

CE

RESERVOIR
GENERATORS

SILENT 5001DM

SILENT 6001 DT

SILENT 8002 DM

SILENT 9002 DT

I MANUALE USO E MANUTENZIONE

GB USE AND MAINTENANCE MANUAL

NL GEBRUIKS-EN ONDERHOUDSHANDLEIDING

D GEBRAUCHSANWEISUNG UND WARTUNGSVORSCHRIFTEN

F MANUEL D'UTILISATION ET D'ENTRETIEN

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FAILURE TO ADHERE TO THE INSTRUCTIONS AND SPECIFICATIONS CONTAINED IN THIS USE AND MAINTENANCE MANUAL WILL INVALIDATE THE PRODUCT GUARANTEE.

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1. GENERAL INFORMATION



Read this manually carefully before using the machine.

1.1 Scope of the manual

Thank you for having chosen a MASE product.

This manual was prepared by the Manufacturer and is an integral part of the components supplied with the machine. This information has been prepared for users and the personnel assigned to perform maintenance on such equipment.

The manual defines the scope for which the machine was built and contains all the information needed to ensure safe and correct use.

Strict compliance with these instructions will guarantee the safety of persons and the machine and will ensure economic operation and extended machine service life.

This manual has been divided into sections which identify the main concepts. Consult the table of contents for a quick guide to the various subjects.

The most important parts of the text are indicated in bold and are preceded by the symbols illustrated and described below.

**DANGER**

This indicates that operators must be very careful to avoid serious consequences which might lead to the death of personnel or create possible health hazards.

**WARNING**

A situation that might occur during the useful life of the product, system or plant which is considered at risk in terms of injury to persons or damage to property and the environment or economic losses.

**CAUTION**

This indicates that careful attention is needed to avoid serious consequences that might damage material goods such as resources or the product.

**INFORMATION**

Particularly important instructions.

The drawings are supplied for the sake of examples. Even if your machine differs greatly from the illustrations included in this manual, machine safety and information are still guaranteed.

Since the manufacturer is constantly developing and updating the product, changes may be made without prior notice.

1.2 Attached documentation

The following documentation is an integral part of this manual:

- EEC conformity declaration (fig.1);
- Engine operation and maintenance manual;
- SERVICE handbook;
- Warranty certificate;
- Warranty card.

1.3 Manufacturer-machine identification

See **FIG. 2**

- 1 - Machine code
- 2 - Year of manufacture
- 3 - Power factor
- 4 - Rated frequency
- 5 - Continuous output
- 6 - Nominal voltage
- 7 - Rated current
- 8 - Mass
- 9 - Series number

See **FIG. 3**

- 1 - Exhaust outlet
- 2 - Instrument panel
- 3 - Tank chassis
- 4 - Socket panel
- 5 - Lifting hook
- 6 - Frontal engine access door
- 7 - Battery space
- 8 - Back engine access door
- 9 - Cooling air discharge grid
- 10 - Cooling air intake grid

Every request for information, spare parts, etc. must bear the machine identification data, machine number and year of manufacture.

1.4 Instrument panel

FIG. 4 Key

- 1 - Hour meter
- 2 - Voltmeter
- 3 - Magnetothermal switch 3p
- 4 - Magnetothermal switch 1p
- 5 - Emergency stop button
- 6 - Connector for hook up to the automatic control panel
- 7 - Single-phase socket
- 8 - Terminal for ground connection
- 9 - Three-phase socket
- 10 - Ignition key
- 11 - Engine protection module
- 12 - Running engine lamp
- 13 - Low oil pressure lamp
- 14 - Level fuel lamp
- 15 - Battery charger lamp

- 16 - High engine temperature
- 17 - Emergency stop button lamp

The generating units in this series Silent have been designed for industrial use and are driven by highly reliable, 3000 r.p.m. air-cooled diesel engines. Special attention has been paid to: the degree of protection against foreign bodies; safeguarding the engine; protecting the electrical components from surges or excessively high temperatures. This is achieved through an automatic system able to shut down the unit if any malfunction arises. The Silent units are particularly silent thanks to a fully insulated, sound-proofed cabin and to an advanced system for soundproofing the exhaust discharge of combustion fumes.

Synchronous, self-exciting alternators with electronic voltage regulator, are employed which can provide extremely high peak currents with a voltage stability of less than 5%.

2. TECHNICAL SPECIFICATIONS

MODEL	SILENT 5001 DM	SILENT 6001 DT	SILENT 8002 DM	SILENT 9002 DT
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GENERATOR		synchronous - 2-ph	synchronous - 3-ph.	synchronous - 2-ph	synchronous - 3-ph.
Type					
Power	VA	3700	4600	6500	8100
Voltage	V	230	400	230	400
Frequency	Hz	50	50	50	50
Current	A	20	6,6	28,2	11,7
Power factor	cos.f	1	0,8	1	0,8
Degree of protection	IP	23			

ENGINE		RUGGERINI	
Type			
Model		MD 95	MD 150
No. of cylinders	n.	1	2
Fuel		Diesel	
Power supply	HP	7,8	12,6
Displacement	cm ³	426	654
Intake		Atmospheric	
r.p.m.		3000	
Tank capacity	l.	20	

Hourly consumption	l/h	1,5	2,9
Electrical system	V	12	12
Size (LxWxH)	mm	1000x570x780	
Weight	kg	205	

3.SAFETY REGULATIONS

3.1 Precautions

Carefully read the Instruction and Maintenance Manuals before starting up and using the machine.

The manufacturer declines any responsibility for damages to persons or things stemming from noncompliance with the safety standards.

Carefully examine the safety panels applied to the machine and follow their contents to the letter.

- Do not allow unqualified or inadequately trained personnel to use the generator.
- Keep children or animals away from the generator when it is running.
- Do not approach the generator with wet hands as it is a potential source of electrical shock if improperly used.
- Do not perform any operations on the generator unless the motor is off; tests which require the motor to be running must only be performed by specialized personnel.

! DANGER *When the generator is connected to an automatic start-up panel, before any tests or maintenance can be performed, it must be locked out - by selecting the BLOCK function - or disconnected - by disengaging the connector.*

- The exhaust fumes contain carbon monoxide and other harmful substances; never run the unit in an inadequately ventilated area.
- Do not run the unit in the vicinity of areas where there is the risk of explosion or fire.
- Refuelling must only be performed when the engine is off.
- The unit is grounded using an adequate diameter copper cable.

! WARNING *When using the generator, bear in mind that in wet or very damp places and in confined, conductive spaces the following regulations must be complied with: Chap. 11, sect. IV of CEI regulation 64-8.*

3.2 Grounding the unit

For user safety the unit must always be grounded paying particular attention to the section of the cable used. Connect the ground cable with the special terminal located on the outlet panel (Fig. 4 Ref. 8). Make ground connections following the table indicating the cable sections to be used; these depend on the power rating of the generator:

Power KVA	1-10	10÷20	20÷40	40÷60	60÷80
Section mm²	5	20	30	40	50

4.SING THE GENERATOR

4.1 Preliminary checks

The first time the unit is started up after maintenance, a good rule of thumb is always to make certain that:

- the oil is at the required level. This is done using the dip stick (fig. 5 ref. 1): see table for the suggested oils.
- the electrical devices are off so that the generator will not start up under a load.
- the fuel pipes are in good condition and properly connected.
- no electrical connections are in poor condition.

4.2 Start-up

Before starting up the generator, make certain that all devices are off so as to prevent forcing the engine when it is cold. Proceed with start-up by rotating the START key (fig. 4 ref. 10) clockwise one click. All the LEDs will light up for approximately 2 seconds as the self-check is performed. The battery recharge LED (fig. 4 ref. 15) and the low oil pressure LED (fig. 4 ref. 13) will then remain on.

Start up the unit by turning the ignition key clockwise all the way; only release it when the engine has cut in. However, in no case should the key be held down for more than 5 seconds in an attempt to start up the engine.

All protections cut in 15 sec. after the unit is started up and, in case of malfunction, the unit will shut down and a warning light will go on indicating the malfunction.

Before turning on any of the devices, leave the engine running without any load for at least five minutes. This will allow it to reach operating temperature gradually thus ensuring maximum engine life and preventing seizing.

4.3 Shut down

The unit is shut down by turning the ignition key (fig. 4 ref. 10) all the way counter-clockwise.

Before shutting down the unit, it is advisable to let it run for a few minutes without any load thus lowering the temperature inside the engine and the alternator.


4.4 Hook up to the automatic control panel

The Silent series units are prepared for connection to an automatic control panel able to automatically start up the generator, to switch lines when line power cuts out and switch back when the line voltage is returned.

In addition, the automatic control panel maintains the charge in the generator start-up battery, even when the generator is off.

The unit is hooked up to the automatic control panel through the 6-pin connector found on the unit instrument panel (fig. 4 ref. 6) and a power supply plug inserted in the outlet located on the generator instrument panel (fig. 4 ref. 9).

 **WARNING** *When the generator is connected to the automatic control panel the ignition key located in the instrument panel must remain in the OFF position.*

 **DANGER** *Select the BLOCK function whenever maintenance or repairs are being performed on the unit. This will prevent the generator from being accidentally started up in case the line power cuts out.*


5. PROTECTIONS

The units are equipped with a series of protections to safeguard them from improper use and from failures which could compromise their function. These protect against:

- Low oil pressure

This cuts in, turning off the unit, whenever there is inadequate pressure in the lubrication circuit; when it cuts in a LED (fig. 4 ref. 13) goes on.

In this case, adding additional oil is usually enough to start up the unit once more.

 **WARNING** *The low oil pressure protection does not provide any indication as to the oil level. To prevent damaging the engine, it is essential to check the oil level periodically.*

- High engine temperature

This protection cuts in, turning off the unit whenever the engine operating temperature is too high. When activated a LED (fig. 4 ref. 16) goes on.

In this case, the unit can only be started up again after the cause has been identified and eliminated.

- Short circuits and overloads


To protect against short circuits and overloads, the unit is equipped with magnetothermal and differential breakers which cut off the power supply when the alternator is overloaded or there is a short circuit.

Before powering the unit again by flipping the magnetothermal breaker levers (fig. 4 ref. 3-4) back to the ON position, the problem which caused it to trip must be removed.

For this purpose the following breakers are used:


- the general differential magnetothermal circuit breaker: in the case of short circuit, overload and current leakage to ground, this cuts off the power supply to all outlets (fig. 4 ref. 3).
- Magnetothermal circuit breakers to the low voltage outlets; these break the circuit whenever the voltage at a given outlet is higher than the nominal voltage for that particular outlet.

6. MAINTENANCE

 **CAUTION** *All maintenance operations on the generator must be performed by authorized personnel. Maintenance must be performed after the engine has been turned off and has cooled down sufficiently.*

6.1 Ordinary engine maintenance

The periodic maintenance required for the engine is reported in the table. For more detailed information, see the manual supplied by the engine manufacturer and attached supplied with the generator.

 **WARNING** *Check the oil level using the special, graduated dip stick (fig. 5 ref. 1). The oil level must always be between the MAX and MIN level notches on the stick.*

6.2 Changing the engine oil


Use AKROS TURBO 15 W 40 oil

The oil tank is filled and topped up through the hole indicated in fig. 5 ref. 2.

For more detailed information, see the engine use and maintenance manual provided with the machine.

To change the engine oil, first remove the lower hatch closing the soundproofing case. Then withdraw the cap located on the oil sump and drain it into a container placed under the body.

It is advisable to drain the oil when it is still sufficiently warm as it will flow more easily.

 **WARNING** *Do not disperse spent oil in the environment as it causes pollution. Deliver spent lubricating oil to special Collection Centers which handle disposal.*

6.3 Venting the system

The presence of air bubbles in the fuel system can cause the engine to run irregularly or prevent it from reaching its nominal r.p.m. Air can penetrate the fuel circuit through imperfectly sealed joints (i.e. piping, filters, tanks) or when the level of fuel in the tank is at a minimum. To eliminate air bubbles from the fuel circuit one must first eliminate the failure which allowed the air to enter in the first place. The following operations must then be performed:

- 1 - Loosen the vent screws located on the fuel filter (fig. 5 ref. 3) and on the injection pump (see the engine use and maintenance manual).
- 2 - Manually manipulate the AC fuel pump lever (fig. 5 ref. 5) until the all the air in the system has been eliminated through the vent screws (fig. 5 ref. 4).

- 3 - Tighten the vent screws once more and start up the engine.
- 4 - Repeat the above operations if the engine is still not functioning properly.

INFORMATION Consult the engine use and maintenance manual for further details on the fuel system.

6.4 Replacing the air filter

To ensure proper functioning and long engine life it is important to clean and periodically replace the air filter (fig.6 ref. 1). An inefficient filter can cause loss of engine power and can give rise to excessively smoky exhaust.

To replace the air filter oil operate as follows:

- Remove the oil tank (fig.6 ref. 1) from the air filter after having unblock the securing springs.
- Remove the oil inside the air filter and refill new oil respecting the maximum level;
- Replace the oil tank and look the securing springs.

Clean the air filter cartridge every 100 hours of operation. Shorten this interval if the generator is operated in a particularly dusty environment. Replace the cartridge when it is excessively fouled or damaged.

6.5 Cleaning the air intake grids

Periodically check the cooling air intake and discharge grids (fig. 3 ref. 9-10) and the cylinder cooling fins for fouling. These must be free of any foreign bodies which could obstruct the flow of cooling air (i.e. leaves, paper, rags, etc.).

6.6 Periods of inactivity

If the unit will not be used for a long period of time, the following operations must be performed:

- replace the engine oil sump;
- replace the fuel filter;
- remove the injector, insert a few drops of oil inside the combustion chamber and manually rotate the drive shaft a few times; reinstall the injector and close the suction and delivery openings.

6.7 Table of scheduled operations

OPERATION	HOURS
Check the level of the oil in the sump	8
Clean the air filter	8
Replacing the oil inside the air filter	50
Cleaning engine cooling fins	100
Check the level of the electrolytes and the battery charger status	150
Cleaning the oil filter	200
Replacing the fuel filter	200
Replacing the oil sump (*)	200
Replacing fuel filter	200
Regulate the play in the rocker lever	200
Calibrate and clean the injectors	500
Partial overhaul	2500
General overhaul	5000
(*) The first oil changing after 50 hours of running	

6.8 Troubleshooting

The starter motor turns but the main engine does not cut in.

- Make certain there is fuel in the tank (refill).
- Make certain that the Stop solenoid is powered (contact the Service Center)
- Make certain that the fuel pump is functioning (contact the Service Center)

The control panel does not cut in when the ignition key is turned.

- Check the protection fuse (replace)
- Check the connection cable and electrical connectors (reconnect)
- Make certain that the battery is operative (recharge or replace)

The unit cuts out during operation.

- Check whether the protection has been activated and the warning light is on (remove the cause and try to start up again)
- Make certain there is fuel in the tank (refill)

The engine is running irregularly.

- Check the fuel filters (replace)
- Make certain that the fuel pump is operating properly (replace)
- Check calibration of the injectors (contact an Authorized Service Center)

7. WIRING DIAGRAM LIST
Fig.8

- 1 - Rotor
- 2 - Stator
- 3 - Electronic voltage regulator
- 4 - Hour counter
- 5 - Voltmeter
- 6 - Earth fault device and magnetothermal switch
- 7 - Three phase socket
- 8 - Singol phase socket
- 9 - Earth connection terminal
- 10 - Connector
- 11 - Engine protection module
- 12 - Starting key
- 13 - Emergency stop button
- 14 - Starter
- 15 - Low oil pressure switch
- 16 - Engine high temperature switch
- 17 - Fuel floating
- 18 - Stop solenoid
- 19 - DC alternator
- 20 - Battery

Fig.9

- 1 - Rotor
- 2 - Stator
- 3 - Electronic voltage regulator
- 4 - Hour counter
- 5 - Voltmeter
- 6 - Magnetothermal switch
- 7 - Singol phase socket
- 8 - Three phase socket
- 9 - Earth connection terminal
- 10 - Connector
- 11 - Engine protection module
- 12 - Starting key
- 13 - Emergency stop button
- 14 - Low oil pressure switch
- 15 - Low oil pressure switch
- 16 - Engine high temperature switch
- 17 - Fuel floating
- 18 - Stop solenoid
- 19 - DC alternator
- 20 - Battery

Fig.10

- 1 - Rotor
- 2 - Stator
- 3 - Electronic voltage regulator
- 4 - Hour counter
- 5 - Voltmeter
- 6 - Magnetothermal switch
- 7 - Magnetothermal switch
- 8 - Singol phase socket
- 9 - Three phase socket
- 10 - Earth connection terminal
- 11 - Connector
- 12 - Engine protection module
- 13 - Starting key
- 14 - Emergency stop button
- 15 - Low oil pressure switch
- 16 - Engine high temperature switch
- 17 - Fuel floating
- 18 - Stop solenoid
- 19 - DC alternator
- 20 - Battery
- 21 - Starter

Fig.11

- 1 - ALTERNATOR
- 2 - BATTERY CHARGER FLYWHEEL ALTERNATOR
- 3 - BATTERY
- 4 - IGNITION KEY
- 5 - STOP ELECTROMAGNET
- 6 - FUSE
- 7 - RESERVE FLOAT
- 8 - PILOT LIGHT
- 9 - 4-POLE MAGNETOTHERMAL SWITCH
- 10 - STARTER MOTOR
- 11 - SCHUKO SOCKET
- 12 - OIL PRESSURE SWITCH
- 13 - EMERGENCY STOP BUTTON
- 14 - BATTERY CHARGE REGULATOR
- 15 - ELECTRONIC VOLTAGE REGULATOR
- 16 - START RELAY
- 17 - ROTOR
- 18 - STATOR
- 19 - ENGINE THERMOSTAT
- 20 - VOLTMETER
- 21 - OUTLET 3P+N+GND 16A
- 22 - PREHEATING
- 23 - RELAY
- 24 - CONNECTOR
- 25 - EARTH CONNECTION SCREW
- 26 - TERMINAL BOARD
- 27 - ALTERNATOR THERMOSTAT
- 28 - COMMANDS ELECTRIC FOR THE AUTOMATIC CONTROL
- 29 - CARD FOR THE AUTOMATIC EXCHANGE