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# Instructions manual, Operation and Maintenance

## AIR-CONDITIONING / GEN-SET SYSTEM

## AUS version

ECOWIND BY LOMBARDINI

TYPE: ECOWIND 350 ECC

MODEL: 350 "C" - 12/24 V

# Instructions manual, Operation and Maintenance

GB

## AIR-CONDITIONING / GEN-SET SYSTEM

**TYPE: ECOWIND 350 ECC**
**MODEL: 350 C - AUS 12/24 V**

**LOMBARDINI S.r.l.**
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# ECOWIND WARRANTY CLAUSE

Products manufactured by Lombardini S.r.l., are guaranteed against conformity faults for a period of 12 months from the date of delivery to the first end user.
The warranty for stationary units, working at constant speed and/or slightly variable speeds with the regulation limits, is limited to a maximum of 1000 operating hours within the above period (12 months).
The warranty for parts that are subject to wear and deterioration (injection/power supply units, electrical system, cooling system, sealing, non-metal piping, belts) is limited to a maximum of 1000 operating hours within the above period (12 months).

Please refer the manuals supplied with each product for the procedures for correct maintenance and regular replacement of these parts.
For the purposes of the warranty and given their technical nature, products must be installed by qualified personnel.
The list of authorised Lombardini S.r.l. service centres can be found in the “Service” booklet supplied with each product.
Special warranties must be agreed to in writing for important modifications to the product.
Within the above stated periods Lombardini or one of its authorised service centres will replace and/or repair any of its products which, upon examination by Lombardini or an authorised Lombardini agent, are found to be defective in workmanship or materials.

Any other responsibility/obligation regarding expenses, damages and direct/indirect losses deriving from use of the motors or from the total or partial impossibility of using them, is excluded.
Repair or replacement of any component will not extend or renew the warranty period.

Lombardini’s warranty obligations as per the previous paragraphs are not valid if:

- Products are not installed correctly and hence the correct operating parameters are compromised or altered;
- Use and maintenance of the products does not comply with the instructions provided by Lombardini S.r.l. in the operation and maintenance booklet supplied with each product;
- The seals affixed to the motor by Lombardini have been tampered with;
- Spare parts are not Lombardini originals;
- The fuel supply and injection systems are damaged due to the use of unsuitable or poor quality fuels;
- There are electrical failures caused by components connected to the electrical systems and which have not been supplied or installed by Lombardini S.r.l.;
- Products have been repaired, disassembled, or altered by any party other than an authorised Lombardini agent.

With the expiry of the above warranty period(s) and/or the specified operating hour limitations, Lombardini will have no further responsibility or obligations as per the previous paragraphs of the clause.

Any warranty request regarding the non-conformity of a product must be addressed to the Lombardini S.r.l. service centres.

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CONFORMITY: CE

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## 1.1 INTRODUCTION

**Important warnings**

To safeguard both professional and non-professional users, as well as authorised installation and maintenance technicians, and to prevent the possibility of damage to the equipment, make sure that you are familiar with the entire contents of the instruction manual before performing any operation on the system.

**Restrictions**

**Users (professional and non-professional) must in no way follow the instructions destined for specialised and authorised installation and maintenance technicians.**
**ECOWIND by Lombardini declines all responsibility for damage caused to things, persons, animals or the equipment itself as a result of non-observance of this regulation.**

**Limited liability**

ECOWIND by Lombardini declines all responsibility for damage caused to persons or things resulting from improper use of the system.

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## 1.2 Preliminary information regarding how the system works

The ECOWIND air-conditioning system has been designed to carry out the following functions:
- Conditioning of the area in which it is installed (vehicle cabs or other areas to be air-conditioned), according to the specifications shown inside this documentation;
- Recharging the battery of the vehicle on which the system is installed, as described in paragraph 3.7 “Battery charging function”.

## 1.3 OPERATING PRINCIPLE

**General description**

The ECOWIND air-conditioning system is able to regulate the temperature inside the vehicle cab, or in the area in which the split unit is installed. The desired temperature may be set using the controls on the control pad (depending on the model) located on the split .

## 1.4 GENERAL AND SAFETY WARNINGS

**Symbols used inside the manual**

The following symbols will be used throughout the manual to highlight particularly important information and warnings:

**ATTENTION:** This symbol highlights accident prevention rules for the operators and/or other persons at risk.

**WARNING:** This symbol indicates that there is a risk of damage to the line and/or its components.

**NOTE:** This symbol highlights important information.

## 1.5 CE IDENTIFICATION PLATE

The ECOWIND air-conditioning system is manufactured in a European Union state, and therefore complies with the safety requisites of Machinery Directive 98/37/EC, in force since 23 July 1998.
This conformity is certified by the “CE” mark located on the body of the power unit, inside the front protective casing.

***NOTE!***
**Do not damage or remove the CE identification plate (below engine), even when the system is resold.**

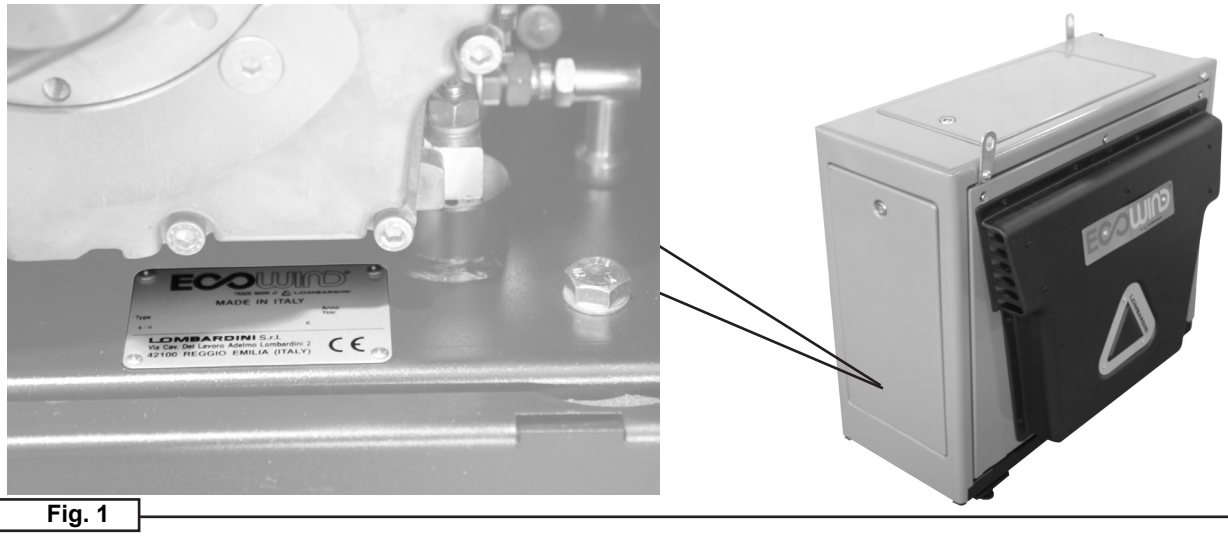


**Fig. 1**

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## 1.6 DIRECTIVE AND STANDARD REFERENCES APPLIED

**Legal provisions**

| Reference | Title |
|---|---|
| **P. D. no. 459 of 24.7.96** | Implementation of EEC Directive no. 89/392 known as the Machinery Directive |
| **L. D. no. 476 of 4.12.92** | Implementation of EEC Directive no. 89/336 regarding Electromagnetic Compatibility (EMC) |

**Table 1-1**

**EU Directives**

| Reference | Title |
|---|---|
| **EU Directive no. 98/37** | Machinery Directive 89/392/EEC codified 98/37 |
| **EU Directive no. 89/336** | Electromagnetic Compatibility (EMC) |
| **Directive 2000/2/EC** | Directive regarding electromagnetic compatibility (EMC) for agricultural and forestry tractors. |
| **Directive 2004/104/EC** | Directive regarding electromagnetic compatibility (EMC) for motor vehicles and their trailers. |
| **Directive 95/54/EC** | Directive regarding electromagnetic compatibility (EMC) for motor vehicles. |
| **ECE R10** | ECE/UN regulation regarding electromagnetic compatibility for motor vehicles. |

**Table 1-2**

## 2.1 GENERAL DESCRIPTION OF THE AIR-CONDITIONING SYSTEM

The ECOWIND air-conditioning system consists of the following main units/elements:

- Power unit;
- Condenser;
- Split (diffuser);
- Cooling circuit pipes and electrical cables;
- Accessories.

## 2.2 Description and arrangement of the components of the air-conditioning system

**Description of the main functional components**

Figures 2-3-4-5 show the main components of the air-conditioning Genset system:

**1** Support structure of the power unit;
**2** Power unit: its function is to supply energy at the right power to the entire system, by the action of a diesel motor;
**3** ECU Power Unit.
**4** Compressor: the function of the compressor is to increase the pressure of the coolant by compressing it and sending it to the condenser by transforming it from gas to liquid form;
**5** Alternator: the function of the alternator is to keep the vehicle battery and the system charged;
**6** Exhaust gas muffler;
**7** Condenser: the function of the condenser is to transform the coolant from gas to liquid form;
**8** Split (evaporator): its function is to cool or regulate ambient temperature in which it is installed;
**9** Split control panel: allows manual access to all the system functions
**10** Adjustable nozzles for the distribution/direction of the airflow.

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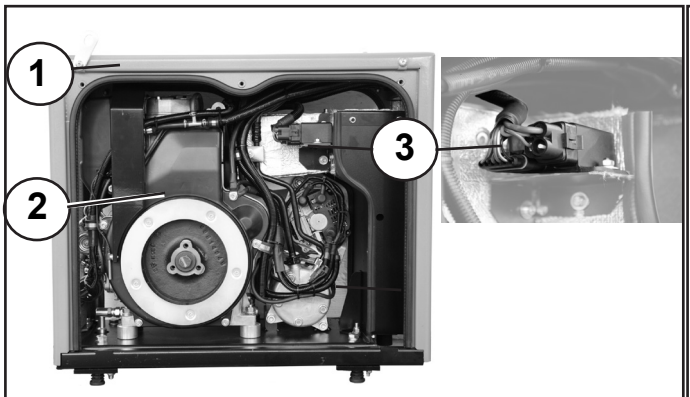

Fig. 2

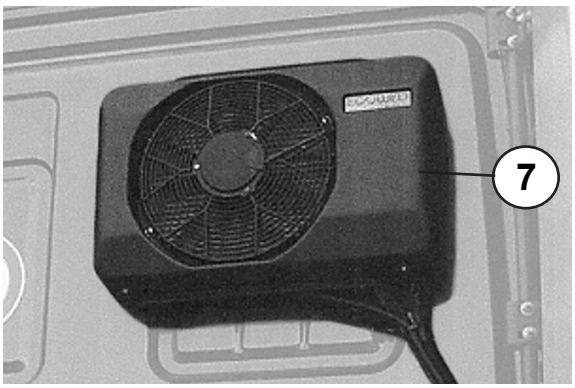

Fig. 4

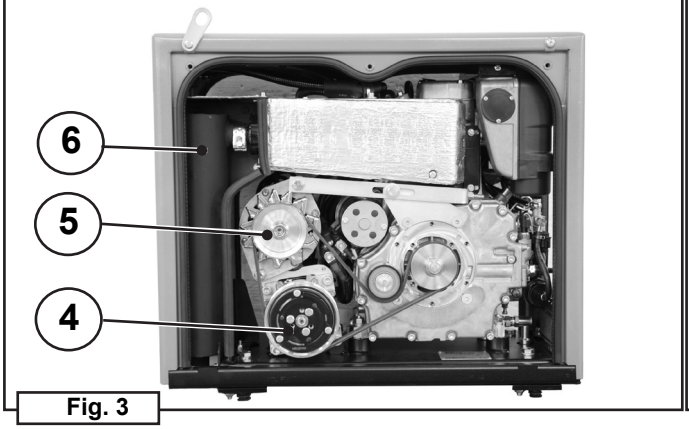

Fig. 3

Fig. 5

## 2.3 TECHNICAL CHARACTERISTICS

| Table of technical data | | | |
|---|---|---|---|
| **Air-conditioning system** | ECOWIND | | |
| **Model** | **350 "C" - AUS** | | |
| | | | |
| **Dimensions and weight** | **Power unit** | **Condenser** | **Split (diffuser)** |
| **Length** | 710 mm | 560 mm | 560 mm |
| **Height** | 560 mm | 360 mm | 360 mm |
| **Depth** | 290 mm | 120 mm | 140 mm |
| **Weight** | 110 kg * | 6 kg | 10 kg |
| *** Without support structure** | | | |
| **350 C - AUS Technical data** | | | |
| **Fuel** | Diesel for automotive use (taken from the vehicle's own tank for models installed directly in vehicles) | | |
| **Maximum fuel consumption** | 0,7 litre/ h | | |
| **Cooling capacity** | 13.000 btu/h (3.800 W) | | |
| **Coolant** | R-134a | | |
| **Quantity of coolant** | min 1000 ÷ max 1200 gr. * The amount of gas may vary according to pipe length see chart 1 - pag. 12 | | |
| **Optimum operating pressure:** | Delivery pressure HP = 13 ÷ 17 bar - @ 30°C ext temp. Intake pressure LP = 1 ÷ 3 bar - @ 30°C ext temp. | | |
| **ATTENTION !!!** **It is important to comply with the above quantities. Non-observance of this recommendation could compromise the performance of the system** | | | |
| **Onboard electrical power supply** | 12 V | 24 V | |
| **Battery recharge capacity (alternator)** | 70 A - MAX | 40 A - MAX | |
| **Evaporator airflow** | 600 $m^3$/h - MAX | 600 $m^3$/h - MAX | |
| **Control system power supply** | 12 Vdc | 24 Vdc | |

## 2.4 CHARACTERISTICS OF COOLANT

**Recommended products:**

| | |
|---|---|
| Fluorocarbon coolant R-134a | TETRAFLUORETHANE |
| Compressor oil | PAG SP 20 or equivalent |

**Non-recommended Products:**

***ATTENTION – All coolants not mentioned in the "recommended products" section are not to be considered for use, are inappropriate and hence prohibited.***
***Lombardini S.r.l declines all responsibility for damage to persons or things caused by non-observance of this regulation.***

**Safety warnings:** It is important to observe the following safety regulations when carrying out maintenance on the system:

***ATTENTION – fluorocarbon coolants evaporate rapidly, freezing anything with which they come into contact, if accidentally released in liquid form into the atmosphere. Furthermore, in the presence of flames or electrical short circuits, they may produce toxic gases capable of causing serious irritation to the respiratory tract.***

***Moreover, this kind of coolant tends to displace air, causing a reduction in the level of oxygen and the risk of suffocation. Always take precautions when working with coolants or on air-conditioning systems that contain coolants, particularly in closed or confined spaces.***





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TAB 1

| TEST | QTY R134a | HOSE | LENGHT | TEMPERATURE EXT | SUC LOW PRESS | DISC HIGH PRESS. |
|---|---|---|---|---|---|---|
| N° | gr | SIZE | mt | °C | bar | bar |
| #1 | **1200** | G 10 | 10 | 30,5 | 2 | 16 |
| | | G 08 | 10 | | | |
| | | G 06 | 3 | | | |
| N° | gr | SIZE | mt | °C | bar | bar |
| #2 | **1100** | G 10 | 5 | 30,4 | 2 | 16 |
| | | G 08 | 5 | | | |
| | | G 06 | 3 | | | |
| N° | gr | SIZE | mt | °C | bar | bar |
| #3 | **1000** | G 10 | 1,5 | 30,7 | 2 | 16 |
| | | G 08 | 1,5 | | | |
| | | G 06 | 1,5 | | | |

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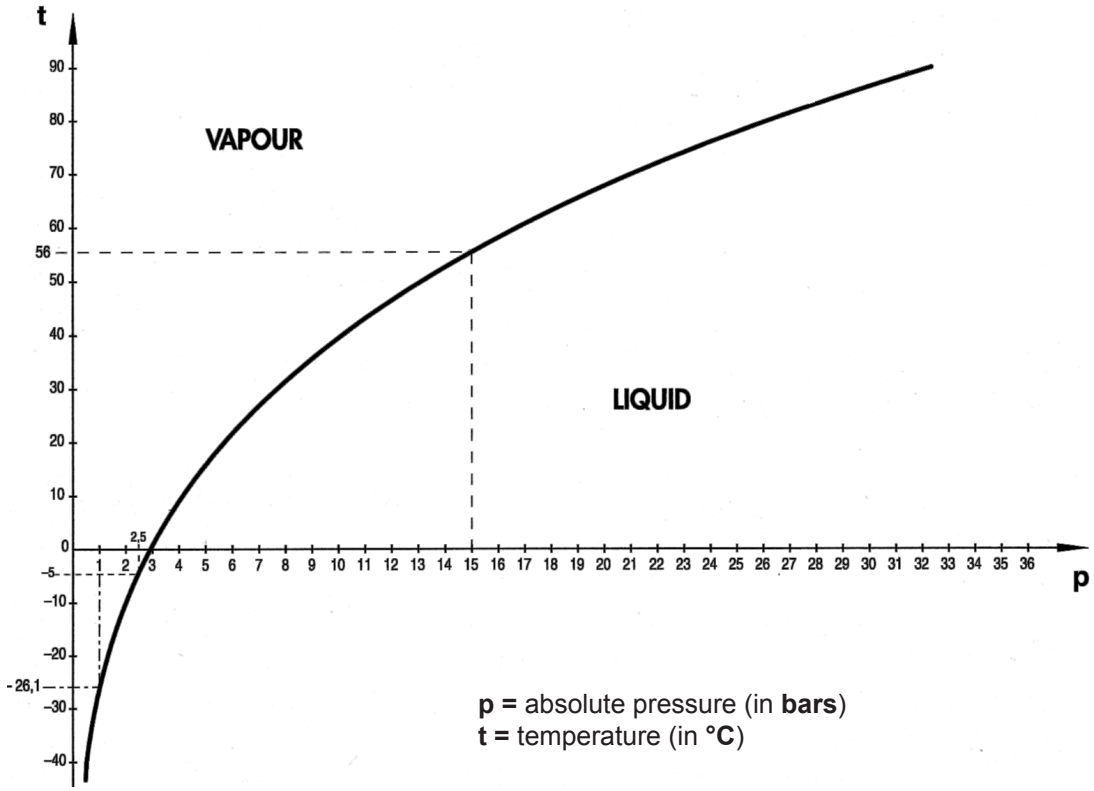
TAB 2

| REFERENCE PRESSURE TABLE | | |
|---|---|---|
| **Outside Temperature** (°C) | **Fixed displacement compressor (F) (es. SD5H09, SDH15)** | |
| | **R134a** | |
| | **LP** (kg/cm²) | **HP** (kg/cm²) |
| | min.....max | min.....max |
| 15,5 | 0,5.....3,0 | 9,5.....13,0 |
| 21,0 | 0,5.....3,0 | 12,5.....17,5 |
| 26,5 | 0,5.....3,0 | 14,0.....20,5 |
| 32,0 | 0,5.....3,5 | 16,0.....24,0 |
| 38,8 | 0,5.....3,5 | 18,5.....25,5 |
| 43,0 | 0,5.....3,5 | 22,0.....28,0 |

**A/C pressures according to ambient temperature for R134a**

TAB 3




Pressure/temperature diagram for the **R134a** refrigerant

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## OIL FOR R-134 A PHYSICAL PROPERTY

TAB 4

| LUBRICANT | | SP20 |
|---|---|---|
| SPECIAL GRAVITY | 15°C | 1.044 |
| COLOUR (ASTM) | | L 0.5 |
| KINEMATIC VISCOSITY (cst) | 40°C<br>100°C | 104.5<br>21.15 |
| VISCOSITY INDEX | | 235 |
| FLASH POINT | | 230 |
| POUR POINT | | < -50 |
| FALEX LOAD TEST ($LBS/IN^2$) | | 1350 |
| CRITICAL SOLUBILITY POINT UPPER<br>LOWER (°C) | | +52 (3%)<br>< -40 |
| TYPE | | PAG |

## 2.5 Operating limit conditions

**WARNING**

**Alternator operating limits**

**The ECOWIND system uses an alternator that is able to supply enough energy to guarantee the functions mentioned under “general operating features”.**
**In the event of alternator overload, caused by the addition of other equipment, Lombardini S.r.l. declines all responsibility regarding possible faults in the system or other vehicle equipment and facilities**

### 3.1 RESIDUAL RISK OF CONTACT WITH COOLANT

**Origin of the residual risk:** This risk exists in the event of accidental contact with the coolant. The characteristics and the safety warnings of the coolant are described in section “Characteristics of coolant”.

**ATTENTION: First aid treatment in the event of contact with the coolant.**

Contact with EYES: • if there is contact with the liquid, rinse thoroughly with water and seek immediate medical attention.

Contact with SKIN: • rinse the area with plenty of lukewarm water and stay calm;
• wrap the burns in thick, dry, sterile bandages to protect the area from further infections or wounding;
• seek medical attention.

INHALATION: • immediately remove the patient to the open air and, if necessary, help him/her to breathe again;
• seek medical attention and remain with the patient until the arrival of professional help.

### 3.2 SAFETY DEVICES

**Introduction :** The ECOWIND air-conditioning system is equipped with safety devices illustrated below, which protect users, specialised technicians and the system itself:

• Automatic reset fuses - to protection of all systems electrical/electronic
• Main electric power supply fuse **FS** (Fig. 6)**;**
• Split Strat/Stop button for **IE** (Fig. 7) and stop emergency;
• Fixed protection cases (**CR**) (Fig. 9);
• Motor oil safety pressure switch;
• Polarity reversal protection
• Motor oil temperature sensor;
• Coolant gas safety pressure switch;
• Diesel on/off cock (**R**) (Fig. 8).
• Waterprof connectors IP68

**ATTENTION:** ***Safety devices must by no means be tampered with or removed.***
***Lombardini declines all responsibility for damage caused to things, persons, animals or the equipment itself as a result of non-observance of this regulation.***

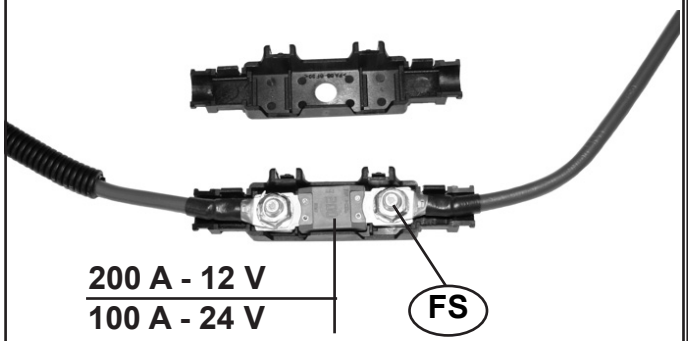



Fig. 6

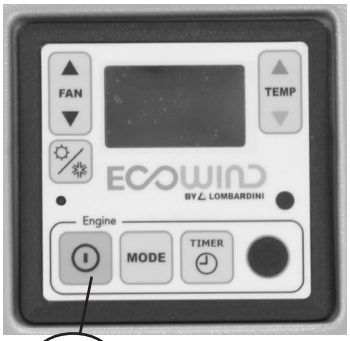



Fig. 7

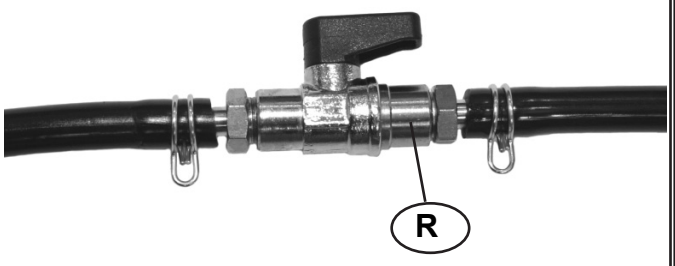



Fig. 8


Fig. 9

### 3.3 SUMMARY DIAGRAM OF THE ECOWIND AIR-CONDITIONING SYSTEM FOR MODEL :

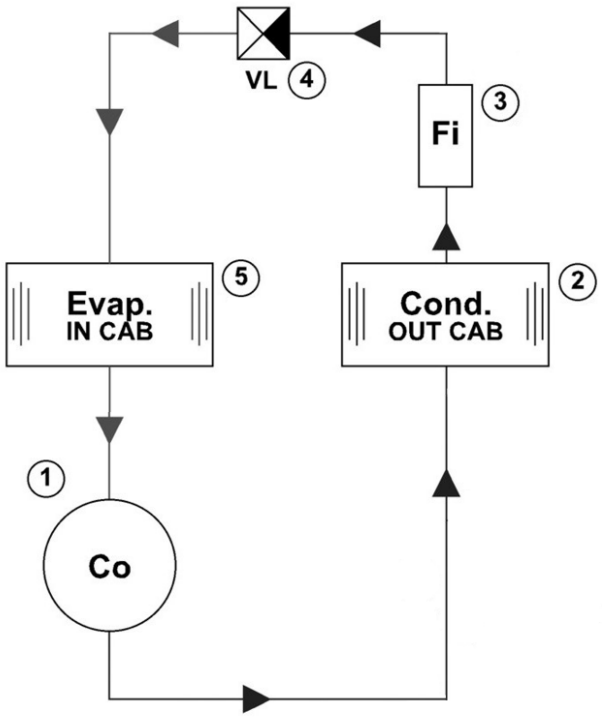
# 350 C

## CONVENTIONAL COOLING CYCLE

The diagram in figure 7 shows the flow chart of the conditioning process:

**HP)** High pressure - Compression (min 10 - max 27 bars _coolant R 134 a);
**LP)** Low pressure - Intake (min 1 - max 5 – bars_coolant R 134 a);

**N.B.: Optimal values for a correct functioning of the system are: suc 1.5 ÷ 2.0 (bar) - dics 13÷17 (bar)**




**LEGEND:**

**1 COMPRESSOR AC;**
**2 AC CONDENSER;**
**3 DEWATERING FILTER;**
**4 EXPANSION VALVE;**
**5 EVAPORATOR AC;**

**GAS R134a LOW PRESSURE (LP)**

**GAS R134a HIGH PRESSURE (HP)**

## 3.4 DESCRIPTION OF OPERATING MODES

**Operating mode types for the user (professional and non-professional)**

The ECOWIND by LOMBARDINI air-conditioning system can be operated by means of the controls located on the evaporator unit (split), according to the settings and procedures described in the paragraphs under “Operating instructions”.

## 3.5 OPERATING INSTRUCTIONS

**Control equipment and commands**

**General description of control devices**

The control apparatus on the ECOWIND by LOMBARDINI system has been designed to handle the air-conditioning of special vehicle where the cooling power is supplied by the diesel motor. In addition to its normal air-conditioning functions it also supervises and controls correct function of the diesel motor. It can also monitor battery voltage , and, if necessary, recharges it automatically.

## 3.6 KEYPAD: Instructions and Use ECO 350 “C” ECC

This keypad located on the internal unit (Split) allows the user to programme all the system functions.

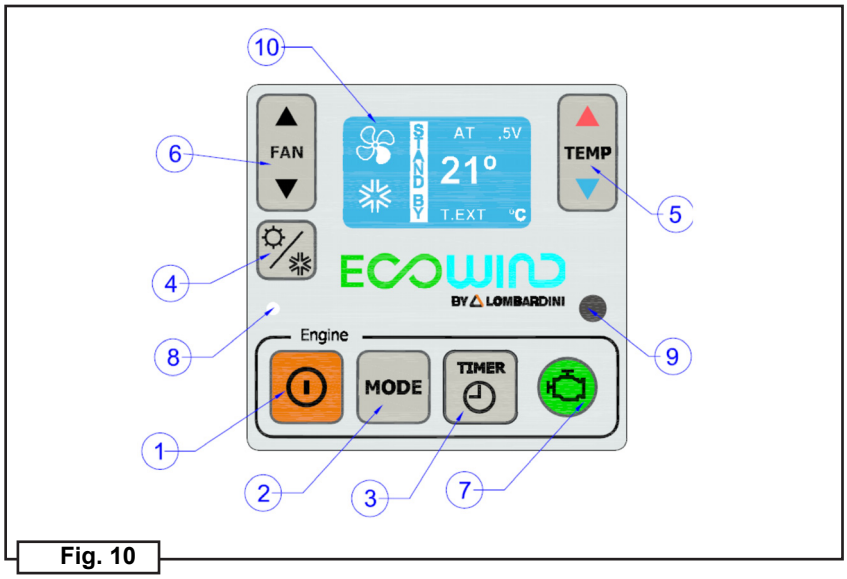



Fig. 10



**Control panel (touchpad, Fig.10).**

**1** ON – OFF, Power Unit engine ignition / stop.
**2** System operating mode selector.
**3** Timer mode selector.
**4** Ambient climate mode selector.
**5** Ambient climate thermostat selector.
**6** Split suction fan speed selector.
**7** APU engine status LED.
**8** System reset button.
**9** IrDA infrared sensor.
**10** System information display

**DATA-SHEET**

- Operating voltage: 12V (6-16V)/ 24 V (18-30 V)
- Maximum absorption in stand-by mode: 20 mA
- BLUE display, negative dot MATRIX STN
- Digital control system
- Automatic battery recharge system
- Tone signal confirmation (beep)

**SAFETY**

- Polarity reversal protection
- Electric system totally protected using automatic rearming fuses
- Fuse for general supply circuit protection: 200 A (12V) / 100 A (24V)
- Emergency stop button
- Waterproof connectors IP 68

## GENERAL INFORMATION

The machine operating modes are outlined through the buttons that are on the ECC module control panel.

All system operating and setting parameters in “AIR CONDITIONING” and “HEATING” mode are executed by the ECC unit only when the Power Unit (diesel engine) is working.

The split suction fan works with stopped Power Unit when the “FAN” ventilation mode is on. This parameter allows the activation of the control mode for fan self-disabling. When the set batteries’ minimum voltage value is reached – OFF FAN ≤11.7 (12 v) / ≤23.0 (24V) Volts, the system automatically stops.

## CONTENTS


**1. DESCRIPTION KEY PAD CONTROL**

**1.1-** Selector POWER _ Start / Stop
**1.2-** Selector MODE
**1.3-** Selector TIMER
**1.4-** Selector CLIMA
**1.5-** Selector TEMP
**1.6-** Selector FAN
**1.7-** Led status diesel engine
**1.8-** Reset
**1.9-** IrDA infrared sensor
**1.10-** Display

**2. CLIMATE SECTION**

**2.1-** Climate Mode (CLIMA)
**2.2-** Starting
**2.3-** Temperature adjust
**2.4-** Automatic fan
**2.5-** Ventilation mode (FAN)
**2.6-** Starting

**3. GENSET SECTION**

**3.1-** Starting

**4. AUTOMATIC RECHARGE BATTERY SECTION**

**4.1-** Starting

**5. TIMER SECTION**

**5.1-** Programming

**6. ALARMS SECTION**

**6.1-** General information
**6.2-** Primary Alarms
**6.3-** Generic service alarm
**6.4-** Device alarms

**7. REMOTE CONTROL**

**7.1-** Description

# 1 – FUNCTIONS KEY PAD DESCRIPTIONS

## 1.1 - POWER selector “1” ( start / stop engine)

The system is activated by pressing POWER selector “1”. 10 seconds after the last set control, the system will activate the automatic sequence for PU* engine ignition will be activated after the preheating time (maximum of 5 attempts). If ignition is not carried out within 5 maximum attempts, the system will send a “start-up failure” alarm by means of the “G” display and will set the system in OFF mode (see warning section).

For a functioning system, if the POWER selector “1” has again been pressed, the system’s stop sequence will be activated. The PU diesel engine, as well as the whole electronic apparatus, will stop after about 30 seconds based on the command indicated above. This time interval is needed to correctly cool down the diesel engine before it stops. During this period of system shut down, the “WAIT” sign will inherently be seen on the “G” display..

**ATTENTION!!**

**“IMMEDIATE EMERGENCY SHUT DOWN”.**



In order to activate the immediate shut down of the system (with relevant PU diesel engine shut down), the POWER selector “1” will have to be pressed for at least 3 seconds. Upon doing this, the system will be set in OFF mode.

**PU* _ Power Unit**

## 1.2 - MODE selector “2”

Pressing in sequence the MODE selector “2” will bring about the following modes:

- ► AIR-CONDITIONING MODE
- ► CURRENT GENERATOR (DC) MODE
- ► AUTOMATIC BATTERY RECHARGE MODE

## 1.3 - TIMER selector “3”

The system can be set in automatic start or stop mode by pressing TIMER selector “3” depending on the user’s preset time.

## 1.4 - CLIMATE selector “4”

Allows to choose one of the three preferred climate modes inside the cab: conditioned air AC (cooling) and forced air FAN (ventilation).

## 1.5 - TEMP balancer “5”

Allows to increase or decrease the temperature set value (°C or °F) inside the cab.

## 1.6 - FAN balancer “ 6”

Allows to increase or decrease the ventilation set value (flow) inside the cab.

## 1.7 - Diesel engine state LED indicator “7”

Monitors the functionality of the power unit diesel engine. “OFF” Led - engine stopped, “GREEN” Led - diesel engine is working, “RED” Led - warning signal indicating a malfunction **in the APU diesel engine.**. This LED will also indicate any type of alarm warning the system encounters.

### 1.8 - RESET button “8”

Allows to completely reset every electronic apparatus of the control system (in case of blockage).

### 1.9 - INFRARED SIGNAL RECEIVER “9”

Allows to receive IrDA infrared signals given off by the remote control and transmits them to the ECC (electronic module) for functions control.

### 1.10 - SYSTEM INFORMATION DISPLAY “10”

Allows real-time monitoring of all information and set-up functions for the system.

## 2 - AIR CONDITIONING SECTION

### 2.1 - CONDITIONING MODE (AC)

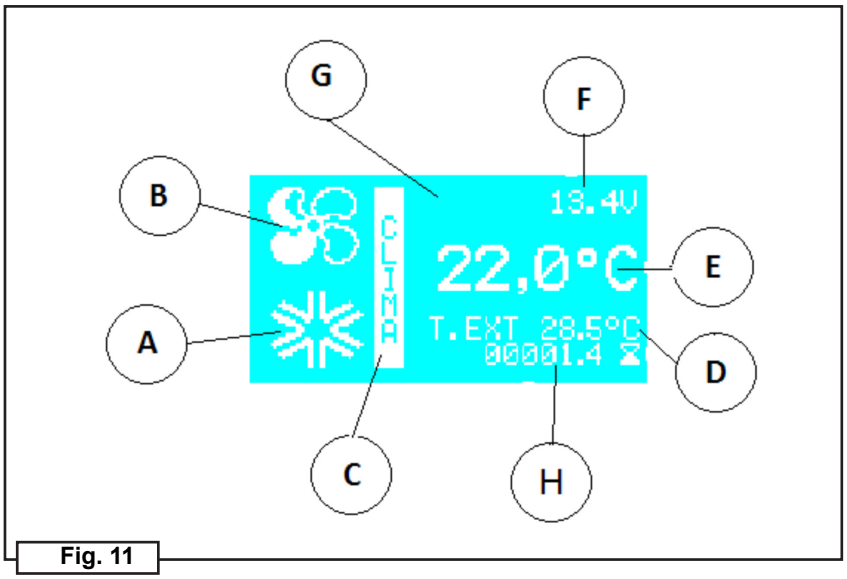



Fig. 11

G
B

### 2.2 - START- UP

Press POWER selector “1” and then MODE selector “2” to obtain the right air-conditioning set-up. The CLIMA position “C” icon will appear on “G” display (Fig.11). The preferred climate set-up is done by clicking on the AMBIENT selector “4”. The ICE position A (snow flake) icon will appear. The system is now set on AIR-CONDITIONING (cooling) mode. All other visual information on the “G” display corresponds to the following:
“B” - split ventilation set-up level, “F” - instant vehicle accumulator / battery voltage value, “E” - temperature inside the cab set value, “D” - external temperature instant value, “H” - system function hour counter.
After 10 seconds the last set-up command and later on the automatic ignition sequence of the APU diesel engine will be started. The AC gas compressor will be activated to start the cooling cycle about 5 seconds after the PU diesel engine start. This is the required time for full engine functional.

**WARNING!**

During system shut down, the electronic module “ECC” always records the last command that was done. When restarting the system, the last set functions will remain unaltered (previously recorded). Check for the preferred function (air-conditioning or ventilation) by monitoring the “G” display. In order to choose a different parameter from the recent set-up, MODE selector “4” will have to be repeatedly pressed while monitoring the display information until the system is able to bring about the desired mode.

### 2.3 - TEMPERATURE

To change the temperature inside the cab (from Min 15°C/60°F to 30°C/85°F) TEMP balancer “5” will have to be repeatedly pressed until the desired value is reached. The RED colored triangle (up) inside balancer “5” is pressed to increase temperature; on the contrary, the BLUE colored triangle (down) inside the same balancer is pressed to decrease temperature. The temperature set value will be displayed at the center of “G” display with numbers following the letter “E”.

### 2.4 - AUTOMATIC VENTILATION

Push one of the triangles inside FAN balancer “6” until they reach the relevant level between 1 and 8 ventilation to activate the “AUTO” mode (automatic split suction fan air capacity). Upon confirming the setting, the AUTO wording will appear under the FAN “B” icon on the “G” display. The setting of this function requires to automatically choose the air fan capacity in relation to the difference between set temperature “TI” and temperature inside the cab “TA”. The bigger the difference between these two parameters, the bigger the ventilation level that needs to be adopted.

## 2.5 - VENTILATION MODE (FAN)

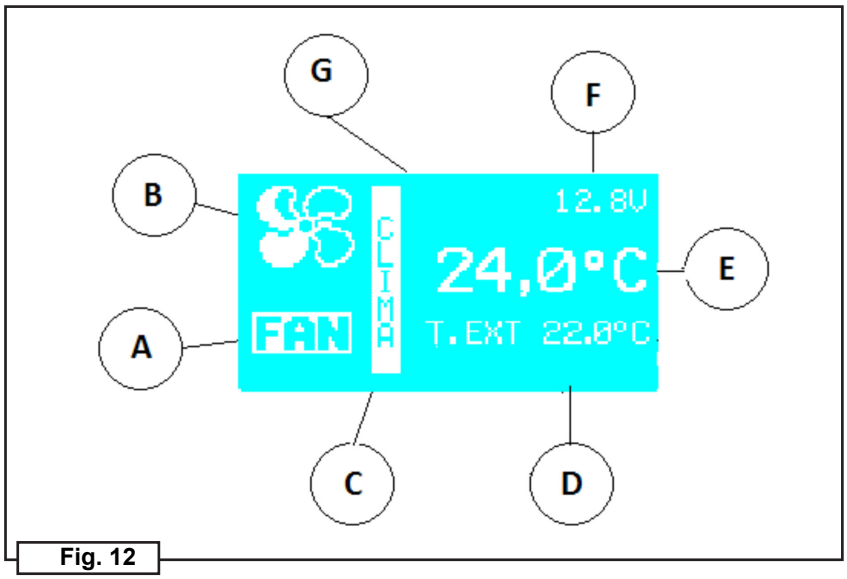



Fig. 12



## 2.6 - START-UP

Press POWER selector “1” and then MODE selector “2” to obtain the right air-conditioning set-up. The CLIMA position “C” icon will appear on “G” display (Fig.12). The preferred climate set-up is selected by clicking on the AMBIENT selector “4”. The FAN position “A” icon will appear on “G” display together with the HELIX position “B” icon. The system is now set on VENTILATION mode. All other visual information on the “G” display corresponds to the following:
“B” - split ventilation set-up level, “F” - instant vehicle accumulator / battery voltage value, “E” - temperature value inside the cab, “D” - external temperature instant value.

**NOTE.** The Power Unit diesel engine will not start working during the FAN ventilation mode. The system is equipped with an automatic voltaic threshold suitable for the system’s electric disconnection. If the voltage level of the battery/accumulator goes below **≤ 11,7 (12V) / ≤ 23 (24V)** Volts, the system will automatically disconnect and set to OFF mode and a “LOW BATTERY” ventilation mode warning message will be shown on “G” display.

To change the fan speed level (split suction fan air capacity), press the triangles inside the FAN balancer “6” up to the preferred position from level 1 to level 8. Each increasing step will progressively light up the Helix icon “B”. Upon verifying the preferred position, the HELIX icon “B” will stay lit on the display “G”.

**NOTE!!! The automatic ventilation “AUTO” control function is not active in this condition but is only active in manual control.**

# 3 - GENSET SECTION

**(DC CURRENT GENERATOR)**

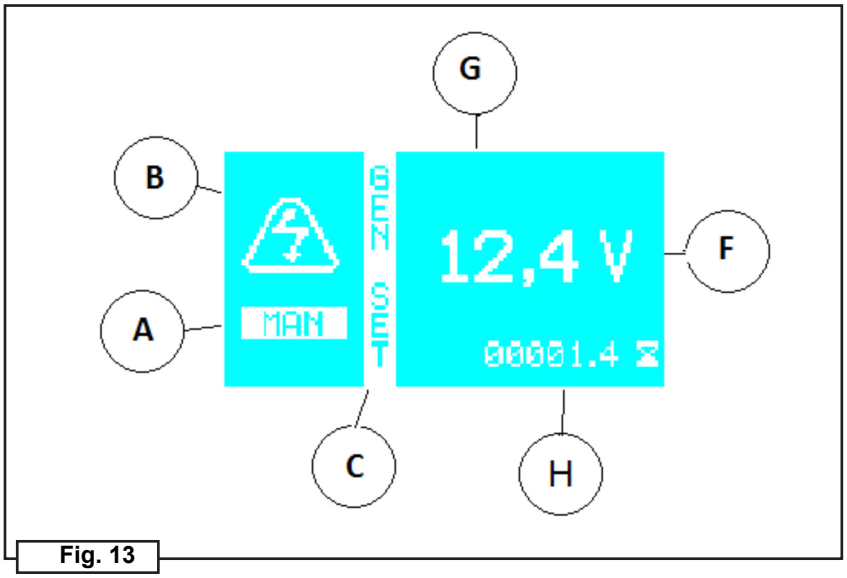



Fig. 13



## 3.1 - START-UP

Press POWER selector “1” and then selector MODE “2” to obtain the right current generator set-up. The GEN SET position “C” icon, the manual condition MAN position “A” icon and the GENERATOR position “B” icon will be shown on “G” display (Fig.13). The system is now set on manual “DC current generator” mode. All other visual information on the “G” display corresponds to the following:
“F” - instant battery voltage, “H” - system function hour counter.
After 10 seconds the last set-up command and later on the automatic ignition sequence of the APU diesel engine will be started. In this mode, the Power Unit alternator can guarantee a consumption activity of 60 Ah DC (12V) / 40 Ah DC (24V) Max, around 1000 Watts.

For a functioning system, it is possible to monitor the instant recharge voltage level by means of icon “F” on display “G”, found between 13.5 and 14 Volt (12V) / 26 and 28 Volt (24V), optimal recharge.

**ATTENTION!!**

**NOTE - The generator only TURNS ON and OFF by means of the user manual command operation on POWER selector “1”.**

The system is provided with a TIMER control to automatically start or shut-down itself within a 24 hour maximum period. This function is available for all set-ups that require a Power Unit diesel engine.

Press POWER selector “1” and then selector MODE “2” to obtain the preferred working set-up. The TIMER position “C” icon will be shown on “G” display. In order to set the preferred CLIMA mode, press AMBIENT selector “4”. The TIMER position “C” icon will appear on display “G” by pressing on TIMER selector “3”. All other visual information on the “G” display corresponds to the following:
“A” - system internal clock , “B” - synchronization/CLOCK icon, “E” - ON/OFF timer status, “F” - system start-up time set-up , “H” - system shut-down time set-up.

**ATTENTION!!**

For a correct functioning of the system, the current time must be set within the internal clock system (parameter “A”) when this (initialization) function is set for the first time!

Press FAN balancer “6” to shift the intermittent cursor towards the other set-up parameter lines A-E-F-H (visible on display “G”) once the TIMER menu has been turned on. By pressing the balancer on the upper arrow key, the cursor is then shifted clockwise on display “G”, while the lower arrow key will shift the cursor anticlockwise.



## 4 - BATTERY RECHARGE SECTION

**(“AUTOMATIC” BATTERY RECHARGE MODE)**

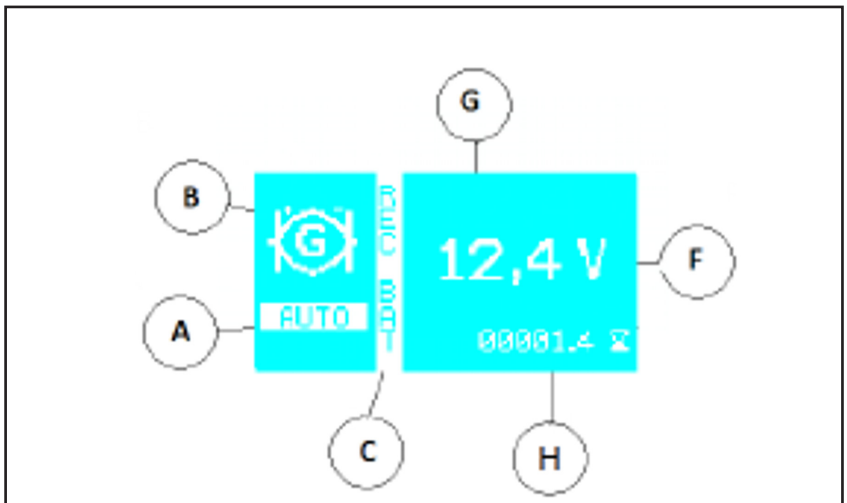



**Fig. 14**

### 4.1 - START-UP

Press POWER selector “1” and then selector MODE “2” to obtain the automatic battery recharge set-up. The BAT REC position “C” icon, the automatic condition AUTO position “A” icon and the GENERATOR (DC) position “B” icon will be shown on “G” (Fig. 14). The system is now set on “Automatic Battery Recharge” mode. All other visual information on the “G” display corresponds to the following:
“F” - instant battery voltage, “H” - system function hour counter.
The automatic battery recharge function will remain active in stand-by mode until the voltage level of the battery becomes higher than-equal to the default set-up value of 12 Volts or 24 Volt. The GENERATOR “B” icon blinks in stand-by mode. If the set-up value goes below the minimum level to 11.5 V / 23.5 V threshold, the system will autonomously activate the sequence Power Unit diesel engine ignition.

The system will simultaneously initiate the accumulator/battery recharge process through the DC alternator. For a functioning system, it is possible to monitor the instant recharge voltage level by means of icon “F” on display “G”, found between 13.5 and 14 Volt (12V) / 26 e 28 Volt (24V) (optimal recharge).

The automatic battery reload system has been designed for automatic intervention each time the battery/accumulator voltage reading (standard level is 13.6 Volts “12V” - 28.0 Volt “24V”)) goes below the 12.0 Volts / 24.0 Volt set-up level. This function also enables a control on the required start-up cycles. The automatic battery recharge system is set-up for a maximum of 5 consecutive recharge cycles and each battery recharge cycle is set-up within a 2.5 hour default time while performing continuously. (60 Ah DC in 12V / 40 Ah DC in 24 V Max supply).
On the bases of the given battery recharge time tests it is therefore considered that this time interval gives out best results for a proper recharge of battery/accumulator kept in good conditions (not worn).
After the first recharge cycle, the system will automatically stop, setting itself in stand-by mode. After 60 seconds the control will begin testing the battery voltage status. The system will remain in stand-by mode if the battery test follows a correct recharge process; on the contrary (<12.0 Volts / < 24.0 Volt, unsuccessful battery recharge reading), the system will reactivate and initiate a new battery recharge cycle.

**WARNING!**

**The automatic battery recharge system is set-up for a maximum of 5 operating consecutive cycles (12.5 hours Max – default). If an increase in the frequency cycles is requested from what has already been set in default, there has to be something wrong with the vehicle battery/accumulator. In this condition, when all the available cycles are completed the system will inherently show a warning signal on the display “G” about the battery/accumulator saying “TIME EXCEED”!**

G
B

## 5 - TIMER SECTION

**(TIMED START-UP / SHUT-DOWN)**

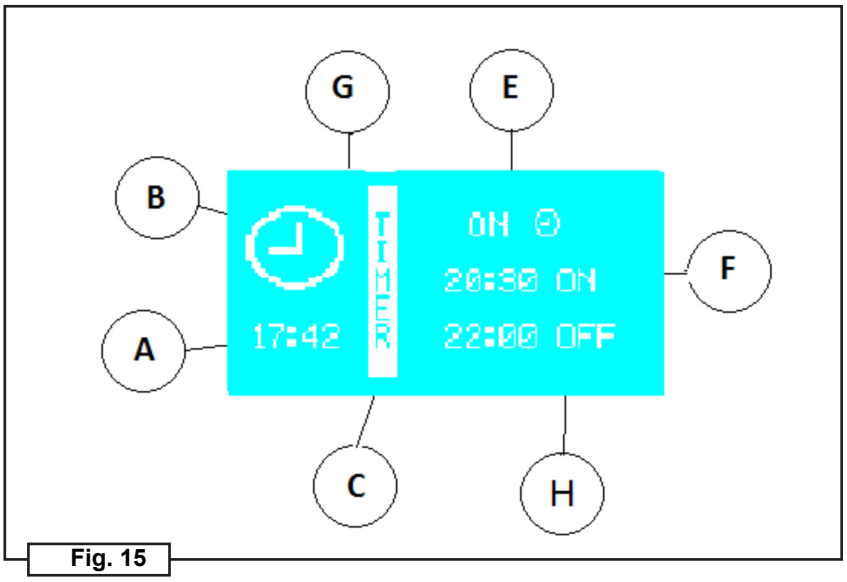



Fig. 15

### 5.1 - PROGRAMMING

The system is provided with a TIMER control to automatically start or shut-down itself within a 24 hour maximum period. This function is available for all set-ups showed below:

- **CLIMA (AC)**
- **FAN**
- **GENSET**
- **BATTERY RECHARGE**

Press POWER selector “1” and then set the system on chose mode (see par. 2-3-4).
After the set mode, press the TIMER selector “3” and on the display “G” (Fig.15) will appear icon TIMER position “C” icon will be shown on “G” display.
All other visual information on the “G” display corresponds to the following:
“A” - system internal clock , “B” - synchronization/CLOCK icon, “E” - ON/OFF timer status, “F” - system start-up time set-up , “H” - system shut-down time set-up.

**ATTENTION!!**

**For a correct functioning of the system, remember to check always the current time. It, must be set within the internal clock system (parameter “A”).**

Press FAN balancer “6” (Fig.16) to shift the intermittent cursor towards the other set-up parameter lines A-E-F-H (visible on display “G”) once the TIMER menu has been turned on. By pressing the balancer on the upper arrow key, the cursor is then shifted clockwise on display “G”, while the lower arrow key will shift the cursor anticlockwise.

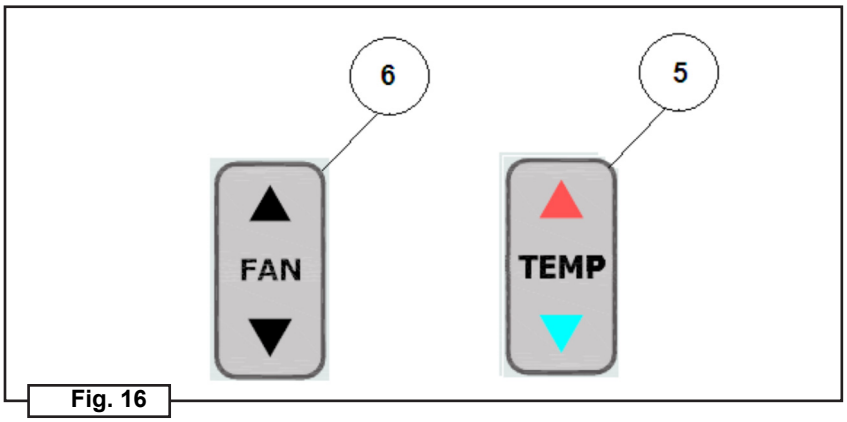


Fig. 16

By pressing TEMP balancer “5” (Fig.16), a desired (hour/minute) reading to where the intermittent cursor is positioned will be gained. Pressing the balancer on the upper RED arrow key will give out a number increase; pressing the lower BLUE arrow key will give out a number decrease except for the “E timer status parameter set-up, which in this case will switch from ON to OFF, or vice versa.

If the procedure for the TIMER set up function has been completed, press TIMER selector “3” again to get back to the previously selected function mode. If the TIMER function has been activated, the clock icon “B” will be shown on display “G” (Fig.6) inside the upper square of the same display screen to confirm the operation.

**Note:** The timer program is independent of the programming methods (CLIMA-FAN-GEN SET-BATT RIC). A programmed timer, you can vary how many times as you want without resetting the timer.

The deactivation of the TIMER function can be done by returning to the TIMER menu and setting the timer status “E” parameter to OFF mode.

The deactivation of the function can also be obtained by interrupting the energy supply to the system and if any kind of alarm condition actually exists (see alarm section).

In case the system has been set in stand-by (OFF) mode, the screen display “G” will set up in energy save mode, deactivating itself but also confirming the activated timer function and monitoring it by means of the LED “7” lit in blinking green (engine status).

# 6 - ALARM SECTION

## 6.1 - GENERAL INFORMATION

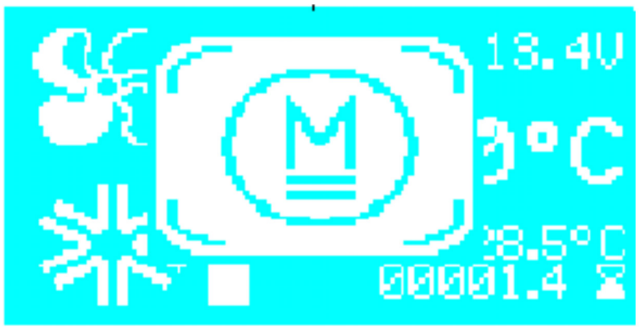
The system is equipped with a control that constantly monitors all the types of alarm related to the engine, to the thermal/cryogenic system and to every electric peripheral device contained in it. All alarms can be seen on the display “G” with the corresponding icons **“A 01 → A 18”** and some relative messages indicating damage such as the ones referred below.
Upon verification of an alarming status, the system immediately shuts down and the ascertained alarm type will be shown on display “G”. In the same way, the APU engine status LED “7” will emit a red light signaling the shut-down of the system. To deactivate the system, press POWER selector “1”; the backlight of the display “G” will otherwise be deactivated (energy saving mode) after around 30 minutes but the red APU engine status LED “7” will remain lit to signal the damage that occurred.
To see once more the display and/or deactivate the system, just consecutively press POWER selector “1”.

**ATTENTION!!**

**The Representation on the display for alarms A01-A02-A03-A04-A05, (Fig. 18 to Fig. 22) is expressed with customized icon and the remaining from A6 to A18 (Fig. 23) are represented with an “warning icon” of common alarm and reported descriptive text below the failed component (see section alarm devices).**

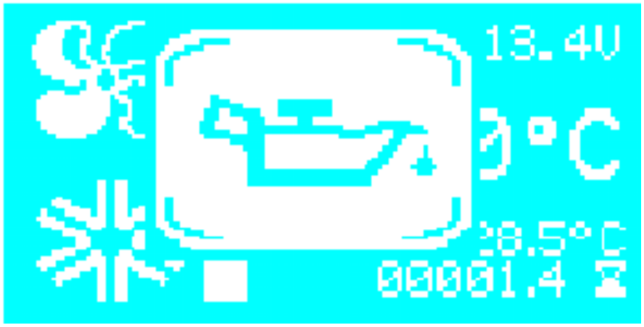
## 6.2 - PRIMARY ALARMS

G
B




A 01 – Failed engine start-up alarm

**Fig. 18**

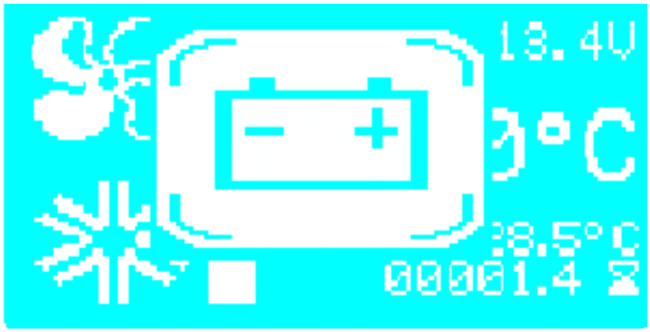



A 02 – Engine oil pressure alarm

**Fig. 19**


A 03 – Engine oil temperature alarm

**Fig. 20**




A 04 – Damaged alternator alarm

**Fig. 21**

6.3 - MAINENANCE ALARM


A 05 – Failed maintenance alarm (Over 250 hours)

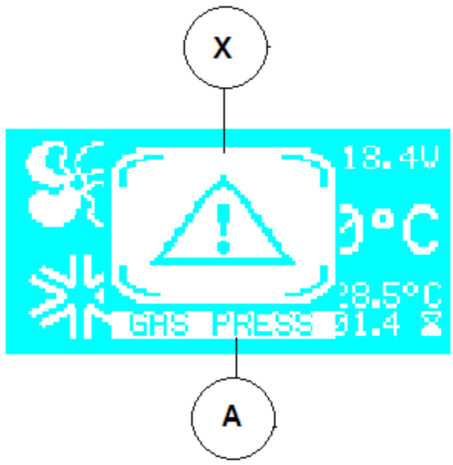
**Fig. 22**

**When this information is showed on the ECC display (Fig. 22), immediately contact a service center "Ecowind/Lombardini" in order to perform general maintenance. This procedure is repeated to cycle of 250 hours.**

**ATTENTION!!**

**If it ignored the REMARK the "Lombardini" declines all responsibility for any damage caused to people, animals, objects or the equipment itself as well as its warranty (within the prescribed period).**

**6.4 - PERIPHERAL DEVICES ALARMS**




**X –** "ATTENTION" generalized peripheral devices alarm
**A –** Recorded alarm types:

**Fig. 23**

A 06 Damaged solenoid E / diesel fuel valve alarm
A 07 R 134a cryogenic circuit gas pressure sensor alarm
A 08 Damaged gas compressor solenoid alarm
A 09 Damaged split centrifugal fan alarm
A 10 Damaged axial condenser fan alarm
A 11 External temperature sensor alarm
A 12 Ambient temperatures sensor alarm
A 13 R 134a cryogenic circuit gas temperature sensor alarm
A 14 Split ventilation low battery tension mode alarm
A 15 Excessive battery recharge time alarm (over 5 cycles)
A 16 Not available
A 17 (Auto RESET) ECC auto diagnosis alarm
A 18 "W" signal damage alarm

**ATTENTION!!**

**General alarm display visualization ( fig. 23 ) and relative component interested to failure:**

- A 06…….. FUEL VALVE
- A 07…….. GAS PRESS
- A 08…….. COMPRESSOR
- A 09…….. SPLIT FAN
- A 10…….. COND FAN
- A 11…….. TEXT SENSOR
- A 12…….. TAMB SENSOR
- A 13…….. TGAS SENSOR
- A 14…….. LOW BATT
- A 15…….. TIME EXCEED
- A 16…….. Not available
- A 17…….. INTERNAL FAILURE
- A 18…….. W SIGNAL



**ATTENTION!!**

**If one of the above mentioned alarms activates, the system will automatically shut-down setting itself up in OFF mode and registering the detected type of damage on display "G"!!**

**The only exception is when a damage occurs at the thermal/cryogenic apparatus (AC-cooling). In this condition, the system will isolate the climatic apparatus function (CLIMA) allowing only the "Generator" and the "Automatic battery recharge" mode to work!**

**ATTENTION!!**

**If a damage occurs with a relative warning signal, please contact or go to an authorized Ecowind/Lombardini service center!!!**

# 7 - REMOTE CONTROL

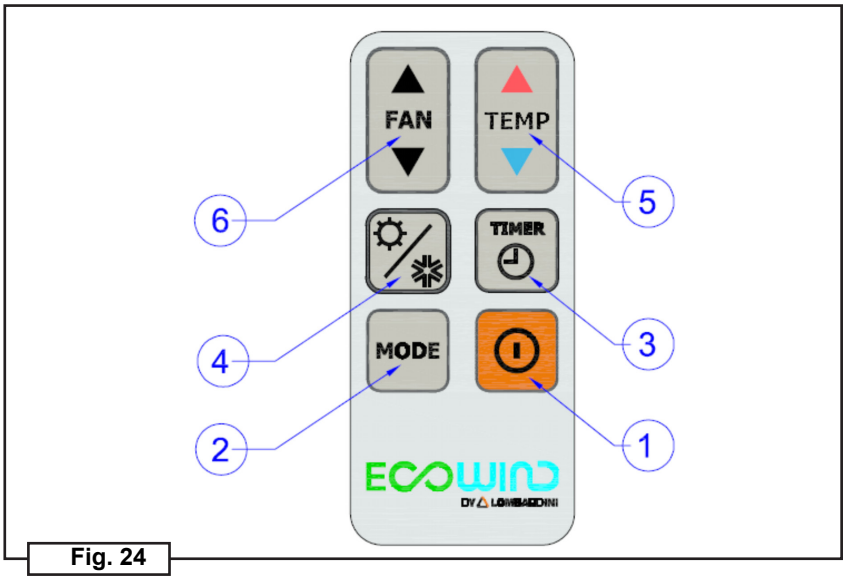



Fig. 24

## 7.1 - DESCRIPTION

**1 -** ON – OFF, Power Unit engine ignition / stop.
**2 -** System operating mode selector.
**3 -** Timer mode selector.
**4 -** Ambient climate mode selector.
**5 -** Internal climate thermostat selector.
**6 -** Split suction fan speed selector.

The remote control (fig. 24) enables the user to set-up and modify all system's relative parameters accurately duplicating all command operations made on the split control panel. The control functions are inherent to the endothermic control and battery recharge but are rather less inherent to that of air-conditioning

Any time an (IrDA) command is correctly received, the system confirms by emitting a brief acoustic signal (beep).

**IMPORTANT !!**

**For a correct usage and function of the remote control, it is advisable not to expose it directly under the sun's rays for long periods of time.**

## 4.1 TABLES OF PROBLEMS, CAUSES AND SOLUTIONS

**Note :** The following tables concern the information regarding the thermodynamic and mechanical components of the system and describe the problems that may occur while the ECOWIND air-conditioning system is running. They identify possible causes and relevant solutions, specifying which operations are to be performed by authorised technicians.

***ATTENTION***

***As far as the thermodynamic components are concerned, the instructions carried in the "Solutions" column are exclusively for authorised ECOWIND service centre technicians.***

**Table of problems, and solutions – due air conditioner system and engine Power Unit**

# TROUBLESHOOTING ECC

| N° | PROBLEM | MESSAGE | ICON | CAUSE | | SOLUTION | | NOTE |
|---|---|---|---|---|---|---|---|---|
| 0 | No switch on when pressing ON/OFF button | No message | Not available | 0.a | No power supply | 0.a.1 | Wait few minutes for ECU fuse rearm | |
| | | | | | | 0.a.2 | Revise fuse FS if is neccessary replace it | See diag. 791 126 e/o 127, pag. 60-66 |
| | | | | | | 0.a.3 | Revise right connection from BATTERY to FS connector X 22 | |
| | | | | | | 0.a.4 | Revise power wiring to connector X 22 at Starter motor "M" - 30 | |
| | | | | | | 0.a.5 | Revise right connection from starter motor "M"- 30 to connector X9 pos. 4. | |
| | | | | | | 0.a.6 | Revise right connections to connector X 9 pos. 3 at connector X15 pos. 1A | |
| | | | | | | 0.a.7 | Revise right connection from GROUND to connector X 15 pos. 3A, to BATT - | |
| | | | | | | 0.a.8 | Replace ECU on PWU | Contact the autorised Service centre. |
| | | | | 0.b | Low or damaged battery | 0.b.1 | Re-charge or replace battery | |
| | | | | 0.c | Damaged ECC | 0.c.1 | Replace ECC on Split | Contact the autorised Service centre. |
| 1 | Engine start failure | Engine start failure icon |  | 1.a | No fuel | 1.a.1 | Revise fuel level | Check the fuel level in the tank |
| | | | | 1.b | Gagged air vent tank | 1.b.1 | Clean and free air vent tank | Consult the vehicle manual service |
| | | | | 1.c | Gagged air filter engine | 1.c.1 | Replace air filter engine | See pag. 51-53 |
| | | | | 1.d | Gagged fuel filter | 1.d.1 | Replace fuel filter | See pag. 51-53 |
| | | | | 1.f | Air in the fuel line | 1.f.1 | make sure that the fuel filter is correctly mounted. If it is right but the problem continues conctat autorised service centre | See pag. 51-53 |
| | | | | 1.g | Fuel pump damaged | 1.g.1 | Mechanical issues in the pump. Replace the fuel pump | Contact the autorised Service centre. |
| | | | | 1.h | Low or damaged battery | 1.h.1 | Re-charge battery | Contact the autorised Service centre. |
| | | | | | | 1.h.2 | Replace battery | |
| | | | | 1.i | Wrong connections | 1.i.1 | Revise right connection to connector X9 pos.5 at connector X15 pos. 6C | See diag. 791 126 or 127, pag. 60-66 |
| | | | | | | 1.i.2 | Revise right connection to connector X7 pos. Z3 at Starter motor – 50 | |
| | | | | 1.l | Damaged Starter motor | 1.l.1 | Replace starter motor on PWU | Contact the autorised Service centre. |
| | | | | 1.m | Damaged ECU | 1.m.1 | Replace ECU on PWU | |
| | | | | 1.n | Damaged ECC | 1.n.1 | Replace ECC on Split | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 2 | Engine oil pressure | Engine oil pressure icon |  | 2.a | No engine oil | 2.a.1 | Revise engine oil level | |
| | | | | | | 2.a.2 | Check if in the engine there are leaks of oil | If they are, contact the autorised Service centre. |
| | | | | 2.b | No engine oil pressure switch detection before starting | 2.b.1 | Revise right connection to oil pressure switch OPS - connector X2 at connector X15 pos .7B | See diag. 791 126 or 127, pag. 60-66 |
| | | | | | | 2.b.2 | Replace oil pressure switch OPS | Contact the autorised Service centre. |
| | | | | 2.c | Damaged ECC | 2.c.1 | Replace ECC on Split | |
| 3 | Engine oil temperature | Engine oil temperature icon |  | 3.a | High engine temperature | 3.a.1 | Check if the air intake engine on PWU are free. | See pag. 53 |
| | | | | | | 3.a.2 | Check if the air outlet to cooling internal PWU are not gagged. | |
| | | | | | | 3.a.3 | Issues engine lubrication | Contact the autorised Service centre. |
| | | | | 3.b | No engine temperature switch detection before starting | 3.b.1 | Revise right connection to engine temperature switch OTS - X3 at connector X15 pos. 5C | See diag. 791 126 or 127, pag. 60-66 |
| | | | | | | 3.b.2 | Replace the engine temperature switch OTS | Contact the autorised Service centre. |
| | | | | 3.c | Damaged ECC | 3.c.1 | Replace ECC on Split | |
| 4 | Alternator failure | Battery icon |  | 4.a | Broken belt trasmission | 4.a.1 | Replace belt on PWU | Contact the autorised Service centre. |
| | | | | 4.b | Alternator no charge signal detection before starting | 4.b.1 | Revise right connection to Alternator D+ at connettor X15 pos. 4B | See diag. 791 126 or 127, pag. 60-66 |
| | | | | | | 4.b.2 | Replace alternator on PWU | Contact the autorised Service centre. |
| | | | | 4.c | Alternator no charge after starting | 4.c.1 | Revise right connection from Alternator - 30 to Starter motor – 30 | See diag. 791 126 or 127, pag. 60-66 |
| | | | | | | 4.c.2 | Replace alternator on PWU | Contact the autorised Service centre. |
| | | | | 4.d | Damaged ECC | 4.d.1 | Replace ECC on Split | |
| 5 | Service | Service icon |  | 5.a | Service working engine hours overpassed | 5.a.1 | attemd service | Contact the autorised Service centre. |
| 6 | Fuel solenoid | Fuel solenoid warning icon |   | 6.a | No fuel solenoid connection | 6.a.1 | Revise right connection from fuel solenoid valve FLS connector X1 pos. 2 to connector X 15 pos. 2C | See diag. 791 126 or 127, pag. 60-66 |
| | | | | | | 6.a.2 | Revise right connection from fuel solenoid valve FLS connector X1 pos. 1 to GROUND | |
| | | | | 6.b | Damaged coil fuel solenoid | 6.b.1 | Replace the coil of valve FLS | Contact the autorised Service centre. |
| | | | | 6.c | Damaged fuel solenoid | 6.c.1 | Replace the fuel valve FLS | |
| | | | | 6.d | Damaged ECC | 6.d.1 | Replace ECC on Split | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 7 | Gas pressure | | 7.a | No gas in circuit R134a . Minimum level pressure gas less < 2bar | 7.a.1 | Check eventually gas leaks in the circuit R134a |
| | | | | | 7.a.2 | Check eventually broken components in the circuit R134a |
| | | | | | 7.a.3 | Verify that there aren't any bottlenecks on the pipes rubber flexible gas line AC |
| | | | | | 7.a.4 | Refill the circuit of Gas R134a, with indicate quantity |
| | | | 7.b | Exceeded the Maximum pressure level of safety circuit > 27 bar | 7.b.1 | Check the correct quantity of Gas R134a in the circuit |
| | | | | | 7.b.2 | Check the fan condenser that works correctly (cycle works) |
| | | | | | 7.b.3 | Ceck the fins of gas condenser are clean and the air of coling gas condenser to crossing properly |
| | | | | | 7.b.4 | Verify that there aren't any bottlenecks on the pipes rubber flexible gas line AC |
| | | | | | 7.b.5 | Check that the plastic cover is install correctly to gas condenser and that it do not break or have a missing parts. |
| | | | | | 7.b.6 | Check that there are not objects or things that prevent the rotation of the condenser fan |
| | | | | | 7.b.7 | Replace gas pressure switch GPS |
| | | | 7.c | Wrong connections | 7.c.1 | Revise right connection from connector X12 pos. A to connector X15 pos. 8C |
| | | | | | 7.c.2 | Revise right connection from connector X12 pos. B to GROUND |
| | | | 7.d | Damaged Gas pressure switch R134a | 7.d.1 | Replace gas pressure switch GPS |
| | | | 7.e | No gas pressure switch detection | 7.c.1 | Revise right connection from GPS connector X13 pos. 2 at connector X 15 pos. 3B |
| | | | | | 7.c.2 | Revise right connection from GPS connector X13 pos.1 at GROUND |
| | | | | | 7.c.3 | Replace gas pressure switch GPS |
| | | | 7.d | Damaged ECC | 7.d.1 | Replace ECC on Split |

| |
|---|
| Contact the autorised Service centre. |
| |
| |
| |
| |
| |
| |
| **WARNING!!! Before proceeding to this verification MUST be strictly off the power supply from the system to battery !** |
| Contact the autorised Service centre. |
| See diag. 791 126 or 127, pag. 60-66 |
| Contact the autorised Service centre. |
| See diag. 791 126 or 127, pag. 60-66 |
| Contact the autorised Service centre. |
| |
| |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 8 | Compressor failure | Compressor failure warning icon | 8.a | Damaged AC compressor | 8.a.1 | Replace AC compressor on PWU | Contact the autorised Service centre. |
| | | | 8.b | Damaged Coil AC compressor | 8.b.1 | Replace AC compressor on PWU | |
| | | | 8.c | No compressor AC connection | 8.c.1 | Revise right connection from COMP AC at connector X15 pos. 7A | See diag. 791 126 or 127, pag. 60-66 |
| | | | 8.d | Damaged ECC | 8.d.1 | Replace ECC on Split | Contact the autorised Service centre. |
| 9 | Split fan failure | Split fan failure warning icon | 9.a | Blocked split fan | 9.a.1 | Check that there are not objects or things that prevent the rotation of the split fan | **WARNING!!! Before proceeding to this verification MUST be strictly off the power supply from the system to battery !** |
| | | | 9.b | Damaged split fan | 9.b.1 | Replace split fan F2 on Split | Contact the autorised Service centre. |
| | | | 9.c | No split fan connection | 9.c.1 | Revise right connection from connector X20 to connector X15 pos.1B (POSITIVE) | See diag. 791 126 or 127, pag. 60-66 |
| | | | | | 9.c.2 | Revise right connection from connector X21 at connector X15 pos .8B (GROUND) | |
| | | | 9.d | PVM (electronic speed control ) damaged | 9.d.1 | Replace ECC on Split | Contact the autorised Service centre. |
| | | | 9.e | Damaged ECC | 9.e.1 | Replace ECC on Split | |

GB

| | | | | | | |
|---|---|---|---|---|---|---|
| 10 | Condensation unit fan failure | Condensation unit fan failure warning icon | 10.a | Blocked gas condenser fan | 10.a.1 | Check that there are not objects or things that prevent the rotation of the condenser fan |
| | | | 10.b | Damaged gas condenser fan | 10.b.1 | Replace gas condenser fan F1 |
| | | | 10.c | No gas condensert fan connection | 10.c.1 | Revise right connection from fan F1 to connector X15 pos. 8C (POSITIVE) |
| | | | | | 10.c.2 | Revise right connection from fan F1 to GROUND |
| | | | 10.d | Damaged ECC | 10.d.1 | Replace ECC on Split |
| 11 | external temperature sensor | external temperature sensor warning icon | 11.a | Damaged external temperature sensor or incorrect read | 11.a.1 | Check right sensor position and correct install of external temperature sensor ETS |
| | | | | | 11.a.2 | Replace the external temperature sensor ETS |
| | | | 11.b | No external temperature sensor connection | 11.b.1 | Revise right connection from sensor ETS to connector X15 pos.3C |
| | | | | | 11.b.2 | Revise right connection from sensor ETS to GROUND |
| | | | 11.c | Damaged ECC | 11.c.1 | Replace ECC on Split |
| 12 | ambient temperature sensor | ambient temperature sensor warning icon | 12.a | Damaged ambient temperature sensor or incorrect read | 12.a.1 | Check right sensor position and correct install of ambient temperature sensor ATS |
| | | | | | 12.a.2 | Replace the ambient temperature sensor ATS |
| | | | 12.b | No ambient temperature sensor connection | 12.b.1 | Revise right connection from sensor ATS to connector X15 pos.4C |
| | | | | | 12.b.2 | Revise right connection from sensor ATS to GROUND |
| | | | 12.c | Damaged ECC | 12.c.1 | Replace ECC on Split |

| WARNING!!! Before proceeding to this verification MUST be strictly off the power supply from the system to battery ! |
|---|
| Contact the autorised Service centre. |
| See diag. 791 126 or 127, pag. 60-66 |
| Contact the autorised Service centre. |
| See to Pag. 38 |
| Contact the autorised Service centre. |
| See diag. 791 126 or 127, pag. 60-66 |
| Contact the autorised Service centre. |
| See Pag. 40 |
| Contact the autorised Service centre. |
| See diag. 791 126 or 127, pag. 60-66 |
| Contact the autorised Service centre. |

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B

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 13 | Gas temperature sensor | Gas temperature sensor warning icon |  | 13.a | Damaged gas temperature sensor or incorrect read | 13.a.1 | Check right sensor position and correct install of gas temperature sensor GTS | See Pag. 40 |
| | | | | | | 13.a.2 | Replace the gas temperature sensor GTS | Contact the autorised Service centre. |
| | | | | 13.b | No gas temperature sensor connection | 13.b.1 | Revise right connection from sensor GTS to connector X15 pos.5B | See diag. 791 126 or 127, pag. 60-66 |
| | | | | | | 13.b.2 | Revise right connection from sensor GTS to GROUND | |
| | | | | 13.c | Damaged ECC | 13.c.1 | Replace ECC on Split | Contact the autorised Service centre. |
| 14 | Low battery | Low battery warning icon |  | 14.a | No enough energy battery level for a normaly condition of works | 14.a.1 | Re-charge battery | Contact a specialist center for batteries |
| | | | | | | 14.a.2 | Replace battery | |
| | | | | 14.b | Connector SICMA not properly connected | 14.b.1 | Check all the connections with SICMA connector | See detail to pag. 42-43 |
| 15 | Time exceed | Time exceed warning icon |  | 15.a | Total time completed of recharging battery on RECHARGE-BATTERY – AUTOMATIC mode | 15.a.1 | Likely demand / consumption exceeding supply in electrical generator | Turn off some electrical loads. Bring the ECC system in OFF mode to reset all the function. |
| | | | | | | 15.a.2 | Check status battery. If necessary replace the battery | Conctact a specialist centr for battery |
| 16 | **NOT AVAILABLE** | | | | | | | |
| 17 | Internal failure | Internal failure warning icon |  | 17.a | Damaged ECC | 17.a.1 | Replace ECC on Split | Contact the autorised Service centre. |
| 18 | W signal | W signal warning icon |  | 18.a | Broken belt trasmission | 18.a.1 | Replace belt on PWU | Contact the autorised Service centre. |
| | | | | 18.b | No W signal connection | 18.b.1 | Revise right connection from Alternator "W" to connector X15 pos.6B | See diag. 791 126 or 127, pag. 60-66 |
| | | | | 18.c | Damaged Alternator / regulator | 18.c.1 | Repalce Alternator ALT in PWU | Contact the autorised Service centre. |
| | | | | 18.d | Damaged ECC | 18.d.1 | Replace ECC on Split | |
| 19 | **NOT AVAILABLE** | | | | | | | |
| 20 | No response at remote control commands | No message | **NOT VISUALIZED** | 23.a | Battery Remote control | 23.a.1 | Repalce battery | Conctact a specialist centr for battery |
| | | | | 23.b | Damaged remote control | 23.b.1 | Replace remote control | Contact the autorised Service centre. |
| | | | | 23.c | Damaged ECC | 23.c.1 | Replace ECC on Split | |

**Other problems due to engine fault but not Recorded to electronic control**

| | | |
|---|---|---|
| The power unit gives off black fumes. | Air filter clogged. | Change the air filter (see pag. 51-53). |
| The power unit gives off white fumes | Fuel filter clogged. | Change the fuel filter. |
| | Air in the fuel circuit. | Make sure the fuel filter is correctly mounted (see parag. 47). If the filter is correctly mounted and the problem continues, contact an authorised ECOWIND service centre. |
| | | |
| | Lubricating oil level to high. | Adjust the oil level (see pag. 47) |



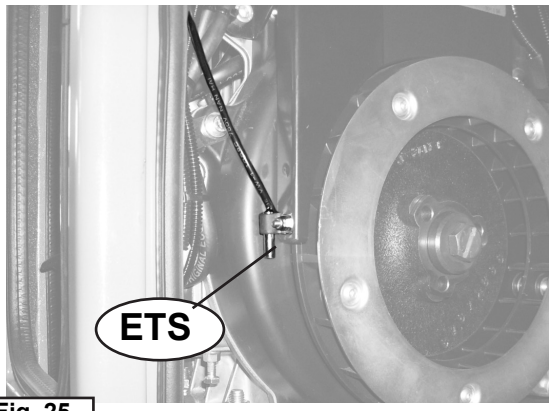



Fig. 25

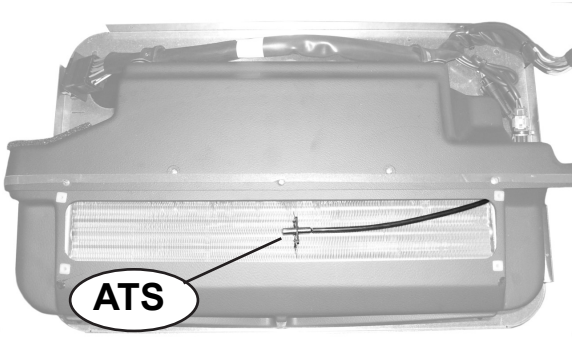



Fig. 26

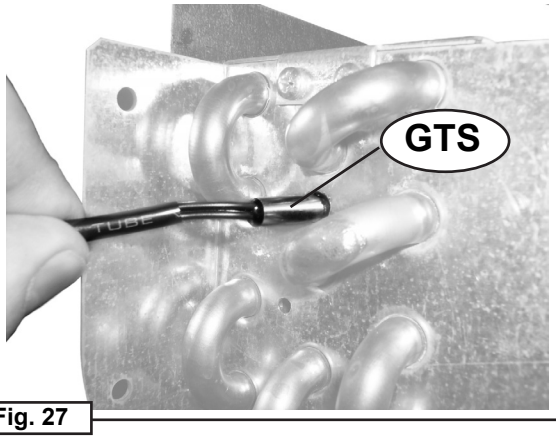



Fig. 27

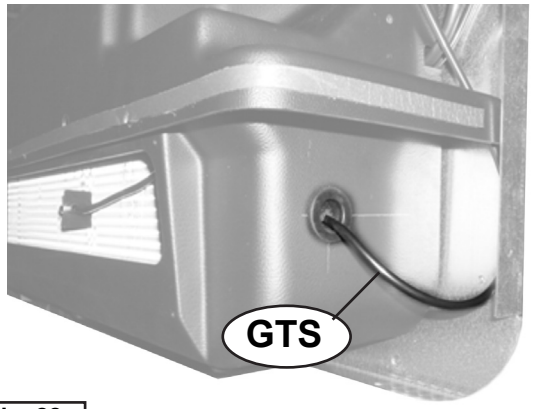



Fig. 28

**WARNING**

Valid for all electrical connections for connectors **“SICMA-FRAMATOME 24 way”!**

During the clamping connector to pay absolute attention to proper electrical contact. If is ignored this REMARK of this procedure could not ensure proper operation of the system !

IF THE CONNECTORS IN NOT PROPERLY INSERT THE MOST PROBABLY ALARM SHOWED ON DISPLAY CONTROL ECC WILL BE LIKE ON FIG. 1.

G
B

**“LOW BATT”**


Fig. 1

(display ECC control)

Bringing the connectors keeping them as parallel as possible. I just put in the press stirs C (Fig. 28a-28b) to allow tightening.

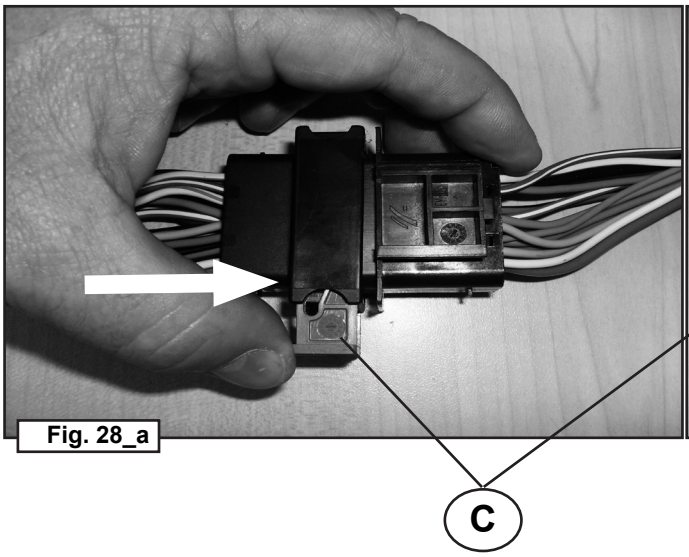


Fig. 28_a

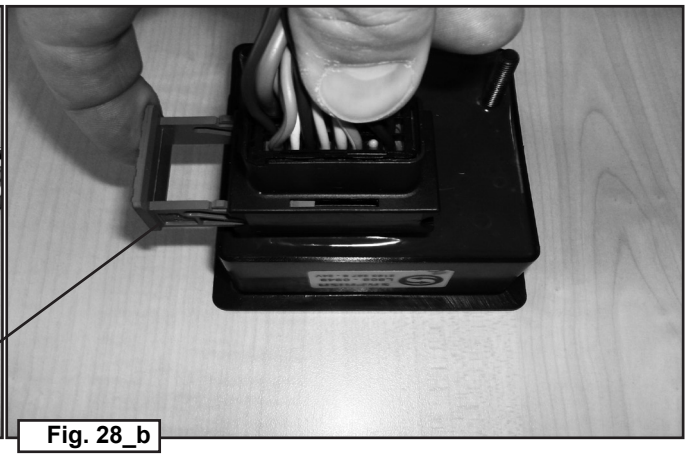


Fig. 28_b

C



**WARNING**

It is absolutely not recommended during the closing connectors, push vigorously the two connectors. The latch guide C (Fig. 28_a-28_b) automatically closes the two sides. If no respected this action would seriously damage the pins inserted into the connector, which would compromise the proper functioning of the system!

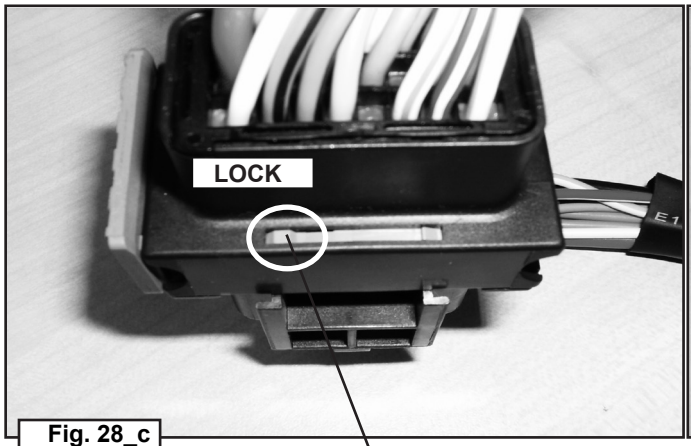



Fig. 28_c

F

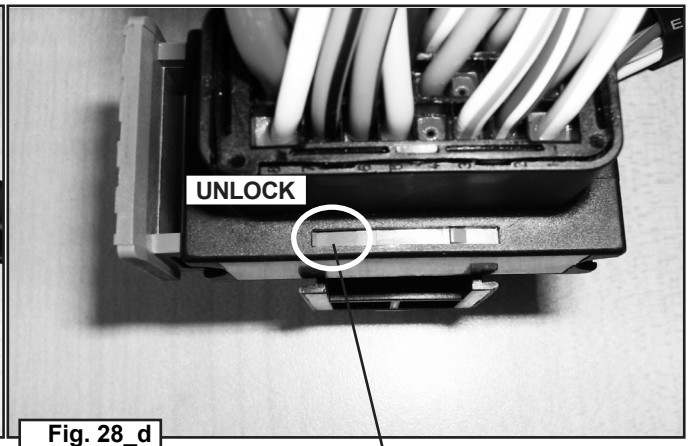



Fig. 28_d

F

To obtain a correct and safe pair of connectors SICMA, make sure that at the end you can hear the closing “CLIK” guidance issued by the firm F (Fig. 28_c - Fig 28_d) and it is positioned strictly in security configuration as shown in Fig . 28_c.

## 5.1 GENERAL SAFETY REGULATIONS FOR MAINTENANCE

**General rules to observe :** - During maintenance operations, it is essential to observe the following regulations:
- Do not tamper with the control equipment and commands;
- Maintenance operations must be performed solely when the system is not running;

**Regulations for restarting the system:** - After servicing and before restarting the system, make sure that:
- all parts and/or tools used during the operation have been removed from the equipment;
- all safety devices have been correctly positioned and are in working order.

**Scheduled controls and ordinary maintenance operations:** In order to ensure that the ECOWIND system runs efficiently, it is important to carry out regular checks and scheduled maintenance as described below.

**Safety regulations for disposing of the motor oil and the motor oil filter and the coolant.**

***ATTENTION*** ***Spent motor and filter oil can cause skin cancer when it comes into contact with skin for long periods. If contact is inevitable, ensure that the skin is washed thoroughly using water and soap.***

***ATTENTION*** ***Moreover it is absolutely necessary to dispose of spent motor and filter oil and coolant correctly at specialist centres, in that they are highly polluting.***

G
B

## 5.2 MAINTENANCE OF MECHANICAL PARTS - INSTRUCTIONS

**Checking and refilling lubricating oil**

**Frequency** Every 100 hours of movement (operation)

**Use the original spare parts and components recommended by Lombardini S.r.l.**

**WARNING**
***To ensure that the system works correctly and to remain within the conditions of the warranty, use the original lubricating oil, spare parts and components recommended by Lombardini S.r.l.***

The engine could be damaged if allowed to operate with insufficient oil. It is also dangerous to add too much oil as its combustion could sharply increase the rotation speed.
Use a suitable oil in order to protect the engine.
The lubrication oil influences the performances and life of the engine in an incredible way.
The risk of piston seizure, jammed piston rings and rapid wear of the cylinder liner, the bearings and all moving parts increases if oil whose characteristics differ from the recommended type is used, or if the oil is not regularly changed. All this notably reduces engine life.
Oil viscosity must suit the ambient temperature in which the engine operates.

Old oil can cause skin cancer if repeatedly left in contact with the skin and for long periods of time. If contact with the oil is inevitable, you are advised to thoroughly wash your hands with soap and water as soon as possible.
Appropriate protective gloves etc should be wore during this operation.
Old oil is highly polluting and must be disposed of in the correct way. Do not litter.

**LUBRICANT INTERNATIONAL SPECIFICATIONS**

They define testing performances and procedures that the lubricants need to successfully respond to in several engine testing and laboratory analysis so as to be considered qualified and in conformity to the regulations set for each lubrication kind.

A.P.I : ( American Petroleum Institute )
MIL : Engine oil U.S. military specifications released for logistic reasons
ACEA : European Automobile Manufacturers Association

## ACEA REGULATIONS - ACEA SEQUENCES

**PETROL**

A1 = Low-viscosity, for frictions reduction

A2 = Standard

A3 = High performances

**LIGHT DUTY DIESEL ENGINES**

B1 = Low-viscosity, for frictions reduction engines )

B2 = Standard

B3 = High performances (indirect injection)

B4 = High quality (direct injection)

**HEAVY DUTY DIESEL ENGINES**

*E1 = OBSOLETE*

E2 = Standard

E3 = Heavy conditions (Euro 1 - Euro 2 engines )

E4 = Heavy conditions (Euro 1 - Euro 2 - Euro 3 engines )

E5 = High performances in heavy conditions (Euro 1 - Euro 2 - Euro 3

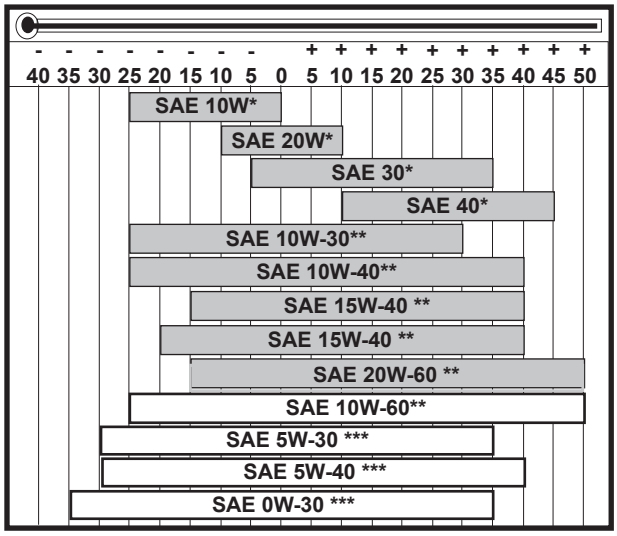
G
B

**SEQUENZE API / MIL - SEQUENCES API / MIL - API / MIL SEQUENCES**

**API / MIL-SEQUENZEN - SECUENCIAS API / MIL - SEQUÊNCIAS API / MIL**

| | DIESEL | | | | | | | | BENZINA - ESSENCE - PETROL BENZIN - GASOLINA | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| API | CH-4 | CG-4 | CF-4 | CF-2 | CF | CE | CD | CC | SC | SD | SE | SF | SG | SH | SJ | SL |
| MIL | | | L- 46152 D / E | | | | | | | | | | | | | |

CORRENTI - CURRENT | OBSOLETI - OBSOLETE




**Gradazioni SAE - Viscosité SAE - SAE Grade**
**SAE Viskositätsklasse - Viscosidad SAE - Gradação SAE**

**SAE 15W-40 ***

base minerale
base minérale
mineral base
Mineralölbasis
Base mineral
base mineral

**SAE 15W-40 ****
**SAE 20W-60 ****

base semi-sintetica
base semi-synthétique
semi-synthetic base
Halbsynthetische Basis
Base semi-sintetica
base semi-sintética

**SAE 10W-60**
**SAE 5W-30 *****
**SAE 0W-30 *****

base sintetica
base synthétique
synthetic base
Synthetische Basis
base sintetica
base sintética

## Recommended oil

**PAKELO KRIPTON 10 W 60 - specification API CH-4/CF SL, ACEA E4,E5,E7,B4.**

**NOTE! Alternatively, we reccomend using the following oil: MOBIL 1 - 15W50 specification API CF ACEA E4, B4, B3.**

***ATTENTION***

The oil quantity for a correct charging is : Qts 1,25
……1,2 (liters)

This quantity has to be strictly respected

| Step | Description |
|---|---|
| 1 | Make sure the vehicle is on a level surface and is at a complete rest. |
| 2 | Make sure the conditioning system has come fully to a halt.<br>Wear special protective gloves and clothing for maintenance operations, as specified in paragraph 5.1 “GENERAL SAFETY REGULATIONS FOR MAINTENANCE” |
| 3 | Loosen the fastening screws (**A**) using the spanner supplied **S** (fig. 29A) to open the protection case (**B**) (fig. 29). |
| 4 | Remove the dipstick (**C**) and check the oil level. The right oil level is close to, but not above, the “MAX” mark. When the level is below or just above the “MIN” mark, it is time to top up (fig. 30). |
| 5 | To top up, open the protection case (**D**) by loosening the fastening screw (**E**). |
| 6 | Unscrew and remove the plug (**F**) and add the amount of oil needed using a funnel (fig. 31). |
| 7 | Now check the oil level again using the dipstick (C) as indicated in step (4) (fig. 30). |
| 8 | Once you have correctly checked and topped up the oil, replace the dipstick (C), insert and screw on the plug (F) and correctly replace the protection cases (D) and (B) tightening them with the screws (E) and (A) with the aid of the supplied spanner. |

G
B

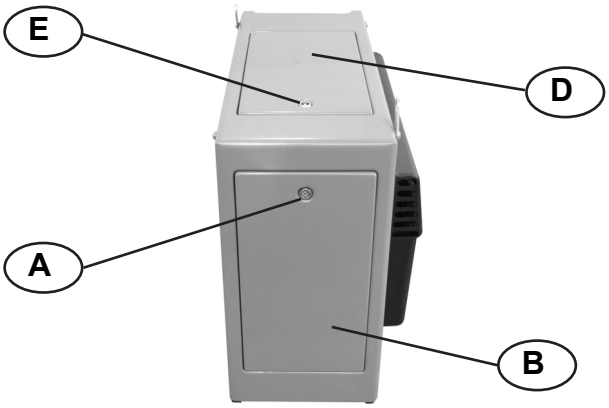



Fig. 29

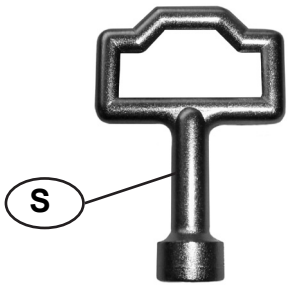



Fig. 29A

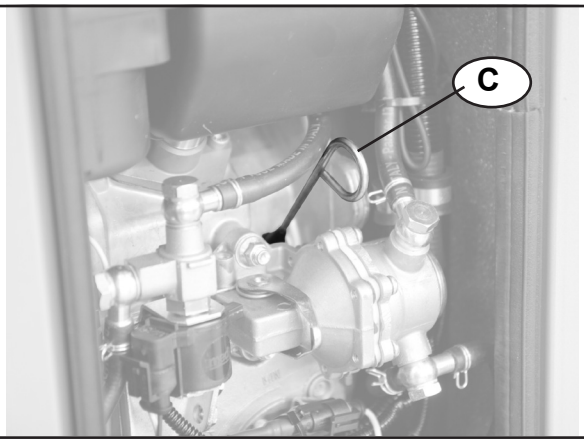




Fig. 30

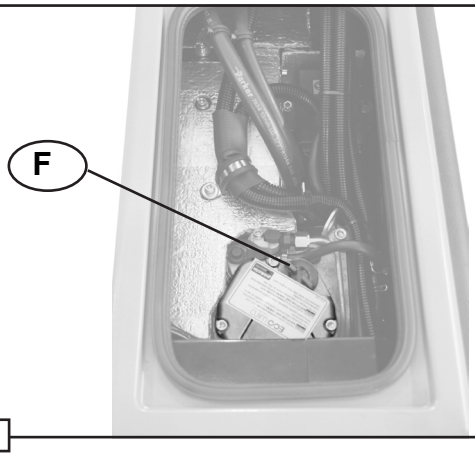



Fig. 31

G
B

## 5.3 Oil and filter replacement

**Frequency** Every 250 hours

**Use the original spare parts and components recommended by Lombardini S.r.l**.

***WARNING***
***To ensure that the system works correctly and to remain within the conditions of the warranty, use the original lubricating oil, spare parts and components recommended by Lombardini S.r.l.***

**Replacing the lubricating oil and oil filter.**

**Recommended oil:** PAKELO KRIPTON 10/W 60

*NOTE! Alternatively, we reccomend using the following oil:* MOBIL DELVAC 15 W 50 ONLY *specification API CF ACEA E4, B4, B3.*

G
B

**Replacement frequency**

- If used infrequently: every 6 months.
- If the oil used is of an inferior quality, it is necessary to replace it every 150 hours in order to ensure that the system functions correctly.

| Step | Description |
|---|---|
| 1 | Make sure the vehicle is on a level surface and is at a complete rest. |
| 2 | Make sure the conditioning system has come fully to a halt.<br>Wear special protective gloves and clothing for maintenance operations, as specified in paragraph 5.1 “GENERAL SAFETY REGULATIONS FOR MAINTENANCE”. |
| 3 | **Position a container to collect the spent oil beneath the hole under the power unit.**<br>***ATTENTION***<br>***Spent motor oil can cause skin cancer when it comes into contact with skin for long periods. If contact is inevitable, ensure that the skin is washed thoroughly using water and soap. It is absolutely necessary to dispose of spent oils correctly at specialist centres, in that they are highly polluting.*** |
| 4 | Loosen the fastening screws (**A**) and (**E**) using the supplied spanner to open the protection cases (**B**) and (**D**) (fig. 32). |
| 5 | Unscrew and remove the upper plug (**F**) to make it easier to empty the oil from the motor (fig. 32). |
| 6 | Unscrew the lower plug (**H**), in order to drain all the oil from the engine. When it is completely drained, insert the plug (H) and tighten it using the spanner (G) (fig. 33-34). |
| 7 | Disconnect the connectors (**L**) of the oil pressure bulbs (fig. 35) |
| 8 | Loosen and remove the 2 screws (**M**) in order to remove the oil filter cover (**N**). Make sure the gasket is intact (OR) and replace if it is damaged (fig. 35-36-37). |
| 9 | Remove and replace the oil filter (**P**) (fig 38 ).<br>***ATTENTION***<br>***It is absolutely necessary to dispose of the oil filter correctly at your local specialist centres, in that they are highly polluting.*** |
| 10 | Replace the oil filter cover (**N**) with its gasket (OR) placed correctly and tighten it using the 2 screws (**M**). |
| 11 | Connect the connectors (**L**) of the oil pressure bulbs. |

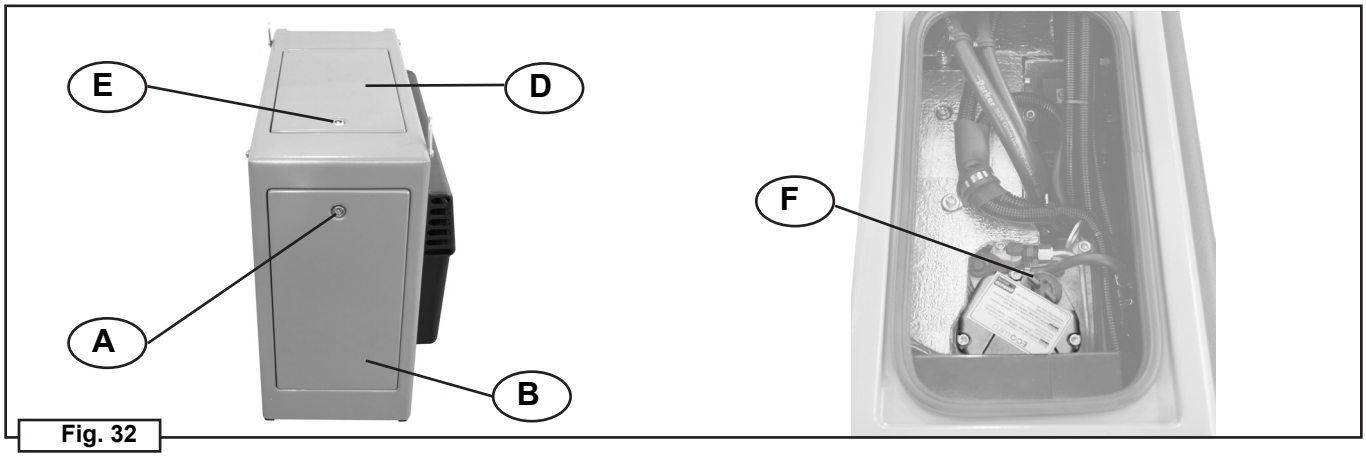


Fig. 32

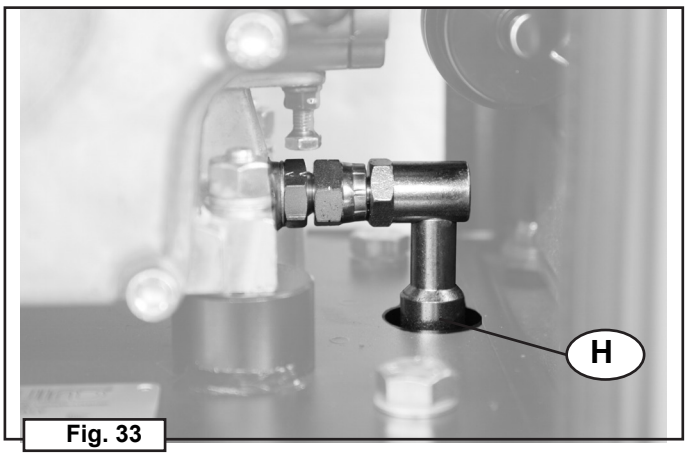


Fig. 33

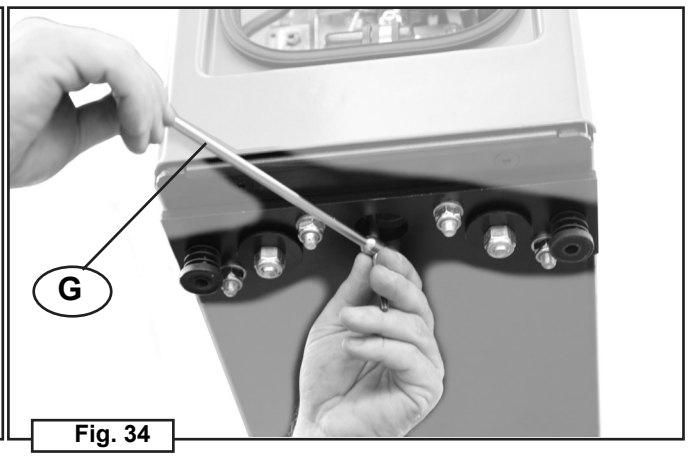


Fig. 34

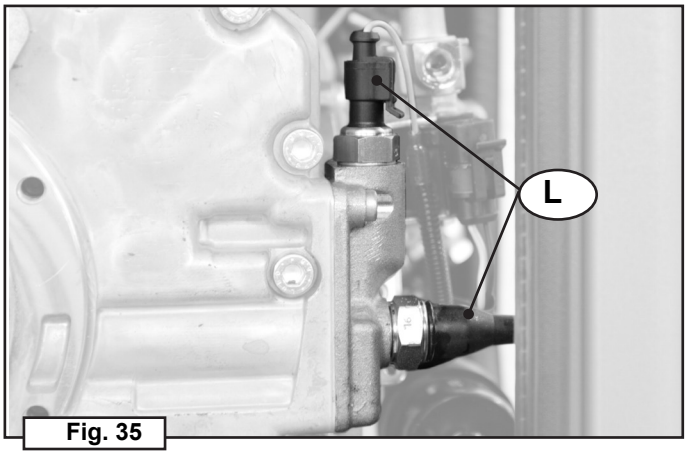


Fig. 35

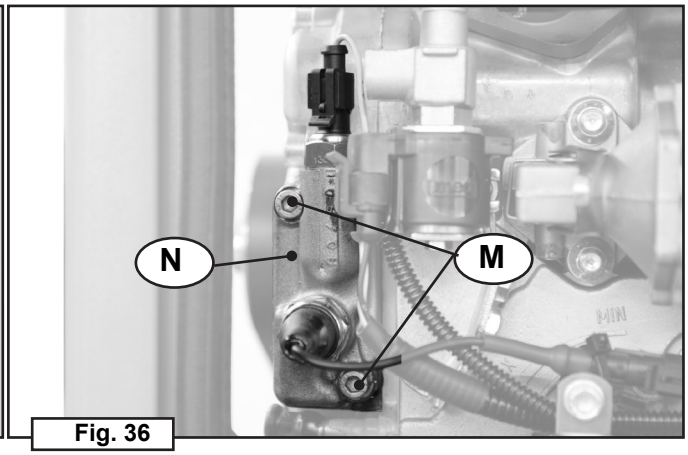


Fig. 36

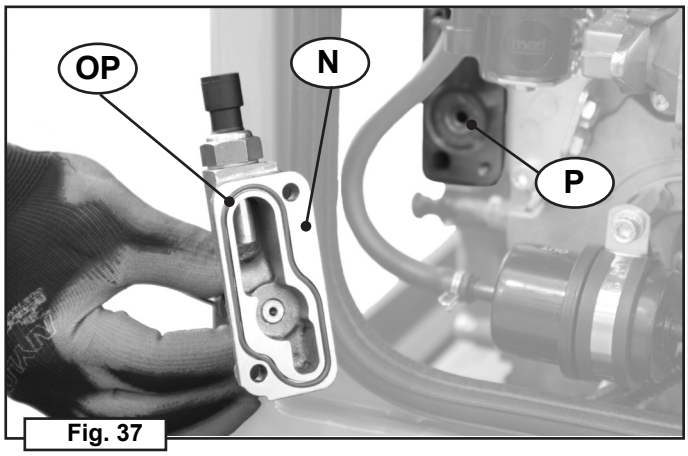


Fig. 37

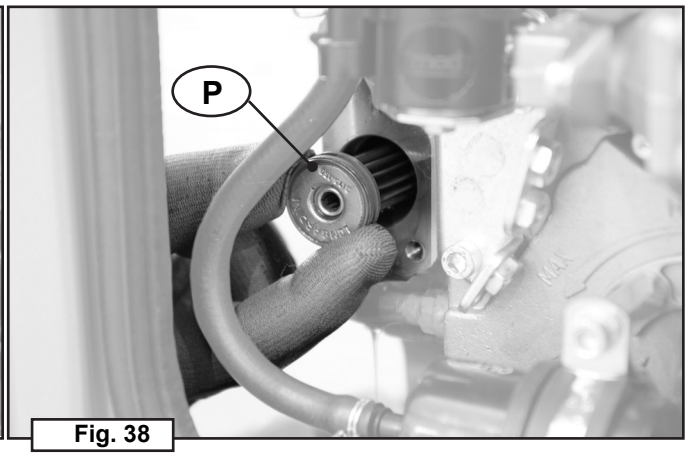


Fig. 38

| Step | Description |
|---|---|
| 12 | Using a funnel pour enough oil into the tank through the upper opening (fig. 39). |
| 13 | Remove the dipstick then check the oil level. The right oil level is close to, but not above, the “MAX” mark (fig. 39). |
| 14 | Once you have correctly carried out the fill up, replace the dipstick (**C**), insert and screw on the plug (**F**) and correctly replace the protection case (**D**) tightening it with the screw (**E**) by means of the supplied spanner (fig. 40). |

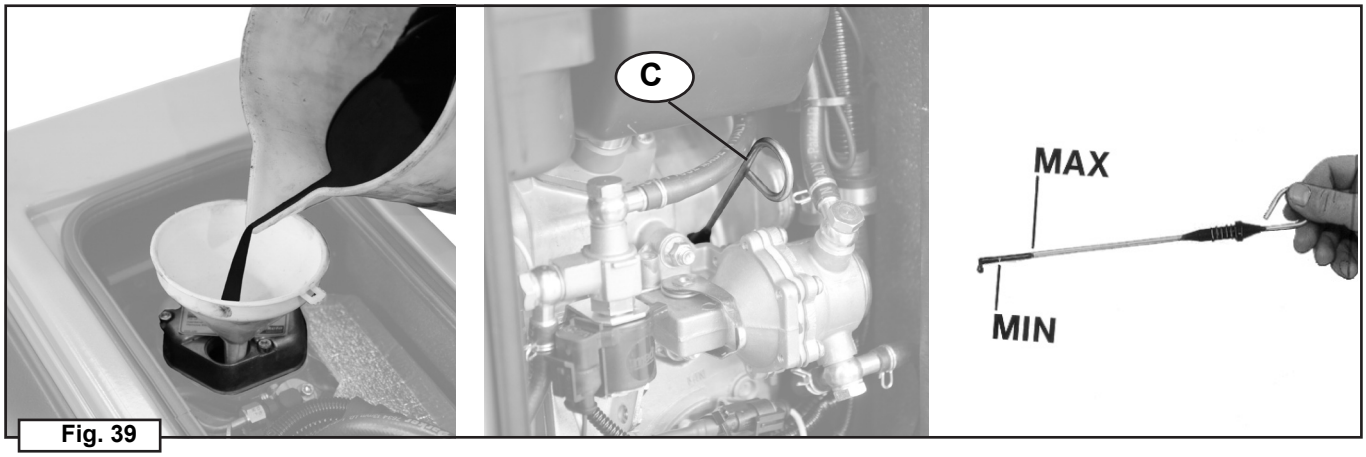



Fig. 39

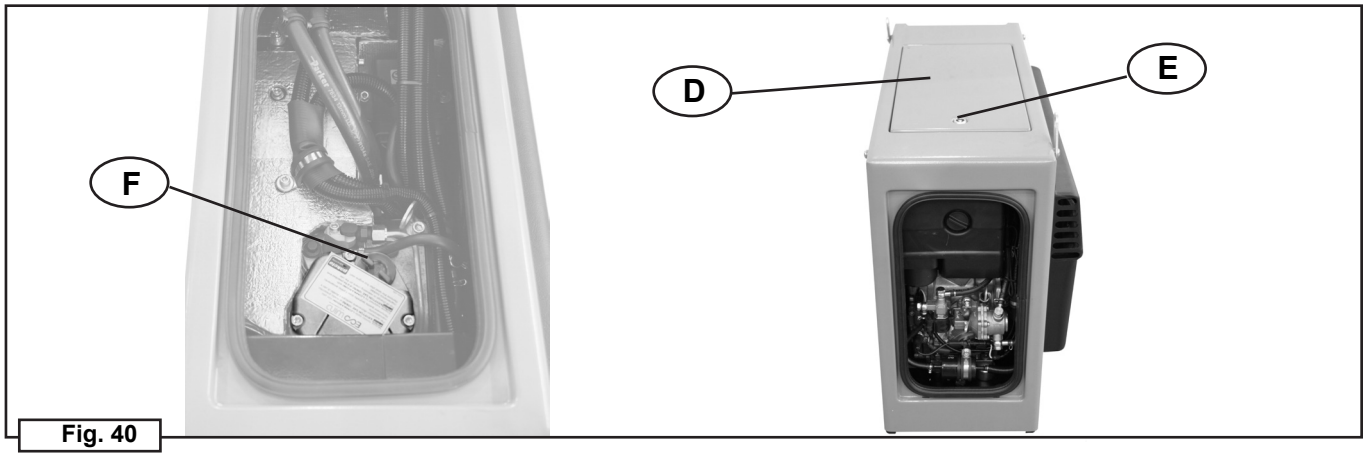



Fig. 40

G
B

### 5.4 Replacing the diesel filter

| Step | Description |
|---|---|
| **15** | Loosen the screw (**Q**) in order to remove the clamp (**R**). Preserve these parts for following assembly. Remove the diesel filter (**S**) from the case in order to facilitate the following operations (fig. 41). |
| **16** | Flatten the clamps (**T**) using pliers to remove them from the coupling points (**U**). |
| **17** | Remove the tubes (**U**) in order to remove and replace the filter (**S**) fig. 42.<br><br>***ATTENTION***<br>***It is absolutely necessary to dispose of oil filters correctly at specialist centres, in that they are highly polluting.*** |
| **18** | Replace the tubes (**U**) into the unions on the filter (**S**), and attach the clamps (**T**) using pliers to fasten**.** |
| **19** | **Replace the clamp around the filter (**R**) and fasten it to the support pin on the engine using the screw (**Q**).** |

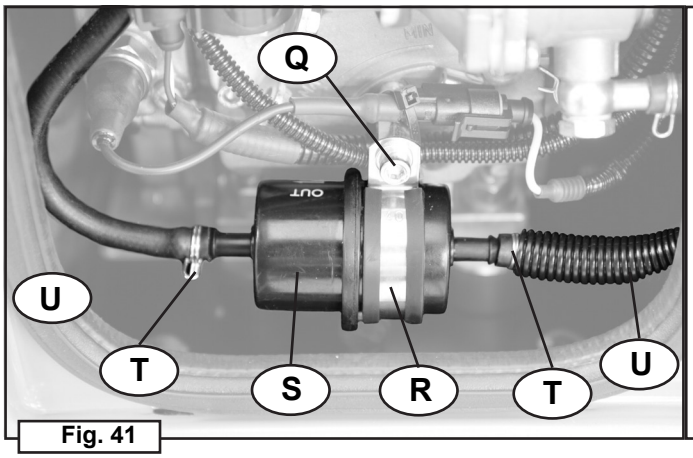


Fig. 41

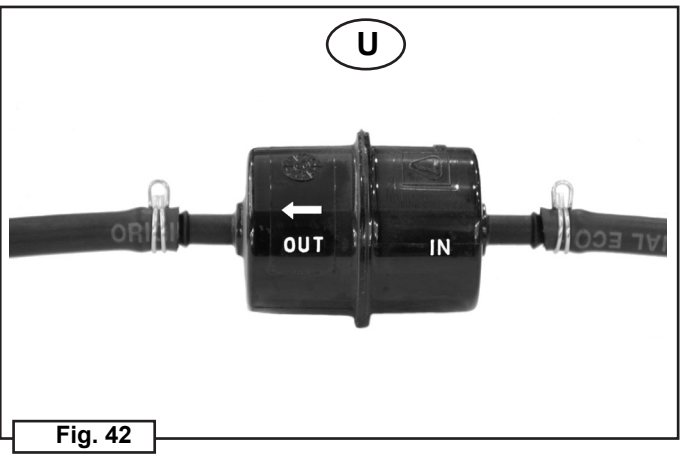


Fig. 42

GB

### 5.5 Cleaning or replacing the air filter.

| Step | Description |
|---|---|
| 20 | Remove the air filter cover (**V**), by turning the knob anticlockwise (**Z**)(fig. 43). |
| 21 | Loosen and remove the wing nut (**X**) in order to remove the filter element (**J**) (fig. 43). |
| 22 | Make sure the rubber gasket (**Y**) is intact, or replace if necessary (fig. 44). |
| 23 | ***ATTENTION***<br><br>***Wear special protective goggles in the following operations involving the use of compressed air.*** |
| 24 | Disassemble the pre-filter (**K**) and check for clogging; if necessary, remove it, from its position on the lower part of the air filter cover (**V**). Clean if clogged (fig. 45). |
| 25 | After cleaning, replace the pre-filter (**K**) on the air filter cover (**V**). |
| 26 | Reassemble the filter element (**J**), making sure that the rubber gasket (**Y**) is properly in position, then tighten the wing nut (**X**). |
| 27 | ***WARNING***<br><br>***Make sure the filter (J) is mounted correctly to prevent dust or impurities entering the intake ducts.*** |
| 28 | **Insert the air filter cover (V) again, by turning the knob clockwise (Z).** |

G
B

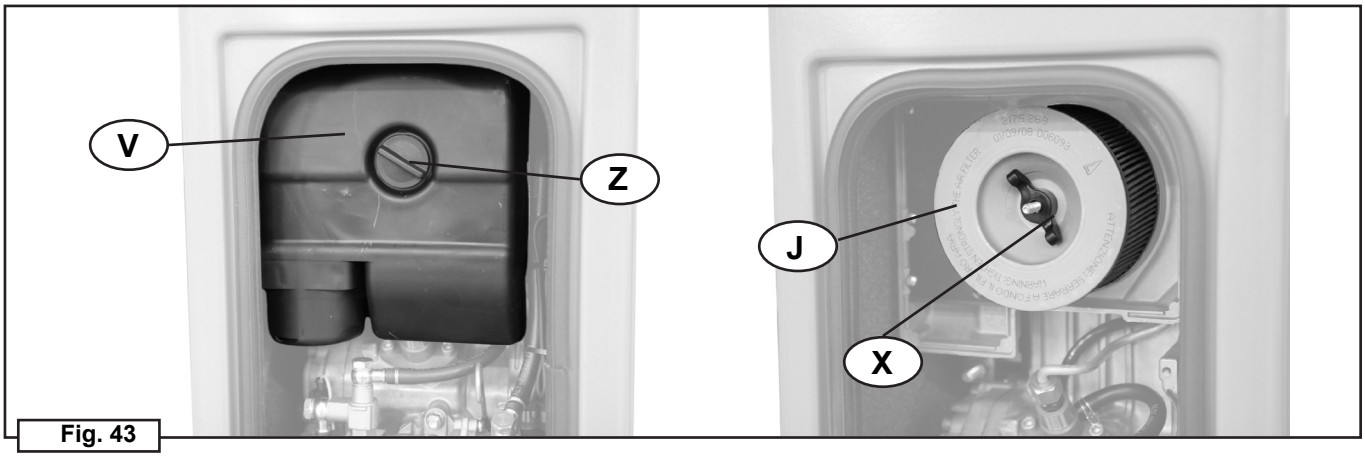



Fig. 43

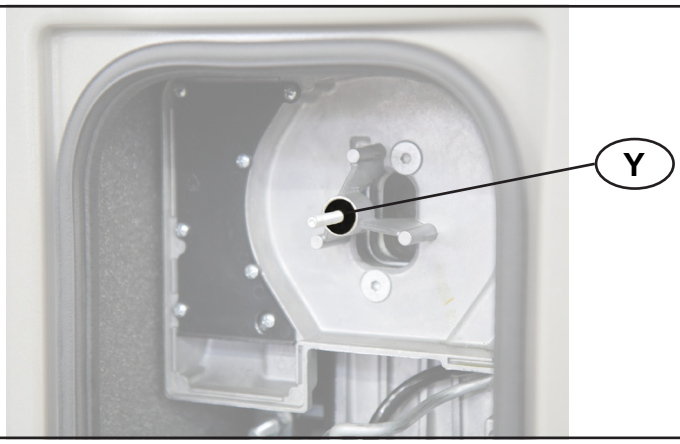



Fig. 44

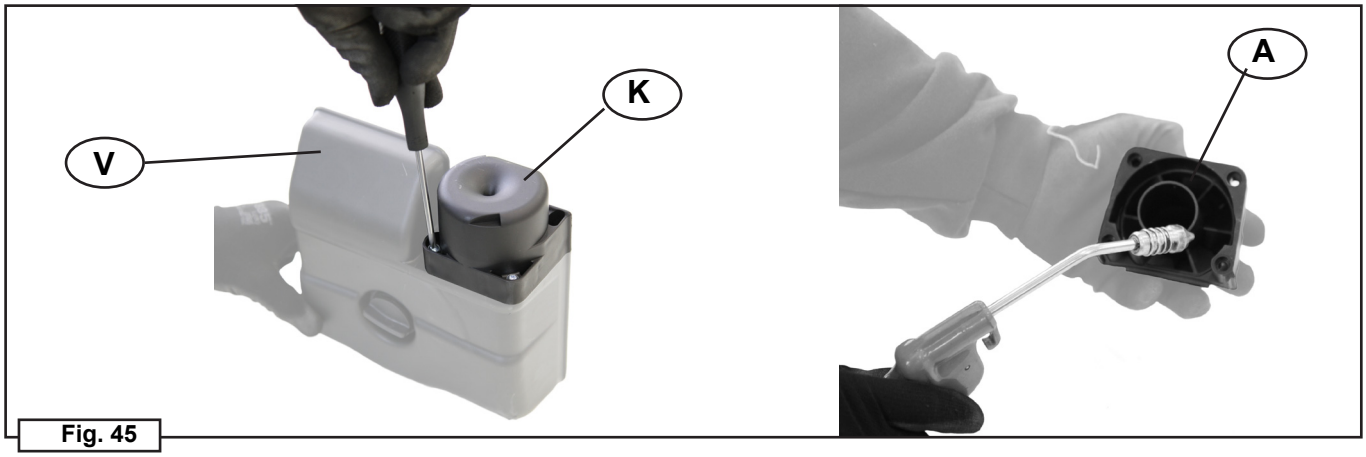



Fig. 45

### 5.6 Control operations following maintenance

| Step | Description |
|---|---|
| 29 | ***ATTENTION***<br>***Start the system and, remaining at a safe distance, check for leaks or dripping.***<br><br>If leaks or dripping are found, operate as follows:<br><br>a) if the leaks are due to incorrect assembly of components, correctly reassemble the pipes and/or components that have been modified;<br><br>b) If the leaks are due to breakage or system irregularities, contact the authorised ECOWIND service centre. |
| 30 | After completing the maintenance operations, replace the protection case (**B**) and fasten it with the screw (**A**) by means of the supplied spanner (fig. 30). |

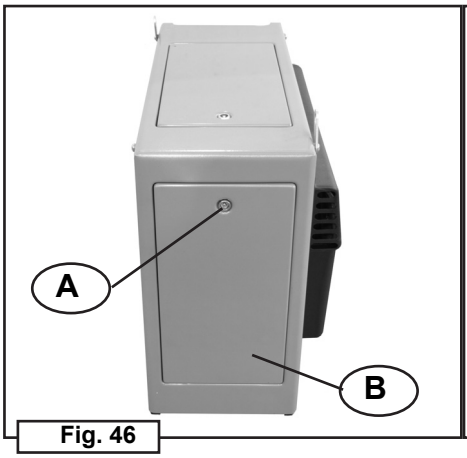



Fig. 46

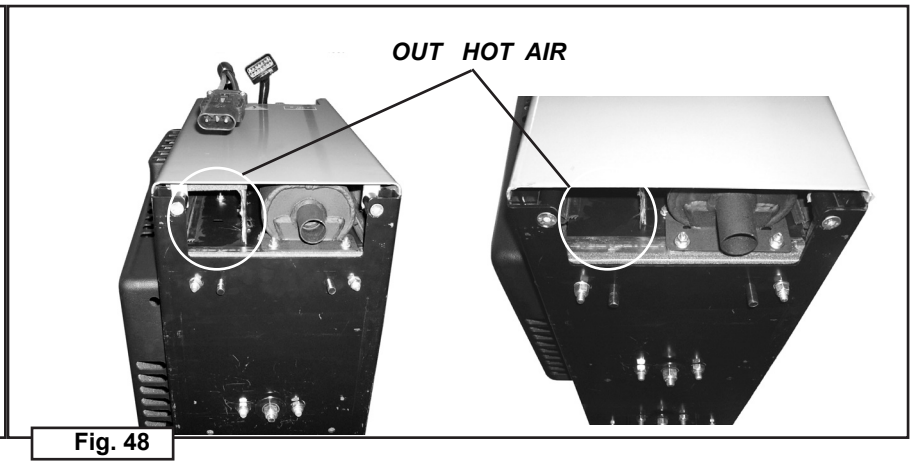



Fig. 48

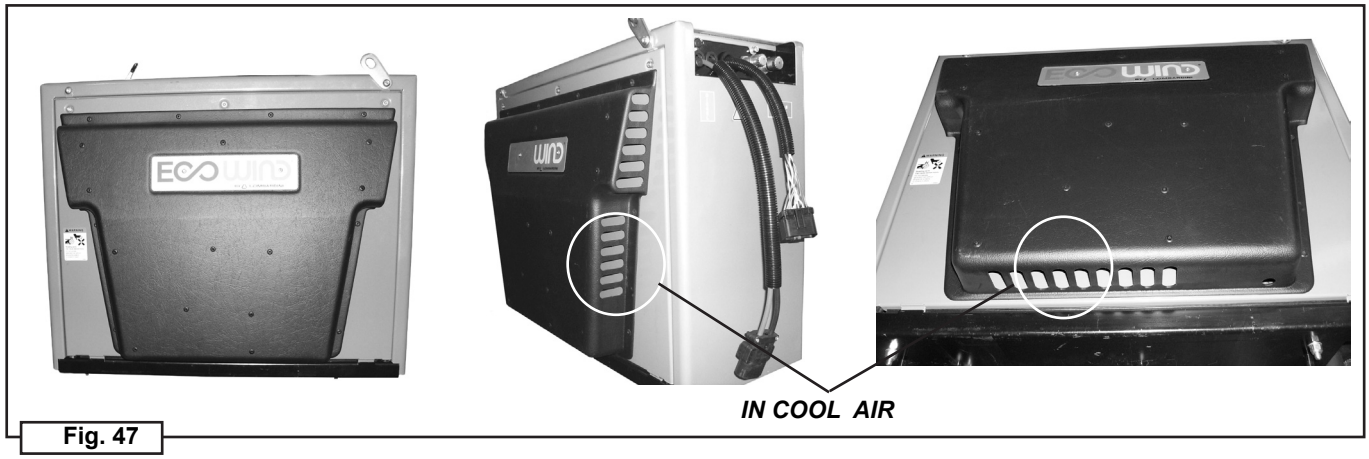



Fig. 47

## 5.7 MAINTENANCE OF THERMODYNAMIC PARTS – OPERATING INSTRUCTIONS

**Warnings and general information**

**Safety warnings**

***ATTENTION***

***As the system is pressurized, specific maintenance operations on the thermodynamic plant must be carried out in full observance of regulations for systems containing "HFC" and must be performed exclusively by the authorised* ECOWIND *service centre. Lombardini S.r.l declines all responsibility for accidents and/or damage deriving from non-observance of this regulation.***

**Frequency of system refilling.**

It is recommended to refill the system with R 134 a (TETRAFLUORETHANE) at least once a season, in order to ensure an optimum system performance.
**NB**: It is extremely important to observe the quantities given on page 11÷12.
Contact an authorised ECOWIND service centre for these operations.

G
B

**Effects of discharge of condensation.**

If water is seen outside and underneath the vehicle cab (while the system is running) this is not to be considered a sign of fault. This is caused by the dehumidification process of the air by the system, with condensation being drained externally through the discharge pipe.

## 5.8 REPLACING THE DEWATERING FILTER

| Frequency | Reference |
|---|---|
| Every 900 hours (or each year) | Please check and refer to the hour counter device. |

**ADVICE**

At each replace of dewatering filter, and before refilling the system with R134a gas, it is recommended to inject c. 50g of compressor oil SP 20 or equivalent directly into the filter (specifics oil see pag. 11).

**ATTENTION**

**PRESSURIZED SYSTEM**

**Before replacing the dewatering filter, it is absolutely essential to empty the pressure system (R134a) using the specific charger/ recovery station.**
**Non-observance of this regulation (ref. Parag. 5.7 - page 50) could cause serious harm to the operator!!!!**

**ECOWIND by Lombardini declines all responsibility for damage caused to things, persons, animals or the equipment itself as a result of non-observance of this regulation**.

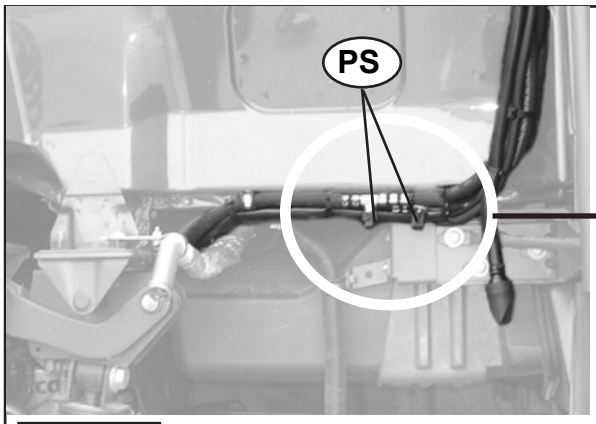



Fig. 49

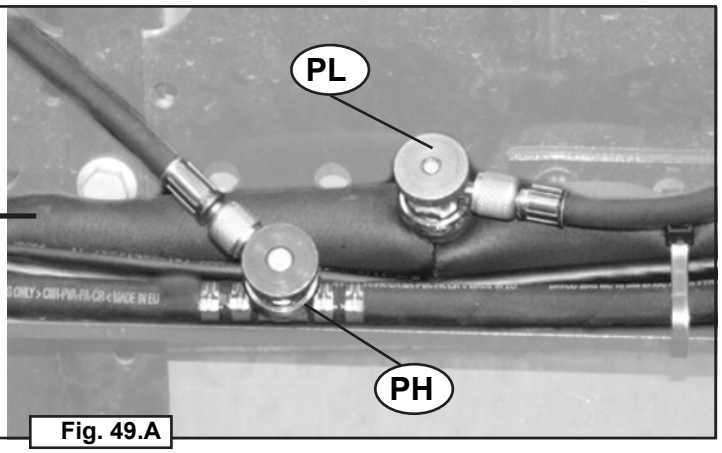



Fig. 49.A

**PS: Access points on the gas circuit (fig. 49)**

**PH + PL: Recovery taps on the charger / recovery station (fig. 49.A)**

**ATTENTION**

**For a correct "system vacuum" operation, a time of at least 30 minutes is recommended (fig. 50).**

Fig. 50

## ⚠ ADVICE

At each replace of dewatering filter, and before refilling the system with R134a gas, it is recommended to inject c. 50g of compressor oil SP 20 or equivalent directly into the filter (specifics oil see pag. 13).

## ⚠ ATTENTION!!

**Check the state of condensation drainage from the specific dissipater on a regular basis (300 hours).**
***Keep the dissipator clean to prevent water overflowing in the cab (fig. 51÷52).***



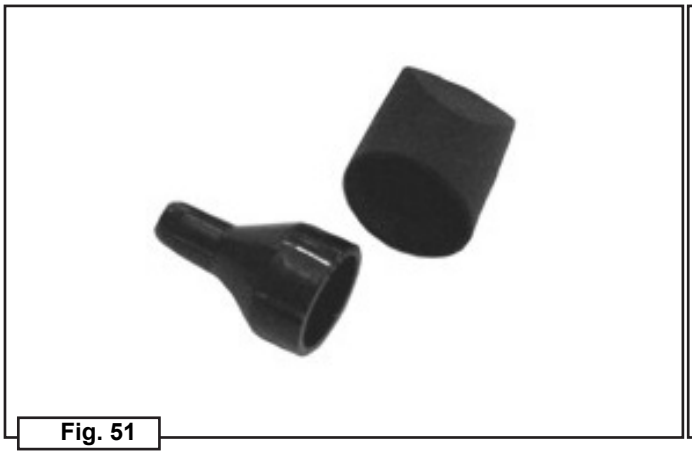


Fig. 51

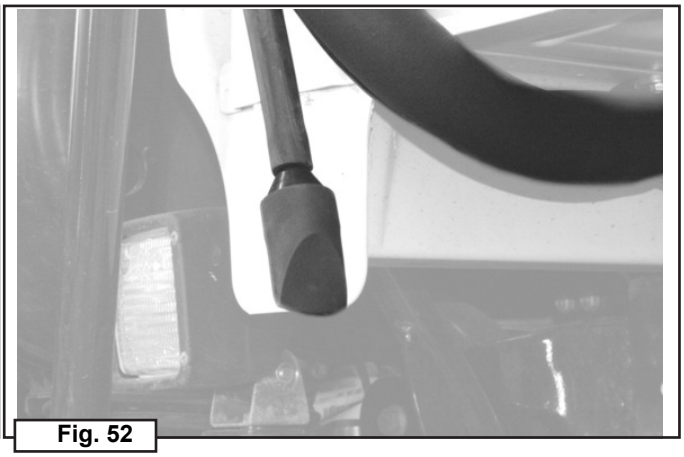


Fig. 52

## ⚠ WARNING!!

**It is strictly forbidden to release and/or dispose of the coolant GAS (R134), the compressor lubricating oil and the saturated dewatering filters contained in the refrigerating circuit into the environment.**
***Lombardini declines all responsibility for damage caused to things, persons, animals or the equipment itself as a result of non-observance of this regulation.***

### 5.9 Replacing the cab filter (inside split) - only model AUS

**Frequency** Every 250 hours

**Use the original spare parts and components recommended by Lombardini S.r.l.**

***WARNING***
***To ensure that the system works correctly and to remain within the conditions of the warranty, use the original spare parts recommended by Lombardini S.r.l.***

| Step | Description |
|---|---|
| 1 | Make sure the conditioning system has come fully to a halt. Also make sure the vehicle is on a level surface and is at a complete rest. |
| 2 | Wear special protective gloves and clothing for maintenance operations, as specified in paragraph 5.1 “GENERAL SAFETY REGULATIONS FOR MAINTENANCE”. |
| 3 | Loosen and remove the 8 self-threading screws (**A**) holding the four sides of the cover ( fig. 53 ). |
| 4 | Temporarily disconnect the wiring internal switch |
| 5 | Remove the plastic cover (**B**). |
| 6 | Loosen and remove the 4 self-threading screws (**C**) holding the filter ( fig. 56 ). |
| 7 | Remove and replace the filter (**D**) ( fig. 57 ). |
| 8 | Return the 4 self-threading screws (**C**) to fasten the filter (**D**). |
| 9 | Reconnect the internal cables switch. |
| 10 | Put the plastic cover (**B**) back in place and fasten it with the 8 self-threading screws (**A**). |

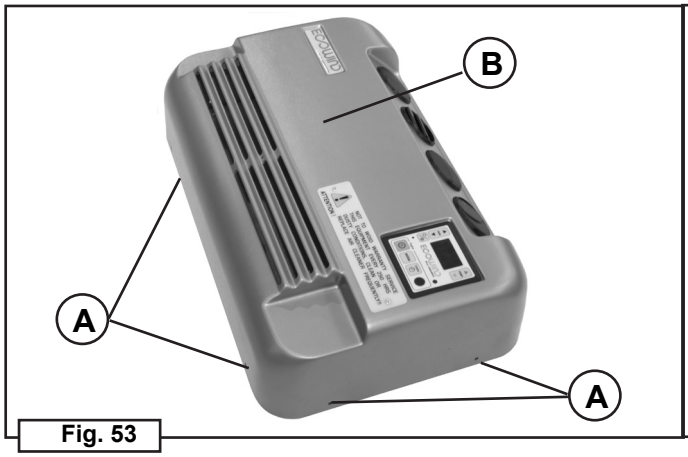


Fig. 53

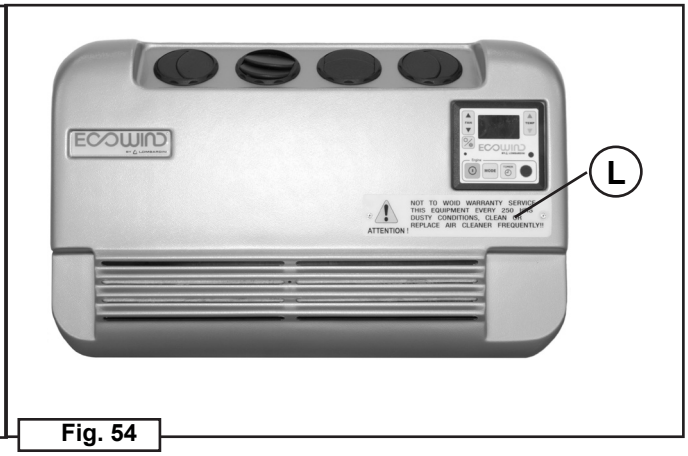


Fig. 54

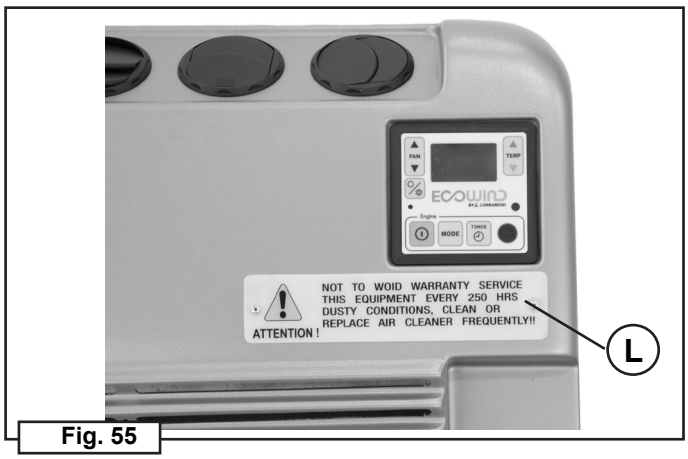


Fig. 55

**ATTENZIONE !!**

**Is absolutely forbidden to remove the label “L” relate to the maintenance schedule for the cabin air filter, located on the plastic cover “C” of the split (see photo 54 – 55).**

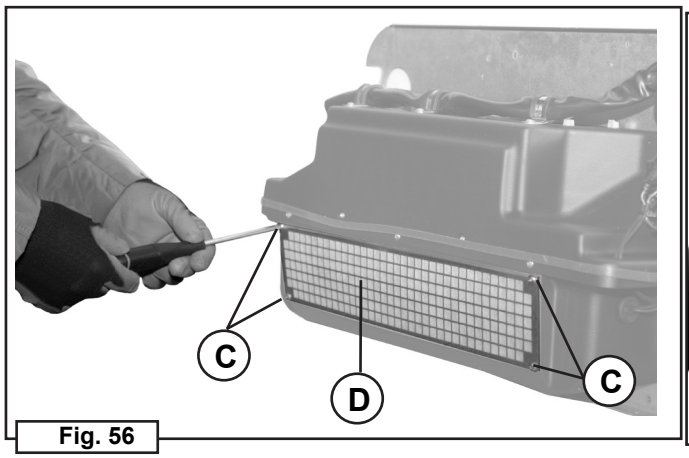


Fig. 56

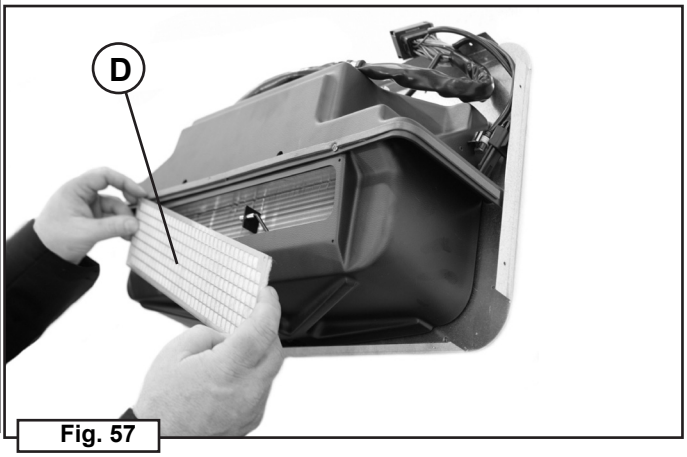


Fig. 57

### 5.10 Operation to replace the air cab filter D on the split (see fig. 56-57)

G
B

**WARNING**

**For an optimal works of air conditioner system, we recommend to clean the air filter cab with compressed air about each 100 hrs**

### 5.11 Operation to maintenance main connections Power

**WARNING**

**Every 500 hrs check the main power connection R that there isn't presence of oxid between the pins. Clean it and add gel or grease G with specifics for electrical protection.**

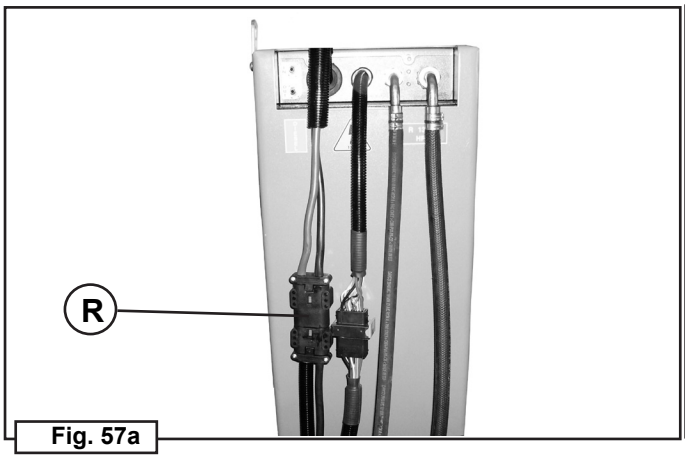


Fig. 57a

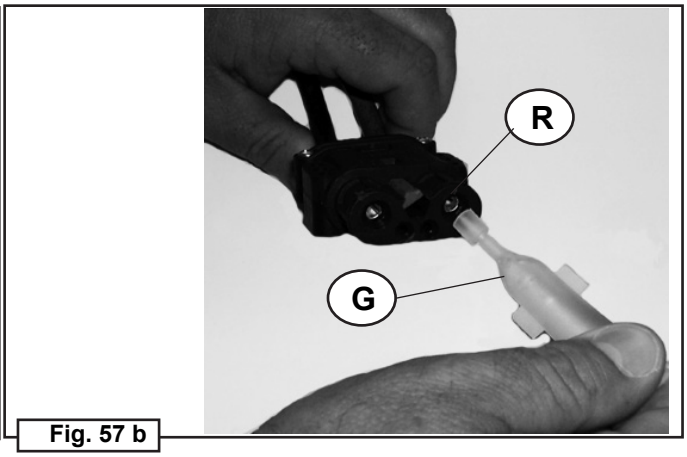


Fig. 57 b

### 6.1 SCHEDULED PREVENTIVE MAINTENANCE

**Frequency:** Every 250 hours

**WARNING**

***If this warning is ignored, after the allowed operating hours Lombardini declines all responsibility regarding the WARRANTY procedures.***

Operations concerning mechanical components, which must be performed.

- Operations to adjust the rocker arm blocks;
- Calibration and cleaning injectors;
- Replacement of the compressor drive belt;
- Maintenance of the cooling fins;

Operations concerning thermodynamic components, which must be performed.

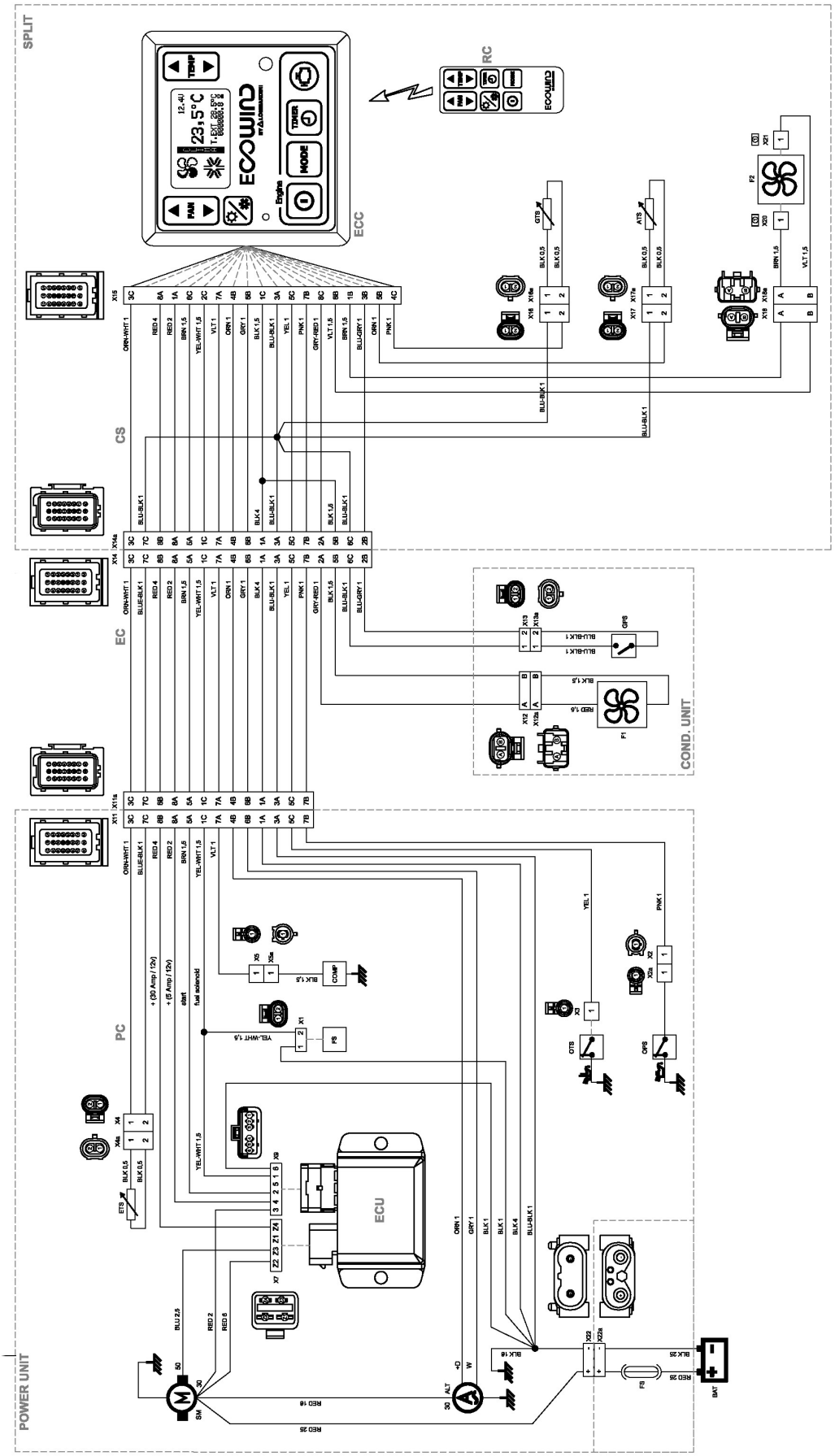
- Replacement of the dewatering filter;
- Pressure controls;
- General maintenance of the compressor.



### 6.2 SUMMARY TABLE OF SCHEDULED MAINTENANCE

| Frequency | Type of maintenance operation | Persons authorised to perform the operation |
|---|---|---|
| Every 100 hours | Checking/adjusting motor oil level. | End user / authorised workshop |
| Every 100 hours | Checking/clean air filter cab | End user / authorised workshop |
| Every 250 hours | Replacing air filter cab | |
| Every 250 hours, or if used less, at the start of every summer. | Replacing the motor oil. | End user / authorised workshop |
| Every 250 hours, or if used less, at the start of every summer. | Replacing the motor filter. | End user / authorised workshop |
| Every 250 hours, or if used less, at the start of every summer. | Replacing the motor diesel filter. | End user / authorised workshop |
| Every 250 hours, or if used less, at the start of every summer. | Replacing the motor air filter. | End user / authorised workshop |
| Every 500 hours. | Chech main power connection | End user / authorised workshop |
| Every 600 hours. | Adjusting rocker arm clearance. | Authorised workshop |
| Every 600 hours. | Calibration and cleaning injectors. | Authorised workshop |
| Every 600 hours. | Servicing of the motor cooling fins. | Authorised workshop |
| Every 900 hours. | Checking the cooling circuit pressure | Authorised workshop |
| Every 900 hours. | Replacing the dewatering filter. | Authorised workshop |
| Every 1000 hours. | Replacing the compressor drive belt | Authorised workshop |
| At the start of every summer. | Filling the cooling circuit. | Authorised workshop |

## 6.3 COMPLETE CABLE HARNESS SYSTEMS 12 Volt - COD. 7971.126




G
B

# COMPLETE CABLE HARNESS SYSTEMS 12 Volt - COD. 7971.126

**ITEMS**

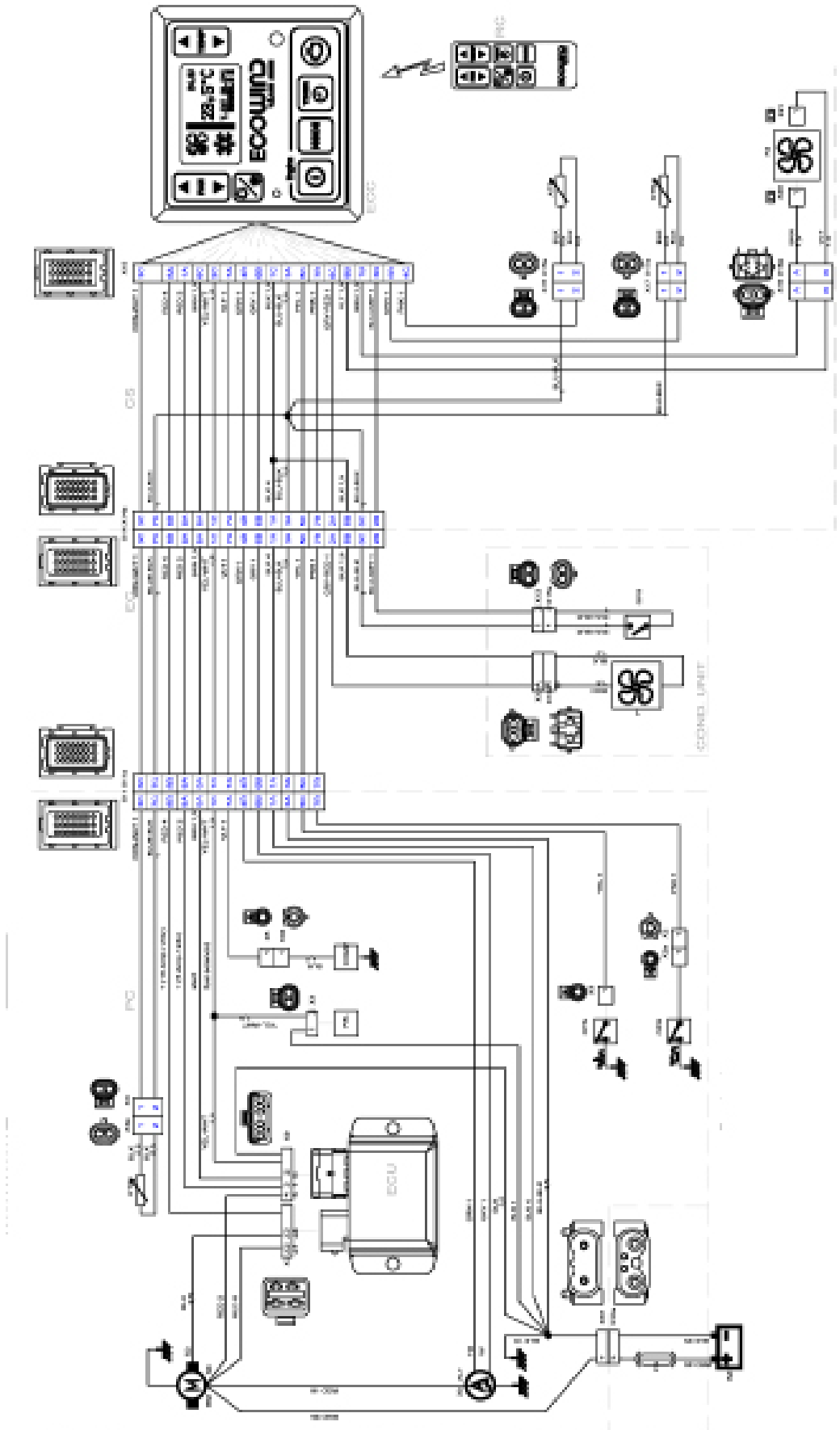
| NAME | DESCRIPTION | SAPRISA P.N. | LOMBARDINI P.N. |
|---|---|---|---|
| ALT | ALTERNATOR | | |
| ATS | AMBIENT TEMP SENSOR | | |
| BAT | BATTERY | | |
| COMP | COMPRESSOR | | |
| EC | EXTENSION CORD | EC02 | 2186 286 8 |
| ECC | CONTROL PANEL | L801 | 2183 295 8 |
| ECU | ELECTRONIC CONTROL UNIT | K042 | 2183 294 8 |
| ETS | EXTERNAL TEMP SENSOR | | |
| F1 | COND. UNIT FAN | | |
| F2 | SPLIT FAN | | |
| F8 | FUSE | | |
| GPS | GAS PRESSURE SWITCH | | |
| GTS | GAS TEMP SENSOR | | |
| OPS | OIL PRESSURE SWITCH | | |
| OTS | OIL TEMPERATURE SWITCH | | |
| PC | POWER CABLE | EC01 | 2186 286 8 |
| RC | IRDA REMOTE CONTROL | L811 | 9141 006 8 |
| SC | SPLIT CABLE | EC03 | 2186 287 8 |
| SM | STARTER MOTOR | | |

**CONNECTORS**

| LETER | NAME / DESCRIPTION | BRAND | P.N. |
|---|---|---|---|
| X1 | 2 WAYS SUPERSEAL 1,5 SERIES HOUSING PLUG | AMP | 282080-1 |
| X2 | 1 WAYS SUPERSEAL 1,5 SERIESHOUSING PLUG | AMP | 282079-2 |
| X2a | 1 WAYS SUPERSEAL 1,5 SERIESHOUSING PLUG | AMP | 282103-1 |
| X3 | 1 WAYS SUPERSEAL 1,5 SERIESHOUSING PLUG | AMP | 282080-1 |
| X4 | 2 WAYS SUPERSEAL 1,5 SERIES HOUSING PLUG | AMP | 282080-1 |
| X4a | 2 WAYS SUPERSEAL 1,5 SERIES HOUSING TAB | AMP | 282104-1 |
| X5 | 1 WAYS SUPERSEAL 1,5 SERIESHOUSING PLUG | AMP | 282080-1 |
| X5a | 1 WAYS SUPERSEAL 1,5 SERIESHOUSING TAB | AMP | 282103-1 |
| X7 | 4 WAYS SEALED CONNECTOR 1620 SERIES | SAPRISA | 1824 + 1822 |
| X9 | 6 WAYS FEMALE HOUSING SICMA SERIES | FCI | 211PC08980049 |
| X11 | 24 WAYS FEMALE HOUSING SICMA SERIES | FCI | 211PC24950005 + 211A247001 |
| X11a | 24 WAYS MALE HOUSING SICMA SERIES | FCI | 211PC249S03 |
| X12 | 2 WAYS METRIPACK SERIES 280 FEMALE | DELPHI | 15300027 |
| X12a | 2 WAYS METRIPACK SERIES 280 MALE | DELPHI | 15300002 |
| X13 | 2 WAYS SUPERSEAL 1,5 SERIES HOUSING PLUG | AMP | 282080-1 |
| X13a | 2 WAYS SUPERSEAL 1,5 SERIESHOUSING TAB | AMP | 282104-1 |
| X14 | 24 WAYS FEMALE HOUSING SICMA SERIES | FCI | 211PC249S0005 + 211A247001 |
| X14a | 24 WAYS MALE HOUSING SICMA SERIES | FCI | 211PC249S0003 |
| X15 | 24 WAYS FEMALE HOUSING SICMA SERIES | FCI | 211PC249S0005 + 211A247001 |
| X16 | 2 WAYS SUPERSEAL 1,5 SERIESHOUSING PLUG | AMP | 282080-1 |
| X16a | 2 WAYS SUPERSEAL 1,5 SERIESHOUSING TAB | AMP | 282104-1 |
| X17 | 2 WAYS SUPERSEAL 1,5 SERIESHOUSING PLUG | AMP | 282080-1 |
| X17a | 2 WAYS SUPERSEAL 1,5 SERIESHOUSING TAB | AMP | 282104-1 |
| X18 | 2 WAYS METRIPACK SERIES 280 FEMALE | DELPHI | 15300027 |
| X18a | 2 WAYS METRIPACK SERIES 280 MALE | DELPHI | 15300007 |
| X20 | FASTON 6,35 FEMALE ISOLATED | - | - |
| X21 | FASTON 6,35 FEMALE ISOLATED | - | - |
| X22 | PLUG 80A 160V (MALE TERMINAL) | REMA | |
| X22a | SOCKET 80A 150V (FEMALE TERMINAL) | REMA | |

GB

## 6.4 COMPLETE CABLE HARNESS SYSTEMS 24 Volt - COD. 7971.127



# COMPLETE CABLE HARNESS SYSTEMS 24 Volt - COD. 7971.127

**ITEMS**

| NAME | DESCRIPTION | SAPRISA P.N. | LOMBARDINI P.N. |
|---|---|---|---|
| ALT | ALTERNATOR | | |
| ATS | AMBIENT TEMP SENSOR | | |
| BAT | BATTERY | | |
| COMP | COMPRESSOR | | |
| EC | EXTENSION CORD | EC02 | 2186 285 8 |
| ECC | CONTROL PANEL | L808 | 2183 297 8 |
| ECU | ELECTRONIC CONTROL UNIT | K048 | 2183 296 8 |
| ETS | EXTERNAL TEMP SENSOR | | |
| F1 | COND. UNIT FAN | | |
| F2 | SPLIT FAN | | |
| F8 | FUSE | | |
| GPS | GAS PRESSURE SWITCH | | |
| GTS | GAS TEMP SENSOR | | |
| OPS | OIL PRESSURE SWITCH | | |
| OTS | OIL TEMPERATURE SWITCH | | |
| PC | POWER CABLE | EC01 | 2186 286 8 |
| RC | IRDA REMOTE CONTROL | L811 | 9141 006 8 |
| SC | SPLIT CABLE | EC03 | 2186 287 8 |
| SM | STARTER MOTOR | | |

**CONNECTORS**

| LETER | NAME / DESCRIPTION | BRAND | P.N. |
|---|---|---|---|
| X1 | 2 WAYS SUPERSEAL 1,5 SERIES HOUSING PLUG | AMP | 282080-1 |
| X2 | 1 WAYS SUPERSEAL 1,5 SERIESHOUSING PLUG | AMP | 282079-2 |
| X2a | 1 WAYS SUPERSEAL 1,5 SERIESHOUSING PLUG | AMP | 282103-1 |
| X3 | 1 WAYS SUPERSEAL 1,5 SERIESHOUSING PLUG | AMP | 282080-1 |
| X4 | 2 WAYS SUPERSEAL 1,5 SERIES HOUSING PLUG | AMP | 282080-1 |
| X4a | 2 WAYS SUPERSEAL 1,5 SERIES HOUSING TAB | AMP | 282104-1 |
| X5 | 1 WAYS SUPERSEAL 1,5 SERIESHOUSING PLUG | AMP | 282080-1 |
| X5a | 1 WAYS SUPERSEAL 1,5 SERIESHOUSING TAB | AMP | 282103-1 |
| X7 | 4 WAYS SEALED CONNECTOR 1620 SERIES | SAPRISA | 1824 + 1822 |
| X9 | 6 WAYS FEMALE HOUSING SICMA SERIES | FCI | 211PC08980049 |
| X11 | 24 WAYS FEMALE HOUSING SICMA SERIES | FCI | 211PC24950005 + 211A247001 |
| X11a | 24 WAYS MALE HOUSING SICMA SERIES | FCI | 211PC249S03 |
| X12 | 2 WAYS METRIPACK SERIES 280 FEMALE | DELPHI | 15300027 |
| X12a | 2 WAYS METRIPACK SERIES 280 MALE | DELPHI | 15300002 |
| X13 | 2 WAYS SUPERSEAL 1,5 SERIES HOUSING PLUG | AMP | 282080-1 |
| X13a | 2 WAYS SUPERSEAL 1,5 SERIESHOUSING TAB | AMP | 282104-1 |
| X14 | 24 WAYS FEMALE HOUSING SICMA SERIES | FCI | 211PC249S0005 + 211A247001 |
| X14a | 24 WAYS MALE HOUSING SICMA SERIES | FCI | 211PC249S0003 |
| X15 | 24 WAYS FEMALE HOUSING SICMA SERIES | FCI | 211PC249S0005 + 211A247001 |
| X16 | 2 WAYS SUPERSEAL 1,5 SERIESHOUSING PLUG | AMP | 282080-1 |
| X16a | 2 WAYS SUPERSEAL 1,5 SERIESHOUSING TAB | AMP | 282104-1 |
| X17 | 2 WAYS SUPERSEAL 1,5 SERIESHOUSING PLUG | AMP | 282080-1 |
| X17a | 2 WAYS SUPERSEAL 1,5 SERIESHOUSING TAB | AMP | 282104-1 |
| X18 | 2 WAYS METRIPACK SERIES 280 FEMALE | DELPHI | 15300027 |
| X18a | 2 WAYS METRIPACK SERIES 280 MALE | DELPHI | 15300007 |
| X20 | FASTON 6,35 FEMALE ISOLATED | - | - |
| X21 | FASTON 6,35 FEMALE ISOLATED | - | - |
| X22 | PLUG 80A 160V (MALE TERMINAL) | REMA | |
| X22a | SOCKET 80A 150V (FEMALE TERMINAL) | REMA | |

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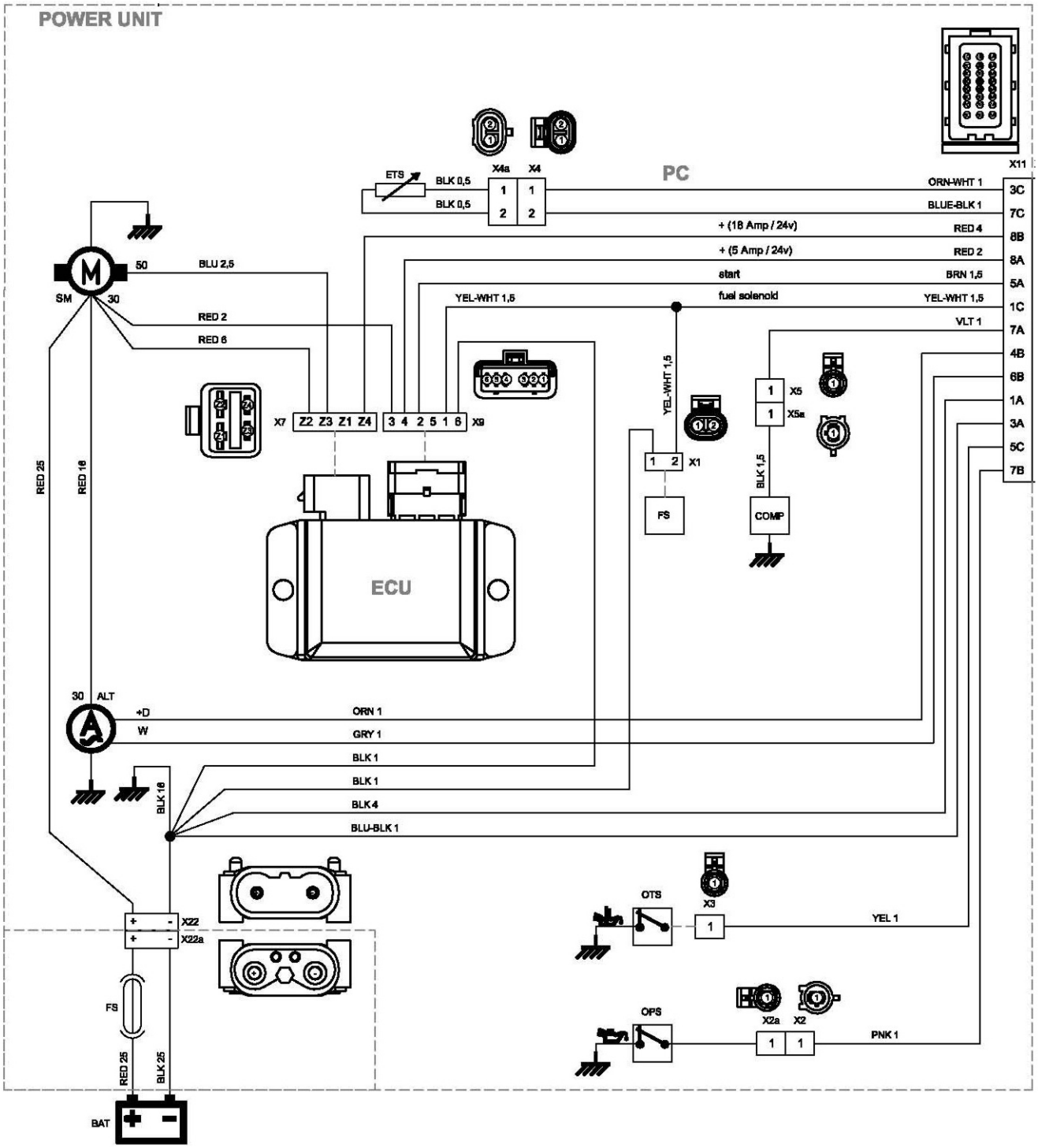
## WIRING POWER UNIT
## Pn: 0021862860



## WIRING EXTENSION / CONDENSER

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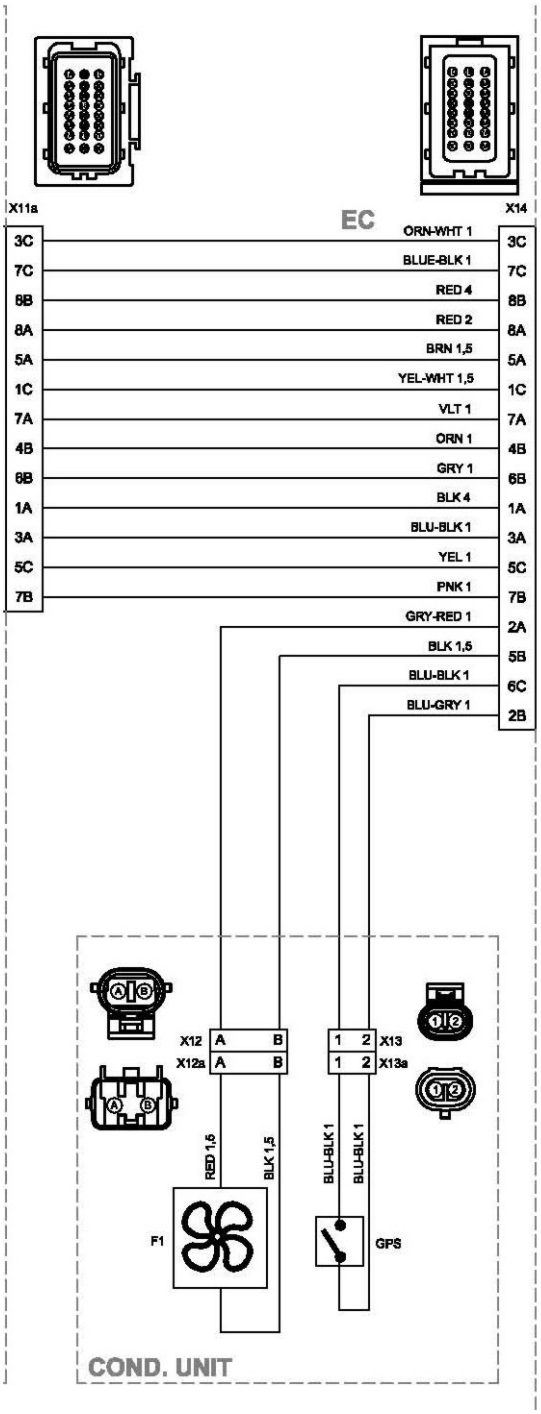


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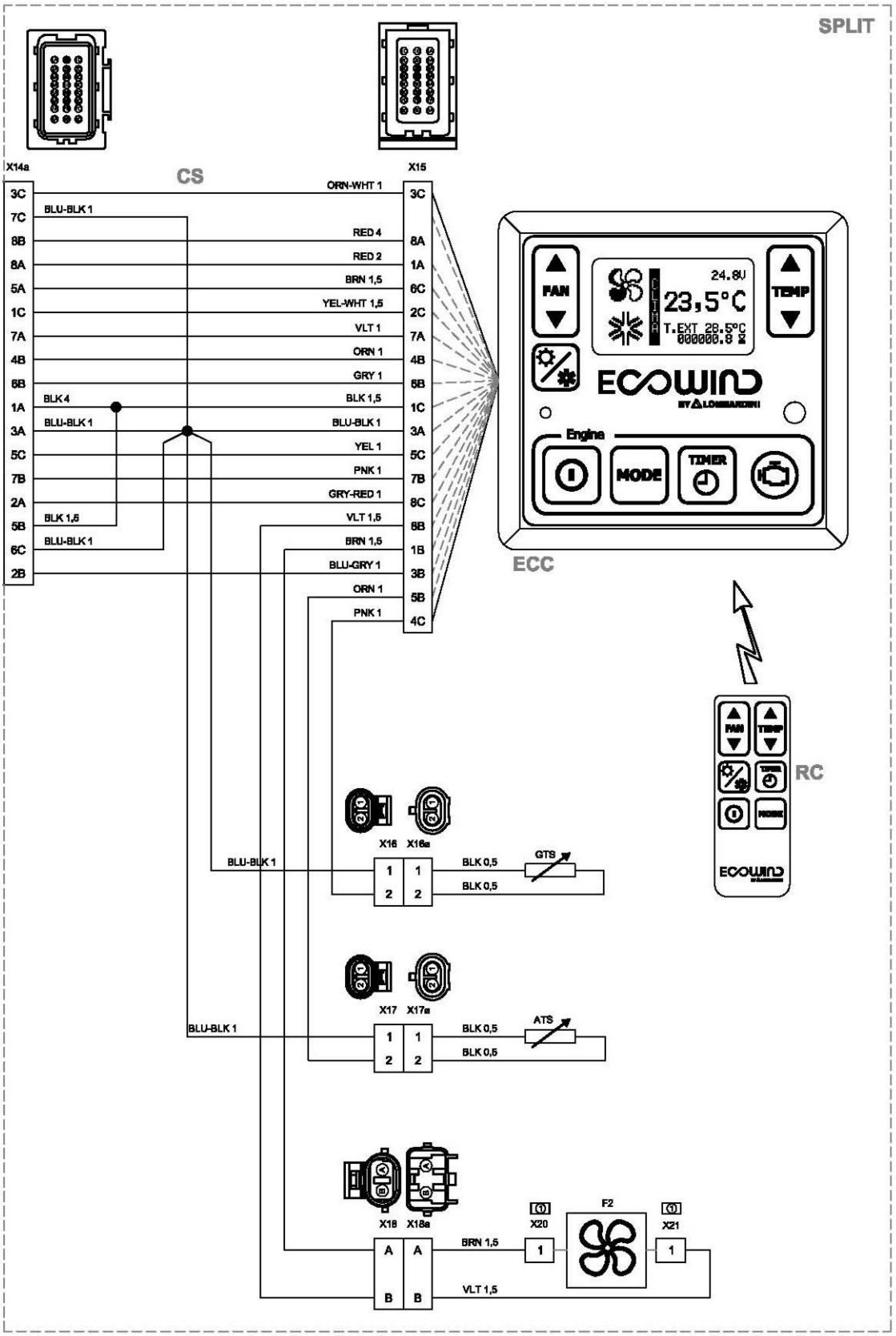
## WIRING SPLIT

## Pn: 0021862870



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| SALE AND SERVICE<br>VENTA E SERVICIO<br>VENDITA E SERVIZIO |
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