Electrical Maintenance Manual for washing machines

MS/RMS610, EM/REM025, MS/MG/RMS/RMG613/17/23, EM/MG/REM/RMG033/040/055, HS-6008/13/17, EH020/030/040

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EN
ATS
Electrical Maintenance

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CONTENTS

SAFETY INSTRUCTIONS

WARNING!

TRANSPORT, INSTALLATION, INSPECTION, MAINTENANCE, REPAIR OR MODIFICATION ROUTINES ON GIRBAU EQUIPMENT

1. The actions described in these instructions are strictly reserved for contractually **AUTHORISED TECHNICAL SERVICES** (**ATS**) and personnel who have successfully completed training by Girbau SA.
2. The company responsible for the Authorised Technical Service accepts full liability for the work done and any possible consequences that may derive from it.
3. Any actions carried out by personnel who are not authorised by the manufacturer will be considered to be improper and will result in the automatic voiding of the machine's warranty.
4. The manufacturer will not accept responsibility for any physical and/or material damage caused by actions performed on the machine undertaken by unauthorised personnel.
5. Do not store or install the machine in areas exposed to the ELEMENTS or where it may be splashed by water.
6. The room where the machine is located MUST comply with the environmental conditions (air venting, temperature, humidity, etc.) specified in the technical specifications table. NEVER INSTALL THE MACHINE IN ENVIRONMENTS where it will be splashed with water or where there is a very high level of humidity in the atmosphere.
7. All installations required for the proper operation of the machine MUST be carried out by a duly accredited Registered Installation Contractors, in compliance with the legal regulations applicable in the country of use.
8. Once the corresponding operation has been performed, the ATS staff must perform the final machine inspection.
9. Avoid carrying out any action on the machine without having first read and understood the machine's Installation and Operating Manuals, paying special attention to the Safety Instructions.
10. In any action that modifies the values of the machine's specifications plate, it should be borne in mind that:
    - It is the responsibility of the ATS to check that the external installation for the machine has been modified and adapted to the new requirements, particularly to those regarding ducting and electrical protection.
    - It is the responsibility of the ATS to update the specifications plate, in accordance with the new operation conditions, once the final machine inspection has been performed.
11. Carrying out transport, installation, inspection routines, adjustments, maintenance, repairs, cleaning or any work on the machines without applying safety measures or having the necessary technical know-how can lead to **ELECTRICAL SHOCK OR SERIOUS ACCIDENTS.**
12. When tools designed for specific transport, installation, maintenance and repair routines are available, their use is compulsory in order to avoid unnecessary risks.
13. Before carrying out any procedures on machines fitted with pneumatic or hydraulic circuits:
    - Make the machines COMPLETELY SAFE by following the instructions set out in the corresponding Manuals or by wedging them with wooden blocks where necessary.
    - Bear in mind that working on a component without having previously understood the role that it performs in the circuit as a whole involves a high risk of suffering a **SERIOUS ACCIDENT**.

14. **BEFORE CARRYING OUT ANY** inspection routine, adjustment, maintenance, repairs, cleaning or any work on the machine, DISCONNECT IT FROM ALL THE ENERGY SOURCES.
    - **COMPLETELY** disconnect the machine from the power supply and prevent the possibility of accidental reconnection by mechanically locking the automatic external switch and/or the switch breaker. Stopping the machine with the NORMAL STOP key or push-button is not enough.
    - Disconnect the electrical connection of any circuit external to the machine; for example external dosing equipment, external vending units, folders or ironer feeders. These circuits are independent of the power supply to the washing machine.
    - Before beginning any procedure on machines equipped with an inverter or equipment with capacitative loads, wait for at least five minutes (10 minutes on equipment with a power rating greater than 25 kW) after the electrical disconnection, to eliminate risk of residual voltage.
    - Close and mechanically lock the manual feed valves of the WATER, GAS, STEAM, HOT OIL, COMPRESSED AIR, etc.
    - Check that the water bath has **COMPLETELY** drained, that no part of the machine is at an excessively high temperature and that no parts are in movement through inertia.
15. **WARNING!** Some fault localisation procedures require checking at different points of the electric circuit with the machine connected to the power supply and other supply sources. While completing these actions, respect the following rules:
    - The appropriate checks must all be carried out by the SAME PERSON.
    - During these procedures, ONLY remove the protective covers from the electric circuit and/or the inverter. Never remove the covers protecting the moving parts of the machine.
16. **THE MANUFACTURER ACCEPTS NO RESPONSIBILITY IF THESE SAFETY INSTRUCTIONS AND ALL THE INFORMATION IN THE CORRESPONDING MANUALS ARE NOT FOLLOWED. KEEP THESE INSTRUCTIONS IN A SAFE PLACE.**

TRANSLATION OF ORIGINAL MANUAL

1. PRESENTATION

This Electrical Maintenance Manual for washing machines is a compilation of operating information for the inverter / motor electrical circuits on HS-6 / EH, MS/MG-6 / EM/MG and RMS/RMG6 / REM/RMG series washing machines, and is designed to facilitate inspection, maintenance, fault location and repair operations.

Before any intervention and as a safety measure it is vital to consider all of the **SAFETY INSTRUCTIONS** that accompany this introduction.

2. FAULTS INTERVENTION, CHECKING AND LOCATION

2.1. Inverter identification

POWER CAPACITY AND TYPE OF INVERTER ACCORDING TO MODEL OF WASHING MACHINE

	DANFOSS 600W	DANFOSS 1800W	E08 INVERTER 800W	E08 INVERTER 1800W	DANFOSS VLT 1500W	DANFOSS VLT 2200W
MS-610	X					
MS-613		Up to Serial No. 2030728			From Serial No. 2030729	
MS-617		Up to Serial No. 2040884			From Serial No. 2040885	
MS-623		Up to Serial No. 2051536				From Serial No. 2051537
MG-613 / MG-617					X	
MG-623						X
RMS610	Up to Serial No. 2022566		From Serial No. 2022567			
RMS613 / RMS617 RMG613 / RMG617					X	
RMS623 / RMG623						X
HS-6008	Up to Serial No. 2702580		From Serial No. 2702581			
HS-6013		Up to Serial No. 2622154		From Serial No. 2622155		
HS-6017		Up to Serial No. 2130307		From Serial No. 2130308		
EM025	X					
EM030		Up to Serial No. 1380056			From Serial No. 1380057	
EM040		Up to Serial No. 1390498			From Serial No. 1390499	
EM055		Up to Serial No. 1400720				From Serial No. 1400721
MG030 / MG040					X	
MG055						X
REM025	Up to Serial No. 1372231		From Serial No. 1372232			
REM033 / REM040					X	
REM055 / RMG055						X
RMG033 / RMG040					X	
EH020	Up to Serial No. 1432073		From Serial No. 1432074			
EH030		Up to Serial No. 1464197		From Serial No. 1464198		
EH040		Up to Serial No. 1476778		From Serial No. 1476779		

2.2. Washers with Danfoss Custom 600/1800 W inverter

2.2.1. Summary table of faults or interventions

DESCRIPTION OF FAULT OR INTERVENTION		INFORMATION DISPLAY LC/LP/CC control	INFORMATION DISPLAY IC control
1	**Communication fault** between the microprocessor and the inverter	**VAR 0**	**Alarm 2**
2	**Overcurrent** in inverter	**VAR 03**	**Alarm 5**
3	**Overvoltage** in the inverter's DC bus	**VAR 05**	**Alarm 7**
4	**Disconnection of thermal protection** of drum motor	**VAR 04**	**Alarm 6**
5	**Overtemperature** in inverter	**VAR 06**	**Alarm 8**
6	**General fault** of the inverter	**VAR 07**	**Alarm 9**
7	**Incoherent transmission of inverter data**	**VAR 08**	**Alarm 10**
8	**Incorrectly identified** inverter **Washers with 1800 W inverter**	**VAR 09**	**Alarm 12**
9	**General electrical wiring checks** related to the inverter. **Other faults** related to the inverter **Washers with 600 W inverter**	**Any alarm related to the inverter / motor**	**- - - - - - - -**
10	**General electrical wiring checks** related to the inverter **Other faults** related to the inverter **Washers with 1800 W inverter**	**Any alarm related to the inverter / motor**	

2.2.2. Details of the interventions for verifying or locating faults

The interventions aimed at checking and locating faults are detailed below, in the same order as in the summary table.

Supplement the following instructions with the diagram and the parts view corresponding to the washing machine.

VERY IMPORTANT!

Before connecting the washing machine to the power supply, the following precautions must be considered:
- The inverter must be properly mounted on the corresponding support and have all of the earth connections securely fixed in place.
- The inverter support must be connected to the washing machine's earth circuit.

Failure to comply with these warnings can cause ELECTRICAL SHOCK OR SERIOUS ACCIDENTS and can lead to the destruction of the inverter.

1.- COMMUNICATION FAULT BETWEEN THE MICROPROCESSOR AND THE INVERTER

Alarm codes
Microprocessor display report, LC/LP/CC control: **VAR 0**
Microprocessor display report, IC control: alarm no. **2**

Description
The alarm is triggered if the communication between the washing machine's microprocessor and the motor inverter control is interrupted at the outset or during the wash cycle.

Microprocessor response
Prevents or interrupts the execution of the wash cycle.
Activates the buzzer.

Remarks
The inverter communication circuit should be checked after giving the order to start a wash cycle or during the TEST program stages where the drum is activated.
The inverter power supply voltage comes from:
- 1Ph+N and 2Ph machines: washer power supply.
- 200...240 V 3Ph machines: two phases of the washer power supply.
- 380...415 V 3Ph+N machines: phase and neutral of the washer power supply.

HS-6008/EH020, MS-610/EM025 and RMS610/REM025 models. For electrical safety reasons, access to the inverter should be made by the lower front cover.
Before working on the inverter, check that the S2 microswitch (consult the washer's electrical diagram) connects the motor earth to the machine's general earth connection when this cover is removed.
See also Section 6/8 - GENERAL ELECTRICAL WIRING CHECKS RELATED TO THE INVERTER

WARNING! RISK OF ENTRAPMENT OR ELECTRIC SHOCK

Step	Check		Action
1	Correct voltage in inverter power supply terminals: 600 W inverter: L1 ↔ N terminals 1800 W inverter: MK1 ↔ MK2 terminals.	NO	600 W inverter: go to Step 6. 1800 W inverter: go to Step 9.
		YES	Go to Step 2.
2	Power supply voltage of communication circuit is equal to 5(±0.1) V.DC. in X7-4 ↔ X7-1 terminals.	NO	Renew microprocessor.
		YES	Go to Step 3.
3	Power supply voltage of communication circuit is equal to 5(±0.1) V.DC. in MK20-4 ↔ MK20-1 terminals.	NO	Check communication connection between microprocessor and inverter: cable, connections, terminals, etc.
		YES	Go to Step 4.
4	Communication voltage 1.8 V.DC. (±0.3) in micro processor (terminals X7-3 ↔ X7-2). This voltage should be measured after a wash cycle has been started. At regular intervals, of a maximum of 5 seconds, oscillations of ±0.3 V.DC should be registered.	NO	Renew microprocessor.
		YES	Go to Step 5.
5	Communication voltage 1.8 V.DC. (±0.3) in inverter (terminals MK20-3↔MK20-2). This voltage should be measured after a wash cycle has been started. At regular intervals, of a maximum of 5 seconds, oscillations of ±0.3 V.DC should be registered.	NO	Check communication connection between microprocessor and inverter: cable, connections, terminals, etc.
		YES	Possible inverter fault. Renew inverter.
6	(600 W inverter) Correct voltage between cable N and terminal X2-3.	NO	Go to Step 7.
		YES	Check inverter power supply connection: wiring, connections, terminals, etc.

1.- (Cont.) COMMUNICATION FAULT BETWEEN THE MICROPROCESSOR AND THE INVERTER			
7	(600 W inverter) Check continuity of fuse F2.	**NO**	Check for possible shortcircuit in inverter power supply circuit. If no reason for blowing of fuse is detected, renew the fuse. In the case of repeated fuse blowing, renew the inverter.
		YES	Go to Step 8.
8	(600 W inverter) Correct voltage between cable N and terminal X1.	**NO**	Check circuit between machine current input and terminal X1.
		YES	Possible contact fault in relay K3. Renew microprocessor.
9	(1800 W inverter) Correct voltage at input to filter Z1.	**NO**	Go to Step 10.
		YES	Renew the filter Z1(**Note 1**).
10	(1800 W inverter) Check continuity of fuse F6.	**NO**	Check for possible shortcircuit in inverter power supply circuit. If no reason for blowing of fuse is detected, renew the fuse. In the case of repeated fuse blowing, renew the filter Z1. If problem persists, renew inverter.
		YES	Go to Step 11.
11	(1800 W inverter) Check inverter relay connection KA1.	**NO**	Go to Step 12.
		YES	Check circuit between main machine switch and terminals 2/6 of KA1.
12	Check power supply (12 V.DC) of relay coil KA1 from terminals X17-1↔X17-4 on the microprocessor.	**NO**	Possible microprocessor fault. Renew microprocessor.
		YES	Renew relay KA1.

Note 1:

- If in doubt over the correct operation of the filter and **only during the checking process**, the filter can be by-passed and the inverter can be connected directly to the power supply.
- By design and owing to the earth discharge, it is correct to detect ohmic continuity between the terminals of the filter and the earth.

2.- OVERCURRENT IN INVERTER

Alarm codes
Microprocessor display report, LC/LP/CC control: **VAR 03**
Microprocessor display report, IC control: alarm no. **5**

Description
The overcurrent alarm is activated if the inverter detects excessive consumption in the outlet towards the motor, whether caused by a shortcircuit or by an excessive charge.

Microprocessor response
Prevents or interrupts the execution of the wash cycle.

Remarks
Irregularities in the power supply voltage or unstable power supply and earth circuit connections in the washing machine can also trigger this alarm. See also Section 6/8 - GENERAL ELECTRICAL WIRING CHECKS RELATED TO THE INVERTER
Checks must be made during the **VAR** phase of the TEST program.

WARNING! RISK OF ENTRAPMENT OR ELECTRIC SHOCK

Step	Check		Action
1	Stable inverter power supply voltage and of a value between 200 and 240 V (±10%).	NO	Rectify the problem (See also Section 1.- COMMUNICATION FAULT BETWEEN THE MICROPROCESSOR AND THE INVERTER).
		YES	Go to Step 2.
2	Phase fault in the motor due to deterioration of the wiring, connections or coils of the motor. Check with an RMS clamp ammeter. Other motor defects.	NO	Go to Step 3.
		YES	Rectify defect. If a fault is detected in the motor, renew the motor.
3	Disconnect connector MK-3 from the inverter output. (To avoid triggering the motor's thermal protection disconnection alarm, by-pass the connection terminals of this protection's circuit: -600 W inverter: by-pass terminals MK3-4↔MK3-5. -1800 W inverter: by-pass terminals MK3↔MK4). Alarm VAR 03 persists.	NO	Re-connect the power supply cable. Go to Step 4.
		YES	Possible inverter fault. Check the motor and its electrical wiring. Renew inverter.
4	Motor connection cabling short-circuited or diverted to earth. Motor coils short-circuited or diverted to earth.	NO	Go to Step 5.
		YES	Rectify the problem.
5	Deteriorated bearings or seizing up of the drum or motor rotation.	NO	Carry out a general check of the electrical wiring. If the problem is not solved, there may be a defect in the inverter: Renew inverter.
		YES	Rectify the problem.

3.- ANOMALY CAUSED BY OVERVOLTAGE IN INVERTER D.C. BUS

Alarm codes
Microprocessor display report, LC/LP/CC control: **VAR 05**
Microprocessor display report, IC control: alarm no. **7**

Description
The overvoltage alarm is activated if an excessive increase in the DC bus voltage is produced due to an incorrect power supply voltage or excessive motor overtorque.

Microprocessor response
Prevents or interrupts the execution of the wash cycle.

Remarks
Irregularities in the power supply voltage or unstable power supply and earth circuit connections in the washing machine can also trigger this alarm. See also Section 6/8 - GENERAL ELECTRICAL WIRING CHECKS RELATED TO THE INVERTER.
Checks must be made during the **VAR** phase of the TEST program.

 **WARNING! RISK OF ENTRAPMENT OR ELECTRIC SHOCK**

Step	Check		Action
1	Stable inverter power supply voltage and of a value between 200 and 240 V (tolerance ±10%).	**NO**	Rectify the problem (See also Section 1.- COMMUNICATION FAULT BETWEEN THE MICROPROCESSOR AND THE INVERTER).
		YES	Go to Step 2.
2	Phase fault in the motor power supply caused by deterioration to the wiring, connections or motor coils. Check with an RMS ammeter. Other motor defects.	**NO**	Go to Step 3.
		YES	Rectify the problem.
3	Deteriorated bearings or seizing up of the drum or motor rotation.	**NO**	Carry out a general check of the electrical wiring. If the problem is not solved, there may be a defect in the inverter: Renew inverter.
		YES	Rectify the problem.

4.- DISCONNECTION OF THERMAL PROTECTION OF DRUM MOTOR

Alarm codes
Microprocessor display report, LC/LP/CC control: **VAR 04**
Microprocessor display report, IC control: alarm no. **6**

Description
The motor overtemperature alarm is activated by the disconnection of the motor's thermal protection (Klixon).

Microprocessor response
Prevents or interrupts the execution of the wash cycle.

Remarks
Checks must be made during the **VAR** phase of the TEST program.

WARNING! RISK OF ENTRAPMENT OR ELECTRIC SHOCK

Step	Check		Action
1	Continuity of the motor's thermal protection circuit when the alarm is triggered. Check the continuity of the circuit at the ends of the connection to the inverter: - 600 W inverter: MK3-4↔MK3-5 - 1800 W inverter: MK-3↔MK-4	**YES**	Possible inverter fault. Renew inverter.
		NO	Go to Step 2.
2	Reconnection in 15 minutes or less.	**NO**	Go to Step 3.
		YES	Go to Step 4.
3	Fault in cabling or motor's thermal protection circuit connection.	**NO**	Possible fault on the motor. Renew motor.
		YES	Rectify defect.
4	Deteriorated bearings or seizing up of the drum or motor rotation.	**NO**	Go to Step 5.
		YES	Rectify defect.
5	Phase fault in the motor due to deterioration of the wiring, connections or coils of the motor. Check with an RMS clamp ammeter. Other motor defects.		Rectify defect. If a fault is detected in the motor, renew the motor.

5.- OVERTEMPERATURE IN INVERTER

Alarm codes
Microprocessor display report, LC/LP/CC control: **VAR 06**
Microprocessor display report, IC control: alarm no. **8**

Description
The inverter overtemperature alarm is activated when the inverter temperature exceeds a predetermined value.

Microprocessor response
Prevents or interrupts the execution of the wash cycle.

Remarks
Checks must be made during the **VAR** phase of the TEST program.

WARNING! RISK OF ENTRAPMENT OR ELECTRIC SHOCK

Step	Check		Action
1	Fan motor rotation.	NO	600 W inverter: go to Step 2. 1800 W inverter: go to Step 4.
		YES	Dirt on the inverter fan blades. Blockages in air conduits or ventilation grilles. Dirt on the surface of the inverter radiator. Excessive room temperature. See Chapter 2 of this manual- INVERTER CLEANING AND MAINTENANCE.
2	600 W inverter: Check voltage in connection terminals of inverter box fan. Correct value 5 V.DC.	NO	Go to Step 3.
		YES	Possible fault on the fan. Renew fan.
3	600 W inverter: Check voltage in output terminals of microprocessor board. Correct value 5 V DC.	NO	Possible microprocessor board fault. Renew the microprocessor board.
		YES	Check wiring and connection terminals.
4	1800 W inverter: Check voltage in fan connection terminals at relay KA1. Correct value: value of inverter connection.	YES	Possible fault on the fan or on the wiring. Renew fan.
		NO	Rectify the problem.

6.- INVERTER FAULT

Alarm codes
Microprocessor display report, LC/LP/CC control: **VAR 07**
Microprocessor display report, IC control: alarm no. **9**

Description
The faulty inverter alarm is triggered when the power supply circuit is defective.

Microprocessor response
Prevents or interrupts the execution of the wash cycle.

Remarks
Checks must be made during the **VAR** phase of the TEST program.

WARNING! RISK OF ENTRAPMENT OR ELECTRIC SHOCK

Step	Check		Action
1	The inverter fault occurs constantly.	NO	Disconnect the washing machine's power supply for 5 minutes and then reconnect it.
		YES	Check for possible shortcircuit in inverter power supply circuit. Renew inverter.

7.- INCOHERENT TRANSMISSION OF INVERTER DATA

Alarm codes
Microprocessor display report, LC/LP/CC control: **VAR 08**
Microprocessor display report, IC control: alarm no. **10**

Description
The incoherent data transmission alarm is triggered when the information sent by the inverter is incoherent.
This fault can also occur in machine models HS-5008/H5020 (see Contents, Appendix 1).

Microprocessor response
Prevents or interrupts the execution of the wash cycle.

Remarks
Checks must be made during the **VAR** phase of the TEST program.

WARNING! RISK OF ENTRAPMENT OR ELECTRIC SHOCK

Step	Check	Action
	Insufficient contact on the power supply connector to the inverter: 600 W inverter: - X2 connector on the A1 microprocessor. - N/L MAINS connector on the A2 inverter. 1800 W inverter: - MK1/2 connector on the A2 inverter.	Check and repair the wiring. See also Sections 9 and 10.- GENERAL ELECTRICAL WIRING CHECKS.

8.- INCORRECTLY IDENTIFIED INVERTER

Only in washers with 1800 W inverter.

Alarm codes

Microprocessor display report, LC/CC control: **VAR 09**
Microprocessor display report, IC control: alarm no. **12**

Description

Agreement error between washer model and inverter configuration.

Microprocessor response

Prevents or interrupts the execution of the wash cycle.

Remarks

The microprocessor identifies the model of the washer from the position of the jumpers on the following connectors:

- Control **LC/LP/CC**: jumpers between the connectors **X18** and **X19**.
- Control **IC**: jumpers on the connector **X7**.

The inverter configuration is made automatically according to the distribution of the jumpers on connector MK10.
Consult the washer's electrical diagram to obtain information about said connectors.
Checks must be made during the **VAR** phase of the TEST program.

WARNING! RISK OF ENTRAPMENT OR ELECTRIC SHOCK

Step	Check		Action
1	Go to the information menu corresponding to the control: LC/LP/CC control: INFO menu. IC control: System tools; Information menu; General Information. Check that the washer model shown on the display corresponds to the actual model of the washing machine.	**NO**	Go to Step 2.
		YES	Go to Step 3.
2	Jumpers between connectors X18 and X19 in good condition and distributed according to the information in the washer's electrical diagram.	**NO**	Rectify the problem.
		YES	Possible microprocessor board fault. Renew microprocessor board.
3	Jumpers on connector MK10 in good condition and distributed according to the information in the washer's electrical diagram.	**NO**	Rectify the problem.
		YES	Possible inverter fault. Renew inverter.

9.- GENERAL ELECTRICAL WIRING CHECKS RELATED TO THE INVERTER. OTHER FAULTS RELATED TO THE INVERTER

Washers with 600 W inverter

Description

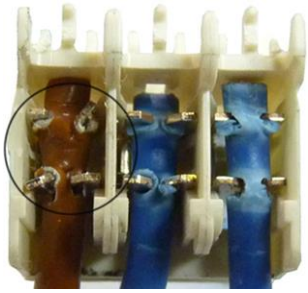
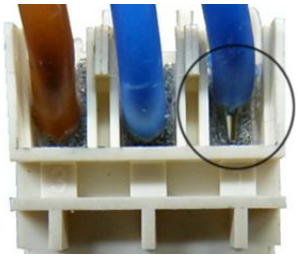
Action suitable:

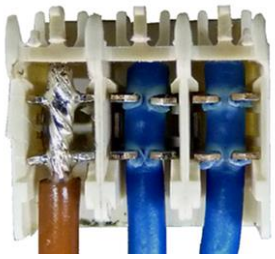
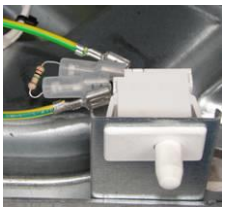
- When alarms or anomalies related to the microprocessor, inverter and motor assembly are triggered without any apparent cause.
- When the motor fails to work without any corresponding alarm report.
- During periodic maintenance actions.

CAUTION!

The steps detailed below have a serious impact on the operation of the inverter and can lead to irreparable damage. Pay particular attention when checking:

- Unstable connections in the washing machine's electrical wiring and the mains connection.
- Irregularities and disturbances in the power supply voltage.
- Continuity faults or defective connections in the washing machine's earth circuit.
- Faults in the securing of the inverter to the support base.
- Connection and state of the connection cables between the inverter and the motor. This cable is subjected to constant vibrations.

Step	Check	Action	
	Power supply voltage of the washer.	Check: - Stable and even voltage between phases and between each of the phases and neutral (value according to the washer's power supply voltage). - Cross section and length of conductors according to installation manual. - Earth cable: if in doubt, consult an accredited installer.	
	Connection of the washing machine to the mains electricity supply.	Connection of the power supply cables and the earth at the current input terminals. Check that the terminals: - Firmly press upon the cable. - Press upon all of the threads that make up the cable. - Only press upon the uncovered tip without pressing upon the insulation.	
	Electrical wiring connecting the microprocessor and the inverter: - X2 connector on the microprocessor. - N/L MAINS connector on the inverter.	Check: - Possible poor crimping of wires.	
		Check: - Possible insufficient insertion of the wires.	

	To solve the problem of a possible deficiency in the insertion and crimping of the wires, the following steps should be taken:	- Free the wires from the connector. - Strip back the end of the wire (6 mm/0.15 in) - Apply a coating of solder to the connecting terminal and to the end of the wire separately. - Weld both sides, taking care to avoid damaging the connector.	
	Electrical wiring connecting the inverter and the motor.	Check: - Connectors and connection terminals. - Crimp of the cables in the connectors and terminals. - Securing of the wiring in the respective clamps and supports. - Condition of the conductors. - Stable and even voltage, without voltage drops in the power supply to the inverter.	
	Earth connections.	Check earth cables and connection bands. - No damage should be visible. - The direction of the bands should absorb the vibrations and the movements of the washer produced during the spin cycle (see image). - The connection points should be firmly tightened. - The contact surfaces should be free from rust or any product that could prevent good contact from being made. - Check the securing of the screened cables to earth via the corresponding clamps.	
	Earth disconnection switch of the motor S2 and discharge resistance. The earth disconnection switch of the motor separates the motor earth from the washer earth when the lower front cover of the washer is closed. The discharge resistance regulates the discharge current whilst the motor is running.	Check: - Correct operation of switch S2. - Correct discharge resistance. Value 1 M Ohm. - Firm discharge resistance connection.	
	Securing of the washer covers. The earth conductions are also made via the washer covers.	Check: - The joints between the covers and between the covers and the washer base; they should be tight and free from rust which prevent a good contact from being made. - The securing of the inverter support box to the washer base.	
	Attaching the inverter to the support. The inverter is fixed to the support board using five metal separators which connect the inverter earth to the machine earth.	Check: - Attaching the inverter assembly to the support.	

9.- (Cont.) GENERAL ELECTRICAL WIRING CHECKS RELATED TO THE INVERTER. OTHER FAULTS RELATED TO THE INVERTER
Washers with 600 W inverter

Step	Check	Action
	General checks. Some of the problems that affect the correct operation of the inverter-motor combination are produced by moisture or aggressive washing products.	Check: - Placement of the inverter box cover. - Watertightness of the water conduction tubes. - Correct placement of the dosing unit gasket. - Watertightness of the water and exterior dosing products collector. - Presence of water or bath remains in the motor or inverter (visual inspection). - Watertightness of the heaters and of the heater housing sealing plugs (machines without heating).

10.- GENERAL ELECTRICAL WIRING CHECKS RELATED TO THE INVERTER OTHER FAULTS RELATED TO THE INVERTER

Washers with 1800 W inverter.

Description

Action suitable:

- When alarms or anomalies related to the microprocessor, inverter and motor assembly are triggered without any apparent cause.
- When the motor fails to work without any corresponding alarm report.
- During periodic maintenance actions.

CAUTION!

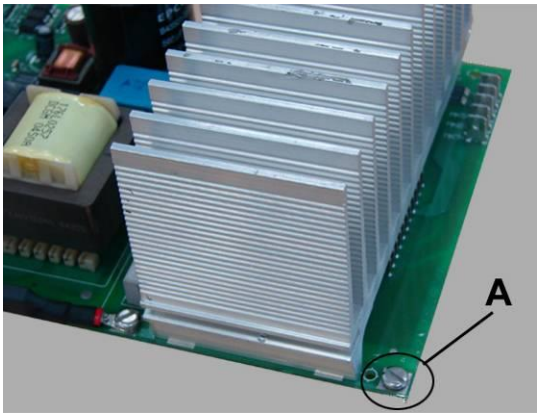
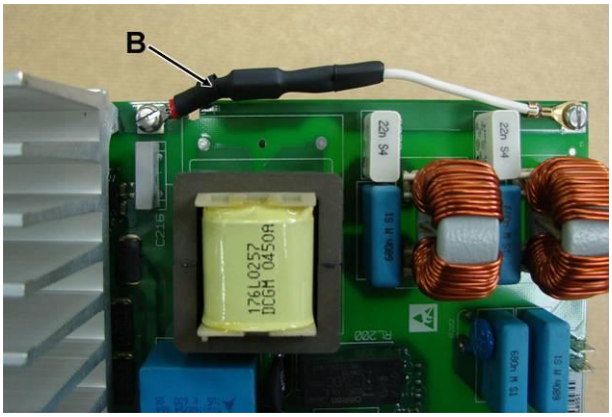
The steps detailed below have a serious impact on the operation of the inverter and can lead to it being destroyed. Pay particular attention when checking:

- Unstable connections in the washing machine's electrical wiring and the mains connection.
- Irregularities and disturbances in the power supply voltage.
- Continuity faults or defective connections in the washing machine's earth circuit.
- Faults in the securing of the inverter to the support base.
- Connection and state of the connection cables between the inverter and the motor. This cable is subjected to constant vibrations.
- Updates to the machine.

Step	Check	Action
	Power supply voltage of the washer.	Check: Stable and even voltage between phases and between each of the phases and neutral (value according to the washer's power supply voltage). Cross section and length of conductors according to installation manual. Earth cable: if in doubt, consult an accredited installer.
	Connection of the washing machine to the mains electricity supply.	Connection of the power supply cables and the earth cable to the washing machine's input switch. Check that the terminals: - Firmly press upon the cable. - Press upon all of the threads that make up the cable. - Only press upon the uncovered tip without pressing upon the insulation.
	General checks. Some of the problems that affect the correct operation of the inverter-motor combination are produced by moisture or aggressive washing products.	Check: - Placement of the inverter box cover. - Watertightness of the water conduction tubes. - Correct placement of the dosing unit gasket. - Watertightness of the water and exterior dosing products collector. - Presence of water or bath remains in the motor or inverter (visual inspection). - Watertightness of the heaters and of the heater housing sealing plugs (machines without heating).
	Electrical wiring connecting the microprocessor and the inverter:	Check that the inverter input terminals MK1/MK2 and the terminals on relay KA1 and filter Z1 are crimped onto the entire stripped end.

10.- (Cont.) GENERAL ELECTRICAL WIRING CHECKS RELATED TO THE INVERTER AND OTHER FAULTS RELATED TO THE INVERTER

Washers with 1800 W inverter

Step	Check	Action
	Electrical wiring connecting the inverter and the motor.	Check: - Connectors and connection terminals. - Crimping of the cables in the connectors and terminals. - Securing of the wiring in the respective clamps and supports. - Condition of the conductors. - Stable and even voltage, without voltage drops in the power supply to the inverter.
	Earth connections.	Check earth connection cables. - No damage should be visible. - The connection points should be firmly tightened. - The contact surfaces should be free from rust or any product that could prevent good contact from being made. - Check the securing of the screened cables to earth via the corresponding clamps.
	The securing of the inverter board to the support box. The inverter is fixed to the support board using six separators. Models HS / MS: six metal separators Models EH / EM: five isolated separators and a metal separator (see position of metal separator (**A**) in figure 1.1).	Check: - The correct distribution of the separators. - The securing of the entire inverter board to the support.
	Models EH and EM. Installation of CEM filter (consult code in machine parts view).	In case this is not fitted at the time of manufacture, updating the machine and installing this filter to protect the inverter against voltage and intensity spikes is recommended. Placement of filter (**B**): see Figure 1.2.
 Fig. 1.1		 Fig. 1.2

2.3. Washing machines with E08/E18 800/1800W inverter

2.3.1. Summary table of faults or interventions

LC/CC/LP Control	IC Control:	Description	Cause	Action
11	51	MOTOR OPEN PHASE	Loss of a motor phase during operation.	✓ Check the electrical wiring between the **M1** motor and the **A2-X2** inverter. ✓ Check the condition of the windings in the **M1** motor. • If all the above is correct, change the **A2** inverter.
12	52	MOTOR NOT CONNECTED	Motor disconnection during operation.	✓ Check the electrical wiring between the **M1** motor and the **A2-X2** inverter. ✓ Check the condition of the windings in the **M1** motor. • If all the above is correct, change the **A2** inverter.
13	53	INVERTER HARDWARE ERROR	Internal electronic component of the inverter damaged.	• Change the **A2** inverter.
14	54	SERIOUS OVERCURRENT DIVERSION	Possible damage to the motor's windings. Possible false contacts in the motor's connector cables. Possible fault in the earthing circuit and/or in the motor's discharging resistor. Possible mechanically-caused over-consumption. Internal electronic component of the inverter damaged.	✓ Check the condition of the windings in the **M1** motor. ✓ Check the electrical wiring between the **M1** motor and the **A2-X2** inverter. ✓ Check the motor's insulation and earth wiring. ✓ Check the condition of the mechanical components. • If all the above is correct, change the **A2** inverter.
15	55	ELECTRONIC CIRCUIT ERROR	Internal electronic component of the inverter damaged.	• Change the **A2** inverter.

LC/CC/LP Control	IC Control:	Description	Cause	Action
16	56	SERIOUS INVERTER OVERCURRENT	Possible damage to the motor's windings. Possible false contacts in the motor's connector cables. Possible fault in the earthing circuit and/or in the motor's discharging resistor. Possible mechanically-caused over-consumption. Internal electronic component of the inverter damaged.	✓ Check the condition of the windings in the **M1** motor. ✓ Check the electrical wiring between the **M1** motor and the **A2-X2** inverter. ✓ Check the motor's insulation and earth wiring. ✓ Check the condition of the mechanical components. • If all the above is correct, change the **A2** inverter.
17	57	OVERLOAD ERROR	Excess motor consumption.	✓ Check that the drum drains at the correct speed. ✓ Remove the belt and check the condition of the motor's bearings. ✓ Check the condition of the drum's bearings. • If all the above is correct, change the **A2** inverter.
18	58	INVERTER LOW VOLTAGE	Low voltage error in Vbus. Inverter supply voltage low, or internal part of the filtration capacitors in poor condition.	✓ Check the power supply to the **A2-X1:1,2** inverter. • If all the above is correct, change the **A2** inverter.
19	59	INVERTER OVERVOLTAGE	Excess voltage error in Vbus. Inverter supply voltage too high, or excess voltage in the Vbus generated by inertia.	✓ Check the machine while empty. If the alarm is not repeated, it may be due to an occasional load with excessive inertia. ✓ Check the power supply to the **A2-X1:1,2** inverter. • If all the above is correct, change the **A2** inverter.
20	60	INVERTER GENERAL ERROR	Internal electronic component of the inverter damaged.	• Change the **A2** inverter. • The ambient temperature should not be less than 0 ºC.

LC/CC/LP Control	IC Control:	Description	Cause	Action
21	61	INVERTER OVERHEATING	Inverter power circuit overheated.	✓ Check the operation of the inverter's fan. ✓ Check the machine's draining process. ✓ Remove the belt and check the condition of the motor's bearings. ✓ Check the condition of the windings in the **M1** motor. • If all the above is correct, change the **A2** inverter.
22	62	SERIOUS VOLTAGE ERROR	Dangerous voltage error. Possible defect in the supply voltage.	✓ Check the power supply to the **A2-X1:1,2** inverter. • If all the above is correct, change the **A2** inverter.
24	64	VBUS SENSOR ERROR	Internal electronic component of the inverter damaged.	• Change the **A2** inverter.
25	65	INVERTER COMMUNICATION ERROR	Communication error.	✓ Check the electrical wiring between the **A2-X3:2,3** inverter and the control board of the machine.
27	67	INITIALIZATION ERROR	Initialization error.	✓ Check the electrical wiring between the **M1** motor and the **A2-X2** inverter. ✓ Check the power supply to the **A2-X1:1,2** inverter. ✓ Check the condition of the **M11** motor. ✓ Check the condition and conductivity of the belt. • If all the above is correct, change the **A2** inverter
28	68	MOTOR SYSTEM ERROR	Inverter's microprocessor damaged.	• Change the **A2** inverter.

LC/CC/LP Control	IC Control:	Description	Cause	Action
29	69	OVERCURRENT DIVERSION	Possible damage to the motor's windings. Possible false contacts in the motor's connector cables. Possible fault in the earthing circuit and/or in the motor's discharging resistor. Possible mechanically-caused over-consumption. Internal electronic component of the inverter damaged.	✓ Check the condition of the windings in the **M1** motor. ✓ Check the electrical wiring between the **M1** motor and the **A2-X2** inverter. ✓ Check the motor's insulation and earth wiring. ✓ Check the condition of the mechanical components. ✓ If all the above is correct, change the **A2** inverter.
30	70	INVERTER OVERCURRENT	Possible damage to the motor's windings. Possible false contacts in the motor's connector cables. Possible fault in the earthing circuit and/or in the motor's discharging resistor. Possible mechanically-caused over-consumption. Internal electronic component of the inverter damaged.	✓ Check the condition of the windings in the **M1** motor. ✓ Check the electrical wiring between the **M1** motor and the **A2-X2** inverter. ✓ Check the motor's insulation and earth wiring. ✓ Check the condition of the mechanical components. • If all the above is correct, change the **A2** inverter.
31	71	SERIOUS MOTOR OVERHEATING	Excess temperature software error in the motor. Possible damage to the motor's windings. Possible false contacts in the motor's connector cables. Possible fault in the earthing circuit and/or in the motor's discharging resistor. Possible mechanically-caused over-consumption. Internal electronic component of the inverter damaged.	✓ Check the condition of the windings in the **M1** motor. ✓ Check the electrical wiring between the **M1** motor and the **A2-X2** inverter. ✓ Check the motor's insulation and earth wiring. ✓ Check the condition of the mechanical components. • If all the above is correct, change the **A2** inverter.

LC/CC/LP Control	IC Control:	Description	Cause	Action
32	72	VOLTAGE ERROR	Non-dangerous voltage error. Possible defect in the supply voltage.	✓ Check the power supply to the **A2-X1:1,2** inverter. • If all the above is correct, change the **A2** inverter.
33	73	INVERTER ERROR	Internal electronic component of the inverter damaged.	✓ Check the electrical wiring between the **M1** motor and the **A2-X2** inverter. ✓ Check the condition of the **M11** motor. ✓ Check the power supply to the **A2-X1:1,2** inverter. • If all the above is correct, change the **A2** inverter.
35	75	INPUT VOLTAGE ERROR	Fault in the input current. Internal electronic component of the inverter damaged.	• Change the **A2** inverter.
36	76	MOTOR OVERHEATING	Internal overtemperature in the motor. Motor's internal thermal protection is open.	✓ Check that the drum drains at the correct speed. ✓ Check the electrical wiring between the **M1** motor's temperature sensor and the **A2-X2:4,5** inverter. ✓ Remove the belt and check the condition of the motor's bearings. ✓ Check the condition of the drum's bearings.
39	79	INVERTER FAN ERROR	Fault in the inverter's fan	✓ Check that it is operating properly. ✓ Check the electrical wiring. ✓ Check the supply voltage. • If all the above is correct, change the **A2** inverter.

2.4. Washers with Danfoss VLT 1500/2200 W inverter

2.4.1. Summary table of faults or interventions

	DESCRIPTION OF FAULT OR INTERVENTION	INFORMATION DISPLAY MICROPROCESSOR	INVERTER DISPLAY INFORMATION
1	**Communication fault** between the microprocessor and the inverter	**ALM U-00**	**---**
2	**Disconnection** of the motor's thermal protection (klixon)	**ALM U-04**	**---**
3	**Error in initialising** the inverter or the machine model	**ALM U-09**	**AL 80**
4	**Fault caused by general fault** of the inverter	**ALM U-39**	**AL 38**
5	**Fault in the inverter's output phase**	**ALM U-41/42/43**	**AL 30/AL 31/AL 32**
6	**Inverter being overloaded**	**ALM U-47**	**AL 9**
7	**Undervoltage** in the inverter's DC bus	**ALM U-48**	**AL 8**
8	**Overvoltage** in inverter D.C. bus	**ALM U-49**	**AL 7**
9	**Short circuit** in the motor	**ALM U-50**	**AL 16**
10	**Faulty inverter's input phase**	**ALM U-52**	**AL 4**
11	**Overtemperature** in inverter	**ALM U-55**	**AL 29**
12	**Short circuit** between the inverter's output phase and the washing machine earth.	**ALM U-56**	**AL 14**
13	**Overcurrent** in inverter	**ALM U-59**	**AL 13**
14	**Fault in** the inverter's internal control	**ALM U-32**, **ALM U-33**, **ALM U-37**, **ALM U-38**, **ALM U-45**, **ALM U-46**, **ALM U-53**, **ALM U-54**, **ALM U-6**, **ALM U-62**	**AL 2**, **AL 10**, **AL 11**, **AL 25**, **AL 27**, **AL 28**, **AL 47**, **AL 51/52**, **AL 63**
15	**General electrical wiring checks** related to the inverter	**Any alarm related to the inverter / motor**	

2.4.2. Details of the interventions for verifying or locating faults

The interventions aimed at checking and locating faults are detailed below, in the same order as in the summary table.

Supplement the following instructions with the diagram and the parts view corresponding to the washing machine.

VERY IMPORTANT!

Before connecting the washer to the power supply, the following precautions must be considered:
- The inverter must be properly mounted on the corresponding support and have all of the earth connections securely fixed in place.
- The inverter support must be connected to the washing machine's earth circuit.

Failure to comply with these warnings can cause ELECTRICAL SHOCK OR SERIOUS ACCIDENTS and can lead to the destruction of the inverter.

1.- COMMUNICATION FAULT BETWEEN THE MICROPROCESSOR AND THE INVERTER

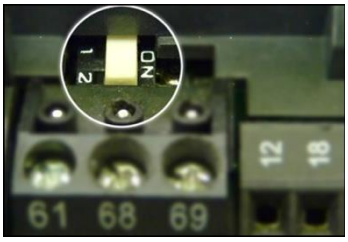
Alarm codes
Microprocessor display report: **ALM U-00**
Inverter display report: **---**

Description
The alarm due to a communication fault between the microprocessor and the inverter is triggered if the communication between the washing machine's microprocessor and the motor inverter control is interrupted at the outset or during the wash cycle. Disconnecting the inverter power supply circuit or a faulty inverter can also cause this alarm.

Microprocessor response
Prevents or interrupts the execution of the wash cycle.
Activates the buzzer.

Remarks
Irregularities in the power supply voltage or unstable power supply and earth circuit connections in the washing machine can also trigger this alarm. See also 15.- GENERAL ELECTRICAL WIRING CHECKS.
Checks must be made during the **VAR** phase of the TEST program.

WARNING! RISK OF ENTRAPMENT OR ELECTRIC SHOCK

Step	Check		Action
1	Inverter switch in **ON** position.		**NO**: Turn the switch to the **ON** position. If this fails to resolve the problem, go to Step 2. **When fitting a new inverter, check the correct position of the switch**.
			YES: Go to Step 2.
2	Voltage of 12 VDC at microprocessor terminals X17-1↔X17-4.		**NO**: Possible microprocessor fault. Renew microprocessor.
			YES: Go to Step 3.
3	Voltage of 12 VDC at terminals 0↔1 of the KA1 relay.		**NO**: Check the connection between the microprocessor and the KA1 relay: cable, connections, terminals, etc.
			YES: Go to Step 4.
4	Voltage between fuse F6 circuit input terminals X1-2↔X1-5 between 200 and 240 V (tolerance ±10%).		**NO**: Possible fault in the KA1 relay or the Z1 filter. Rectify the problem.
			YES: Go to Step 5.
5	Voltage between fuse F6 circuit terminals X1-1↔X1-4 between 200 and 240 V (tolerance ±10%).		**NO**: Fuse F6 blown. Renew fuse F6. If the problem persists, go on to Step 6.
			YES: Go to Step 7.
6	Fuse possibly blown due to short circuit caused by one of the following components: M3 fan, inductor L1 or filter Z2 (models MS/MG-623, EM/MG055).		**NO**: Go to Step 7.
			YES: Rectify the problem.
7	Voltage at inverter input terminals L3/N↔L1/L, between 200 and 240 V (tolerance ±10%).		**NO**: Possible fault in the inverter's inductor L1. Renew inductor L1.
			YES: Go to Step 8.

1.- (Cont.) COMMUNICATION FAULT BETWEEN THE MICROPROCESSOR AND THE INVERTER				
8	Run the **VAR** phase of the TEST program. From the outset the LED on the inverter flashes clearly and sharply.		**NO**	Possible microprocessor fault. Renew microprocessor. If the problem persists, it may damage the inverter. Possible causes: • Inverter communication circuit damaged. • Inverter power circuit damaged by short circuit or shorting to earth at the power output. See also 12.- SHORT CIRCUIT BETWEEN THE INVERTER OUTPUT PHASE AND THE WASHING MACHINE EARTH.
			YES	Possible damage, short circuit or disconnection of the communication cable between the microprocessor and inverter, microprocessor terminals X7-2↔X7-3, inverter terminals 68↔69. Renew the communication cable.

2.- DISCONNECTION OF THE MOTOR'S THERMAL PROTECTION (KLIXON)

Alarm codes
Microprocessor display report: **ALM U-04**
Inverter display report: **---**

Description
The alarm triggered by the tripping of the motor's thermal cut-out tripping is caused by the motor overheating.
Probable causes: overloading, deterioration of the bearings, short circuit or fault in the motor windings.

Microprocessor response
Prevents or interrupts the execution of the wash cycle.
Activates the buzzer.

Remarks
Irregularities in the power supply voltage or unstable power supply and earth circuit connections in the washing machine can also trigger this alarm. See also 15.- GENERAL ELECTRICAL WIRING CHECKS.
Checks must be made during the **VAR** phase of the TEST program.

WARNING! RISK OF ENTRAPMENT OR ELECTRIC SHOCK

Step	Check		Action
1	Continuity of the motor's thermal protection circuit when the alarm is triggered. Check continuity of circuit at inverter terminals 12↔27 (Klixon).	**YES**	Possible inverter fault. Renew inverter.
		NO	Go to Step 2.
2	Reconnection in 15 minutes or less.	**NO**	Go to Step 3.
		YES	Go to Step 4.
3	Fault in the motor's thermal protection circuit wiring or connection.	**NO**	Possible fault on the motor. Renew motor.
		YES	Rectify defect.
4	Deteriorated bearings or seizing up of the drum or motor rotation.	**NO**	Go to Step 5.
		YES	Rectify defect.
5	Phase fault in the motor due to deterioration of the wiring, connections or coils of the motor. Check with an RMS clamp ammeter. Other motor defects.		Rectify defect. If a fault is detected in the motor, renew the motor.

3.- INITIALISATION ERROR IN THE INVERTER OR THE MACHINE MODEL

Alarm code
Microprocessor display report: **ALM U-09**
Inverter display report: **AL 80**

Description
This alarm indicates faulty concordance between the values of the inverter and the parameters programmed into the washer's microprocessor. Displayed when replacing the microprocessor and/or the inverter without programming the parameters between the two devices. This alarm can also occur if the microprocessor identification connector does not match the machine model.

Microprocessor response
Prevents or interrupts the execution of the wash cycle.
Activates the buzzer.

Remarks
Checks must be made during the **VAR** phase of the TEST program.

WARNING! RISK OF ENTRAPMENT OR ELECTRIC SHOCK

Step	Check		Action
1	Set/check the parameters in the inverter (see Logi Control / Logi Pro / Coin Control Operating Manual). Check that the microprocessor identification connector matches the washing machine model. The problem has been resolved.	**NO**	Possible microprocessor fault. Possible inverter fault. Possible error in the identification connector.
		YES	

4 .- GENERAL INVERTER FAULT

Alarm codes
Microprocessor display report: **ALM U-39**
Inverter display report: **AL 38**

Description
The triggering of this alarm indicates a fault in the inverter's internal control.

Microprocessor response
Prevents or interrupts the execution of the wash cycle.
Activates the buzzer.

Remarks
Irregularities in the power supply voltage or unstable power supply and earth circuit connections in the washing machine can also trigger this alarm. See also 15.- GENERAL ELECTRICAL WIRING CHECKS.
Checks must be made during the **VAR** phase of the TEST program.

WARNING! RISK OF ENTRAPMENT OR ELECTRIC SHOCK

Step	Check		Action
1	The inverter fault occurs constantly.	**NO**	Disconnect the washing machine's power supply for 5 minutes and then reconnect it.
		YES	Possible inverter fault. Renew inverter.

5.- FAULT IN THE INVERTER'S OUTPUT PHASE

Alarm codes
Microprocessor display report: **ALM U-41**, **ALM U-42**, **ALM U-43**
Inverter display report: **AL 30**, **AL 31**, **AL 32**

Description
The inverter output phase fault alarm is triggered by a fault of one of the three phases of the inverter motor output or due to a significant imbalance of consumption between these phases. When the alarm is triggered in the inverter, the washing machine shuts off the power supply to the inverter for a period of approximately three minutes. If this fault is repeated for the third time in the same program phase, the U-41 alarm appears (U phase fault), U-42 (V phase fault), or U-43 (W phase fault) in the microprocessor.

Microprocessor response
Prevents or interrupts the execution of the wash cycle.
Activates the buzzer.

Remarks
Irregularities in the power supply voltage or unstable power supply and earth circuit connections in the washing machine can also trigger this alarm. See also 15.- GENERAL ELECTRICAL WIRING CHECKS.
Checks must be made during the **VAR** phase of the TEST program.

WARNING! RISK OF ENTRAPMENT OR ELECTRIC SHOCK

Step	Check		Action
1	Run the **VAR** phase of the TEST program (without a load). The consumption of the three phases must be balanced. A fault in one of the three output phases of the inverter motor. A difference of consumption in one of the three output phases of the inverter motor.	**NO**	Go to Step 3.
		YES	Go to Step 2.
2	Check the wiring, the connection terminals and the condition of the inverter output wiring. Check the general appearance of the wiring. Connections correct.	**NO**	Rectify the problem.
		YES	Go to Step 3.
3	Check the condition of the wiring and the motor connection box terminals. Connections correct.	**NO**	Rectify the problem.
		YES	Go to Step 4.
4	Check the condition of the motor. Appearance of motor correct.	**NO**	Renew motor.
		YES	Possible inverter fault. Renew inverter.

6.- OVERLOADING THE INVERTER

Alarm codes
Microprocessor display report: **ALM U-47**
Inverter display report: **AL 9**

Description
The overload alarm is triggered if the motor consumption exceeds the limits set in the inverter program. When the alarm is triggered in the inverter, the washing machine shuts off the power supply to the inverter for a period of approximately three minutes. If this fault is repeated for the third time in the same program phase, the alarm is triggered.
Damaged bearings or stiffness in the rotation of the drum or motor can set off this alarm.

Microprocessor response
Prevents or interrupts the execution of the wash cycle.
Activates the buzzer.

Remarks
Irregularities in the power supply voltage or unstable power supply and earth circuit connections in the washing machine can also trigger this alarm. See also 15.- GENERAL ELECTRICAL WIRING CHECKS.
Checks must be made during the **VAR** phase of the TEST program.

WARNING! RISK OF ENTRAPMENT OR ELECTRIC SHOCK

Step	Check		Action
1	Stable voltage at inverter input terminals L3/N↔L1/L , between 200 and 240 V (tolerance ±10%).	NO	Rectify the problem.
		YES	Go to Step 2.
2	Phase fault in the motor's power supply due to deterioration of the wiring, connections or windings of the motor. Check the output of the inverter with an RMS clamp ammeter. Other motor defects.	NO	Go to Step 3.
		YES	Rectify defect. If a fault is detected in the motor, renew the motor.
3	Disconnect the motor's power supply cable from terminals U, V and W at the output of the inverter. (To avoid triggering the motor's thermal protection disconnection alarm, by-pass the inverter connection terminals 12↔27.) The overload alarm continues.	NO	Re-connect the power supply cable. Go to Step 4.
		YES	Possible inverter fault. Renew inverter.
4	Bath not draining properly. Possible causes: - Blocked draining hoses. - Faulty drain valve. - Direction of rotation reversed (if the connections on the motor have been tampered with).	NO	Go to Step 5.
		YES	Rectify the problem.
5	Deteriorated bearings or seizing up of the drum or motor rotation.	NO	Possible inverter fault. Renew inverter.
		YES	Rectify the problem.

7.- UNDERVOLTAGE IN THE INVERTER D.C. BUS

Alarm codes
Microprocessor display report: **ALM U-48**
Inverter display report: **AL 8**

Description
The undervoltage alarm is triggered if the input voltage of the inverter falls below its operating limit. When the alarm is triggered in the inverter, the washing machine shuts off the power supply to the inverter for a period of approximately three minutes. If this fault is repeated for the third time in the same program phase, the alarm is triggered.

Microprocessor response
Prevents or interrupts the execution of the wash cycle.
Activates the buzzer.

Remarks
Irregularities in the power supply voltage or unstable power supply and earth circuit connections in the washing machine can also trigger this alarm. See also 15.- GENERAL ELECTRICAL WIRING CHECKS.
Checks must be made during the **VAR** phase of the TEST program.

WARNING! RISK OF ENTRAPMENT OR ELECTRIC SHOCK

Step	Check		Action
1	Inverter supply voltage stable and with a value of not less than 180 VAC (200V-10%) at terminals L3/N↔L1/L.	**NO**	Rectify the problem. See also 1.- COMMUNICATION FAULT BETWEEN THE MICROPROCESSOR AND THE INVERTER.
		YES	Go to Step 2.
2	Phase fault in the motor power supply caused by deterioration to the wiring, connections or motor coils. Check with an RMS ammeter. Other motor defects.	**NO**	Go to Step 3.
		YES	Rectify the problem.
3	Deteriorated bearings or seizing up of the drum or motor rotation.	**NO**	Carry out a general check of the electrical wiring. If the problem is not solved, there may be a defect in the inverter: Renew inverter.
		YES	Rectify the problem.

8.- ANOMALY CAUSED BY OVERVOLTAGE IN INVERTER D.C. BUS

Alarm codes
Microprocessor display report: **ALM U-49**
Inverter display report: **AL 7**

Description
The overvoltage alarm is triggered if an excessive increase in the voltage in the DC bus occurs due to incorrect power supply voltage or excessive increase in motor torque.
When the alarm is triggered in the inverter, the washing machine shuts off the power supply to the inverter for a period of approximately three minutes. If this fault is repeated for the third time in the same program phase, the alarm is triggered.

Microprocessor response
Prevents or interrupts the execution of the wash cycle.
Activates the buzzer.

Remarks
Irregularities in the power supply voltage or unstable power supply and earth circuit connections in the washing machine can also trigger this alarm. See also 15.- GENERAL ELECTRICAL WIRING CHECKS.
Checks must be made during the **VAR** phase of the TEST program.

WARNING! RISK OF ENTRAPMENT OR ELECTRIC SHOCK

Step	Check		Action
1	Inverter supply voltage unstable and with a value higher than 264 VAC(240+10%) at terminals L3/N↔L1/L.	NO	Go to Step 2.
		YES	Rectify the problem. See also 1.- COMMUNICATION FAULT BETWEEN THE MICROPROCESSOR AND THE INVERTER.
2	Phase fault in the motor power supply caused by deterioration to the wiring, connections or motor coils. Check with an RMS ammeter. Other motor defects.	NO	Go to Step 3.
		YES	Rectify the problem.
3	Deteriorated bearings or seizing up of the drum or motor rotation.	NO	Carry out a general check of the electrical wiring. If the problem is not solved, there may be a defect in the inverter: Renew inverter.
		YES	Rectify the problem.

9.- SHORT CIRCUIT IN THE MOTOR

Alarm codes
Microprocessor display report: **ALM U-50**
Inverter display report: **AL 16**

Description
The motor short circuit alarm is triggered when a short circuit occurs in the inverter output wiring or due to damage or short circuit in the motor's windings.
When the alarm is triggered in the inverter, the washing machine shuts off the power supply to the inverter for a period of approximately three minutes. If this fault is repeated for the third time in the same program phase, the alarm is triggered.

Microprocessor response
Prevents or interrupts the execution of the wash cycle.
Activates the buzzer.

Remarks
Irregularities in the power supply voltage or unstable power supply and earth circuit connections in the washing machine can also trigger this alarm. See also 15.- GENERAL ELECTRICAL WIRING CHECKS.
Checks must be made during the **VAR** phase of the TEST program.

WARNING! RISK OF ENTRAPMENT OR ELECTRIC SHOCK

Step	Check		Action
1	Possible short circuit or deterioration of the cables running from the inverter output phases to the motor.	**NO**	Go to Step 2.
		YES	Rectify the problem.
2	Short circuit between motor phases due to damaged wiring, connections or windings of the motor. To rule out a possible fault in the motor, disconnect the motor's power supply cable from terminals (U, V and W) at the output of the inverter. (To avoid triggering the motor's thermal protection disconnection alarm, by-pass the inverter connection terminals 12↔27.) The alarm continues.	**NO**	Possible fault in the motor. Renew motor.
		YES	Possible inverter fault. Renew inverter.

10.- FAULTY INVERTER INPUT PHASE

Alarm codes
Microprocessor display report: **ALM U-52**
Inverter display report: **AL 4**

Description
The alarm due to a faulty inverter input phase is triggered by a fault in of one of the two power supply phases of the inverter or by a significant voltage imbalance between these phases.
When the alarm is triggered in the inverter, the washing machine shuts off the power supply to the inverter for a period of approximately three minutes. If this fault is repeated for the third time in the same program phase, the alarm is triggered.

Microprocessor response
Prevents or interrupts the execution of the wash cycle.
Activates the buzzer.

Remarks
Irregularities in the power supply voltage or unstable power supply and earth circuit connections in the washing machine can also trigger this alarm. See also 15.- GENERAL ELECTRICAL WIRING CHECKS.
Checks must be made during the **VAR** phase of the TEST program.

WARNING! RISK OF ENTRAPMENT OR ELECTRIC SHOCK

Step	Check		Action
1	Voltage at inverter input terminals L3/N↔L1/L, between 200 and 240 V (tolerance ±10%).	**NO**	Rectify the problem. See also 1.- COMMUNICATION FAULT BETWEEN THE MICROPROCESSOR AND THE INVERTER ALARM.
		YES	Go to Step 2.
2	Consumption imbalance between the two inverter input phases.	**NO**	Possible inverter fault. Renew inverter.
		YES	Carry out a general check of the electrical wiring. If the problem is not solved, there may be a defect in the inverter: Renew inverter.

11.- OVERTEMPERATURE IN INVERTER

Alarm codes
Microprocessor display report: **ALM U-55**
Inverter display report: **AL 29**

Description
The inverter's excess temperature alarm is triggered when the heat sink temperature exceeds a preset value due to a deficiency in the ventilation of the sink or a higher outside temperature than that indicated in the washing machine's installation manual.
When the alarm is triggered in the inverter, the washing machine shuts off the power supply to the inverter for a period of approximately three minutes. If this fault is repeated for the third time in the same program phase, the alarm is triggered.

Microprocessor response
Prevents or interrupts the execution of the wash cycle.
Activates the buzzer.

Remarks
Checks must be made during the **VAR** phase of the TEST program.

 **WARNING! RISK OF ENTRAPMENT OR ELECTRIC SHOCK**

Step	Check		Action
1	Run the **VAR** phase of the TEST program. Rotation of the inverter box M3 fan.	**NO**	Go to Step 2.
		YES	Go to Step 4.
2	Mechanical obstruction that prevents the fan from rotating. Dirt on the blades of the M3 fan or in the suction duct.	**NO**	Possible fault in the M3 fan. Renew M3 fan.
		YES	Rectify the problem. If the fault persists, go to Step 3.
3	Obstruction in the inverter's ventilation system: ventilation of the inverter protection box, heat sink fins or dirt on the blades of the internal fan.	**NO**	Go to Step 4.
		YES	Dismantle and clean the inverter's internal ventilation system. Follow the instructions in Chapter 2 in this manual entitled INVERTER CLEANING AND MAINTENANCE. It is advisable to repeat this cleaning process on a regular basis. If the problem persists, go to Step 4.
4	Rotation of the inverter fan.	**NO**	Possible inverter fault. Renew inverter.
		YES	Excessive outside temperature of the washing machine. Reduce the outside temperature.

12.- SHORT CIRCUIT BETWEEN THE INVERTER'S OUTPUT PHASE AND THE WASHING MACHINE EARTH

Alarm codes
Microprocessor display report: **ALM U-56**
Inverter display report: **AL 14**

Description
Shorting an inverter output phase to earth may cause serious damage to the inverter.

Microprocessor response
Prevents or interrupts the execution of the wash cycle.
Activates the buzzer.

Remarks
Irregularities in the power supply voltage or unstable power supply and earth circuit connections in the washing machine can also trigger this alarm. See also 15.- GENERAL ELECTRICAL WIRING CHECKS.
Checks must be made during the **VAR** phase of the TEST program.

WARNING! RISK OF ENTRAPMENT OR ELECTRIC SHOCK

Step	Check	Action
1	Possible shorting to earth caused by damaged wiring between the inverter and the motor or the motor windings.	Carry out a general check of the electrical wiring.
2	Washing machine power supply RCD breaker switch.	The onset of the alarm can be indicative of a malfunction of the washing machine's external power supply line RCD circuit breaker switch. Carry out a check on this RCD circuit breaker.

13.- OVERCURRENT IN INVERTER

Alarm codes
Microprocessor display report: **ALM U-59**
Inverter display report: **AL 13**

Description
The overcurrent alarm is triggered if the inverter detects an excessive consumption at the output to the motor, caused by a short circuit, an undervoltage, worn bearings, or seizing in the motor rotation, transmission, etc. When the alarm is triggered in the inverter, the washing machine shuts off the power supply to the inverter for a period of approximately three minutes. If this fault is repeated for the third time in the same program phase, the alarm is triggered.

Microprocessor response
Prevents or interrupts the execution of the wash cycle.
Activates the buzzer.

Remarks
Irregularities in the power supply voltage or unstable power supply and earth circuit connections in the washing machine can also trigger this alarm. See also 15.- GENERAL ELECTRICAL WIRING CHECKS.
Checks must be made during the **VAR** phase of the TEST program.

WARNING! RISK OF ENTRAPMENT OR ELECTRIC SHOCK

Step	Check		Action
1	Inverter supply voltage stable and with a value between 200 and 240 V (±10%) at terminals L3/N↔L1/L.	**NO**	Rectify the problem. See also 1.- COMMUNICATION FAULT BETWEEN THE MICROPROCESSOR AND THE INVERTER ALARM.
		YES	Go to Step 2.
2	Phase fault in the motor due to deterioration of the wiring, connections or coils of the motor. Check with an RMS clamp ammeter. Other motor defects.	**NO**	Go to Step 3.
		YES	Rectify defect. If a fault is detected in the motor, renew the motor.
3	Disconnect the motor connection. To avoid triggering the motor's thermal protection disconnection alarm, by-pass the connection terminals 12↔27 (klixon) on the inverter. The alarm continues.	**NO**	Re-connect the motor connection. Go to Step 4.
		YES	Possible inverter fault. Check the motor and its electrical wiring. Renew inverter.
4	Motor connection cabling short-circuited or diverted to earth. Motor coils short-circuited or diverted to earth.	**NO**	Go to Step 5.
		YES	Rectify the problem. If a fault is detected in the motor, renew the motor.
5	Deteriorated bearings or seizing up of the drum or motor rotation.	**NO**	Carry out a general check of the electrical wiring. If the problem is not solved, there may be a defect in the inverter: Renew inverter.
		YES	Rectify the problem.

14.- FAULT IN THE INVERTER'S INTERNAL CONTROL

Alarm codes

Microprocessor display report: **ALM U-06**, **ALM U-32**, **ALM U-33**, **ALM U-37**, **ALM U-38**, **ALM U-45**, **ALM U-46**, **ALM U-53**, **ALM U-54**, **ALM U-62**.
Inverter display report: **AL 2**, **AL 10**, **AL 11**, **AL 25**, **AL 27**, **AL 28**, **AL 47**, **AL 51/52**, **AL 63**.

Description

The inverter has options and possibilities not used in this application. Any fault in one of these options may cause these alarms to be triggered.

Microprocessor response

Prevents or interrupts the execution of the wash cycle.
Activates the buzzer.

Remarks

Irregularities in the power supply voltage or unstable power supply and earth circuit connections in the washing machine can also trigger this alarm. See also 15.- GENERAL ELECTRICAL WIRING CHECKS.
Checks must be made during the **VAR** phase of the TEST program.

WARNING! RISK OF ENTRAPMENT OR ELECTRIC SHOCK

Step	Check		Action
1	The inverter fault occurs constantly.	NO	Disconnect the washing machine's power supply for 5 minutes and then reconnect it.
		YES	Go to the CONF MENU, reset the microprocessor and program/check the parameters with the inverter. If the alarm persists, the inverter may be faulty. Renew inverter.

15.- GENERAL ELECTRICAL WIRING CHECKS RELATED TO THE INVERTER

Description

Action suitable:

- When alarms or anomalies related to the microprocessor, inverter and motor assembly are triggered without any apparent cause.
- When the motor fails to work without any corresponding alarm report.
- During periodic maintenance actions.

CAUTION!

The steps detailed below have a serious impact on the operation of the inverter and can lead to it being destroyed. Pay particular attention when checking:

- Unstable connections in the washing machine's electrical wiring and the mains connection.
- Irregularities and disturbances in the power supply voltage.
- Continuity faults or defective connections in the washing machine's earth circuit.
- Faults in the securing of the inverter to the support base.
- Connection and state of the connection cables between the inverter and the motor. This cable is subjected to constant vibrations.
- Updates to the machine.

Step	Check	Action
	Washing machine power supply.	Check: Stable and even voltage between phases and between each of the phases and neutral (value according to the washer's power supply voltage). Cross section and length of conductors according to installation manual. Earth cable: if in doubt, consult an accredited installer.
	Connection of the washing machine to the mains electricity supply. Connection of the power supply cables and the earth cable to the washing machine's input switch.	Check that the terminals: - Firmly press upon the cable. - Press upon all of the threads that make up the cable. - Only press upon the uncovered tip without pressing upon the insulation.
	General checks. Some of the problems that affect the correct operation of the inverter-motor combination are produced by moisture or aggressive washing products.	Check: - Placement of the inverter box cover. - Watertightness of the water conduction tubes. - Correct placement of the dosing unit gasket. - Watertightness of the water and exterior dosing products collector. - Presence of water or bath remains in the motor or inverter (visual inspection). - Watertightness of the heaters and of the heater housing sealing plugs (machines without heating).
	Electrical wiring connecting the inverter and the motor.	Check: - Connectors and connection terminals. - Crimping of the cables in the connectors and terminals. - Securing of the wiring in the respective clamps and supports. - Condition of the conductors. - Stable and even voltage, without voltage drops in the power supply to the inverter.

15.- (Cont.) GENERAL ELECTRICAL WIRING CHECKS RELATED TO THE INVERTER		
Step	**Check**	**Action**
	Earth connections.	Check earth connection cables. - No damage should be visible. - The connection points should be firmly tightened. - The contact surfaces should be free from rust or any product that could prevent good contact from being made. - Check the securing of the screened cables to earth via the corresponding clamps.
	Attaching the inverter to the support box. The inverter is attached to the support box by three screws.	Check: - that the inverter is correctly attached to the support box.

3. INVERTER CLEANING AND MAINTENANCE

3.1. Presentation

The appearance of the inverter overheated alarm can be caused by the accumulation of dirt and lint at the inverter cooling area, making it difficult to properly ventilate the equipment. For this reason it is essential to periodically clean the inverter to maintain good ventilation and thus avoid the overheating problems.
The maintenance and cleaning manual is aimed at MS/MG-6, EM/MG, RMS/RMG6, REM/RMG, HS-6/EH.

3.2. Preparation

Tool requirements

Intervention on MS-610, RMS610, HS-6008, EM025, REM025, EH020 models with inverter Danfoss Custom 600 W / E08 800W

Screwdriver Torx 25
1/2 in open end wrench (13 mm)
A soft brush and a dry cloth

Intervention on MS-613, MS-617, MS-623, HS-6013, HS-6017, EM030, EM040, EM055, EH030, EH040 models with Danfoss Custom 1800 W / E18 1800W inverter

Screwdriver Torx 25
Ratchet wrench with Torx 25 end
Allen wrench 3 mm
Wire, 2 meters long
A soft brush and a dry cloth

Intervention on models MS/MG-613, MS/MG-617, MS/MG-623, EM/MG030, EM/MG040, EM/MG055 with Danfoss VLT 1500/2200 W inverter

Screwdriver Torx 10
Screwdriver Torx 25
0.5x2x40 (2x1.5 in) flat end screwdriver
0.5x2.5x40 (2x1.5 in) flat end screwdriver
0.5x3x75 (3x3 in) flat end screwdriver
0.8x4x100 (4x4 in) flat end screwdriver
Wire, 2 meters long
A soft brush and a dry cloth

Intervention on RMS/RMG613, RMS/RMG617, RMS/RMG623, REM/RMG033, REM/RMG040, REM/RMG055 models with Danfoss VLT 1500/2200 W inverter

Screwdriver Torx 10
Screwdriver Torx 25
0.5x2x40 (2x1.5 in) flat end screwdriver
0.5x2.5x40 (2x1.5 in) flat end screwdriver
0.5x3x75 (3x3 in) flat end screwdriver
0.8x4x100 (4x4 in) flat end screwdriver
0.4 in open end wrench (10 mm)
A soft brush and a dry cloth

3.3. Cleaning the Danfoss Custom 600 W / E08 800W inverter

MS-610, RMS610, HS-6008, EM025,
REM025, EH020 models

1. Remove the machine's bottom panel **A** (Fig. 3.1).

Fig. 3.1

2. Remove the protection cover **A** from the inverter. Loosen **B** and **C** screws of the inverter box (Fig. 3.2).

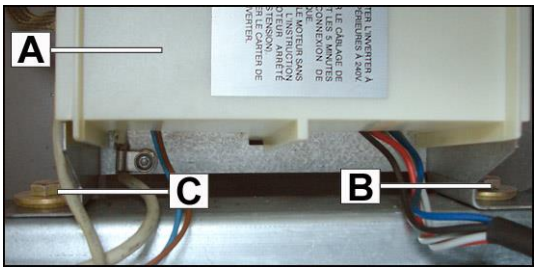


Fig. 3.2

3. Turn the inverter box towards the front of the machine to be able to clean the fan and heat sink properly (Fig. 3.3). Remove the dirt using a brush or a dry cloth.

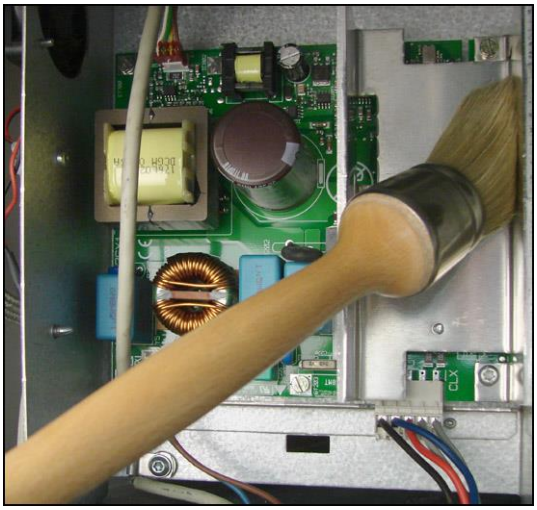


Fig. 3.3

4. Assemble the inverter box. Renew the inverter protection cover.
5. Renew the bottom panel.
6. Once the maintenance operation has been completed, run the TEST program to ensure that the machine is operating properly. See TECHNICAL assistance Instructions manual.

3.4. Cleaning the Danfoss Custom 1800W / E18 1800W inverter and the suction duct

Models MS-613, MS-617, MS-623, HS-6013, HS-6017, EM030, EM040, EM055, EH030, EH040

1. Remove the machine's top cover **A** and bottom front cover **B** (Fig. 3.4).

Fig. 3.4

2. Remove covers **A** and **B** from the inverter (Fig. 3.5).

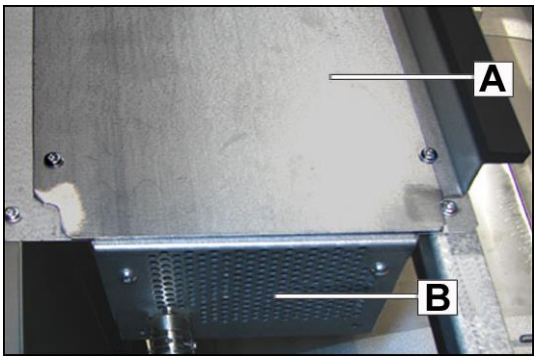


Fig. 3.5

3. Disconnect **A**, **B** and **C** connectors from the inverter and **D** earth wire. Remove **E** locking screws from the inverter and remove it from inside the box (Fig. 3.6).

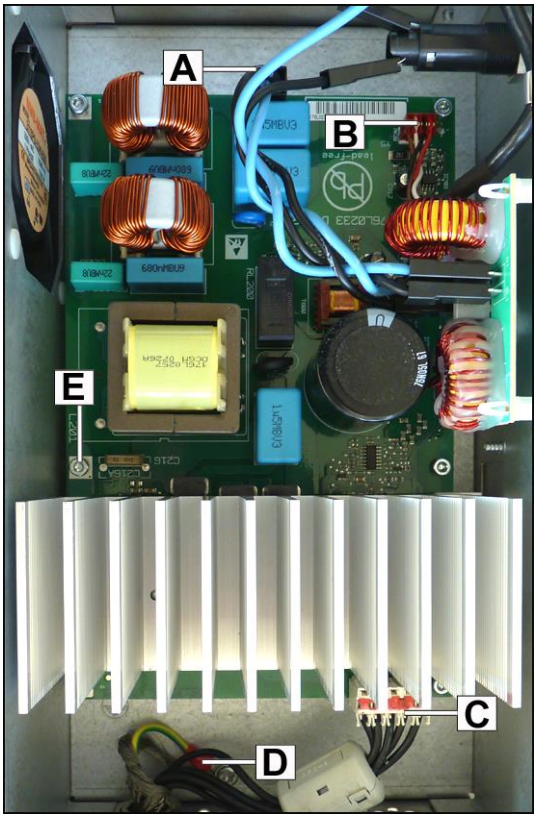


Fig. 3.6

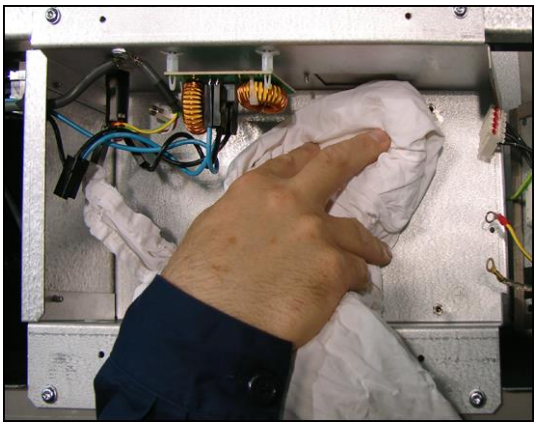


Fig. 3.7

4. Remove dirt from the inverter box and heat sink with a brush or a dry cloth (Fig. 3.7 and 3.8).

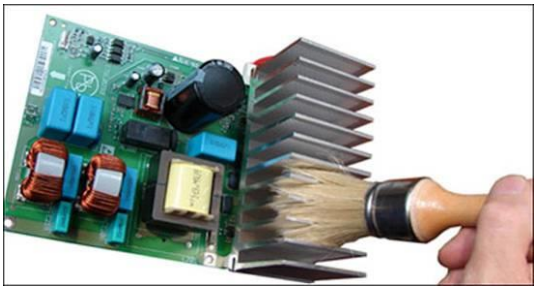


Fig. 3.8

5. Remove **A** locking screws from the inverter box (Fig. 3.9).

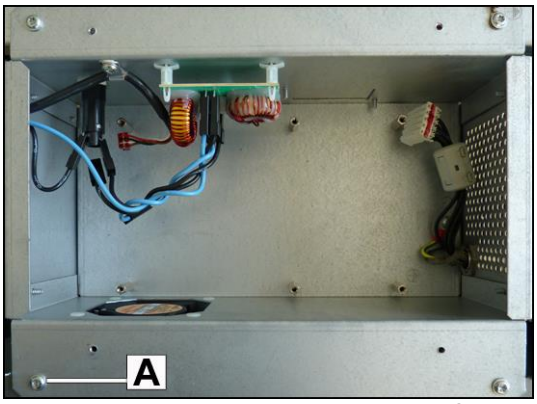


Fig. 3.9

6. Lift up the inverter box and separate it from the suction hole, taking care not to pull on the wiring. Remove dirt from both sides of the fan and the inverter box cavity with a brush or a dry cloth (Fig. 3.10).

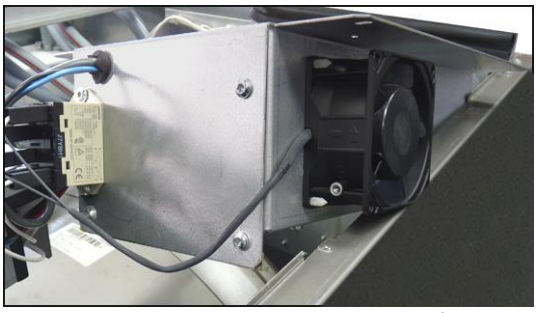


Fig. 3.10

7. Insert the wire through the upper hole of the fan's fresh air ducting until it comes out by the lower part (Fig. 3.11).

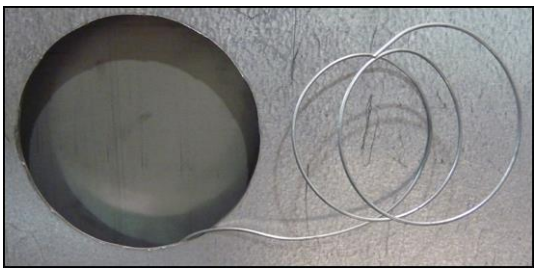


Fig. 3.11

8. Wrap the cloth with the wire and arrange it to pass between the fresh air ducting and the side panel (Fig. 3.12).


Fig. 3.12

9. Carefully pull the wire end until the cloth comes out by the upper part (Fig. 3.13). Repeat the operation as much as necessary until the fresh air ducting is free from dust or dirt.

Fig. 3.13

10. Assemble the inverter box.
11. Assemble the inverter.
12. Connect the inverter cables, paying special attention to the earth cable.
13. Renew the inverter box covers.
14. Renew the top cover and bottom front cover of the machine.
15. Once the maintenance operation has been completed, run the TEST program to ensure that the machine is operating properly. See TECHNICAL assistance Instructions manual.

3.5. Cleaning the Danfoss VLT 1500/2200 W inverter and the suction duct

Models MS/MG-613, MS/MG-617, MS/MG-623, EM/MG030, EM/MG040, EM/MG055

1. Remove the machine's top cover **A** and bottom front cover **B** (Fig. 3.14).

Fig. 3.14

2. Remove the cover **A** from the inverter box (Fig. 3.15).

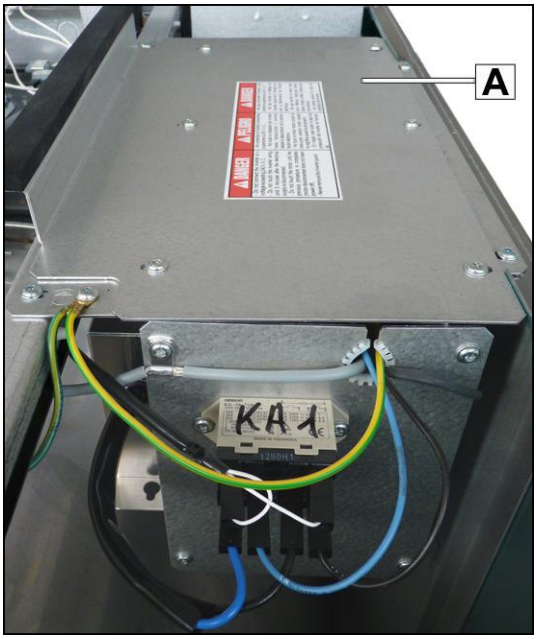


Fig. 3.15

3. Remove the cover **A** protecting the inverter connection terminals (Fig. 3.16).

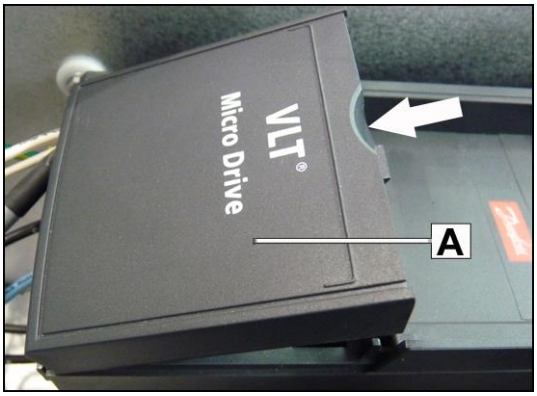


Fig. 3.16

4. Disconnect the communication wires **A** and the motor's thermal protection wires **B** (Fig. 3.17).

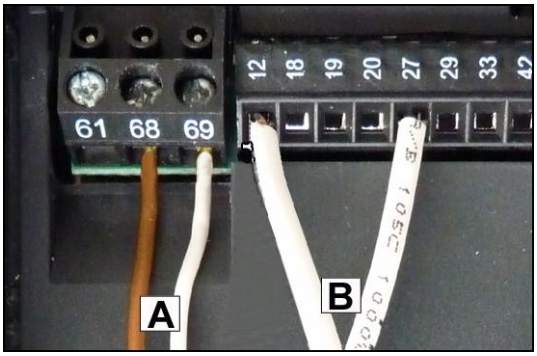


Fig. 3.17

5. Disconnect the earth cable **A**, power cables **B** and output to motor **C** from the inverter (Fig. 3.18).

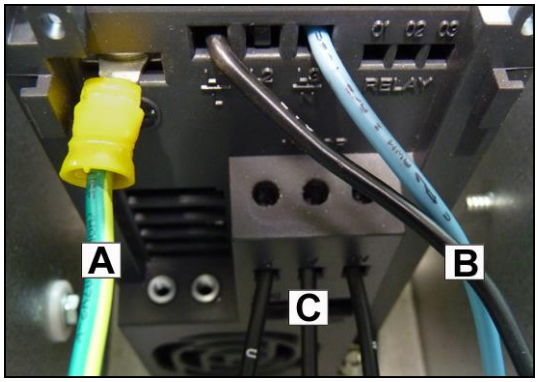


Fig. 3.18

6. Remove the screws **A** and **B** securing the inverter to the box (Fig. 3.19 and 3.20).
   Remove the inverter.

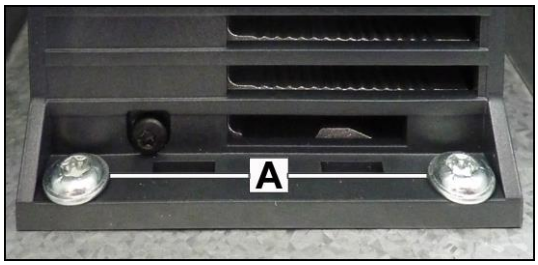


Fig. 3.19

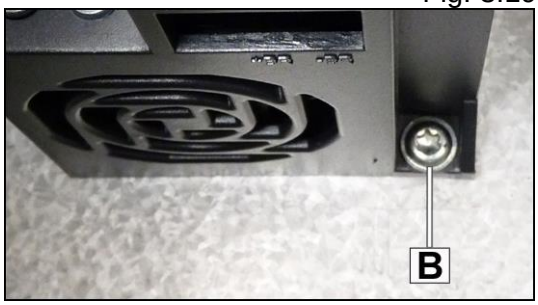


Fig. 3.20

7. Remove dirt from the inverter box with a brush or a dry cloth (Fig. 3.21).
8. Remove the screws **A** securing the inverter box.

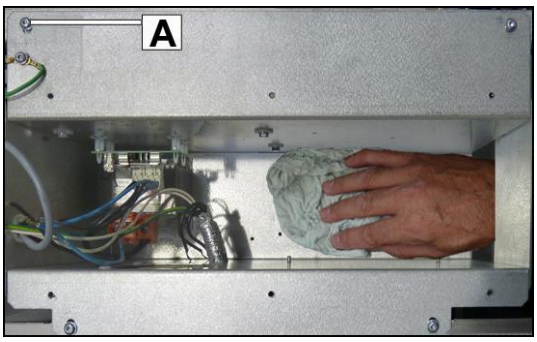


Fig. 3.21

9. Remove the screws **A** securing the inverter box angle bracket to the suction duct (Fig. 3.22).

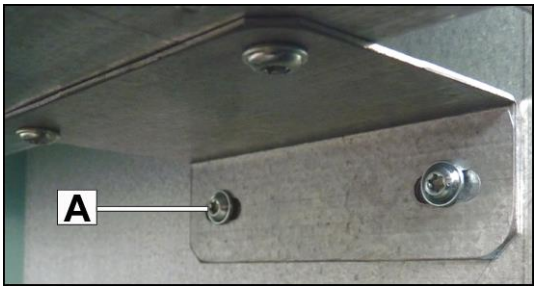


Fig. 3.22

10. Lift up the inverter box and separate it from the suction duct opening, taking great care not to pull on the wiring. Remove dirt from the opening and from both sides of the fan with a brush or a dry cloth (Fig. 3.23).

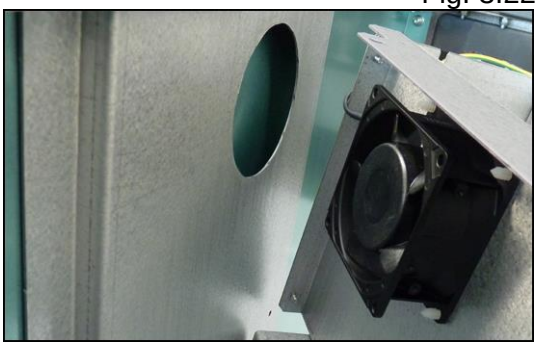


Fig. 3.23

11. To clean the inside of the suction pipe, insert the wire through the hole until it comes out at the bottom (Fig. 3.24).

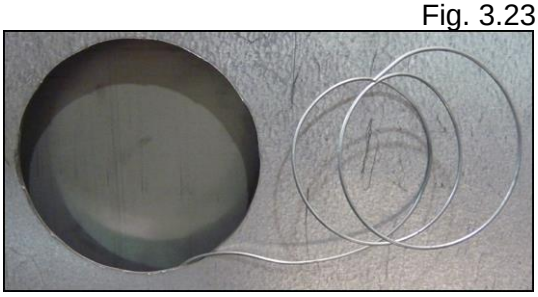


Fig. 3.24

12. Wrap the cloth with the wire and arrange it to pass between the tube and the side panel (Fig. 3.25).


Fig. 3.25

13. Gently pull the end of the wire until the cloth emerges through the hole at the top (Fig. 3.26). Repeat the operation as much as necessary until the fresh air ducting is free from dust or dirt.

Fig. 3.26

14. Remove the screws **A** and **B** from the inverter (Fig. 3.27 and 3.28).

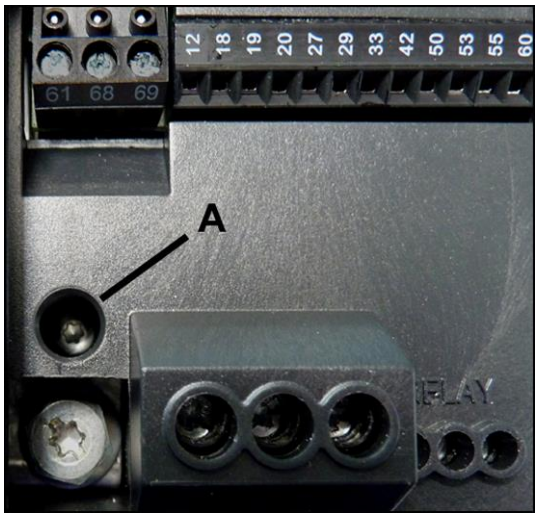


Fig. 3.27

Fig. 3.28

15. Separate the inverter's plastic protector from the metal base (Fig. 3.29).
16. Remove dirt from the fan, the heat sink and the ventilation grille in the plastic protector with a brush or a dry cloth.

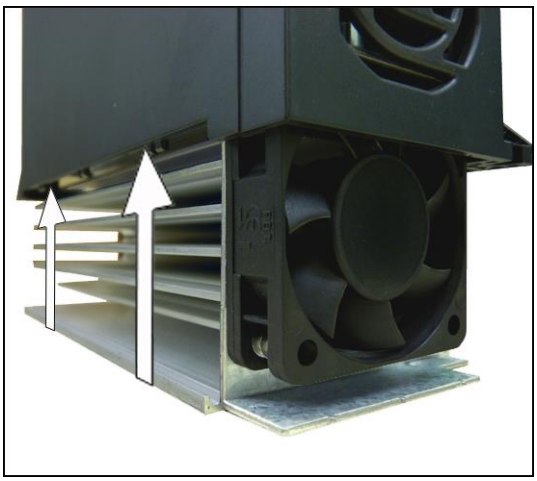


Fig. 3.29

17. Fit the plastic protector onto the inverter.
18. Fit the inverter in the box.
19. Connect the inverter cables, paying special attention to the earth cable.
20. Assemble the inverter box.
21. Renew the inverter box covers.
22. Renew the top cover and bottom front cover of the machine.
23. Once the maintenance operation has been completed, run the TEST program to ensure that the machine is operating properly. See TECHNICAL assistance Instructions manual.

3.6. Cleaning the Danfoss VLT 1500/2200 W inverter

RMS/RMG-613, RMS/RMG-617, RMS/RMG-623, REM/RMG033, REM/RMG040, REM/RMG055 models

1. Remove the bottom front cover **A** from the machine (Fig. 3.30).

Fig. 3.30

2. The inverter is attached at the back of the protection box **A** (Fig. 3.31). To extract it, the inverter needs to be extracted together with this box.

Fig. 3.31

3. Remove the communication and power supply connectors **A**. Do not forget to disconnect the connector **B** from the motor. Once disconnected, remove the protection cover **C** and the screws **D**, thereby releasing the inverter and box assembly (Fig. 3.32).

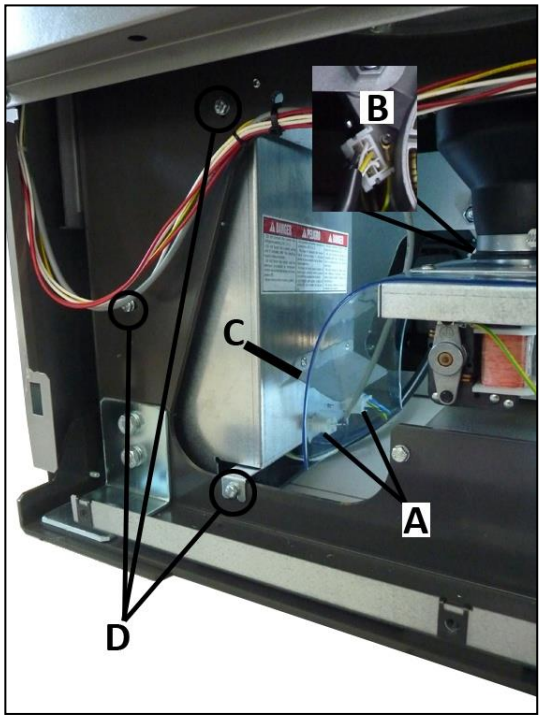


Fig. 3.32

4. Move the inverter and box assembly in direction **A** until it touches the motor support. Turn the assembly 90º as in **B** and move it in direction **C** (Fig. 3.33).

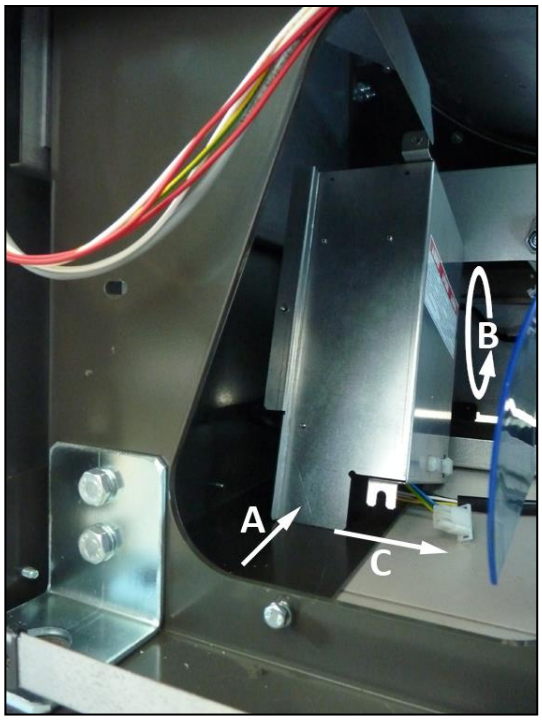


Fig. 3.33

5. Extract the assembly by moving it in the direction indicated as **A**. (Fig. 3.34).

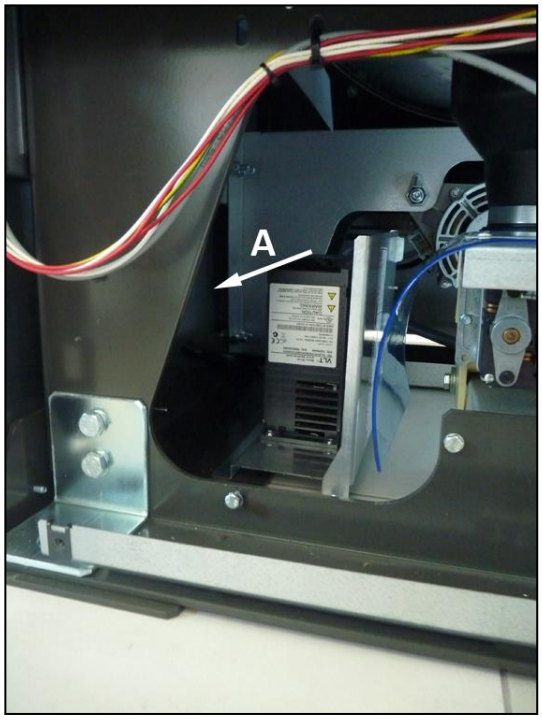


Fig. 3.34

6. Remove the cover **A** protecting the inverter connection terminals (Fig. 3.35).

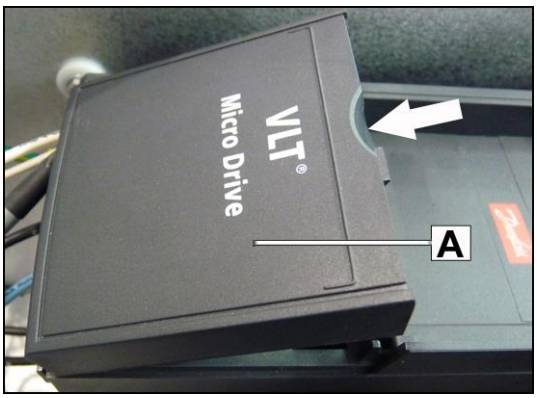


Fig. 3.35

7. Disconnect the communication wires A and the motor's thermal protection wires B (Fig. 3.36).

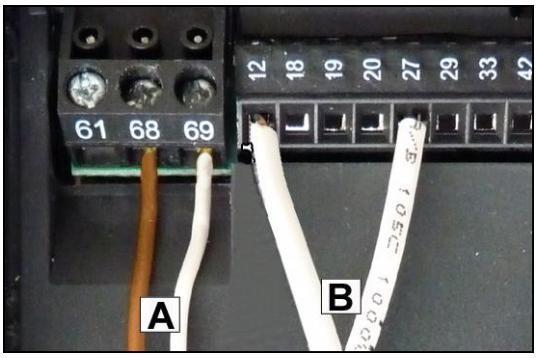


Fig. 3.36

8. Disconnect the earth wires **A**, the power supply wires **B** and the output wires to the motor **C** from the inverter (Fig.3.36). 3.37).

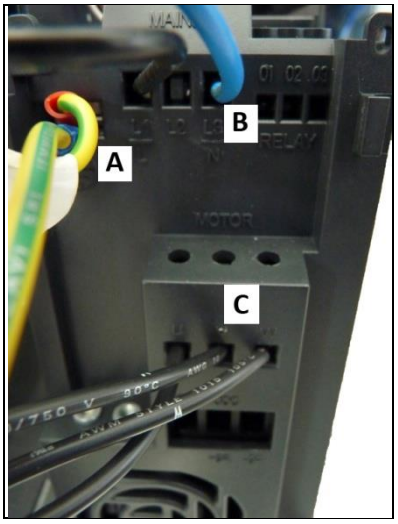


Fig. 3.37

9. Remove the screws **A** and **B** securing the inverter to the protection box (Fig. 3.38 and 3.39).

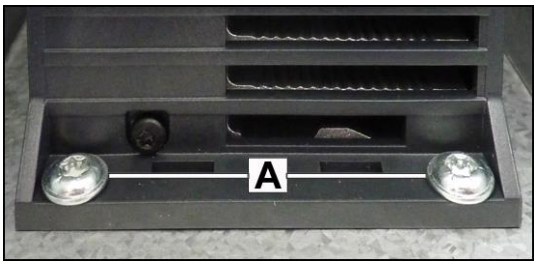


Fig. 3.38

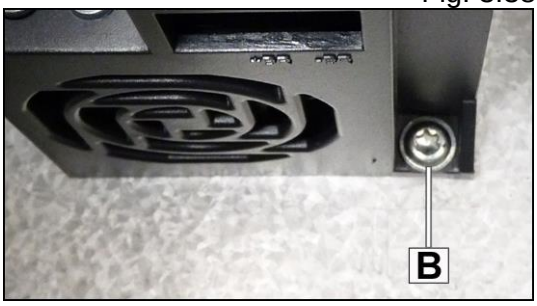


Fig. 3.39

10. Remove the screws **A** and **B** from the inverter (Fig. 3.40 and 3.41).

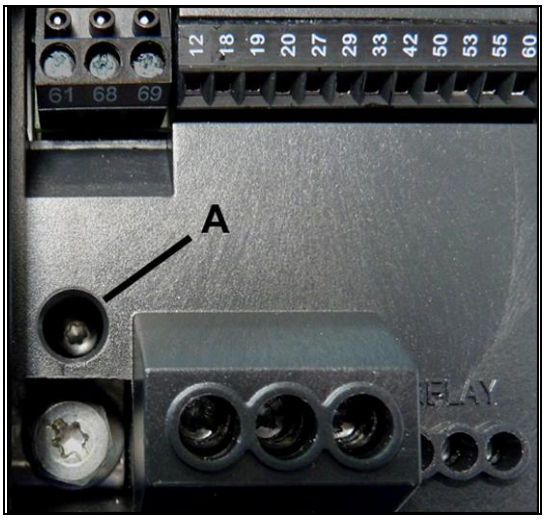


Fig. 3.40

Fig. 3.41

11. Separate the inverter's plastic protector from the metal base (Fig. 3.42).
12. Remove dirt from the fan, the heat sink and the ventilation grille in the plastic protector with a brush or a dry cloth.
13. Refit the plastic protector and tighten the screws **A** and **B** on the inverter (Fig. 3.40 and 3.41).

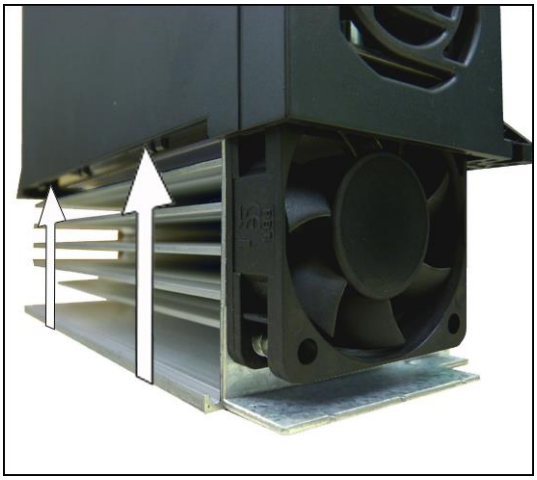


Fig. 3.42

14. Remove dust from inverter's protection box with a brush or a dry cloth (Fig. 3.43).

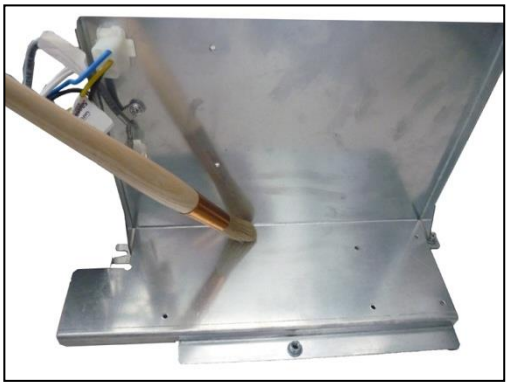


Fig. 3.43

15. Fit the inverter into the box by following the procedure described for dismantling it.
16. Connect the inverter wires paying particular attention to the earth wires.
17. Insert the inverter assembly with its protection box into the machine and reattach it.
18. Connect the inverter's communication and power supply connectors. Do not forget to connect the motor connector. Once connected, refit the protective cover for the inverter connectors.
19. Refit the machine's bottom front cover.
20. Once the maintenance operation has been completed, run the TEST program to ensure that the machine is operating properly. See TECHNICAL assistance Instructions manual.

APPENDIX 1. RENEWING THE INVERTER IN MODEL HS-5008/H5020

INTRODUCTION

Renewing the inverter in washer model HS-5008 and H5020 can cause the triggering of the VAR 8 alarm, directly affecting the operation of the machine. To avoid this fault, the microprocessor should be replaced with another device of Version 34 or higher.

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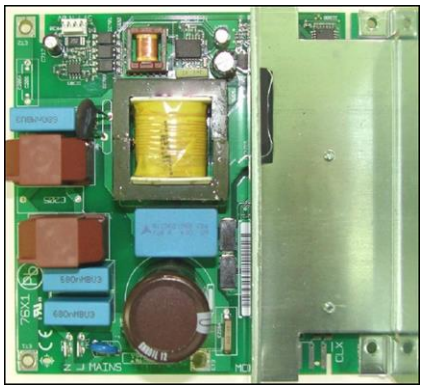
<tr><td rowspan="2">Inverter identification</td><td>Series inverter part number 358176</td><td>  </td></tr>
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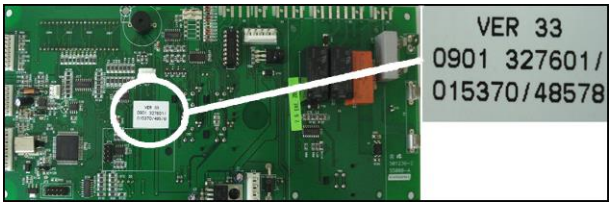
<tr><td>Microprocessor identification</td><td colspan="2"> 
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NOTE
Inverter 358176 code can run on any type of microprocessor version.
This appendix is an extract from bulletin BT-419.