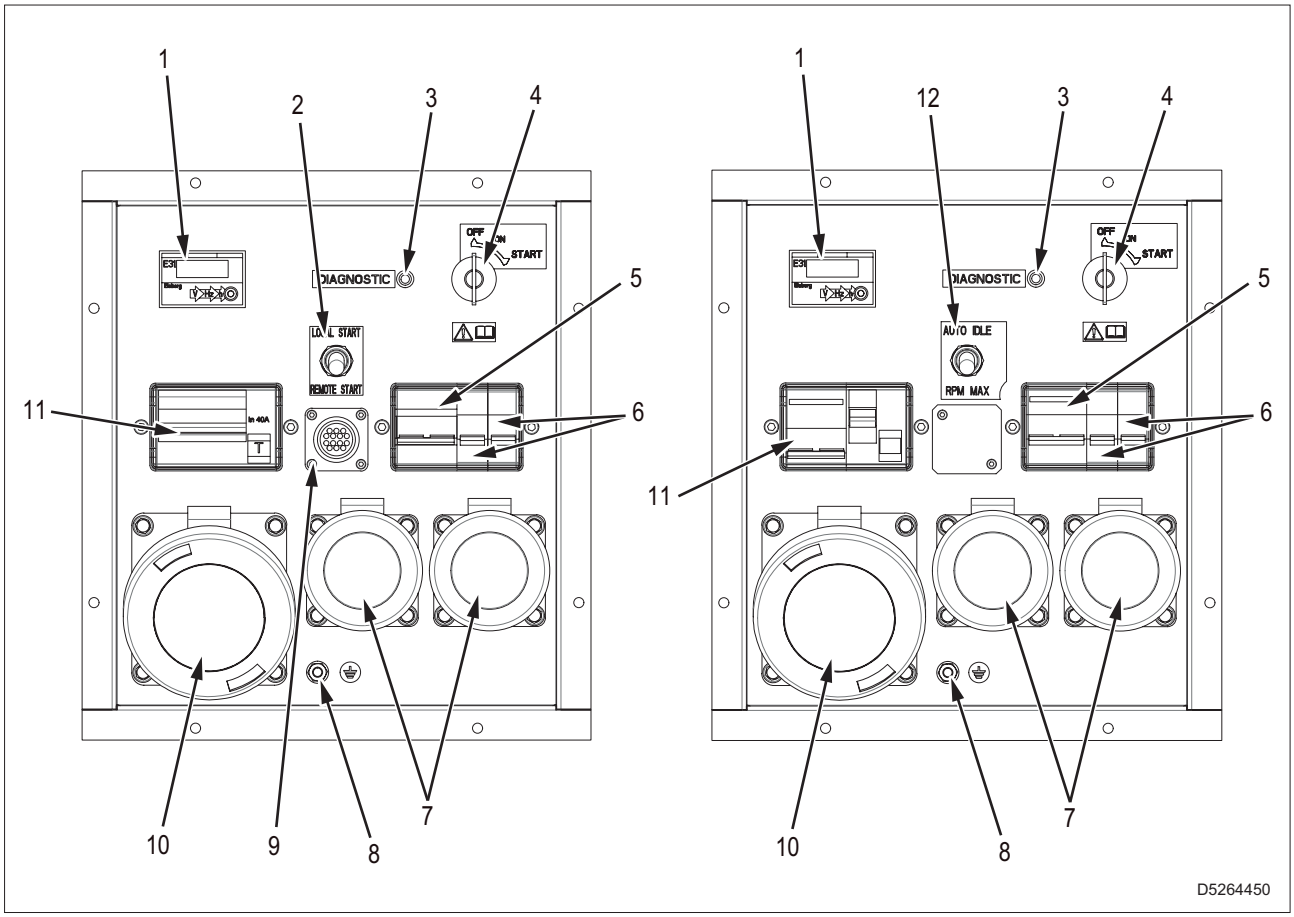
1 - Frame
2 - Engine
3 - Central lifting point
4 - Fuel tank
5 - Fuel filler plug
6 - Air intake grid
7 - Battery compartment access door
8 - Vibration dampers
9 - Oil level dipstick
10 - Engine control unit (ECU)
11 - Oil filler plug
12 - Muffler
13 - Engine air filter
14 - Engine air intake grid
15 - Fuel filter
16 - Oil drain plug
17 - Oil filter
18 - Fuel valve
19 - Alternator
20 - Control panel

4.1.2 Control panel and electrical panel components (mod. GE 15000 HBM)



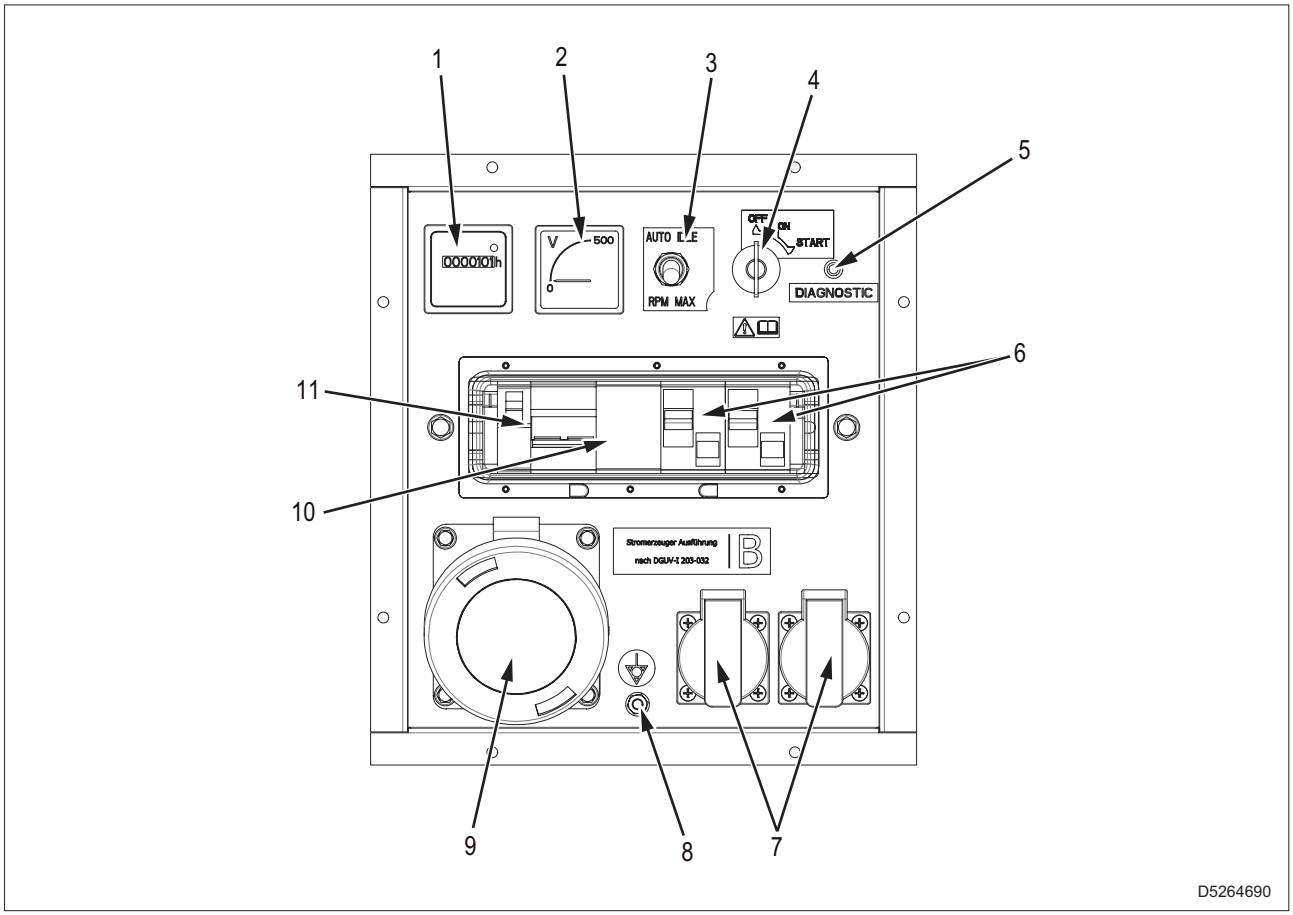
1 - Multi-purpose digital instrument: Volt - Hz / Total hour counter / - Partial hour counter (resettable)
2 - Auto-Idle switch (Auto-Ile versions)
3 - DIAGNOSTIC warning light - Oil alarm and engine malfunction
4 - Ignition and stop key
5 - Magnetic circuit breakers 5a - 2P 32A - C-curve for 32A 230V single-phase socket
5b - 2P 16A - C-curve for 16A 230V single-phase sockets (No. 2)
6 - 16A 230V 2P+E CEE IP67 sockets
16A 230V 2P+E IP54 SCHUKO sockets (SCHUKO version)
7 - PE ground terminal
8 - 32A 230V 2P+T CEE IP67 socket
9 - Main machine switch
10 - 30mA Type A residual current circuit breaker
11 - Local - Remote Start switch (EAS version)
12 - 63A 230V 2P+T CEE IP67 socket (except EAS version)
13 - EAS switchboard connector (EAS version)

4.1.3 Control panel and electrical panel components (mod. GE 17000 HBT)



1 - Multi-purpose digital instrument: Volt - Hz / Total hour counter / - Partial hour counter (resettable)
2 - Local - Remote Start switch (EAS version)
3 - DIAGNOSTIC warning light - Oil alarm and engine malfunction
4 - Ignition and stop key
5 - Main machine switch
6- 2P 16A magnetic circuit breakers for 16A 230V sockets (No. 2)
7 - 16A 230V 2P+E CEE IP67 sockets
16A 230V 2P+E IP54 SCHUKO sockets (SCHUKO version)
8 - PE ground terminal
9 - EAS switchboard connector (EAS version)
10 - 32A 400V 3P+N+T CEE IP67 socket
11 - 30mA Type A residual current circuit breaker
12 - Auto-Idle switch (Auto-Ile versions)

4.1.4 Control panel and electrical panel components (mod. GE 17054 HBT)



1 - Hour counter
2 - Voltmeter
3 - Auto-Idle switch
4 - Ignition and stop key
5 - DIAGNOSTIC warning light - Oil alarm and engine malfunction
6 - Magnetic/residual current circuit breakers - 2P 16A - 30mA Type A for 16A 230V SHUCKO sockets (No. 2)
7 - 16A 230V 2P+T SCHUKO IP54 sockets
8 - Equipotential ground terminal
9 - 32A 400V 3P+N+T CEE IP67 socket
10 - Insulation monitor
11 - Main machine switch

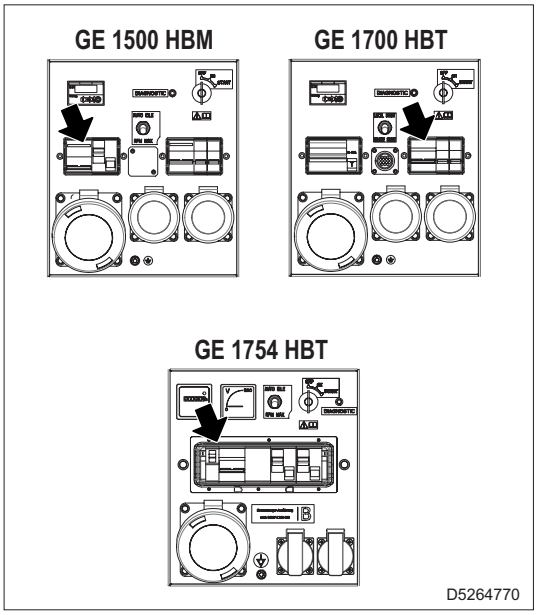
4.2 Electrical protection

4.2.1 Main machine switch

The generating set is protected against short circuits and overloads by a circuit breaker (1) located upstream of the system.

Overload protection tripping is not instantaneous; it follows an overcurrent/time characteristic. The greater the overcurrent, the shorter the tripping time.

The rated tripping current refers to an operating temperature of 30°C. Each variation of 10°C corresponds approximately to a variation of 5% on the rated current value.



4.2.2 Residual current circuit breaker

The residual current circuit breaker guarantees protection against indirect contacts due to ground fault currents.

When the switch detects a fault current greater than the rated one, it opens interrupting the electric circuit connected.

The residual current circuit breakers differ according to their characteristics:

tripping differential current, maximum rated current, type of differential correction detected.

4.2.3 Residual current circuit breaker with overcurrent protection (RCBO)

The residual current circuit breaker with overcurrent protection (RCBO) performs both electrical protection functions against short circuits and overcurrents and against indirect contacts due to ground fault currents.

In the electrical panel there are several residual current circuit breakers with overcurrent protection (RCBO), one for each output socket, this allows to individually protect the equipment connected to the sockets.

The residual current circuit breakers with overcurrent protection (RCBO) differ according to their characteristics: tripping thermal current, magnetic tripping curve, breaking power, tripping differential current, type of differential correction detected.

4.2.4 Insulation monitor

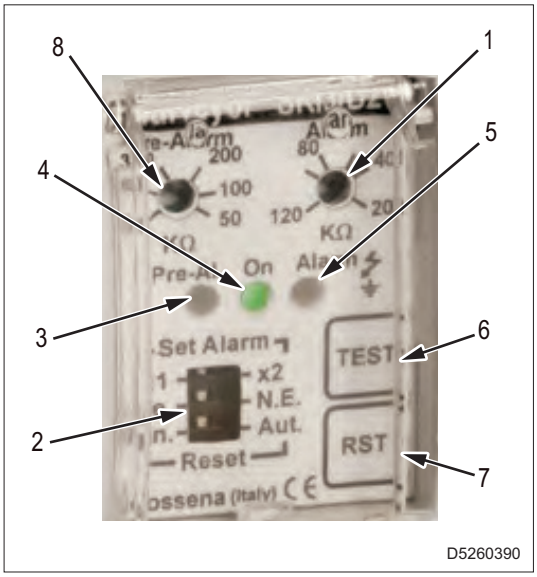
☛ Important

- Isolation monitor calibration changes must only be performed by qualified personnel. If necessary, contact Technical Support.

The isolation monitor is a device that continuously controls the ground insulation of the electrical circuit.

When the device detects a resistance value (isolation) lower than the set value, it intervenes by signalling the fault and opening the main machine switch.

1 - Alarm threshold adjustment
2 - Dip-switch
3 - Pre-alarm indication led
4 - Power supply presence indication led
5 - Alarm indication led
6 - Test button
7 - Reset button
8 - Pre-alarm threshold adjustment



SRI3/ D2 operation

- ON indicator (4) indicates that the equipment is powered.
- Pressing the test button (6) for at least 5 seconds, turns on the Alarm (5) and Pre-alarm (3) LEDs.
- When the button (6) is released, the Pre-alarm led (3) turns off and the Alarm led (5) remains ON. Press the test button (6) again to turn off the Alarm led (5).
- If the isolation resistance drops below the set pre-alarm value, the Pre-alarm led (3) lights up and the contact of the Pre-alarm relay switches.
- If the isolation resistance drops further below the alarm value threshold, the Alarm led (5) turns on, along with the contact of the Alarm switch relay.
- After checking the system and removing the cause of the problem, reset the circuit by pressing the reset button (7).

SRI3/ D2 model factory settings

- Microswitches
- Resistive value multiplier: x 1
- Output relay: N.De (Normally de-energized)
- Reset: Man. (manual)
- Potentiometers
- Alarm: 40 kΩ
- Pre-Al. : 100 kΩ

4.3 Optional equipment and accessories

4.3.1 Auto Idle

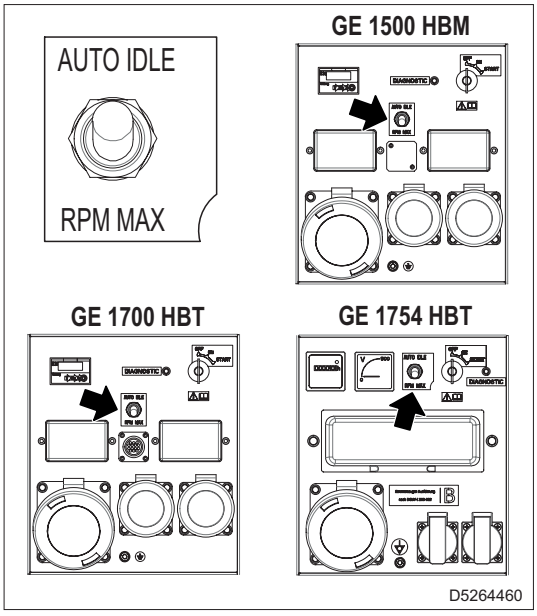
☛ Important

- Run the engine for the time indicated in the table below before drawing power to supply loads.

Ambient temperature	Time required
– -10°C	2 minutes
-9°C – -5°C	1 minute
≤ -4°C	20 seconds

The 'Auto Idle' function is used to reduce the number of revolutions when the machine is operating without load and therefore no energy is required.
As a result, both the fuel consumption and the noise generated by the machine are reduced.

- **Selector switch set to AUTO IDLE.**
  When the machine is started, the engine runs at idle speed.
  The engine automatically switches to nominal speed, allowing power to be drawn when needed.
  When the power supply is disconnected, the engine will continue to run at nominal speed for approximately 15 seconds, after which it will return to idle speed.
- **Selector switch set to RPM MAX.**
  The engine always runs at the nominal speed.



WARNING

When the generating set is to power equipment driven by electric motors (e.g. compressors, water pumps, etc.), set the selector switch to RPM MAX. If the selector switch is left in the AUTO IDLE position, the electric motor may not start.

4.3.2 TCM6 remote control

☛ Important

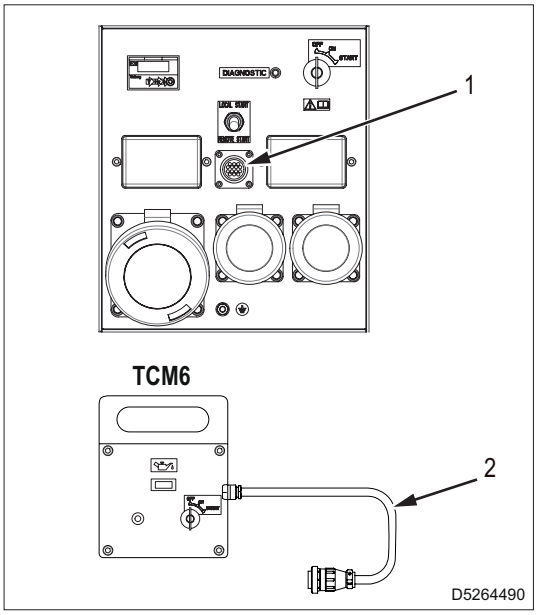
- The TMC6 remote control can only be connected on EAS generator sets.

⚠ WARNING

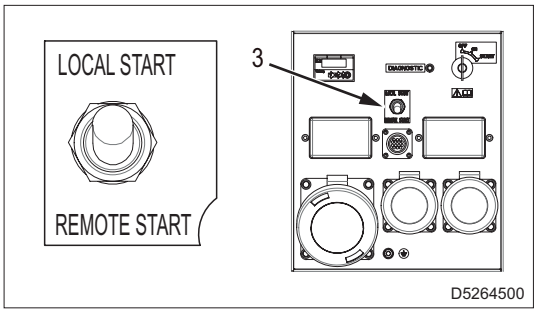
- **Before starting the machine, carefully read section “2. Safety” and in particular paragraph “2.8 Precautions for generating sets with automatic or remote start-up”.**

Pairing the TCM6 remote control with the generating set allows it to be started and stopped remotely.

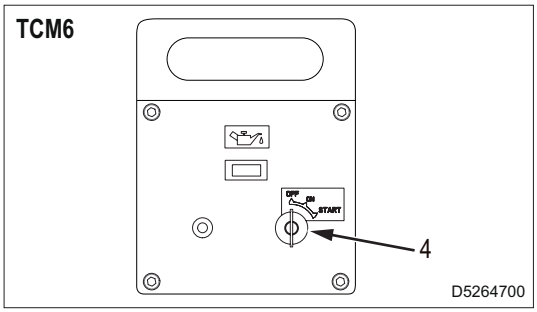
1 - Connect the TCM6 remote control to the EAS connector (1) using the control cable (2).



2 - Set the Local-Remote Start switch (3) to the REMOTE STARTposition.



3 - Turn the ignition key (4) to the ON position.
4 - Turn the ignition key (4) to the START. position
5 - When the engine starts, release ignition key. The key automatically returns to the 'ON' position.
6 - Before shutting down the generator, disconnect or switch off all loads connected to the output sockets.
7 - Wait a few minutes to allow the engine to cool down.
8 - Turn the ignition key (4) to the OFF position.



Note

- In the REMOTE START position, the ignition key on the front panel is completely disabled.
- Use the ignition key (4) of the TCM 6 remote control to start and stop the generator.

4.3.3 EAS mains/generator switchboard

☛ Important

- The mains/group switchboard can only be installed on EAS generating sets.
- The operations described below are general operating information.
  For details on installation, operation and control, see the EAS switchboard manual.

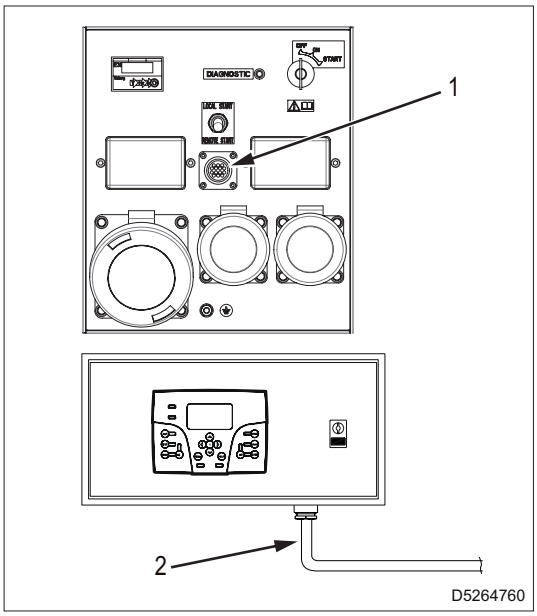
⚠ WARNING

- **Before starting the machine, carefully read section “2. Safety” and in particular paragraph “2.8 Precautions for generating sets with automatic or remote start-up”.**
- **The installation of the EAS switchboard and all connections between the board and the commercial electricity grid (MAINS), the system to be powered (LOAD) and the generating set (GENERATOR) must be carried out by a qualified electrician and in accordance with the regulations in force in the place of installation.**

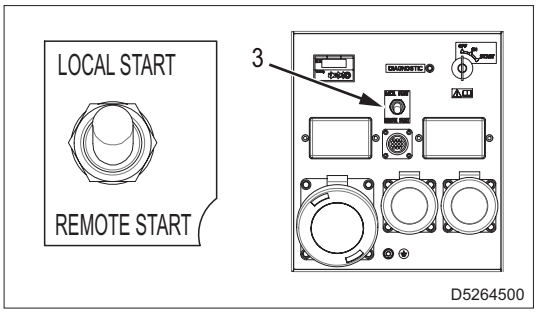
The EAS version generating set combined with a EAS mains/generator switchboard, forms a unit for the supply of electricity within a few seconds from the failure of the commercial electricity grid.

1 - Ensure that the system is connected under safe conditions.

2 - Connect the mains/ EAS switchboard to the EAS connector (1) using the control cable (2).



3 - Set the Local-Remote Start switch (3) to the REMOTE STARTposition.



4 - Check that the EAS switchboard is in RESET mode; if not, press the RESET button (4).

5 - Perform the first start-up in MANUAL mode:

a - Check that the main machine switch and other electrical protection switches are closed (switch lever up).

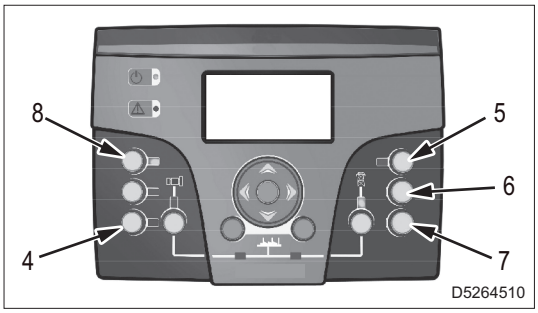
b - Switch the EAS switchboard to manual mode by pressing the MAN button (5).

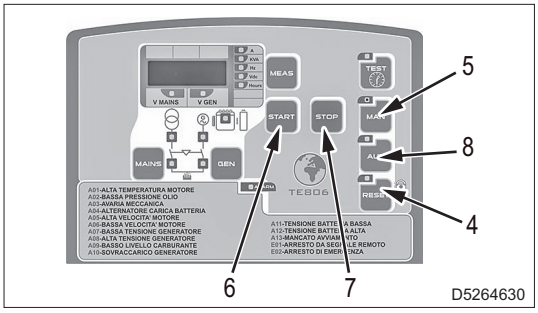
c - Check that there are no dangerous situations and press the START button (6) to start the generating set.

4 - Check the correct operation of the generator by checking the values shown on the EAS switchboard display.

5 - Stop the generator by pressing the STOP button (7).

6 - Press the AUT button (8) to operate the system in emergency mode.





The EAS switchboard provides full management of the emergency system.

- No MAINS or MAINS out of limits detection.
- Engine start-up.
- GENERATOR remote control switch closing control, that is, the system is powered by the generator (after engine warm-up and check that the generator parameters are within the limits)
- MAINS back within limits detection.
- GENERATOR remote control switch opening command and MAINS remote control switch closing command.
- Engine shutdown after cooling time.
- System ready again for next No MAINS.

Note

- In the REMOTE START position, the ignition key on the front panel is completely disabled.
- Use the controls on the EAS switchboard to start and stop the generator.

5. Delivery and unpacking

5.1 Delivery

- The machine is normally transported and delivered packed in a suitable cardboard box.
- All shipped equipment is checked before being delivered to the Client.
- Check the material delivered against the detailed shipment list.

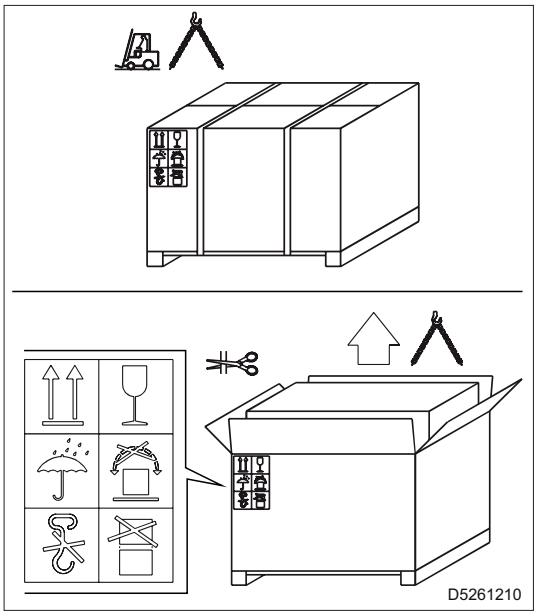
☛ Important

- Upon receipt, check the equipment for damage (breakage or significant dents) caused by transport. If this occurs, immediately inform the transport company and write down the "Conditional Acceptance" clause in the delivery note.
- In the event that, at the time of delivery, significant damage is found, caused during transport, together with any missing parts that may be found, promptly notify MOSA Div. of BCS S.p.A.

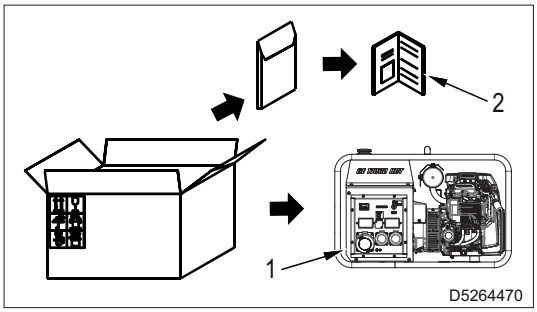
5.2 Unpacking

- Unloading of the packaging must be carried out with the utmost care, using lifting equipment of a suitable capacity (e.g. forklift truck), if necessary.
- Place the packaging on a stable and horizontal surface.
- Load handling operations must be carried out by qualified personnel, in compliance with the current regulations on safety in the workplace of the country of use.

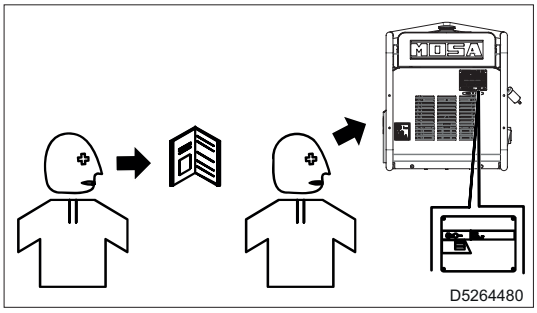
	Do not dump the packaging into the environment; comply with the regulations in force in the country of use.



1 - Remove the machine (1) and the documents (2) from the packaging.



2 - Check the machine identification plate, the integrity of the decal and data, and read the use and maintenance manual before proceeding with use.



6. Installation

WARNING

- **Before proceeding with the installation, carefully read section Safety - “2.6 Precautions for positioning the machine” and “2.7 Precautions during operation”.**
- **The installation and the electrical connection described in this chapter are indicative. For these operations, it is necessary to contact Specialized Technicians who must issue the necessary certifications.**

6.1 Fastening

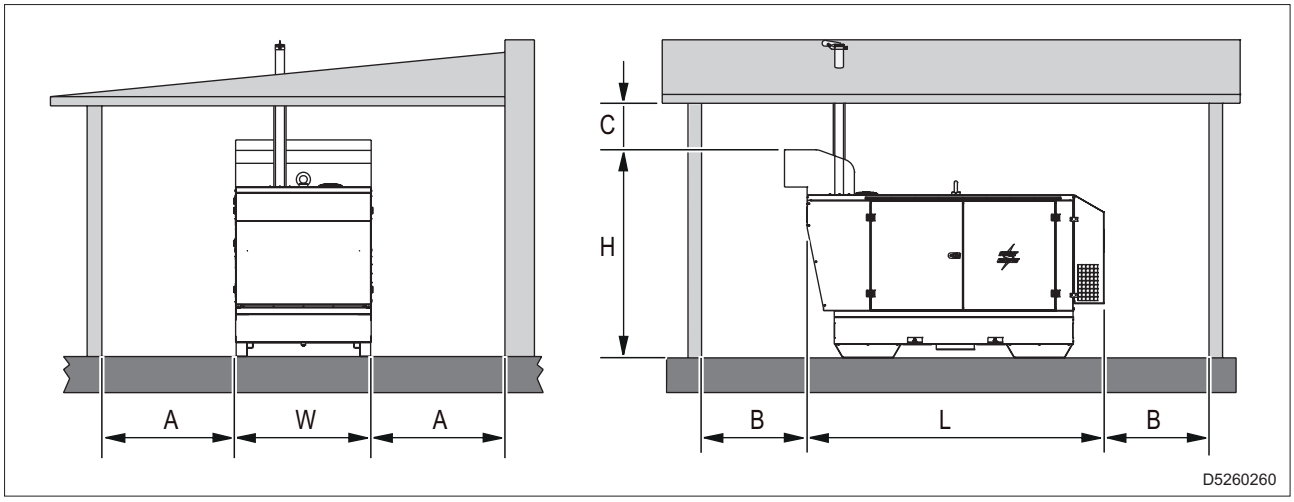
- Fix the generating set on rigid pitches, isolated against vibrations coming from other structures and with a mass equal to at least three times the mass of the generating set.
  This guarantees an adequate absorption of the vibrations produced by the machine.
- Do not place the generating set on terraces or raised floors that have not been adequately sized and verified beforehand.

6.2 Installation outdoors

WARNING

- **If the outdoor installation is temporary, correctly place the generating set on the ground. This prevents vibrations on the frame during operation from causing the generating set to move, in particular when the electrical load is on.**

Example of installation with shelter



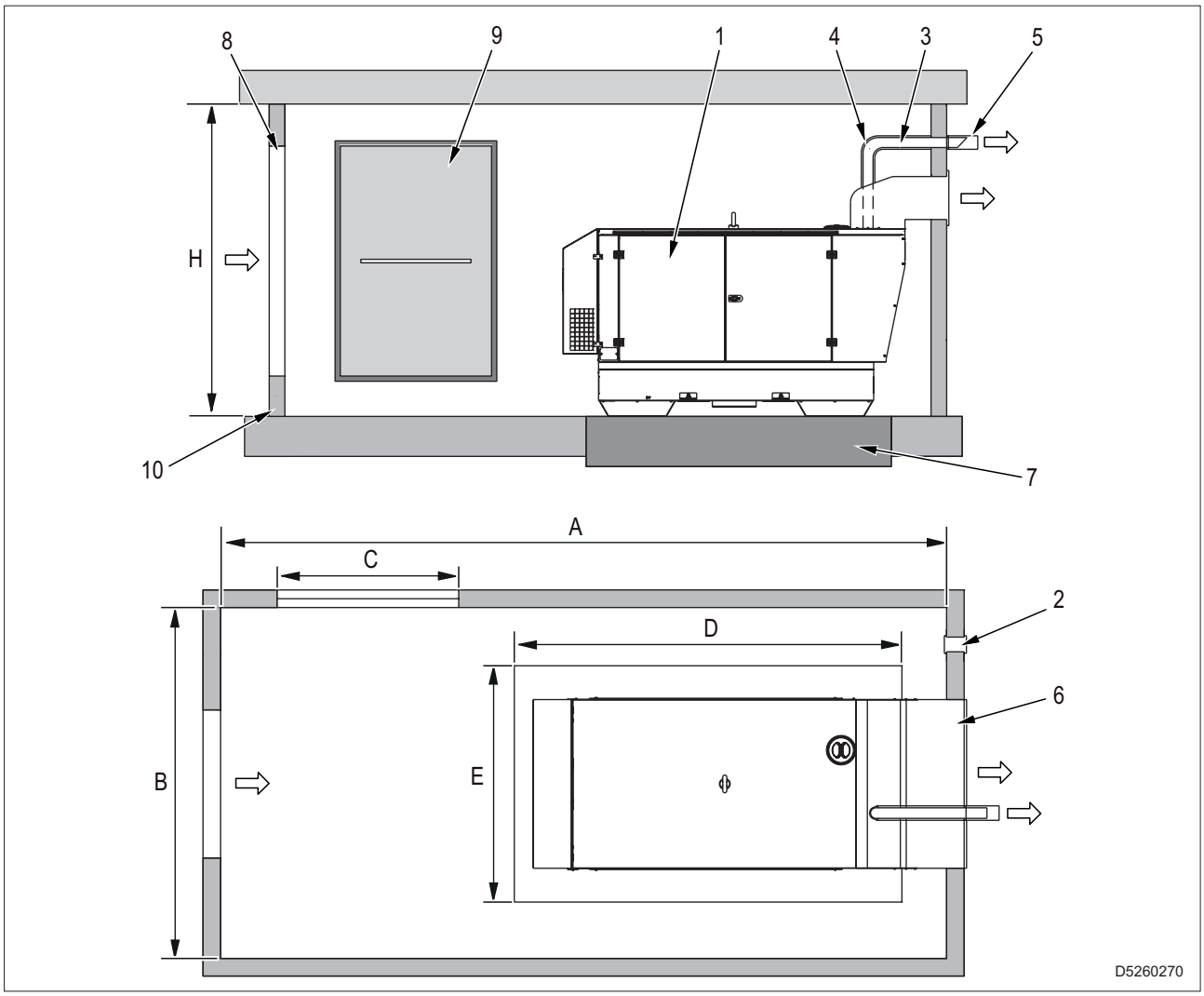
W: Generating set width
L: Generating set length
H: Generating set height
A: >1000 mm
B: >500 mm
C= H+1500 mm (Min. 2500 mm)

6.3 Indoor installation

☛ Important

- The room where the generating set will be installed must comply with the legislation in force at the place of installation.

Installation of the generating set indoor must be carried out in accordance with the instructions described.



(1) Generating set
(2) Auxiliary extractor
(3) Exhaust pipes
(4) Exhaust pipe protection and insulation
(5) Rain cap and anti-intrusion hood
(6) Air ejection duct
(7) Platform with insulated foundation
(8) Air inlet with anti-intrusion mesh
(9) Entrance door
(10) Containment step

Recommended minimum size

(A) Generating set length + 1000 mm
(B) Generating set width + 2000 mm
(C) Generating set width + 200 mm
(D) Generating set length + 400 mm
(E) Generating set width + 400 mm
(H) Generating set height + 1500 mm (Min. 2500 mm)

6.3.1 Supporting floor

For a correct support of the electronic unit and to avoid the transmission of vibrations, it is necessary to build a reinforced concrete platform (7) on the floor, isolated from the rest of the structure.

The generating set frame must be fixed to the platform (7) with dowels or anchor bolts.

The platform must have a length (D) and a width (E) greater than 400 mm (200 mm per side) with respect to the support base of the generating set (200 mm per side).

The weight of the platform must be 3 times the static weight of the generating set reported in the technical data.

The floor of the room must be level and adequate to support the weight of the generating set.

If the generating set is not equipped with a liquid containment tank, the door thresholds (9) or entrance to the room must have a plinth that can contain the liquids in case of leakage.

6.3.2 Opening and ventilation of the room

The room must have a sufficient ventilation system to dispose of the heat produced by the generating set during operation, without any possible stagnation or recycling of overheated air.

The inlet and outlet openings of the cooling and combustion air must be sized taking into account the minimum air flow rates and maximum back pressures reported in the engine manual.

The air inlet opening (8) must be positioned near the floor towards the rear of the generating set.

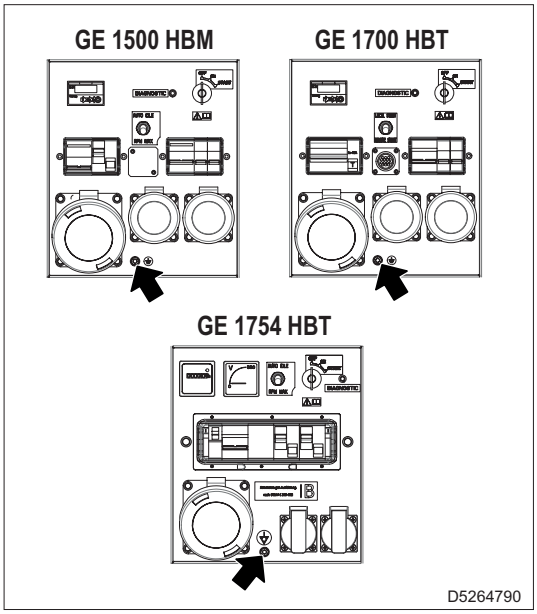
If the air inlet (8) and outlet (6) openings are not aligned with the generating set, ducts must be installed to convey the air and ensure ventilation of the room.

6.4 Grounding

☛ Important

- Comply with local and/or current regulations on installation and electrical safety.

The grounding terminal (1) is in the position shown in figure.



6.4.3 Grounding with residual current circuit breaker or earth leakage relay

Connection to a grounding system is mandatory for all models equipped with a residual current circuit breaker or earth leakage relay.

In these groups, the star centre of the generating set is generally connected to the machine ground.
By adopting the TN or TT distribution system, the differential relay guarantees protection against indirect contacts.

If powering complex systems that require or adopt additional electrical protection devices, coordination between the protections must be verified.

Use the grounding terminal (1) for connection.

6.4.4 Grounding with isolation monitor

In machines equipped with an insulation monitor, connection of the grounding terminal (1) to a grounding system is not required.

Located on the front of the machine, the isolation monitor continuously monitors the ground insulation of the active parts.

If the isolation resistance drops below the set fault value, the isolation monitor interrupts the power supply to the connected equipment.

It is important that the power cables of the equipment are equipped with the protective conductor (yellow-green cable) so as to ensure the equipotential connection between all the masses of the equipment and the mass of the machine.

This provision is not valid for double insulated or reinforced insulated equipment.

Note:

You can connect the grounding terminal (1) to your own grounding system.
In this case, an IT-type system is created, that is, with the active parts isolated from the ground and the ground plane earthed.
In this case, the isolation monitor controls the isolation resistance of the active parts both towards ground and towards earth (for example, ground insulation of the power cables).

6.5 Electrical connections

☛ Important

- Connection to the systems must be carried out by a qualified electrician, who must perform the connection according to the regulations in force at the place of installation.

The electrical connection to the user system is one of the most important operations to be carried out before use.

The safety and efficiency of the generating set and the user system itself depend on the correct connection.

Before powering the user system, perform the following checks.

1 - The connection cables between the generating set and the user system must comply with the rated voltages of the system.

2 - The type of cable, section and length must be sized according to the environmental conditions of installation and local regulations.

3 - The earth connection must be efficient to allow correct operation of the differential protection device.

4 - The cyclical direction of the phases must correspond to the needs of the user system. Do not connect the phases to the neutral.

7. Operation

WARNING

- **Before starting the machine, carefully read section “2. Safety”.**
- **It is forbidden to connect the set to the public grid and/or other source of electricity.**

7.1 Operating conditions

7.1.1 Power

The electrical power of the generating set, expressed in kVA, is the available output power at the reference environmental conditions and at the rated values of: voltage, frequency, power factor (cos ϕ).
There are different types of power established by ISO 8528-1 and 3046/1:

- PRIME POWER (PRP)
- STAND-BY POWER
- COP

See “3. Technical data”.

Important

- When using the generating set, do not exceed the declared powers, paying particular attention when powering multiple loads at the same time.

7.1.2 Voltage

Alternators with Electronic Adjustment (AVR)

In these types of generating sets, the voltage accuracy is maintained within ±1.5% with speed variation between -10% and +30% and with balanced loads.
The voltage remains constant both without load and with connected loads that have a cos φ between 0.8 ÷1.
The insertion and release of the load causes a change of transient voltage lower than 15%, with return to the rated value within 0.2-0.3 seconds.

7.1.3 Frequency

Frequency is a parameter directly dependent on engine revolutions.
With a 2-pole alternator, you have a frequency of 50/60 Hz with a rotational speed of 3000/3600 rpm.
The electronic speed regulator, present on the engine of the generating set, maintains the constant speed of rotation in all operating conditions, unladen or with load (isochronous operation), and therefore also the frequency of the electrical system remains constant, with a maximum variation of ±0.25% in static conditions.

Power factor - cos ϕ

The power factor is a data that depends on the electrical characteristics of the load.
It indicates the ratio between the Active Power (kW) and the Apparent Power (kVA).
The apparent power is the total power required for the load, given by the sum of the active power delivered by the engine (after the alternator has transformed the mechanical power into electrical power) and the Reactive Power (kVAR) delivered by the alternator.
The rated value of the power factor is cos ϕ = 0.8.
For different values between 0.8 and 1, it is important during use not to exceed the declared active power (kW) so as not to overload the engine of the generating set; the apparent power (kVA) will decrease proportionally to the increase in cos ϕ.

For cos ϕ values lower than 0.8, the alternator must be downgraded, because, at the same apparent power, the alternator should provide a greater reactive power.
For the reduction coefficients, contact the Technical Support Service.

Asynchronous motor start

Starting an asynchronous motor by a generating set can be critical, due to the high starting currents that the asynchronous motor requires (Iavv. = up to 8 times rated current In.).
The starting current must not exceed the overload current allowed by the alternator for short periods, generally 250-300% for 10-15 seconds.
To avoid oversizing the group, we recommend adopting some precautions:

- When starting multiple motors, divide them into groups and arrange for them to start at intervals of 30-60 seconds.
- If the machine coupled to the motor allows it, set it for a reduced-voltage start, star/triangle start or with autotransformer, or use a soft-start system.

In all cases, when the user circuit provides for the start of an asynchronous motor, it is necessary to check that there are no utilities inserted in the system that, due to the transient voltage drop, may cause more or less serious disruptions (opening of contactors, temporary power failure to command and control systems, etc.).

Single-phase loads

The supply of single-phase utilities through three-phase generators requires some operational limitations.

- In single-phase operation, the declared voltage accuracy can no longer be maintained by the AVR electronic regulator, as the system becomes highly unbalanced.
  The voltage variation is limited by the particular three-phase sensing AVR regulator, which tends to balance the three phase voltages.
  When connecting multiple single-phase utilities, it is mandatory to distribute the utilities over the three phases, in order to balance the system as much as possible.
- The maximum withdrawable power between Neutral and Phase (star connection) is generally 33% of the rated three-phase power, or 40% if only one utility is connected on a single phase.

7.2 Checks before start-up

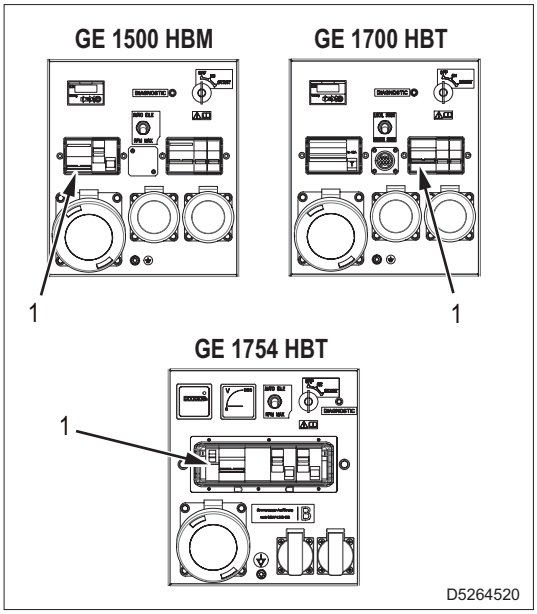
1 - Check the oil and fuel levels.
2 - Check that there are no oil and fuel leaks.
3 - Check that there is no flammable or dirty material around the exhaust pipe.
4 - Check that there are no unauthorized persons in the area adjacent to the generating set.
5 - Check that the main machine switch is in the OFF position (insertion lever downwards). For the details, see “4.2.1 Main machine switch”.
6 - Before each work session, if the distribution system adopted requires it, check the effectiveness of the earth connection of the generating set (e.g., TT and TN systems).
7 - Check that the electrical characteristics of the devices to be supplied, voltage, power, frequency, are compatible with those of the generating set.
  Too high or too low values of voltage and frequency can irreparably damage the electrical equipment.
  In some cases, when powering three-phase loads, it is necessary to ensure that the cyclical direction of the phases corresponds to the needs of the system.
8 - Connect the utilities to be powered using suitable cables and plugs, in excellent condition.

7.3 Starting the generating set

WARNING

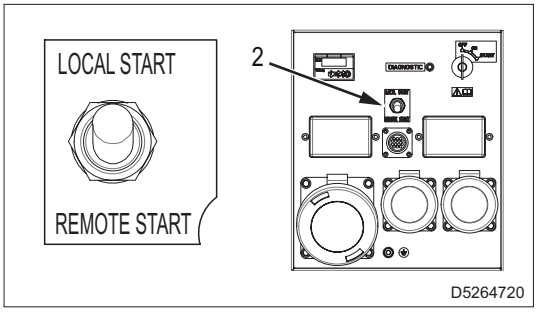
- **Do not change the factory settings and do not tamper with sealed parts.**

1 - Check that the main machine switch (1) is set to OFF (insertion lever downwards).

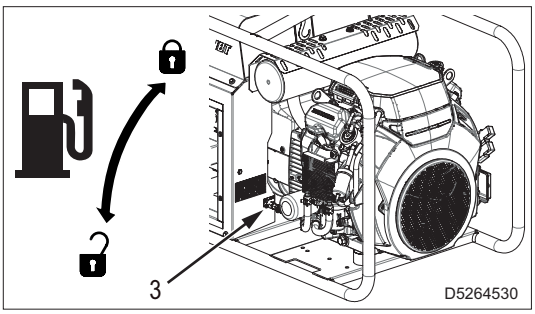


2 - EAS versions.
Set the Local-Remote Start switch (2) to the LOCAL START position.

3 - Connect the plug of the load to the generating set.



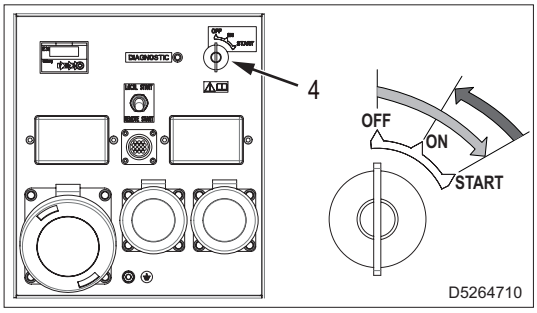
4 - Open the fuel valve (3) by turning it fully counter-clockwise.



5 - Turn the ignition key (4) to the ON position.

6 - Turn the ignition key (4) to the START. position

7 - When the engine starts, release ignition key.
The key automatically returns to the ON position.



☛ Important

- The engine is equipped with an automatic choke (Auto Choke) that facilitates the starting phase and requires no manual operation on the choke (air) control.
- At start-up, the engine runs at nominal speed.
  Versions with 'Auto Idle'.
  When the selector switch is set to AUTO IDLE, the engine starts at its idle speed. For the details, see “4.3.1 Auto Idle”.

8 - Run the engine for the time indicated in the table below before drawing power to supply loads.

Ambient temperature	Time required
– -10°C	2 minutes
-9°C – -5°C	1 minute
≤ -4°C	20 seconds

Note

- For starting and use at temperatures below -10°C, refer to the engine instruction manual or contact the Technical Support Service.

9 - Set the main machine switch (1) to ON (insertion lever upwards).

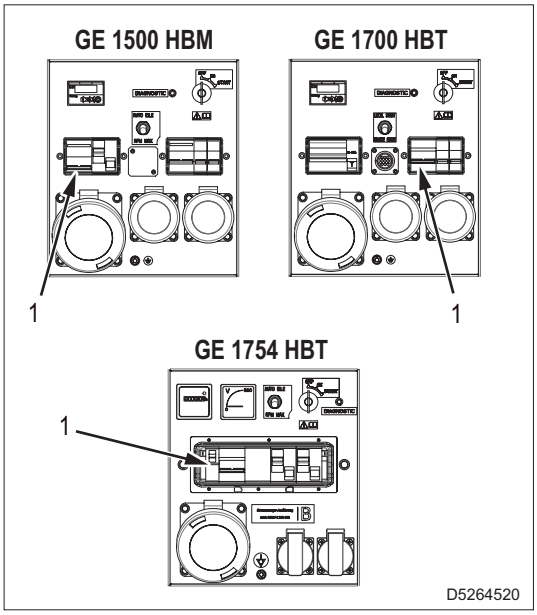
10 - Turn all residual current circuit breaker with overcurrent protection (RCBO) and the residual current circuit breakers that protect the utilities connected to the output sockets to ON.

Note

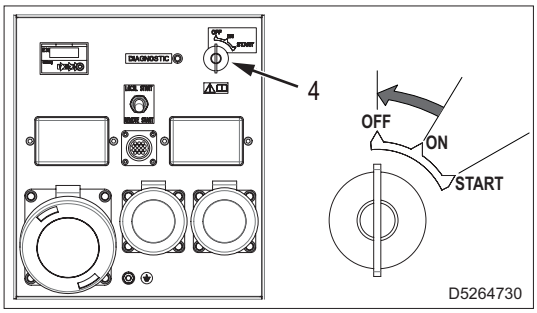
- Not to set the switches of unused output sockets to ON.

7.4 Stopping the generating set

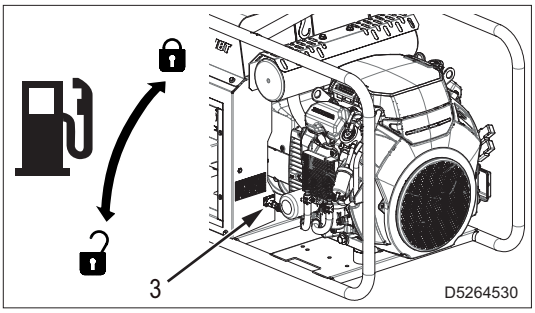
1 - Turn off the loads connected to the generating set.
2 - Set the main machine switch (1) to OFF (insertion lever downwards).
3 - Allow the engine to run without load for a few minutes.



4 - Turn the ignition key (4) to the “OFF” position.



5 - Close the fuel valve (3) by turning it fully clockwise



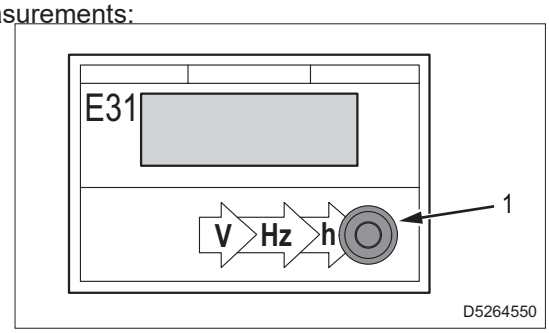
7.4.1 Emergency stop

In case of emergency, turn the ignition key (4) to the OFF position.

7.5 Displaying measurements and resetting working hours with the multi-purpose digital instrument (models GE 15000 HBM - GE 17000 HBT)

The multi-purpose digital instrument displays the following measurements:

- U = Alternating voltage VAC
- F = Frequency Hz
- h = Total hour counter
- n = partial hour counter (resettable)



Displaying measurements

Press the button (1) to cycle through the measurements.

Resetting working hours

The partial hours are reset each time the machine is stopped.

To reset the partial hours during machine operation, press and hold button (1).

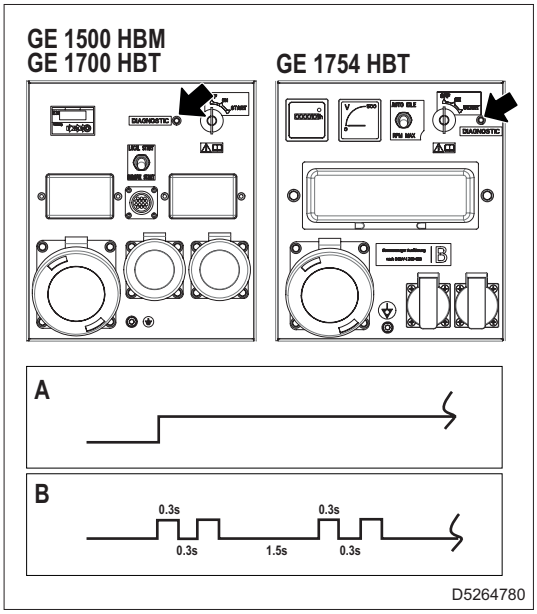
7.6 Alarms

WARNING

- **If an alarm is signalled, stop the machine immediately and rectify the fault.**

Engine alarms are indicated by the number of times the DIAGNOSTIC light flashes.

- A steady DIAGNOSTIC light (A) is an indication of low engine oil. In this case, the engine stops.
- A flashing DIAGNOSTIC light (B) indicates that it is necessary to count the number of flashes, which occur every 0.3 seconds.
  The number of flashes is repeated at 1.5 second intervals.
- To reset the alarm, turn the machine main switch to OFF.



To identify the fault or malfunction, please refer to the following table.

Number of flashes	Fault/Failure	Possible fault
Steady light	Oil Alarm	Faulty wiring or insufficient oil
1x	Battery voltage problem	Faulty wiring or insufficient oil
2x	Faulty accelerator	Regulator failure or excessive electrical load
3x	Faulty throttle opening sensor 1	Wiring fault or blocked throttle valve
4x	Faulty throttle opening sensor 2	Wiring fault or sensor failure
5x	Throttle opening sensor error	Wiring fault or sensor failure
6x	Outdoor temperature sensor error detection	Wiring fault or sensor failure
7x	Faulty engine temperature sensor	Wiring fault or sensor failure
8x	Faulty atmospheric pressure/intake manifold pressure sensor	Wiring fault or sensor failure
9x	Control Unit Error	EEPROM error or CAN communication error

NOTES:

8. Maintenance

WARNING

- **Before proceeding with maintenance, carefully read section “2. Safety”.**

8.1 Refuelling

Use fuel and lubricants according to the ambient temperature.

8.1.1 Fuel

- Only use gasoline and fill the tank with clean fuel.
- Keep the engine off during refuelling.
- Fill the fuel tank up to the lower edge of the maximum level, and immediately dry any spilled fuel.

8.1.2 Engine oil

- To ensure adequate protection of the engine and keep it efficient for a long time, use only detergent oil for 4-stroke automotive engines. Using different oils can reduce the life of the engine.
- The viscosity must be appropriate to the ambient temperature.
- The oil to be used must comply with API SJ specifications or subsequent (or equivalent) specifications.

Refuelling and checks

WARNING

- **Before refuelling, read “2.9 Precautions during fuel and engine oil filling” carefully.**
- **Do not introduce more oil than indicated in the engine manual. Combustion of excess oil may result in increased engine revolutions.**

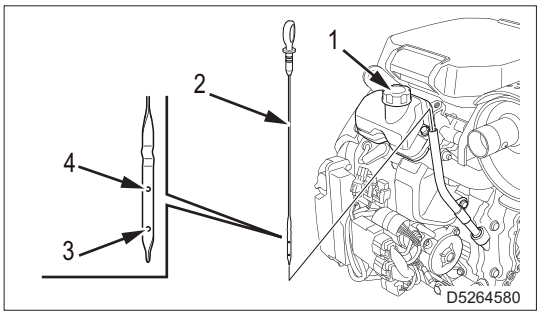
1 - Check the engine oil level with the engine stopped and on a level surface.

2 - Remove the engine fill cap (1) and wipe the oil level dipstick (2) with a cloth.

3 - Fully insert the dipstick (2), then remove it to check the level.

4 - If the oil level is near or below the lower limit mark (3), fill the oil to the upper limit mark (4).

5 - Fully insert the dipstick (2). Screw the oil filler cap (1) back on and tighten it.

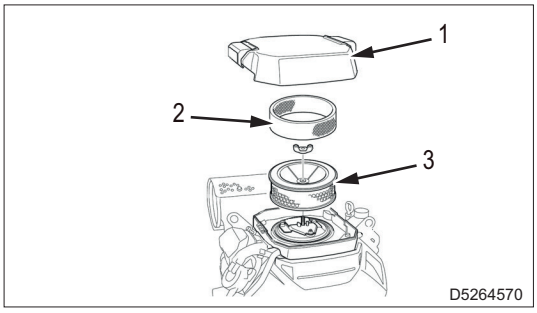


8.1.3 Checking and cleaning the engine air filter

Inspection

1 - Remove the air filter cover (1) and inspect the filter elements (2) and (3).

2 - Clean any dirty filter elements and replace the damaged ones.

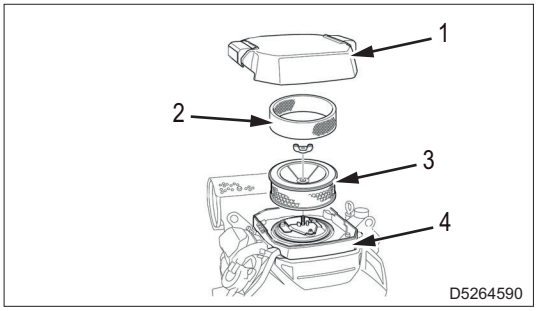


Cleaning

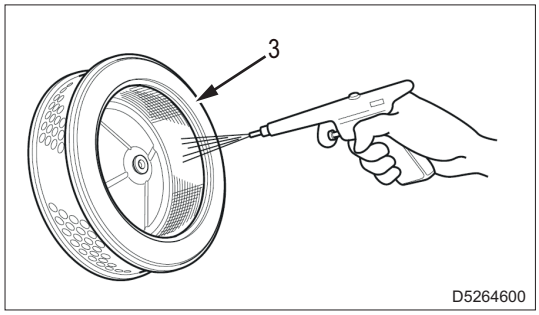
1 - Remove the air filter cover (1)

2 - Pull out the filter elements (2) and (3).

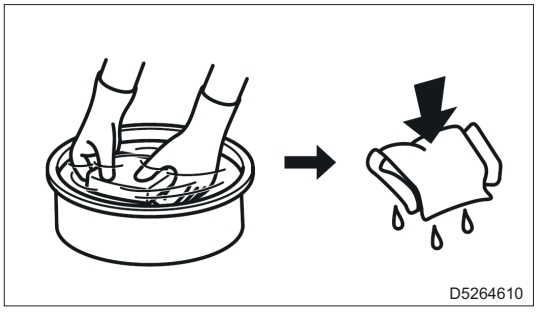
3 - Using a damp cloth, clean the inside of the cover (1) and the air filter box (4).



4 - Blow air over the paper filtering element (3) using compressed air at 207 kPa (2.1 kgf/cm2).
Never use a brush, as this would force dirt into the fibres.



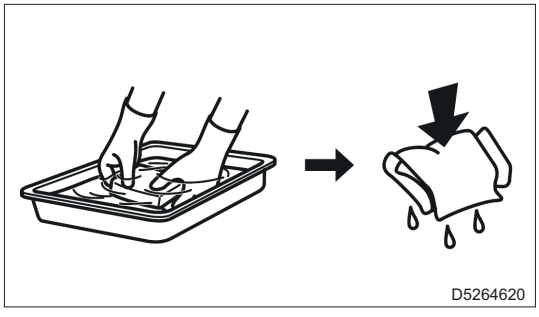
5 - Clean the foam filtering element (2) with warm soapy water, rinse and allow to dry.



6 - Soak the foam filtering element in clean engine oil and then squeeze it to remove excess oil.

7 - Place the foam filtering element over the paper filtering element, then place the assembled filter back into the filter box (4). Check that the gasket is correctly positioned.

8 - Tighten the filter with the wing nut, put back the cover (1) and lock it in place with the retaining tabs.



8.2 Routine maintenance

WARNING

- **Pay the utmost attention to the generating sets equipped with an automatic or remote intervention system.**
  Make sure that the generating set does not start during routine maintenance or repair operations by carrying out the following operations:
  - **Disconnect power to the generating set control board.**
  - **Press the emergency button.**

Note

For engine maintenance, refer to the engine maintenance manual.

Every day

- Check engine oil level (see “8.1.2 Engine oil”).
- Check air filter (see “8.1.3 Checking and cleaning the engine air filter”)

After the first 20 hours

- Replace engine oil

Every 100 hours

- Replace engine oil
- Clean air filter (see “8.1.3 Checking and cleaning the engine air filter”)
- Check spark plug

Every 200 hours

- Replace the engine oil filter

Every 300 hours

- Replace spark plug
- Check and adjust the clearance of the valve
- Replace the fuel filter

Every 500 hours

- Replace air filter cartridge

8.3 Maintenance of generating sets with automatic intervention system

For generating sets preset for automatic intervention, in addition to carrying out all the periodic maintenance operations required for normal use, some operations necessary for the particular type of use must be carried out.

The generating set must be continuously set up for operation even after long periods of inactivity.

Every week

- Carry out a TEST cycle or AUTOMATIC NO-LOAD TEST cycle to keep the generating set constantly operating
- Check engine oil, fuel, battery electrolyte levels. If necessary, top up with oil.

Every month and/or after a load operation

- Carry out a TEST cycle or AUTOMATIC LOAD TEST cycle to keep the generating set constantly operating.

- Check engine oil, fuel, battery electrolyte levels. If necessary, top up with oil.
- Check electric connections and clean control panel.

Every year

- Check electric connections and clean control panel.
- Replace the engine oil.

8.4 Storage

- Carefully clean the fairings and all other machine parts.
- Run the machine with load every 10 days for 15-30 minutes.
  Doing so ensures proper lubrication of the engine, keeps the battery charged and prevents any blockage of the injection system.
- If the machine is not used for more than 30 days, make sure that the machine is protected from heat sources and from weather phenomena that can cause rust, corrosion of the components and damage to the machine.
- Protect the machine with a case and store it in a dry place.
- Use qualified personnel to carry out the operations necessary for storage.
- For the correct engine storage, follow the instructions in the manual or contact the engine manufacturer's Technical Support.

8.5 Disposal

WARNING

- **Before refuelling, read “2.12 Precautions for disposal of waste material” and “2.13 Disposing of the generating set”.**

In the event of disposal of the equipment or parts of it (oils, hoses, plastic materials, etc.), comply with the regulations in force in the country in which this operation is carried out.

MOSA div. della BCS S.p.A.
Viale Europa, 59 20047 Cusago (Milano) Italy
Tel.+39 - 0290352.1 Fax +39 - 0290390466 www.mosa.it