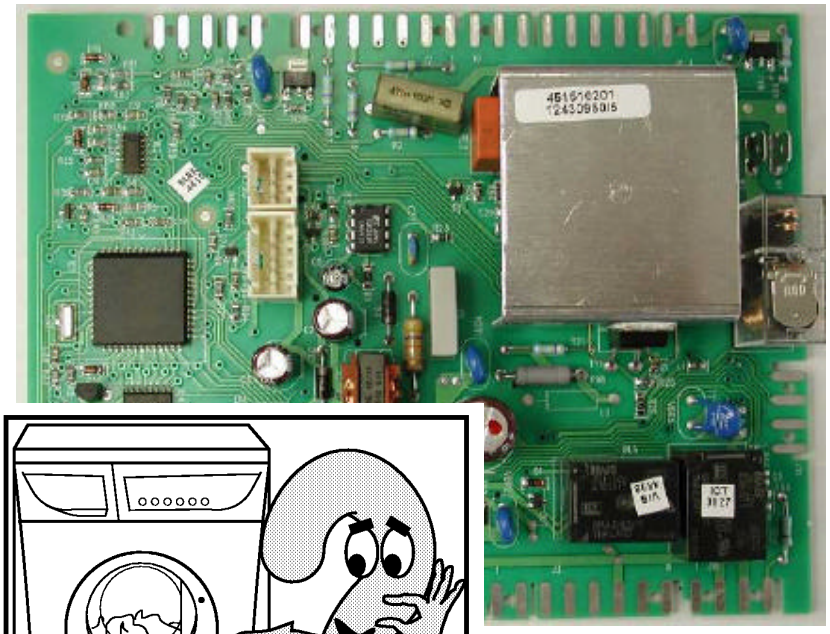
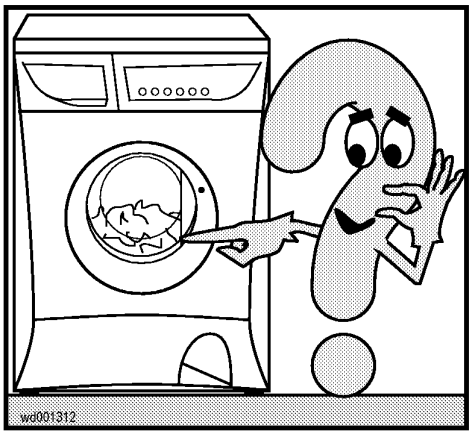
Electrolux DISTRIPARTS ORIGINAL ©

SERVICE MANUAL

WASHING





Diagnostics Guide to EWM2000 Electronic Control

WASHING MACHINES
&
WASHER DRYERS

Production: ZP Porcia (Italy)

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CONTENTS

INTRODUCTION

Aim of this manual

This manual aims to explain in a clear and simple way the phases a Service Engineer should follow to solve problems highlighted by the different alarm codes in EWM2000 electronic appliances with electronic control.

Operating procedure

1. Find the type of control involved by checking the summary at page **V**.
2. Every user interface is connected with a summary table of the operations necessary to read the possible alarms, to access the diagnostic cycle and to configurate the main electronic board (see column “Diagnostic Table”).
3. Read the memorized alarm and consult the relative information (see “alarm codes”, from page 8.1).
4. Delete memorized alarm.
5. If you cannot access the diagnostic cycle, consult chapter “No access to diagnostic cycle” (page 7.1).
6. In case of replacement of main PCB check if there are burn marks (see page 13.1-13.2)
7. After every replacing of the main electronic board, you need to configurate the module. You can find further information about the configuration code at page 10.1 (”configuration code”).
8. After every operation, check the functioning of the appliance through the diagnostic cycle. For further information see page 6.1 (diagnostic cycle phases)
9. (Delete memorized alarm).

SUMMARY OF EWM2000 ELECTRONIC CONTROLS (ZP)

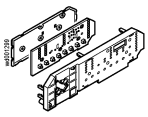
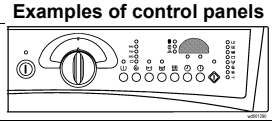
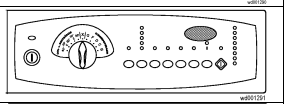
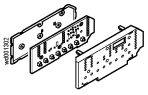
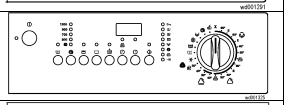
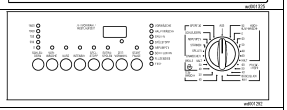
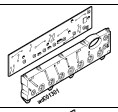
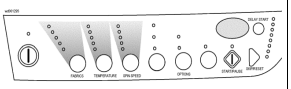
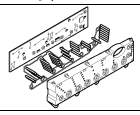
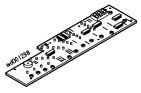
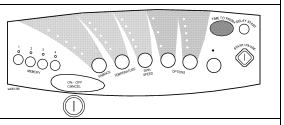
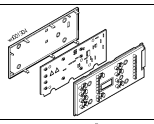
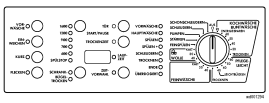
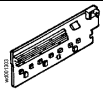
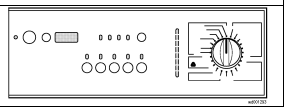
Type	Styling	Marks	User interface	Manuals (actual)	Note	Diagnostics table	Examples of control panels
FULL SMD	Alpha 2	Electrolux A.Martin- Electrolux		599 34 00-75; 599 33 70-05 599 34 05-08	Alarm Led	1	
				599 34 20-83	Obstructed filter Led	1	
	Ellipse	Privileg, Zoppas Husqvarna, Rosenlew, AEG, Marynen, Hansa		599 34 00-75; 599 33 70-05 599 34 05-08	Alarm Led	1	
				599 34 20-83	Obstructed filter Led	1	
	Multipanel (Built-in)	Electrolux Zanussi, AEG Privileg		599 34 55-61	With ON/OFF button	1	
	Sigma	Zanker		599 34 37-91	Selector with ON/OFF	2	
DELTA 3	Delta 3	Zanussi, Rex		599 34 27-56		3	
	Neat (Jetsy-IZ)	Zanussi, Rex, Aeg Privileg, Electrolux, Elektro-Helios		599 34 22-16		3	
INPUT	Input	Rex Zanussi Privileg		599 34 22-87		4	
AEG	Aeg	Aeg Privileg		599 34 15-14	Standard	5	
				599 34 39-45	Far East	5	
BIG SIZE	Multipanel (first version)	Zanker Elektro-Helios		599 33 52-03		1	

Table 1: FULL SMD with on/off button version

(the programme selector can be on the right or on the left of the module)

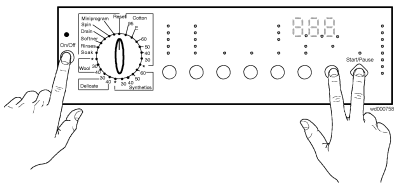
ACCESS TO THE DIAGNOSTICS

To access the diagnostics system:

→ switch off the appliance and turn the programme selector knob to RESET

→ press the START/PAUSE button together with one of the other buttons and then, holding down both buttons, press the ON/OFF button to switch on the appliance.

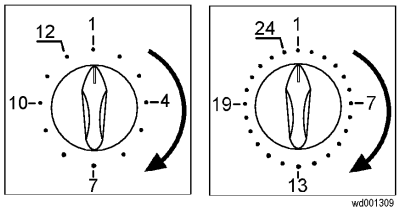
→ hold both buttons down until the buzzer (if featured) sounds and the LEDs begin to flash (about 4 seconds)



DIAGNOSTIC CYCLE

→ Correct operation of all the components in the appliance can be checked by turning the programme selector knob clockwise.

1. Operation of the user interface (step 0, page 6.1)
2. Water fill to wash compartment (step 1, page 6.1)
3. Water fill to pre-wash compartment (step 2, page 6.1)
4. Water fill to conditioner compartment (step 3, page 6.1)
5. Hot water fill or fill to bleach compartment (certain models only) (step 4, page 6.1)
6. Heating and, in Jetsystem models, recirculation (step 5, page 6.1)
7. Check for leaks from tub (step 6, page 6.1)
8. Drain and spin, check for pressure switch congruency (step 7, page 6.1)
9. Drying (washer/dryers only) (step 8, page 6.1)



ALARMS

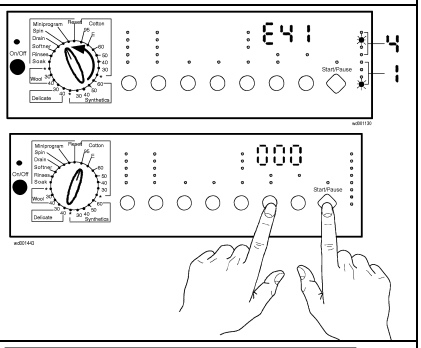
To read the last alarm condition, after accessing the diagnostics system:

→ turn the programme selector knob two positions counter-clockwise from the RESET position (23 o 11).

Cancelling the last alarm condition

→ press START/PAUSE button and no. **6** button at the same time during the course of the diagnostic cycle (2÷9).

→ The alarm is cancelled also when a new configuration is given to the main PCB.



CONFIGURATION OF THE MAIN PCB

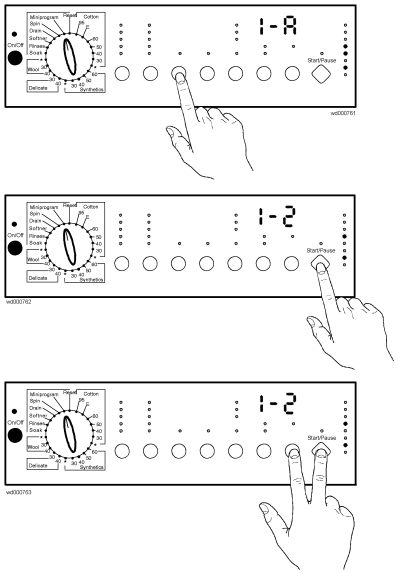
To access the machine configuration procedure, first enter the diagnostics system, and then:

→ turn the programme selector one position counter-clockwise; the display window shows the code relative to the position of the programme selector and, after two seconds, the code relative to the first of the 16 digits of the configuration code (position 0).

→ when one of the option buttons is pressed (with the exception of the START/PAUSE button), all the digits which make up the configuration code are displayed in sequence.

→ press the START/PAUSE button to modify the configuration code (digit by digit).

→ when all 16 digits have been entered, check that the code is correct, then memorize the code by pressing the START/PAUSE button and one of the option buttons at the same time; these buttons should be held down until the buzzer (if featured) sounds.



EXITING THE DIAGNOSTIC

→ To exit the diagnostic cycle, switch the appliance off, on, and then off again.

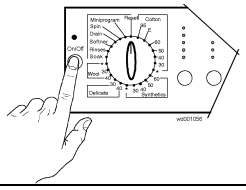
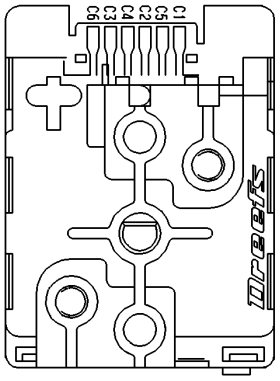


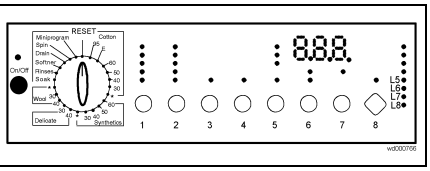
Table 1: FULL SMD with on/off button version
(the programme selector can be on the right or on the left of the module)

PROGRAMME SELECTOR	24-position selector knob	12-position selector knob (C1 not present)	Closure of selector contacts (C6 = common)					Display code
			C1	C2	C3	C4	C5	
	1 - Reset	1 - Reset		●	●	●	●	1 E
	2	2		●			●	0 6
	3	-		●	●			1 4
	4	3		●		●		0 C
	5	-		●	●	●		1 C
	6	4				●	●	0 A
	7	-	●					0 1
	8	-	●				●	0 3
	9	-	●			●		0 9
	10	5		●		●	●	0 E
	11	-			●		●	1 2
	12	-	●			●	●	0 b
	13	-	●		●			1 1
	14	-			●	●		1 8
	15	6	●		●		●	1 3
	16	-			●	●	●	1 A
	17	7	●		●	●		1 9
	18	8	●		●	●	●	1 b
	19	-	●	●				0 5
	20	9		●	●		●	1 6
	21	-					●	0 2
	22	10		●				0 4
	23	11				●		0 8
	24	12			●			1 0

● closed contact

Table of button codes

BUTTON No.		0	1	2	3	4	5	6	7	8
LED	L5	❍	❍	❍	❍	❍	❍	❍	❍	●
	L6	❍	❍	❍	❍	●	●	●	●	❍
	L7	❍	❍	●	●	❍	❍	●	●	❍
	L8	❍	●	❍	●	❍	●	❍	●	❍



❍ LED off
● LED lit

BINARY CODES

The table below can be used to convert the binary code shown by the LEDs into the corresponding letter or decimal number

value	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
											A	b	C	d	E	F
8	❍	❍	❍	❍	❍	❍	❍	❍	●	●	●	●	●	●	●	●
4	❍	❍	❍	❍	●	●	●	●	❍	❍	❍	❍	●	●	●	●
2	❍	❍	●	●	❍	❍	●	●	❍	❍	●	●	❍	❍	●	●
1	❍	●	❍	●	❍	●	❍	●	❍	●	❍	●	❍	●	❍	●

❍ LED off
● LED lit

Table 2: FULL SMD version with on/off switch on the programme selector
(the programme selector can be on the right or on the left of the module)

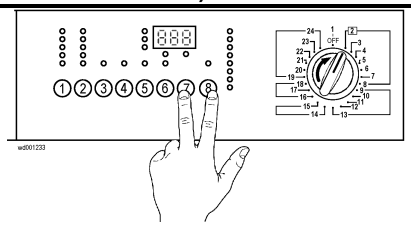
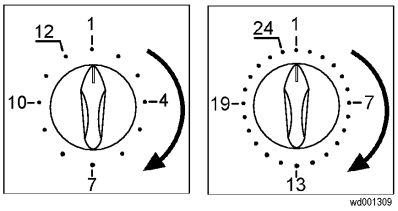
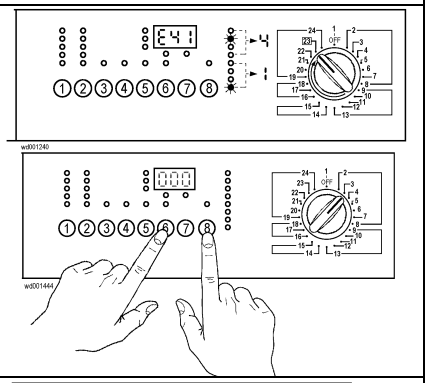
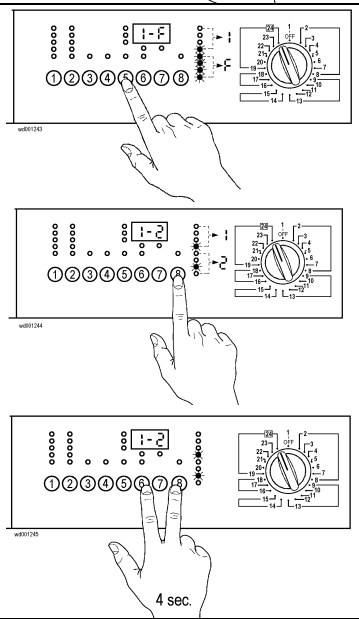
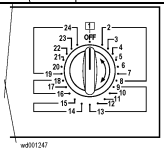
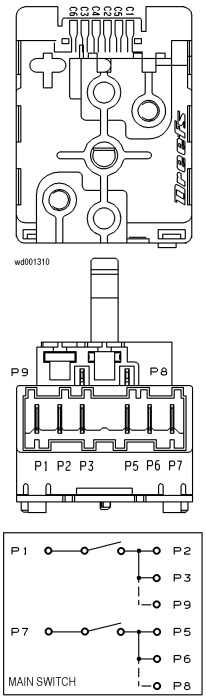
ACCESS TO THE DIAGNOSTICS	To access the diagnostics system: → switch off the appliance → press the START/PAUSE button (8) together with one of the other buttons and then, holding down both buttons, switch on the appliance by turning the programme selector one position clockwise. → hold both buttons down until the buzzer (if featured) sounds and the LEDs begin to flash (about 4 seconds).	
DIAGNOSTIC CYCLE	→ Correct operation of all the components in the appliance can be checked by turning the programme selector knob clockwise. 2. Operation of the user interface (step 0, page 6.1) 3. Water fill to wash compartment (step 1, page 6.1) 4. Water fill to pre-wash compartment (step 2, page 6.1) 5. Water fill to conditioner compartment (step 3, page 6.1) 6. Hot water fill or fill to bleach compartment (certain models only) (step 4, page 6.1) 7. Heating and, in Jetsystem models, recirculation (step 5, page 6.1) 8. Check for leaks from tub (step 6, page 6.1) 9. Drain and spin, check for pressure switch congruency (step 7, page 6.1) 10. Drying (washer/dryers only) (step 8, page 6.1)	
ALARMS	To read the last alarm condition, after accessing the diagnostics system: → turn the programme selector knob to the last position but one (**23** or **11**). To cancel the last memorised alarm condition: → press START/PAUSE button (**8**) and no. **4** button at the same time during one of the 8 phases of the diagnostic cycle and not in the alarm or configuration reading positions. → The alarm is cancelled also when a new configuration is given to the main PCB.	
CONFIGURATION OF THE MAIN PCB	To access the machine configuration procedure, first enter the diagnostics system, and then: → turn the programme selector **clockwise** to the last position (**24 or 12**); the code relative to the programme selector is displayed and after 2 seconds the code relative to the first of the 16 digits of the configuration code (position 0) is displayed → when one of the option buttons is pressed (with the exception of the START/PAUSE button), all the digits, which make up the configuration code, are displayed in sequence. → press the START/PAUSE button (8) to modify the configuration code (digit by digit). → when all 16 digits have been entered, check that the code is correct, then memorize the code by pressing the START/PAUSE button and one of the option buttons at the same time; these buttons should be held down for at least 4 seconds (i.e. the buzzer sounds).	
EXITING	→ To exit the diagnostic cycle, switch the appliance off, on, and then off again.	

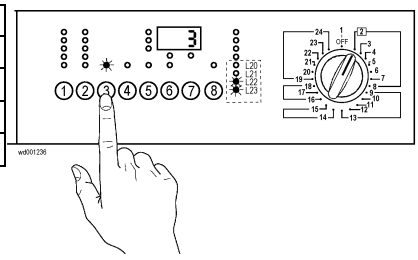
Table 2: FULL SMD version with on/off button on the programme selector
(the programme selector can be on the right or on the left of the module)

PROGRAMME SELECTOR	24-position selector knob	12-position selector knob (C1 not present)	Closure of selector contacts (C6 = common)					Display code
			C1	C2	C3	C4	C5	
	1 - Reset	1 - Reset		●	●	●	●	1 E
	2	2		●			●	0 6
	3	-		●	●			1 4
	4	3		●		●		0 C
	5	-		●	●	●		1 C
	6	4				●	●	0 A
	7	-	●					0 1
	8	-	●				●	0 3
	9	-	●			●		0 9
	10	5		●		●	●	0 E
	11	-			●		●	1 2
	12	-	●			●	●	0 b
	13	-	●		●			1 1
	14	-			●	●		1 8
	15	6	●		●		●	1 3
	16	-			●	●	●	1 A
	17	7	●		●	●		1 9
	18	8	●		●	●	●	1 b
	19	-	●	●				0 5
	20	9		●	●		●	1 6
	21	-					●	0 2
	22	10		●				0 4
	23	11				●		0 8
	24	12			●			1 0

● closed contact

Table of button codes

BUTTON No.		0	1	2	3	4	5	6	7	8
LED	L20	❍	❍	❍	❍	❍	❍	❍	❍	●
	L21	❍	❍	❍	❍	●	●	●	●	❍
	L22	❍	❍	●	●	❍	❍	●	●	❍
	L23	❍	●	❍	●	❍	●	❍	●	❍



❍ LED off
● LED lit

BINARY CODES

The table below can be used to convert the binary code shown by the LEDs into the corresponding letter or decimal number

Value	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
											A	b	C	d	E	F
8	❍	❍	❍	❍	❍	❍	❍	❍	●	●	●	●	●	●	●	●
4	❍	❍	❍	❍	●	●	●	●	❍	❍	❍	❍	●	●	●	●
2	❍	❍	●	●	❍	❍	●	●	❍	❍	●	●	❍	❍	●	●
1	❍	●	❍	●	❍	●	❍	●	❍	●	❍	●	❍	●	❍	●

❍ LED off
● LED lit

Table 3: DELTA3 - NEAT version

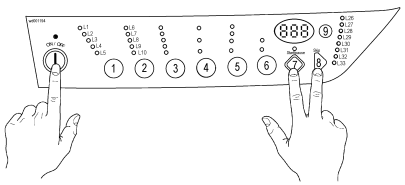
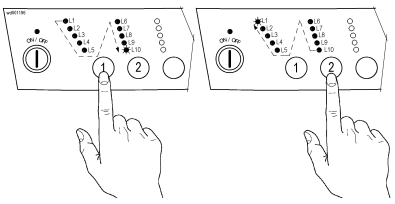
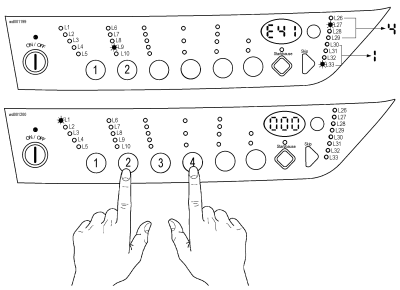
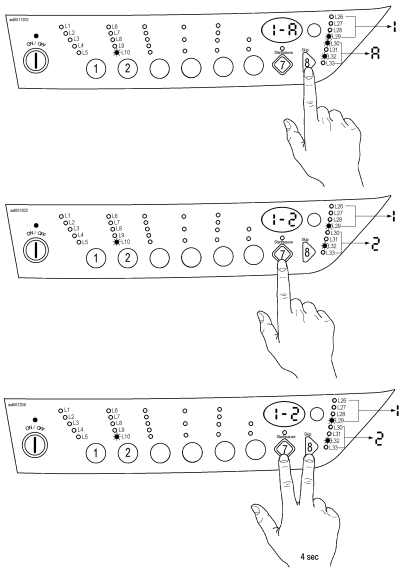
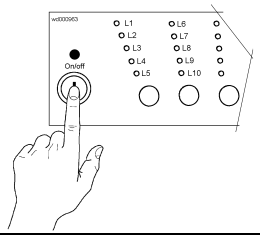
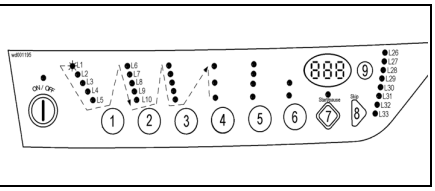
ACCESS TO THE DIAGNOSTICS	To access the system: → press the SKIP/RESET button to cancel the programme previously selected and switch off the appliance. → press the START/PAUSE (7) button together with the SKIP/RESET (8) button and then, holding down both buttons, press the ON/OFF button to switch on the appliance. → hold both buttons (START/PAUSE and SKIP/RESET) down until the buzzer sounds and the LEDs begin to flash (about 4 seconds)	
DIAGNOSTIC CYCLE	After accessing the diagnostics routine, the display board is checked for correct operation. All the LEDs (and, if featured, the display) light in sequence. → Press the FABRICS button (1) to pass to the subsequent phase of the test (LED L1 lights). Press the FABRICS button again to increment the number of the phase controlled. After the last phase, the display returns to its normal condition. The LED corresponding to the phase being tested lights (L1 .L10). → Press the TEMPERATURE button (2) to decrement the number of the phase controlled. After the last phase, the display returns to its normal condition(L10 .L1).(see page 3.2)	
ALARMS	To read the last alarm condition, after accessing the diagnostics system: → press the FABRICS or TEMPERATURE buttons until LED **L9** lights. To cancel the last memorized alarm condition: → press button no. **2** (TEMPERATURES) and no. **4** at the same time during one of the 8 phases of the diagnostic cycle and not in the alarm or configuration reading positions. → the alarm is cancelled also when a new configuration is given to the main PCB.	
CONFIGURATION OF THE MAIN PCB	To access the machine configuration procedure, first enter the diagnostics system, and then: → press the FABRICS (1) or TEMPERATURE (2) buttons until LED **L10** lights; the code relative to the first of the 16 digits of the configuration code (position 0) is displayed. → when the SKIP/RESET button (8) is pressed, all the digits which make up the configuration code are displayed in sequence. → press the START/PAUSE button (7) to modify the configuration code (digit by digit). → when all 16 digits have been entered, check that the code is correct, then memorize the code by pressing the START/PAUSE (7) and SKIP/RESET (8) buttons at the same time; these buttons should be held down for at least 4 seconds (i.e. until the buzzer sounds).	
EXITING	→ To exit the diagnostic cycle, switch the appliance off, then on, then off again.	

Table 3: DELTA3 - NEAT version

DIAGNOSTIC CONTROL SYSTEM		
Step	**LED lit**	**Function tested**
0	**All (in sequence)**	Tests the user interface (step 0, page 6.1)
1	**L1**	Water fill to wash compartment in the dispenser (step 1, page 6.1)
2	**L2**	Water fill to pre-wash compartment in the dispenser (step 2, page 6.1)
3	**L3**	Water fill to conditioner compartment in the dispenser (step 3, page 6.1)
4	**L4**	Hot water fill or cold water fill to bleach compartment (certain models only) (step 4, page 6.1)
5	**L5**	Heating and, in Jetsystem models, circulation pump (step 5, page 6.1)
6	**L6**	Rotation of drum at 250 rpm with water in the tub (test for leaks from tub) (step 6, page 6.1)
7	**L7**	Drain and spin at maximum speed; pressure switches. (step 7, page 6.1)
8	**L8**	Drying (washer/dryers only) (step 8, page 6.1)
9	**L9**	Displays the last alarm
10	**L10**	Configuration of the main electronic board

Table of button codes

BUTTON No.		**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
LED	**L30**	❍	❍	❍	❍	❍	❍	❍	❍	●
	L31	❍	❍	❍	❍	●	●	●	●	❍
	L32	❍	❍	●	●	❍	❍	●	●	❍
	L33	❍	●	❍	●	❍	●	❍	●	❍



❍ LED off
● LED lit

BINARY CODES

The table below can be used to convert the binary code shown by the LEDs into the corresponding letter or decimal number

Value	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
											A	**b**	**C**	**d**	**E**	**F**
8□	❍	❍	❍	❍	❍	❍	❍	❍	●	●	●	●	●	●	●	●
4□	❍	❍	❍	❍	●	●	●	●	❍	❍	❍	❍	●	●	●	●
2□	❍	❍	●	●	❍	❍	●	●	❍	❍	●	●	❍	❍	●	●
1□	❍	●	❍	●	❍	●	❍	●	❍	●	❍	●	❍	●	❍	●

❍ LED off
● LED lit

Table 4: INPUT version

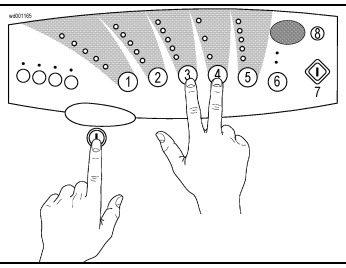
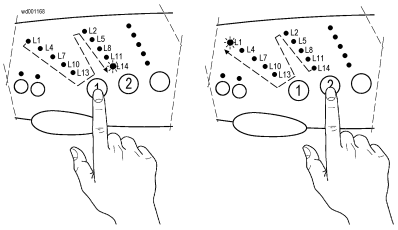
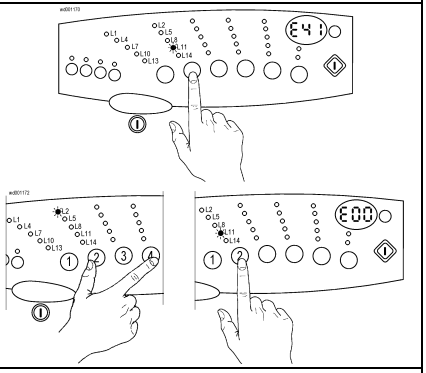
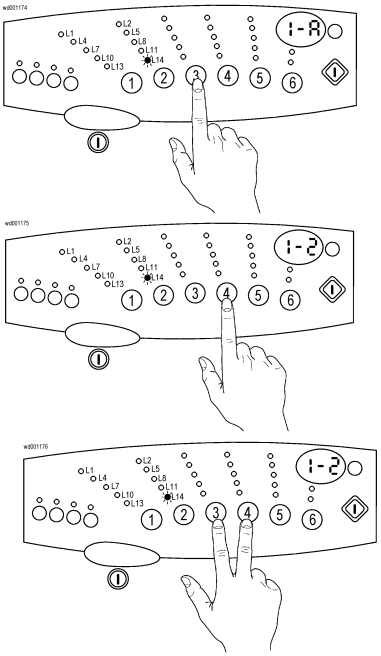
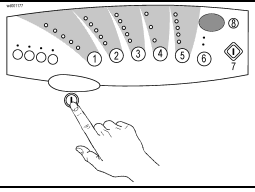
ACCESS TO THE DIAGNOSTICS	To access the system: → switch off the appliance. → press the SPIN button (**3**) together with the button n. **4** and then, holding down both buttons, press the ON/OFF button to switch on the appliance. → hold both buttons **(3** and **4**) down until the buzzer sounds and the LEDs begin to flash (about 4 seconds)	
DIAGNOSTIC CYCLE	After accessing the diagnostics routine, the display board is checked for correct operation. All the LEDs and the display light in sequence. → Press the FABRICS button (1) to pass to the subsequent phase of the test (LED L1 lights). → Press the FABRICS button (1) again to increment the number of the phase controlled. After the last phase, the display returns to its normal condition. The LED corresponding to the phase being tested lights (L1 .L4 …. L14). → Press the TEMPERATURE button (2) to decrement the number of the phase controlled. After the last phase, the display returns to its normal condition (L14 .L11 ….. L1). (see page 4.2)	
ALARMS	To read the last alarm condition, after accessing the diagnostics system: → press the FABRICS (**1**) or TEMPERATURE (**2**) buttons until LED **L11** lights. To cancel the last memorized alarm condition: → press button no. **2** (TEMPERATURES) and no. **4** at the same time during one of the 8 phases of the diagnostic cycle and not in the alarm or configuration reading positions. To check for correct operation, go back to the alarm reading position (the L11 LED is on); the display should show **E00.** → The alarm is cancelled also when a new configuration is given to the main PCB.	
CONFIGURATION OF THE MAIN PCB	To access the machine configuration procedure, first enter the diagnostics system, and then: → press the FABRICS (1) or TEMPERATURE (2) buttons until LED **L14** lights; the code relative to the first of the 16 digits of the configuration code (position 0) is displayed. → when the SPIN (3) button is pressed, all the digits which make up the configuration code are displayed in sequence. → to modify the configuration code (digit by digit) press button no. **4** → when all the 16 digits have been entered, check that the code is correct; then memorise the code by pressing the SPIN button (3) and the button no. **4** at the same time, holding them down for at least 4 seconds (i.e. the buzzer sounds).	
EXITING	→ To exit the diagnostic cycle, switch the appliance off, then on, then off again.	

Table 4: INPUT version

DIAGNOSTIC CONTROL SYSTEM		
Step	**LED lit**	**Function tested**
0	**All (in sequence)**	Tests the user interface (step 0, page 6.1)
1	**L1**	Water fill to wash compartment in the dispenser (step 1, page 6.1)
2	**L4**	Water fill to pre-wash compartment in the dispenser (step 2, page 6.1)
3	**L7**	Water fill to conditioner compartment in the dispenser (step 3, page 6.1)
4	**L10**	Hot water fill or cold water fill to bleach compartment (certain models only) (step 4, page 6.1)
5	**L13**	Heating and, in Jetsystem models, circulation pump (step 5, page 6.1)
6	**L2**	Rotation of drum at 250 rpm with water in the tub (test for leaks from tub) (step 6, page 6.1)
7	**L5**	Drain and spin at maximum speed; pressure switches. (step 7, page 6.1)
8	**L8**	Drying (washer/dryers only) (step 8, page 6.1)
9	**L11**	Displays the last alarm
10	**L14**	Configuration of the main electronic board

Table of button codes

BUTTON No.	LEDs lit	Display code
1	L1, L4, L7, L10, L13	1
2	L2, L5, L8, L11, L14	2
3	L3, L6, L9, L12, L15	3
4	L25, L28, L31, L34, L37	4
5	L26, L29, L32, L35, L38	5
6	L16, L19	6
7	--	12
8	--	7
M1	L27	8
M2	L30	9
M3	L33	10
M4	L36	11

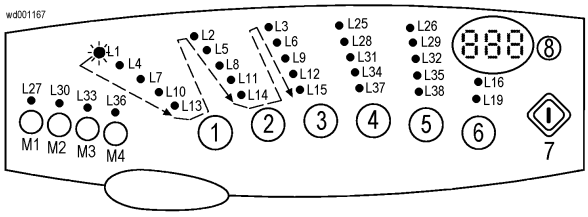


Table 5: AEG version (with on/off button on the programme selector)

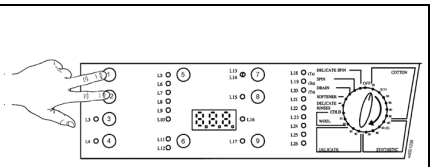
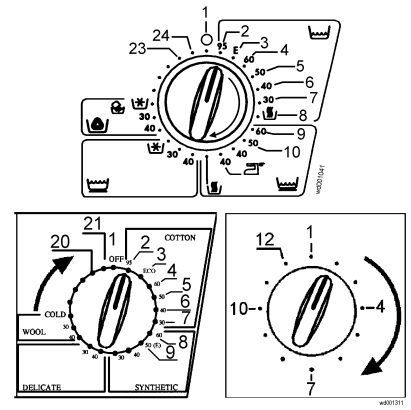
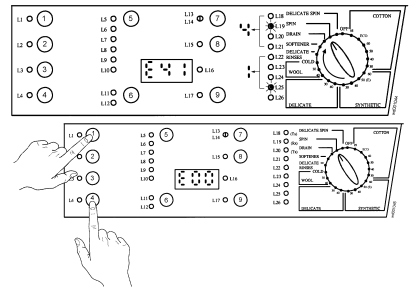
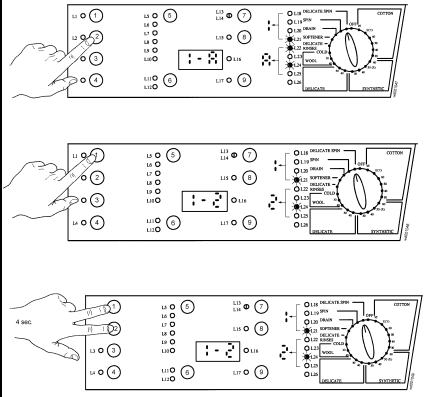
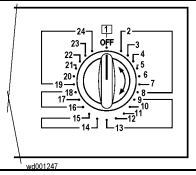
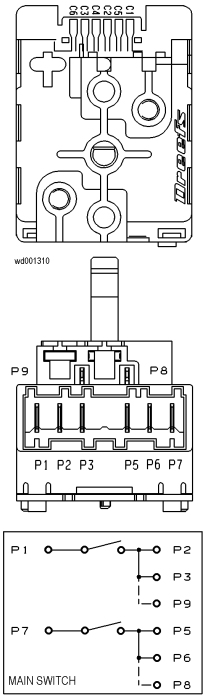
ACCESS TO THE DIAGNOSTICS	To access the system: → switch off the appliance and turn the programme selector knob to OFF/RESET. → press button **1** and **2** at the same time and then, while holding them down, switch on the appliance by turning the programme selector one position clockwise. → hold both buttons down until the buzzer (if featured) sounds and the LEDs begin to flash (about 4 seconds)	
DIAGNOSTIC CYCLE	→ Correct operation of all the components in the appliance can be checked by turning the programme selector knob clockwise. 2. Operation of the user interface (step 0, page 6.1) 3. Water fill to wash compartment (step 1, page 6.1) 4. Water fill to pre-wash compartment (step 2, page 6.1) 5. Water fill to conditioner compartment (step 3, page 6.1) 6. Hot water fill or fill to bleach compartment (certain models only) (step 4, page 6.1) 7. Heating and, in Jetsystem models, recirculation (step 5, page 6.1) 8. Check for leaks from tub (step 6, page 6.1) 9. Drain and spin, check for pressure switch congruency (step 7, page 6.1) 10. Drying (washer/dryers only) (step 8, page 6.1)	
ALARMS	To read the last alarm condition, after accessing the diagnostics system: → turn the programme selector knob to the last position but one (**11,20** or **23**). To cancel the last memorized alarm condition: → press button no. **1** and no. **4** at the same time during the course of the diagnostic cycle(3-10) → The alarm is cancelled also when a new configuration is given to the main PCB.	
CONFIGURATION OF THE MAIN PCB	To access the machine configuration procedure, first enter the diagnostics system, and then: → turn the programme selector clockwise to the last position (**24** o **21**) → the code relative to the programme selector is displayed and after 2 seconds the code relative to the first of the 16 digits of the configuration code (position 0) is displayed. → when button **2** is pressed, all the digits, which make up the configuration code, are displayed in sequence. → to modify the configuration code (digit by digit) press button 1. When all the 16 digits have been entered, check that the code is correct; → then memorise the code by pressing button **1** and **2** at the same time, holding them down for at least 4 seconds (i.e. the buzzer sounds).	
EXITING	→ To exit the diagnostic cycle, switch the appliance off, then on, then off again.	

Table 5: AEG version (with on/off button on the programme selector)

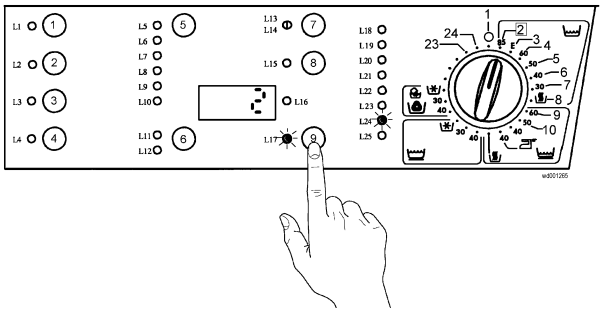


Selector knob position			Closure of selector contacts (C6 - common)					Display Code
24 Pos.	21 Pos.	12 Pos.	C1	C2	C3	C4	C5	
1	1	1		●	●	●	●	OF
2	2	2		●			●	OC
3	3	--		●	●			O5
4	4	3		●		●		O6
5	5	--		●	●	●		O7
6	6	4				●	●	OA
7	7	--	●					1O
8	--	--	●				●	18
9	8	--	●			●		12
10	9	5		●		●	●	OE
11	10	6			●		●	O9
12	11	--	●			●	●	1A
13	--	--	●		●			11
14	12	7			●	●		O3
15	13	--	●		●		●	19
16	--	8			●	●	●	OB
17	14	--	●		●	●		13
18	15	--	●		●	●	●	1B
19	16	--	●	●				14
20	17	9		●	●		●	OD
21	18	--					●	O8
22	19	10		●				O4
23	20	11				●		O2
24	21	12			●			O1

● closed contact

Table of button codes

BUTTON No.	DISPLAY	LED			
		L22	L23	L24	L25
1	9	●	❍	❍	●
2	6	❍	●	●	❍
3	5	❍	●	❍	●
4	4	❍	●	❍	❍
5	3	❍	❍	●	●
6	1	❍	❍	❍	●
7	7	❍	●	●	●
8	8	●	❍	❍	❍
9	2	❍	❍	●	❍



❍ LED off
● LED lit

BINARY CODES

The table below can be used to convert the binary code shown by the LEDs into the corresponding letter or decimal number

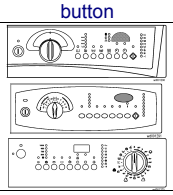
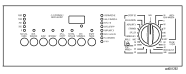
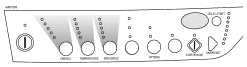
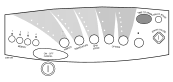
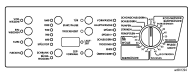
Value	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
											A	b	C	d	E	F
8	❍	❍	❍	❍	❍	❍	❍	❍	●	●	●	●	●	●	●	●
4	❍	❍	❍	❍	●	●	●	●	❍	❍	❍	❍	●	●	●	●
2	❍	❍	●	●	❍	❍	●	●	❍	❍	●	●	❍	❍	●	●
1	❍	●	❍	●	❍	●	❍	●	❍	●	❍	●	❍	●	❍	●

❍ LED off
● LED lit

DIAGNOSTICS CYCLE PHASES

Step	Components actioned	Operating conditions	Parameters displayed	Function tested
0	All the LEDs light in sequence. When a button is pressed, the corresponding LED lights.	Always operative	Button code	Operation of the user interface
1	- door interlock - wash solenoid	Door closed, water fill to anti-overflow level for max. 10 min	Water level in mm	Water fill to wash compartment
2	- door interlock - pre-wash solenoid	Door closed, water fill to anti-overflow level for max. 10 min	Water level in mm	Water fill to prewash compartment
3	- door interlock - pre-wash solenoid - wash solenoid	Door closed, water fill to anti-overflow level for max. 10 min	Water level in mm	Water fill to softener compartment
4	- door interlock - hot water or bleach solenoid	Door closed, water fill to anti-overflow level for max. 10 min	Water level in mm	Hot water fill or fill to bleach compartment (certain models only)
5	- door interlock - (wash solenoid if level is lower than the anti-boiling) - recirculation pump - heating element	Door closed, water fill to above anti-boiling level if not yet reached, heating for max. 10 min or to 90°C	Water temperature in °C	Heating and recirculation (jetsystem)
6	- door interlock - (wash solenoid if level is <anti-boiling) - motor	Door closed, (water fill above anti-boiling level), drum movement at 50 rpm (cw), motor movement until the drum reaches 250 rpm (ccw)	Motor speed (rpm)	Check for leaks from tub
7	- door interlock - drain pump - motor	Door closed, water drain, motor movement (from lower level to anti-foam level), until maximum spin speed is reached	Motor speed (rpm ÷ 10)	Drain and spin, check for pressure switch congruency
8	- door interlock - drain pump - drying heater (full power) - fan motor - condensation solenoid	Door closed, water drain to a level lower than the anti-boiling device, drying heater for max. 10 min or until the drying temperature sensor (fitted to the duct) detects a temperature of 150°C	NTC drying temperature and condenser temperature (°C, displayed alternately for 2 sec)	Drying (washer/dryers only)

Access the diagnostic cycle:

Table 1: FULL SMD with on/off button	Table 2: FULL SMD with on/off switch on the selector	Table 3: DELTA3 - NEAT	Table 4: INPUT	Table 5: AEG
				

NO ACCESS TO DIAGNOSTICS PROGRAMME

1. NO LEDs SWITCH ON IN THE USER INTERFACE?

Are the power supply and the connection functioning?	No →	Replace/set cable, check connection
Yes ↓		
Is the interference suppressor functioning?	No →	Replace interference suppressor
Yes ↓		
Is the general switch functioning?	No →	Replace general switch/programme selector
Yes ↓		
Is the wiring which connects the general junction block, the interference suppressor, the general switch functioning correctly?	No →	Replace/Reset wiring
Yes ↓		
Is the wiring between the general switch and the main PCB (**W1** and **J2.3**connectors) functioning correctly?	No →	Replace/Reset wiring
Yes ↓		
Is the wiring which connects the main PCB and the user interface functioning correctly? (plug in and out)	No →	Replace/Reset wiring
Yes ↓		
Replace main PCB, is the appliance functioning correctly?	No →	Replace user interface and carry out diagnostic cycle
Yes ↓		
Carry out diagnostic cycle		

2. SOME LEDs SWITCH ON IN THE USER INTERFACE?

The push buttons do not jam in the holes of the control panel and activate correctly the different functions?	No →	Check mechanical problems (control panel/push buttons)
Yes ↓		
Can you cancel the cycle? (if it is not canceled, selecting any button the display shows the signal Err or the phases LEDs blink)	No →	Neat/Delta3washing machines: check if the skip/reset button functions correctly Input washing machines: see 1-2 closure contact start switch (when it switches off, it cancels the cycle) and relative connection wiring to the main PCB Washing machines with selector: check selector contacts closure in position 1 (reset) and relative connection wiring to user interface
Yes ↓		
Does the programme selector (where featured) close correctly in the first (and in the second) position?	No →	Replace programme selector
Yes ↓		
Is the wiring of the programme selector (where featured) efficient?	No →	Replace/reset wiring
Yes ↓		
Does the user interface carry out a self-diagnosis?	No →	Replace user interface
Yes ↓		
Does the appliance carry out correctly every step of the diagnostics test?	No →	Change main PCB and carry out diagnostic cycle
Yes ↓		
Carry out diagnostic cycle		

ALARM CODES

Alarm code	Description of fault	User code	Effect	Page
E11	Problems with water fill in wash phase	**E10**	Cycle PAUSED	**8.2**
E12	Problems with water fill in drying	**E10**	Cycle PAUSED	**8.3**
E21	Problems with water drain in wash phase	**E20**	Cycle PAUSED	**8.4**
E22	Problems with water drain during drying or drying condenser blocked	**E20**	Heating phase skipped	**8.5**
E31	Analogic (electronic) pressure switch circuit faulty	**---**	Cycle blocked with door closed	**8.6**
E32	Incorrect calibration of analogic (electronic) pressure switch	**---**	Cycle PAUSED	**8.7**
E33	Incongruency between level of analogic (electronic) pressure switch and level of anti-boiling pressure switch 1	**---**	Cycle blocked with door closed	**8.8**
E34	Incongruency between level of electronic pressure switch and level of anti-boiling pressure switch 2	**---**	Cycle blocked with door closed	**8.9**
E35	Water level too high	**---**	Cycle blocked with door closed and water drain	**8.10**
E36	"Sensing" circuit of anti-boiling pressure switch 1 faulty	**---**	Cycle blocked with door closed	**8.11**
E37	"Sensing" circuit of anti-boiling pressure switch 2 faulty	**---**	Cycle blocked with door closed	**8.11**
E38	Pressure chamber blocked	**---**	Heating phase skipped	**8.12**
E41	Door open	**E40**	Cycle PAUSED	**8.13-14**
E42	Problems with door closure	**E40**	Cycle PAUSED	**8.15-16**
E43	TRIAC which powers the door interlock faulty	**E40**	Cycle PAUSED	**8.17-18**
E44	"Sensing" circuit of door delay interlock faulty	**---**	Cycle blocked	**8.19**
E45	"Sensing" circuit of door delay interlock triac faulty	**---**	Cycle blocked with door closed	**8.19**
E51	TRIAC which powers the motor short-circuited	**---**	Cycle blocked with door closed (after 5 attempts)	**8.20**
E52	No signal from tachometric generator	**---**	Cycle blocked with door closed (after 5 attempts)	**8.21-22**
E53	"Sensing" circuit of motor TRIAC faulty	**---**	Cycle blocked with door closed	**8.23**
E54	Relays (motor) contacts faulty	**---**	Cycle blocked with door closed (after 5 attempts)	**8.23**
E61	Insufficient heating during washing	**---**	Heating phase skipped	**8.24**
E62	Overheating during washing	**---**	Drain, end of cycle	**8.25**
E63	Insufficient heating during drying		Heating phase skipped	**8.26**
E64	Overheating during drying	**---**	Heating phase skipped	**8.27**
E66	Power relay to heating element faulty	**---**	Drain, end of cycle	**8.28**
E71	NTC wash sensor faulty	**---**	Heating phase skipped	**8.29**
E72	NTC sensor on drying condenser faulty	**---**	Heating phase skipped	**8.30**
E73	NTC sensor on drying duct faulty	**---**	Heating phase skipped	**8.31**
E84	"Sensing" circuit on circulation pump triac faulty	**---**	Drain, end of cycle (door open)	**8.32**
E85	Circulation pump faulty	**---**	Drain, end of cycle (door open)	**8.33**
E91	Communications error between main PCB and user interface	**---**	---	**8.34**
E93	Configuration error	**E90**	Cycle blocked	**8.34**
E94	Incorrect configuration of washing cycle	**E90**	Cycle blocked	**8.34**
EF1	Drain filter blocked	**LED-EF0**	---	**8.35**
EF2	Excessive detergent	**LED-EF0**	---	**8.35**

E11 Problems during water filling phase – washing

(Machine tries to fill for 10 min without reaching the level)

Checks to do:

Inside the diagnostic cycle make the machine filling in each compartment (step 1,2,4)

Is there one of the tree valves that is not working?

NO → Verify that tap and hoses are letting the water coming in. (tap open, hoses connected and not kinked)

YES ↓

Is the Ohm value of the valve about 3,8 KOhm? (Measure directly on the valve without cable) -see pic.01-

NO → Change the valve and run again diagnostic cycle to verify any further possible alarm

YES ↓

Is the wiring OK? (Measure the 3,8 K Ω of the valve from the cable Main board side: - between J6-1 and J6-5 wash valve; - between J6-2 and J6-4 prewash valve; -between J6-3 and J6-7 hot or bleach valve. - see pic.02 -

NO → Replace the cable and run again diagnostic cycle to verify any further possible alarm.

YES ↓

Change the main Board and run again diagnostic cycle to verify any further possible alarm.

If there are burn marks on electronic board, see page 13.1-2

E12 Problems filling water during drying cycle phase

(To check if the drying inlet valve is working machine measure the increasing water level at the beginning of the drying phase. Alarm appear after 10 min of filling without reaching the level)

Checks to do:

Inside the diagnostic cycle make the machine starting the drying cycle (step 8)

Is small quantity of water going through the hose that connects the condenser to the detergent compartment? - see pic. 03 -

NO → Are the tap and hoses letting the water coming in. (tap open, hoses connected and not kinked)

YES ↓

Do the diagnostic cycle again and verify any further possible alarm.

YES ↓

Is the Ohm value of the valve about 4,0 KOhm? (Measure directly on the valve without cable) - see pic 01 -

NO → Change the valve and run again the diagnostic cycle to verify any further possible alarm.

YES ↓

Is the wiring OK? Measure the 4,0 K Ohm of the valve from the cable Main board side between connector J6-6 and J6-3 - see pic.02 -

NO → Check / change the cable and run again the diagnostic cycle to verify any further possible alarm.

YES ↓

Change the main board and run again the diagnostic cycle to verify any further possible alarm.

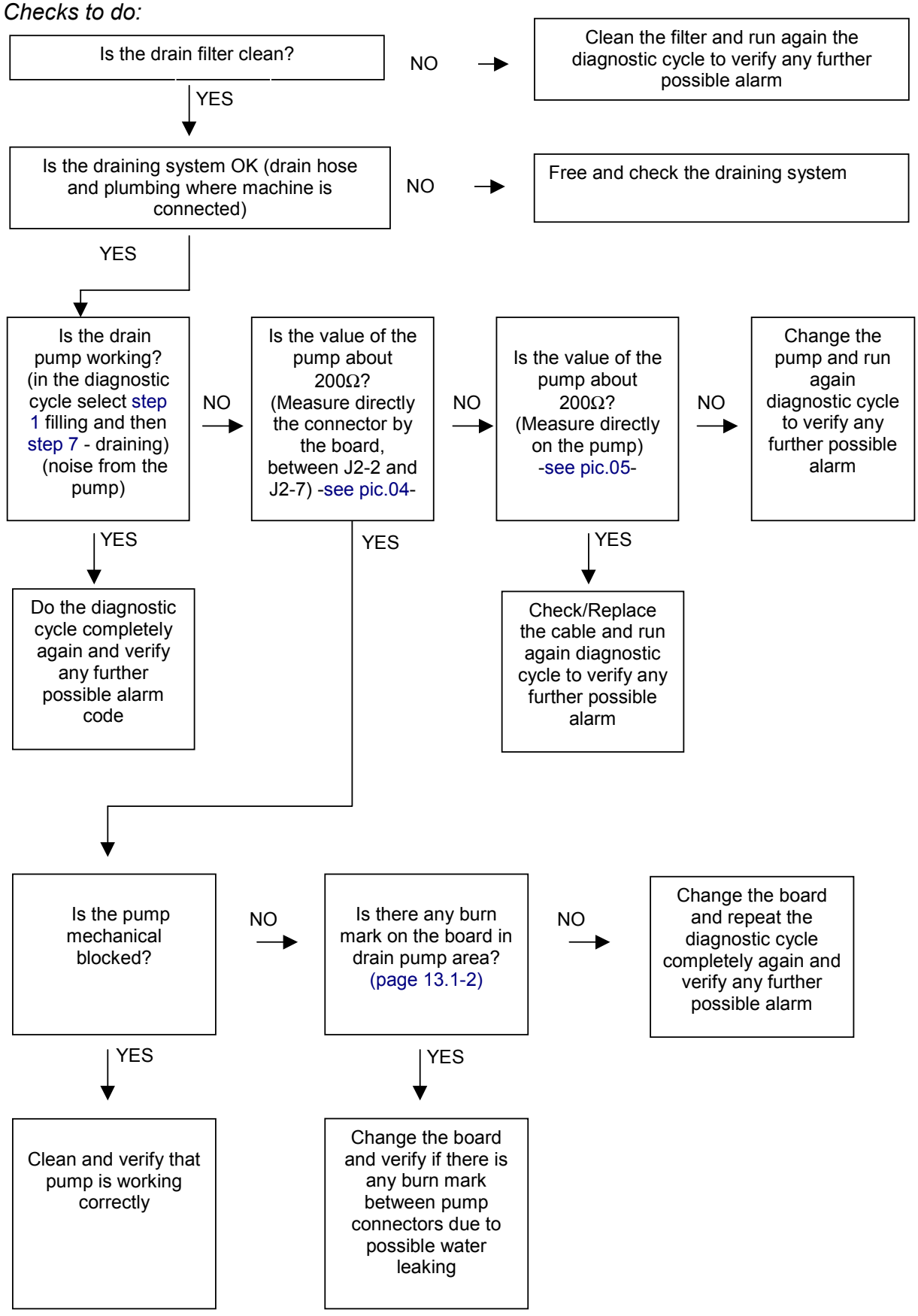
If there are burn marks on electronic board, see page 13.1-2

E21

Problems during draining phase

(Machine tries to drain for 10 min without emptying the tub)

Checks to do:



E22 Difficulties in draining water during drying phase

Checks to do:

Is the condenser clean?
-see pic.06 -

NO → Clean the condenser and repeat completely the diagnostic cycle to verify any further possible alarm

YES ↓

Do the diagnostic cycle completely again and verify any further possible alarm code

E31 The analogic pressure switch is giving to the main board a signal outside the range

Checks to do:

Measure a close circuit between J4-3, J4-4 and J4-5 and the 3 connector on analogic pressure switch plug (they are 3 independent connections)
Is the cable between main board and analogic pressure switch OK and connected correctly on both sides?
- see pic.07-

NO → Reconnect and/or replace the cable and do the diagnostic cycle again to verify any further possible alarm code.

YES ↓

Change the analogic pressure switch and do the diagnostic cycle completely again to verify any further possible alarm code. Is the machine displaying the alarm code again?

YES ↓

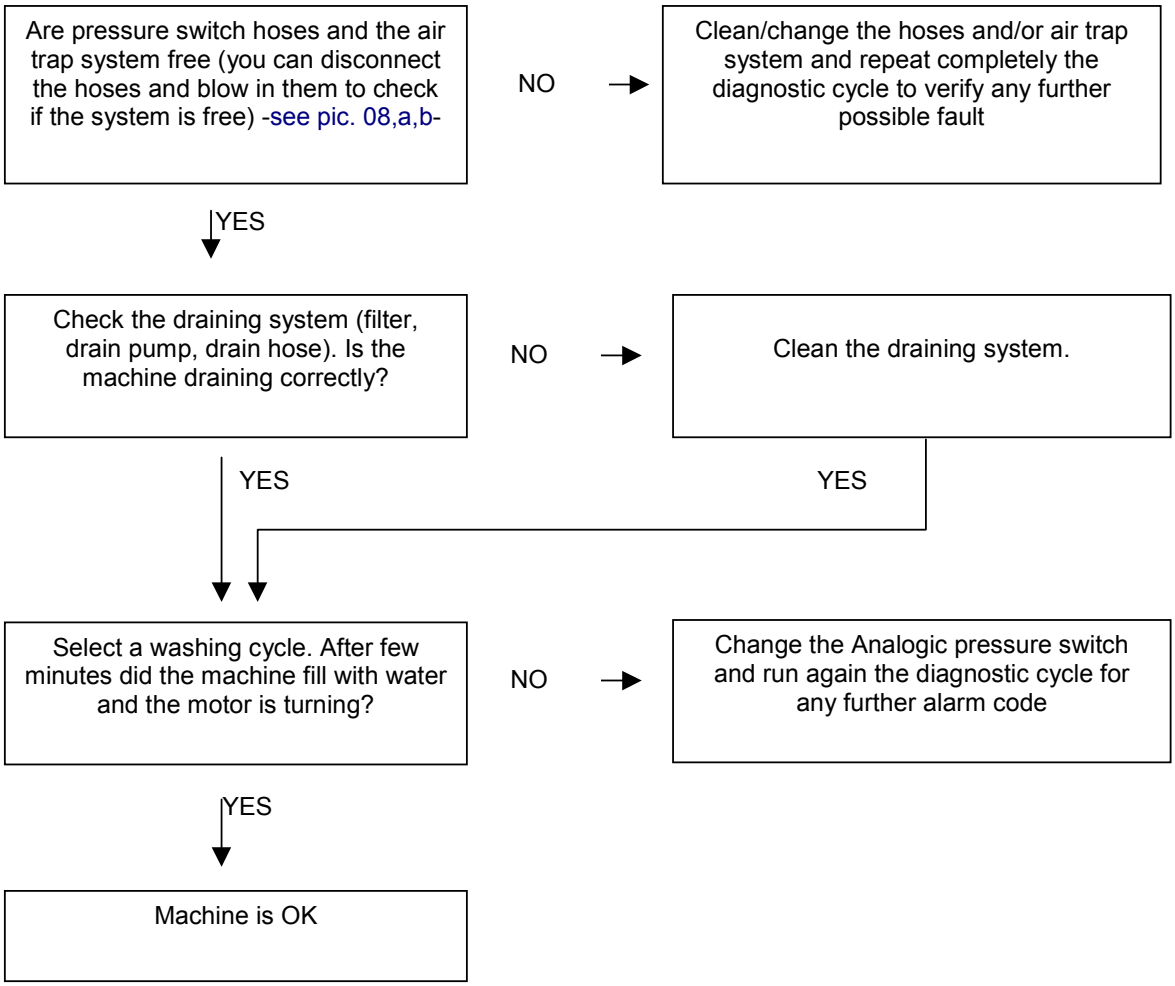
Change Main Board and do the diagnostic cycle completely again to verify any further possible alarm code.

If there are burn marks on electronic board, see page 13.1-2

E32 The analogic pressure switch is giving an error during the calibration phase

(At the beginning of each cycle the appliance drain to empty the tub
and create a 0 level to verify the calibration of the analogic pressure switch)

Checks to do:



E33 There is an incongruity between the water level measured by the analogic pressure switch and the mechanical pressure switch " anti-boil switch 1 "

Checks to do: (incongruity for more then 60 sec)

Empty the machine. Are pressure switch hoses and the air trap system free? (you can disconnect the hoses and blow in them to check if the system is free) –see pic.08,a,b-

NO → Clean/change the hoses and/or air trap system and repeat completely the diagnostic cycle to verify any further possible fault

YES ↓

Verify the pressure switch hoses. Can you see any leak or cut in the hoses? -see pic. 09, 10-

(cuts or damages to the hoses might be very difficult to see)

NO → Reconnect hoses, start the diagnostic cycle and go to step 2, fill water up to the lower part of the door and stop machine (machine could stop after 60sec. timeout, you can reach the level by selecting step 1 and again step 2) you should hear the 2 "clicks" made by the mechanical pressure switch. On main board measure between J2-1 and J2-6, you should find a close circuit. Is the mechanical pressure switch OK? -see pic.11-

NO → Measure directly on the pressure switch -DON'T DISCONNECT THE HOSE- between connector 11 and 14 do you measure a close circuit? - see pic.12-

NO → Change the mechanical pressure switch and run again the diagnostic cycle to verify any further possible alarm

YES ↓ Change the hoses and repeat completely the diagnostic cycle to verify any further possible alarm

YES ↓

YES ↓ Change / check the cable and verify any further possible alarm

Drain the water and select again step 2: after 60 sec. does the alarm appear? (In the newer models with display you can read the increasing of the water level measured by the analogic pressure switch)

NO 1 → The fault can be caused by a very small leak in the pressure hose or air trap system that can appear after several time of use

NO 2 → The fault can be caused by the washing heating element that loose his insulation giving strange signal to the main board. Usually the fault occurs when the element is hot.

YES ↓

Change the analogic pressure switch and run the diagnostic cycle to verify any further possible alarm → If the alarm still appears change the main board and get into diagnostic cycle to verify any further possible alarm

If there are burn marks on electronic board, see page 13.1-2

E34 There is an incongruity between the water level measured by the analogic pressure switch and the mechanical pressure switch "anti-boil switch 2"

(incongruity for more then 60 sec)

Checks to do:

Empty the machine. Are pressure switch hoses and the air trap system free? (you can disconnect the hoses and blow in them to check if the system is free) –see pic.08,a,b-

NO → Clean/change the hoses and/or air trap system and repeat completely the diagnostic cycle to verify any further possible fault

YES ↓

Verify the pressure switch hoses. Can you see any leak or cut in the hoses? -see pic. 09, 10-

(cuts or damages to the hoses might be very difficult to see)

NO → Reconnect hoses, start the diagnostic cycle go to step 2 fill water up to the lower part of the door and stop the machine (machine could stop after 60sec. timeout, you can reach the level by selecting step 1 and again step 2) you should hear the 2 "clicks" made by the mechanical pressure switch. On main board measure between W2 and J2-6 you should NOT find an open circuit and between J2-5 and W2 an open circuit. Is the mechanical pressure switch OK? -see pic.13-

NO → Measure directly on the pressure switch -DON'T DISCONNECT THE HOSE- between connector 21 e 22 do you measure a open circuit, between 21 and 24 a close circuit? Is pressure switch OK? -see pic. 14-

NO → Change the mechanical pressure switch and run again the diagnostic cycle to verify any further possible alarm

YES ↓ Change the hoses and repeat completely the diagnostic cycle to verify any further possible alarm

YES ↓ Change / check the cable and verify any further possible alarm

YES ↓

Drain the water and measure between J2-5 and W2 do you find the circuit close?

NO → Change / check the cable and verify any further possible alarm. In Washer-dryers models make sure the connector is plugged in correctly –see pic.15-

YES ↓

Change the analogic pressure switch and run the diagnostic cycle to verify any further possible alarm → If the alarm still appears change the main board and get into diagnostic cycle to verify any further possible alarm

E35 Water level too high

The electronic board measures a water level from analogic pressure switch higher then 300 mm for more then 15 seconds.

Checks to do:

Empty the machine. Are pressure switch hoses and the air trap system free? (you can disconnect the hoses and blow in them to check if the system is free) –see pic.08,a,b-

NO → Clean/change the hoses and/or air trap system and repeat completely the diagnostic cycle to verify any further possible fault.

YES ↓

Is the machine filling water when main switch is turned OFF?

NO → Get inside diagnostic cycle at step 8. After door lock is the machine also filling water?

NO → Is the cable between main board and analogic pressure switch connected correctly on both sides?

NO → Reconnect and/or replace the cable and do the diagnostic cycle completely again to verify any further possible alarm code.

YES ↓ Change the inlet valves and repeat completely the diagnostic cycle to verify any further possible alarm.

YES ↓ Change the main board and repeat completely the diagnostic cycle to verify any further possible alarm

YES ↓ Change the analogic pressure switch and run the diagnostic cycle to verify any further possible alarm

If there are burn marks on electronic board, see page 13.1-2

E36 The sensing of the ”anti-boil switch 1“ on the electronic board is not working properly

Checks to do:

Are pressure switch hoses and the air trap system free?
(you can disconnect the hoses and blow in them to check if the system is free)
–see pic.08,a,b-

NO → Clean/change the hoses and/or air trap system and repeat completely the diagnostic cycle to verify any further possible fault

YES ↓

Change the main board and repeat the diagnostic cycle to verify any further possible alarm

---

E37 The sensing of the ”anti-boil switch 2“ on the electronic board is not working properly

Checks to do:

Are pressure switch hoses and the air trap system free?
(you can disconnect the hoses and blow in them to check if the system is free)
–see pic.08,a,b-

NO → Clean/change the hoses and/or air trap system and repeat completely the diagnostic cycle to verify any further possible fault

YES ↓

Change the main board and repeat the diagnostic cycle to verify any further possible alarm

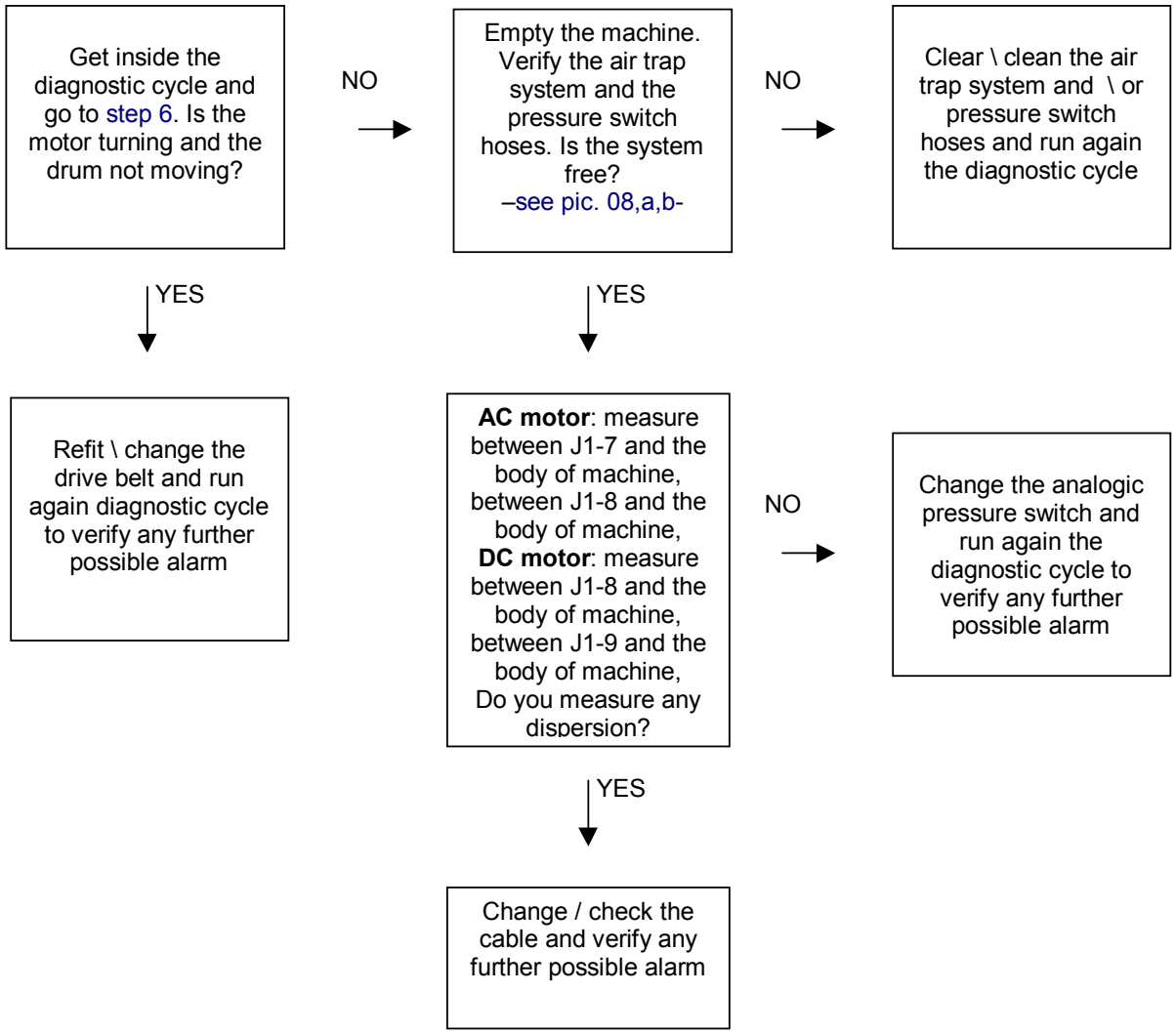
If there are burn marks on electronic board, see page 13.1-2

E38

Pressure chamber blocked

The analogic pressure switch is not able to measure any variation of the water level for at least 30-sec. during drum movement.

Checks to do:

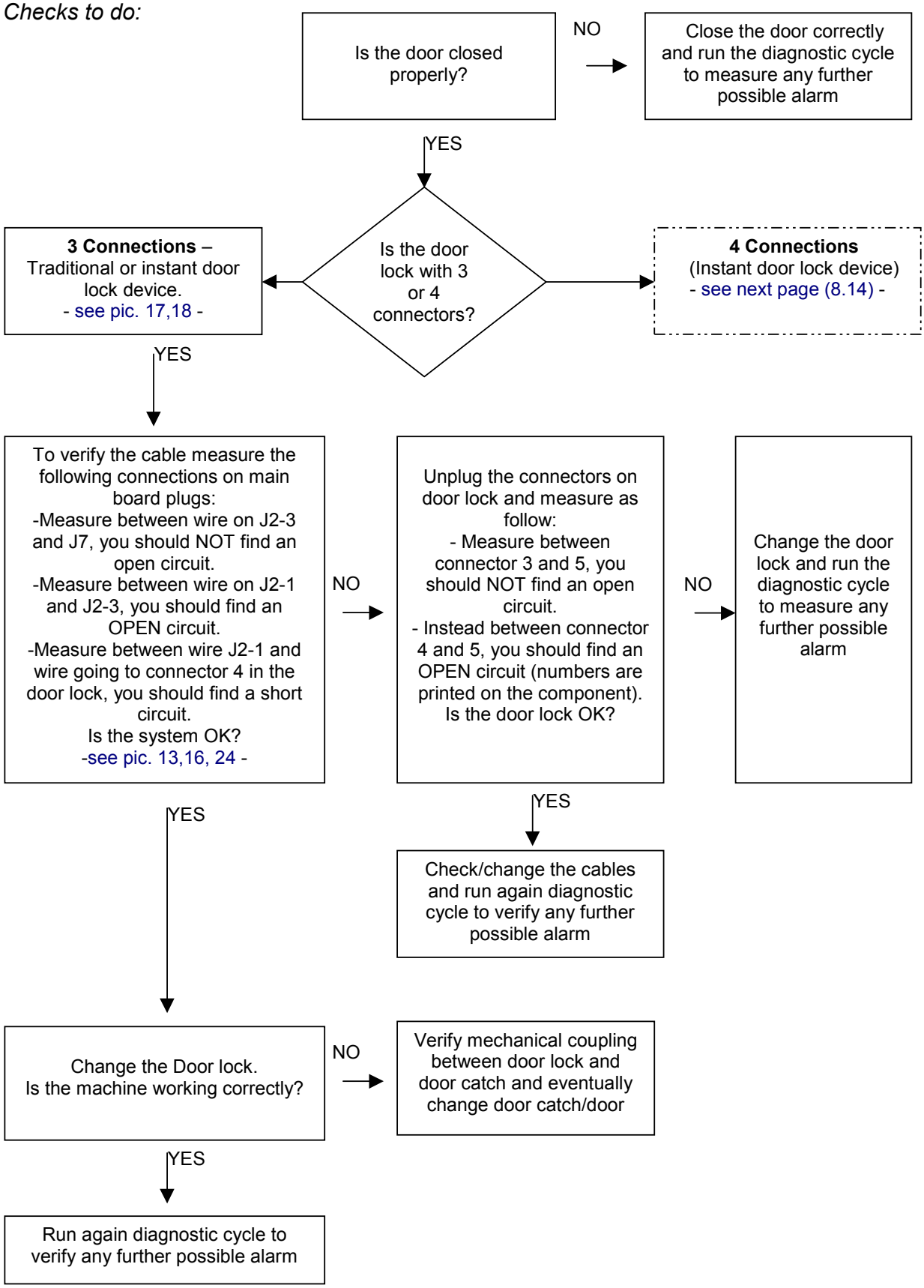


E41

The machine is not able to lock the door.

(1st page)

Checks to do:



E41

The machine is not able to lock the door.

(2nd page)

Checks to do:

4 Connections
Instant door lock device
-see pic.19-

YES

To verify the cable measure the following connections on main board plugs:
- Measure between wire on J2-3 and J7, you should NOT find an open circuit
- Measure between wire on J2-3 and W1, you should NOT find an open circuit
- Measure between wire on J2-3 and J2-1, you should find an OPEN circuit
- Measure between wire on J2-1 and the wire going to connector 5 on door lock, you should find a short circuit

Is the system OK?
-see pic. 13, 16, 24-

NO →

Unplug the connectors on door lock and measure as follow:
- Measure between connector 3 and 4, you should NOT find an open circuit.
- Between connector 4 and 2, you should NOT find an open circuit.
- Between connector 4 and 5 you should find an OPEN circuit.

(numbers are printed on the component)
Is door lock OK?

NO →

Change the door lock and run the diagnostic cycle to measure any further possible alarm

YES

Check/change the cables and run again diagnostic cycle to verify any further possible alarm

YES

Change the Door lock.
Is the machine working correctly?

NO →

Verify mechanical coupling between door lock and door catch and eventually change door catch/door

YES

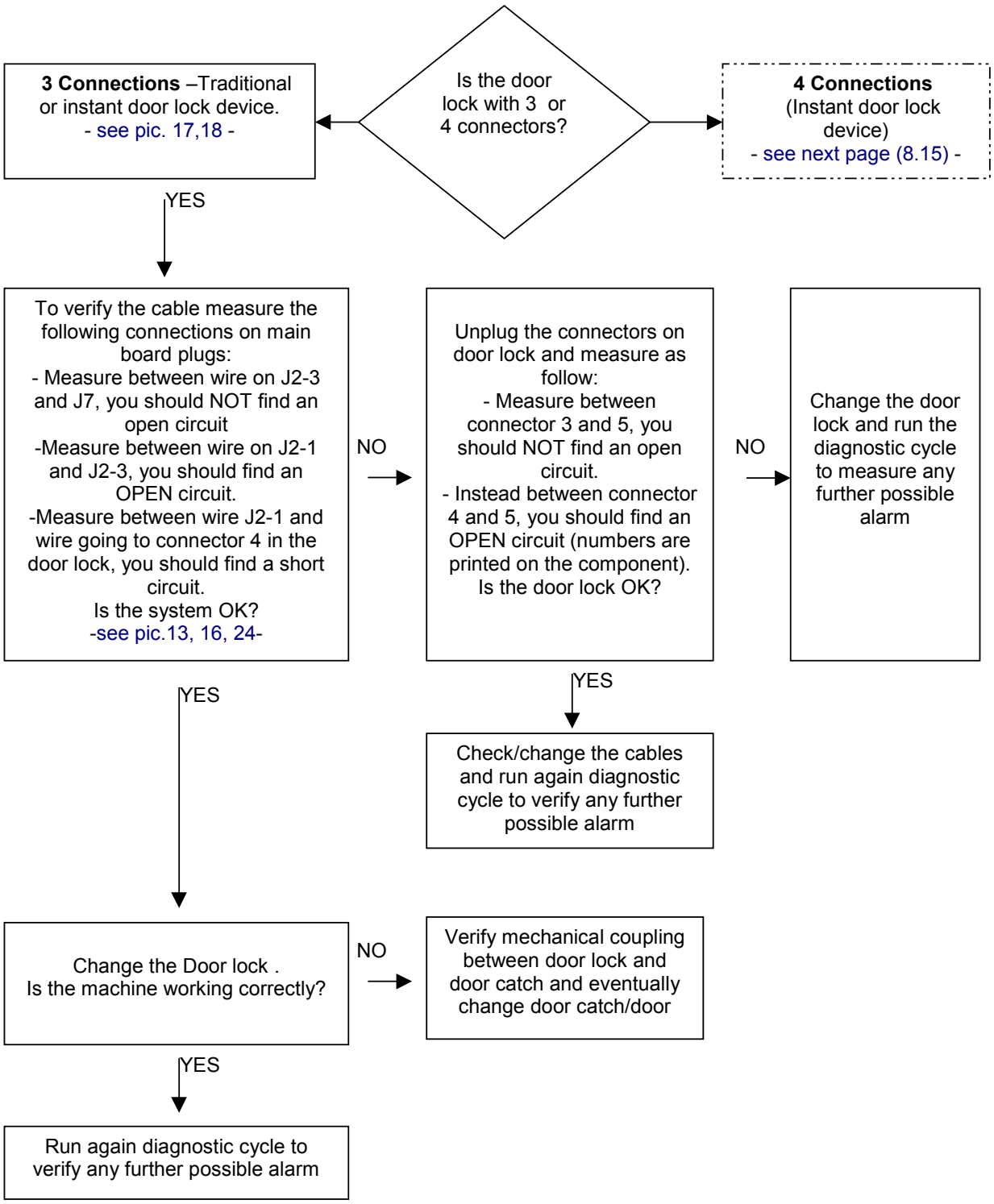
Run again diagnostic cycle to verify any further possible alarm

E42

(1st page)

The door is felt open during the cycle or remain close at the end of the cycle.

Checks to do:



If there are burn marks on electronic board, see page 13.1-2

E42

The door is felt open during the cycle or remain close at the end of the cycle.

(2nd page)

Checks to do:

4 Connections
Instant door lock device
- see pic.19 -

YES

To verify the cable measure the following connections on main board plugs:
- Measure between wire on J2-3 and J7, you should NOT find an open circuit
- Measure between wire on J2-3 and W1, you should NOT find an open circuit
- Measure between wire on J2-3 and J2-1, you should find an OPEN circuit
- Measure between wire on J2-1 and the wire going to connector 5 on door lock, you should find a short circuit

Is the system OK?
-see pic. 13,16,24-

NO →

Unplug the connectors on door lock and measure as follow:
- Measure between connector 3 and 4, you should NOT find an open circuit.
- Between connector 4 and 2, you should NOT find an open circuit.
- Between connector 4 and 5 you should find an OPEN circuit.

(numbers are printed on the component)
Is door lock OK?

NO →

Change the door lock and run the diagnostic cycle to measure any further possible alarm

YES

Check/change the cables and run again diagnostic cycle to verify any further possible alarm

YES

Change the Door lock.
Is the machine working correctly?

NO →

Verify mechanical coupling between door lock and door catch and eventually change door catch/door

YES

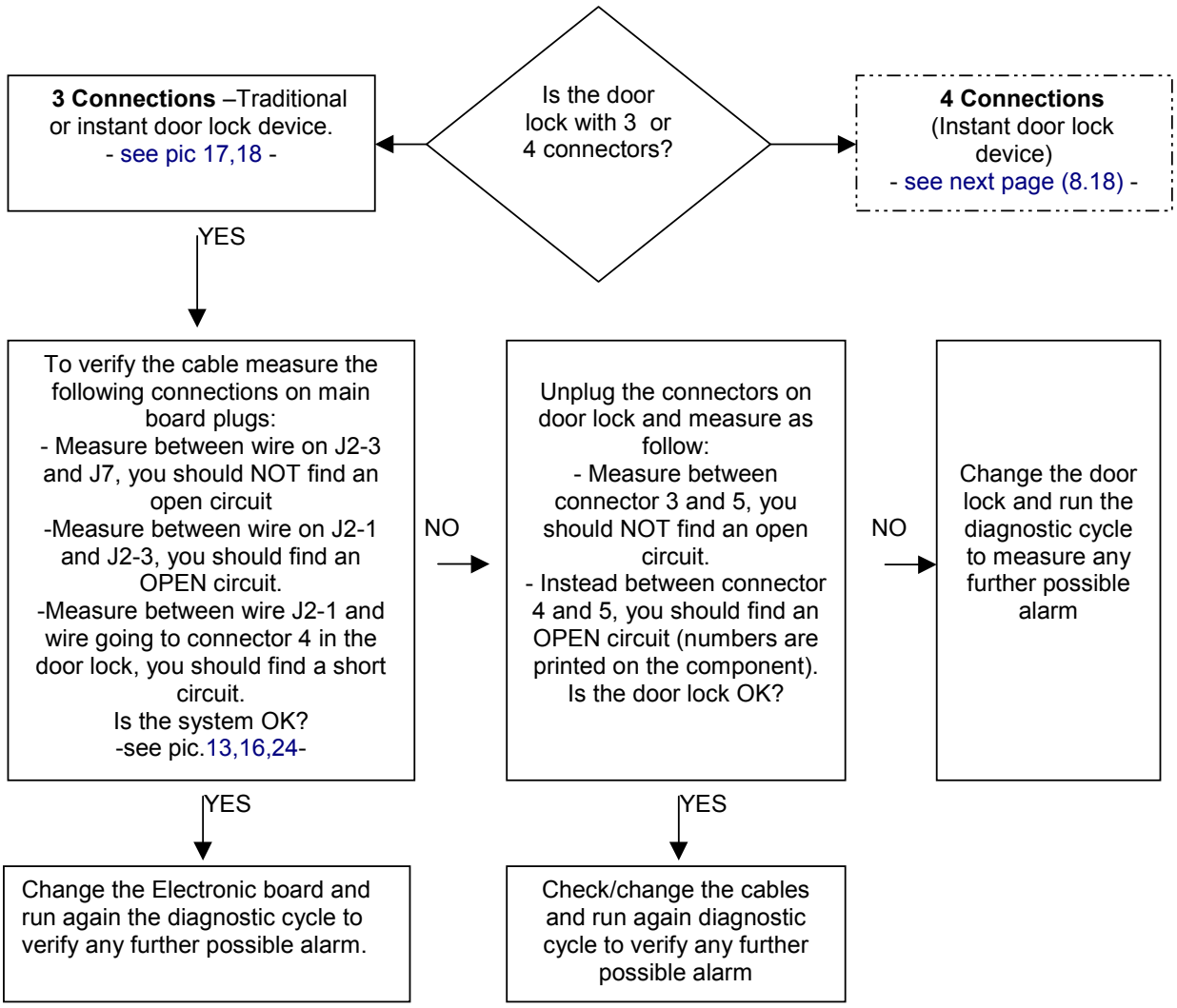
Run again the diagnostic cycle to verify any further possible alarm

E43

(1st page)

There is an incongruity on the component (Triac) that commands the door lock device.

Checks to do:



If there are burn marks on electronic board, see page 13.1-2

E43

There is an incongruity on the component (Triac) that commands the door lock device.

(2nd page)

Checks to do:

4 Connections
Instant door lock device
- see pic.19 -

YES

To verify the cable measure the following connections on main board plugs:
- Measure between wire on J2-3 and J7, you should NOT find an open circuit
- Measure between wire on J2-3 and W1, you should NOT find an open circuit
- Measure between wire on J2-3 and J2-1, you should find an OPEN circuit
- Measure between wire on J2-1 and the wire going to connector 5 on door lock, you should find a short circuit

Is the system OK?
- see pic. 13,16,24 -

NO →

Unplug the connectors on door lock and measure as follow:
- Measure between connector 3 and 4, you should NOT find an open circuit.
- Between connector 4 and 2, you should NOT find an open circuit.
- Between connector 4 and 5 you should find an OPEN circuit.

(numbers are printed on the component)
Is door lock OK?

NO →

Change the door lock and run the diagnostic cycle to measure any further possible alarm

YES

Change the Main electronic board and run again the diagnostic cycle to verify any further possible alarm.

YES

Check/change the cables and run again diagnostic cycle to verify any further possible alarm

If there are burn marks on electronic board, see page 13.1-2

E44 **The sensing of door lock device on the electronic board is not working properly.**

Checks to do:

Change the Electronic board and run again the diagnostic cycle to verify any further possible alarm.

E45 **The sensing of the component (triac) that commands the door lock device on the electronic board in not working properly.**

Checks to do:

Change the Electronic board and run again the diagnostic cycle to verify any further possible alarm.

If there are burn marks on electronic board, see page 13.1-2

E51 The component (Triac) that commands the motor is in short circuit or dispersion.

Checks to do:

Unplug the motor connector J1 from the main board, close the top of the machine and turn on the machine in the diagnostic cycle and go to step 6.
Does the alarm E51 appear again?

NO → As last alarm you get an E85 (jetsystem models with recirculation pump) or E52 (traditional models)

YES → Replace the main board and run again the diagnostic cycle to verify any further alarm

YES → Measure between all wires in the connector J1 in main boards and body of machine (see page 9.1, point "3").
Do you measure any dispersion?
- see pic. 20 -

NO → Reconnect plug on main board, get inside diagnostic cycle and go to step 7.
Do you get alarm E51?

YES → Replace the main board and run again the diagnostic cycle to verify any further alarm.

YES → Unplug the connector in the motor and measure between motor connectors and body of the machine.
Do you see any dispersion?
(-see pic.21-)

NO → Replace/change the cables /wiring and run again the diagnostic cycle to verify any further alarm.

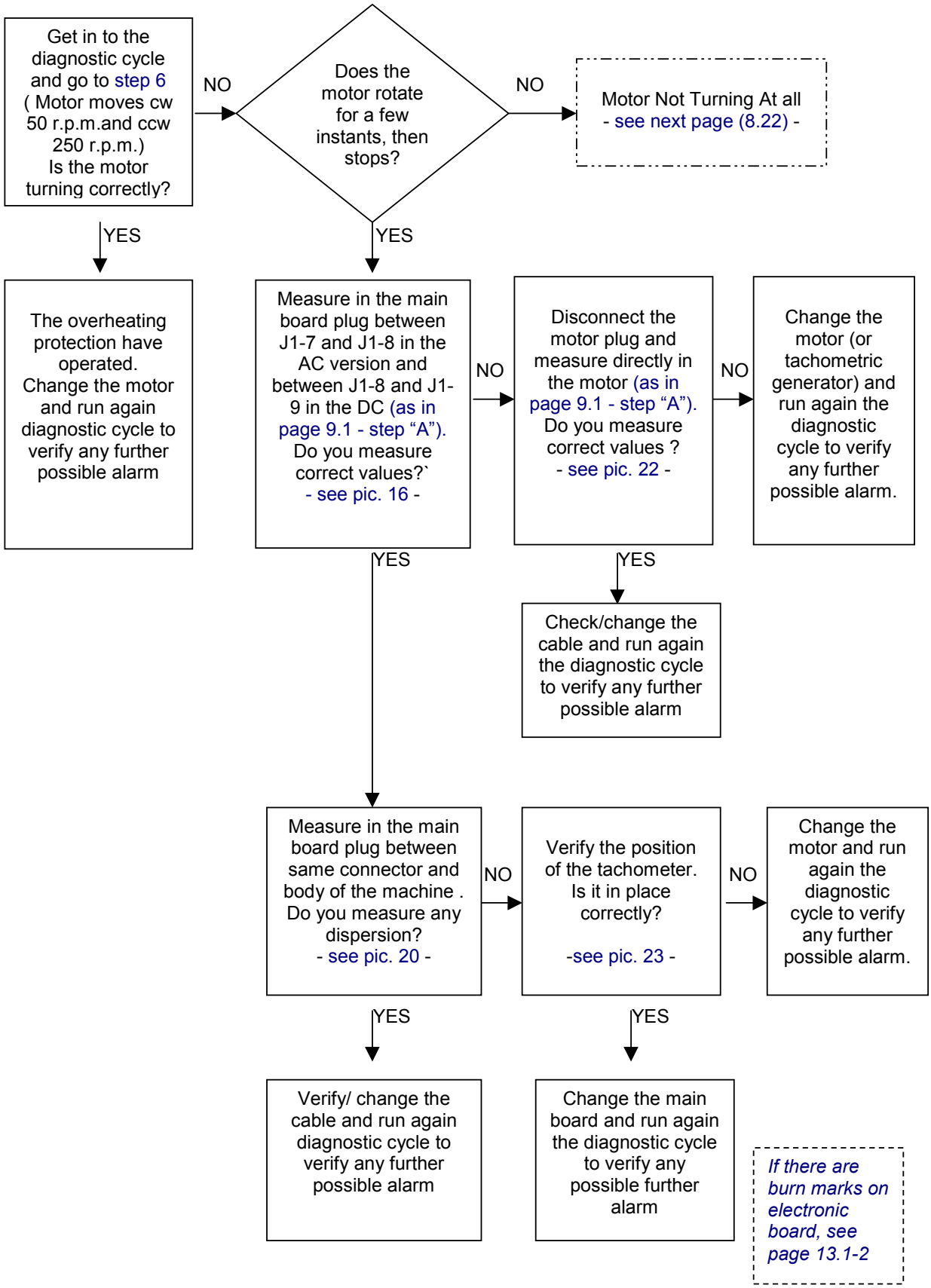
YES → Replace the Motor and run again the diagnostic cycle to verify any further alarm.

If there are burn marks on electronic board, see page 13.1-2

E52 — No signal coming from the tachometric generator in the motor.

(Page 1)

Checks to do:



E52

No signal coming from the tachometric generator in the motor.

(Page 2)

Motor Not Turning At all

Verify motor and wiring. Is it an AC or DC motor?

DC Motor

AC Motor

DC Motor: connector **J1** with **10 wires** and 2nd board motor control (AC/DC converter)

YES

To verify the cable measure the following connections on main board plugs and compare them with the correct values (see page 9.1 motor parameters):
- Measure between wire on J1-4 and J1-6, you should find a value like in point D.
- Measure between wire on J1-3 and J1-5, you should find a value like in point E.
- Measure between wire on J1-2 and connector 6 on the 2nd board motor control, you should find a close circuit.
- Measure between connector J1-10 and connector 4 on the 2nd board motor control, you should find a close circuit.
- Reconnect plug J1 on main board and measure between connector 5 and 1 on the 2nd board you should find Ohm value B+D

(see page 9.1 motor parameters):
- see pic. 16 -
Do you measure correct values?

NO

Check the motor as in Page 9.1.
If the motor is OK check / change wirings.

YES

Change the 2nd board motor control (AC/DC converter). If the problem still appears change the main board.

AC Motor: connector **J1** with **9 wires**

YES

To verify the cable measure the following connections on main board plugs and compare them with the correct values (see page 9.1 motor parameters):
- Measure between wire on J1-2 and J1-4, you should find a value like in point B.
- Measure between wire on J1-3 and J1-4, you should find a value like in point E.
- Measure between wire on J1-5 and J1-6, you should find a value like in point D.
- see pic. 16 -
Do you measure correct values?

NO

YES

Change the main board and run again the diagnostic cycle to verify any further possible alarm

If there are burn marks on electronic board, see page 13.1-2

E53

The sensing of the component (triac) that commands the Motor device on the electronic board in not working properly.

Checks to do:

Change the main board and run again the diagnostic cycle to verify any further possible alarm

---

E54

One of the Relays of the main board is not working properly. Does not exist in the DC version.

Checks to do:

Measure between all wires in the connector J1 in main board and the body of the machine (see page 9.1, point "3"). Do you measure any dispersion? - see pic. 20 -

NO → Change the main board and run again the diagnostic cycle to verify any further possible alarm

YES ↓

Unplug the connector in the motor and measure between motor connectors and body of the machine. Do you see any dispersion? (-see pic.21-)

NO → Replace/change the cables /wiring and run again the diagnostic cycle to verify any further alarm.

YES ↓

Replace the Motor and run again the diagnostic cycle to verify any further alarm.

If there are burn marks on electronic board, see page 13.1-2

E61

Insufficient heating measured by the main board during washing cycle.

➜ ***SOMETIME THE ALARM CAN BE CAUSED BY LOW SUPPLY VOLTAGE!***

Checks to do:

Get inside the diagnostic cycle and fill water up to the glass to make the pressure switch operate. In the main board plugs measure between connector W2 and J2-1, you should find the ohm value of the heating element. Is the circuit OK?
- see pic. 13 -

NO → Measure the Ohm value directly on the heating element unplugging the connectors the heating element is OK?
- see pic.25 -

NO → Change the heating element and run again the diagnostic cycle to verify any further possible alarm.

YES ↓

Measure on the mechanical pressure switch between connector 11 and 14 and between 21 and 24. -DON'T DISCONNECT THE HOSE- Do you measure a close circuit on both measures?
- see pic. 12,14 -

NO → Change the mechanical pressure switch and run again the diagnostic cycle to verify any further possible alarm

YES ↓

Check / change the cables and repeat diagnostic cycle to verify any further possible alarm (in machines with display you can read temperature increasing in step 6 otherwise run a normal cycle and feel water temperature directly on the door).

YES ↓

On main board plug measure between J4-1 and J4-2 an Ohm value. (between 5.7 and 6.3 KOhm at 20°C) Do you read the Ohm value?
- see pic. 16 -

NO → Unplug connectors measure directly on the NTC washing the Ohm value.
Do you read the right Ohm value? – see pic 27 -

NO → Change the NTC sensor and run again the diagnostic cycle to verify any further possible alarm.

YES ↓

Change the Main board and run again the diagnostic cycle to verify any further possible alarm.

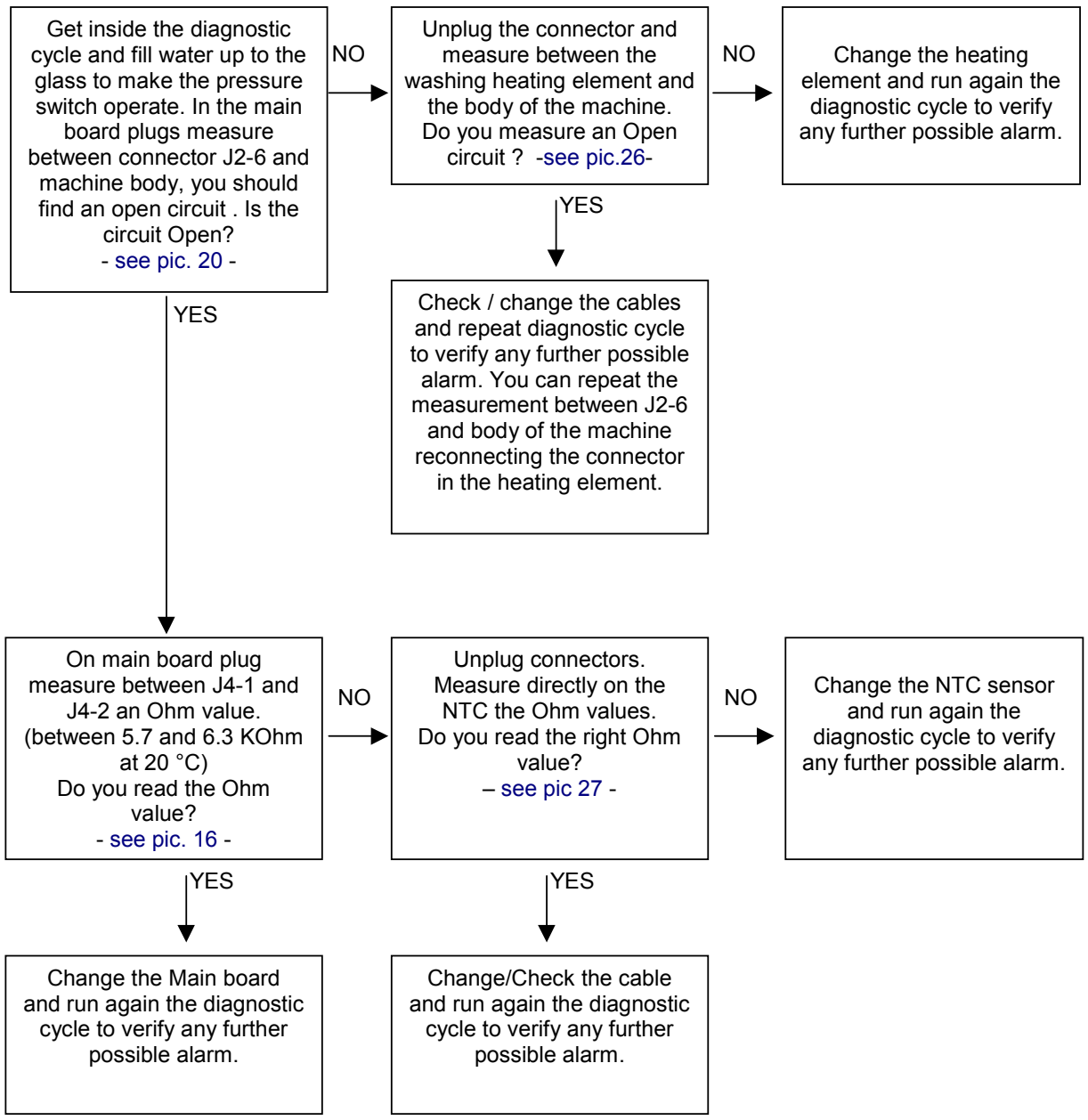
YES ↓

Change/Check the cable and run again the diagnostic cycle to verify any further possible alarm.

If there are burn marks on electronic board, see page 13.1-2

E62 Overheating during washing cycle more than 88°C.

Checks to do:



If there are burn marks on electronic board, see page 13.1-2

E63 Insufficient heating measured by the main board during drying cycle.

Checks to do:

Empty the machine. In the main board plugs measure between connector W2 and J2-1, you should find the ohm value of the heating element (drying). Is the circuit OK? - see pic. 13 -

NO → Measure the Ohm value directly on the heating element unplugging the connectors.Is the heating element OK? - see pic.28 -

NO → Change the heating element and run again the diagnostic cycle to verify any further possible alarm.

YES → Measure on the mechanical pressure switch between connector 11 and 12 and between 21 and 22. Do you measure a close circuit on both measures? - see pic 12,14-.

NO → Change the mechanical pressure switch and run again the diagnostic cycle to verify any further possible alarm

YES → Check / change the cables and repeat diagnostic cycle to verify any further possible alarm (in display you can read temperature increasing in step 8)

YES → On main board plug measure between J3-1 and J3-4 an Ohm value. (between 5.7 and 6.3 KOhm at 20°C). Do you read the Ohm value? - see pic. 16 -

NO → Unplug the connector and measure directly on the NTC on drying duct the Ohm value. Do you read the right Ohm value? – see pic. 29 -

NO → Change the NTC sensor and run again the diagnostic cycle to verify any further possible alarm.

YES → Change the Main board and run again the diagnostic cycle to verify any further possible alarm.

YES → Change/Check the cable and run again the diagnostic cycle to verify any further possible alarm.

If there are burn marks on electronic board, see page 13.1-2

E64

Overheating during drying cycle more then 180°C.

Checks to do:

In the main board plugs measure between connector J2-5 and machine body, you should find an open circuit . Is the circuit Open? - see pic 20 -

NO → Unplug the connectors measure between the 2 drying heating element and body of the machine .Do you measure an Open circuit? –see pic.30-

NO → Change the heating element and run again the diagnostic cycle to verify any further possible alarm.

YES → Check / change the cables and repeat diagnostic cycle to verify any further possible alarm. You can repeat the measurement between J2-5 and body of the machine reconnecting the connector in the heating element. –see pic.20-

YES → On main board plug measure between J3-1 and J3-4 an Ohm value. (between 5.7 and 6.3 KOhm at 20°C) Do you read the Ohm value? - see pic. 16 -

NO → Unplug the connectors. Measure directly on the NTC the Ohm value. Do you read the right Ohm value? – see pic 29 -

NO → Change the NTC sensor and run again the diagnostic cycle to verify any further possible alarm.

YES → Change the Main board and run again the diagnostic cycle to verify any further possible alarm.

YES → Change/Check the cable and run again the diagnostic cycle to verify any further possible alarm.

If there are burn marks on electronic board, see page 13.1-2

E66

Faulty Relay that gives power to the heating element.

Incongruity between anti-boil switch 2 and status of the relay.

Checks to do:

Unplug the connector W1-W2 and measure directly on the main board, you should find an open circuit.
Is it OK?

NO → Change the Main board and run again the diagnostic cycle to verify any further possible alarm.

YES ↓

Measure between J2-5 and the body of the machine. Do you measure any dispersion?

NO → Change the Main board and run again the diagnostic cycle to verify any further possible alarm.

YES ↓

Unplug all the connectors from the drying heating elements and measure directly between the component and the body of the machine. Do you measure any dispersion?

NO → Change/Check the cable and run again the diagnostic cycle to verify any further possible alarm.

YES ↓

Change the drying heating element and run again the diagnostic cycle to verify any further possible alarm.

If there are burn marks on electronic board, see page 13.1-2

E71

Washing NTC sensor failure.
(ohm value of the NTC out of limits)

Checks to do:

Get inside diagnostic cycle and fill in water on step 5 to make the pressure switch operating .Turn off machine and on main board plug measure between J4-1 and J4-2 an Ohm value (between 5.7 and 6.3 KOhm at 20°C)
Do you read the Ohm value?
- see pic .16 -

NO → Unplug connectors. Measure directly on the NTC the Ohm value. Do you read the right Ohm value?
- see pic. 27 -

NO → Change the NTC sensor and run again the diagnostic cycle to verify any further possible alarm.

YES → Change/Check the cable and run again the diagnostic cycle to verify any further possible alarm.

YES → Measure between J4-1 and body of the machine and between J4-2 and body of the machine. Do you measure any dispersion?
- see pic. 20 -

NO → Change the Main board and run again the diagnostic cycle to verify any further possible alarm.

YES → Unplug connector and measure directly between NTC sensor body of the machine . Do you measure any dispersion? The machine must have water inside.
-see pic.31-

NO → Change/Check the cable and run again the diagnostic cycle to verify any further possible alarm.

YES → Change the NTC sensor and run again the diagnostic cycle to verify any further possible alarm.

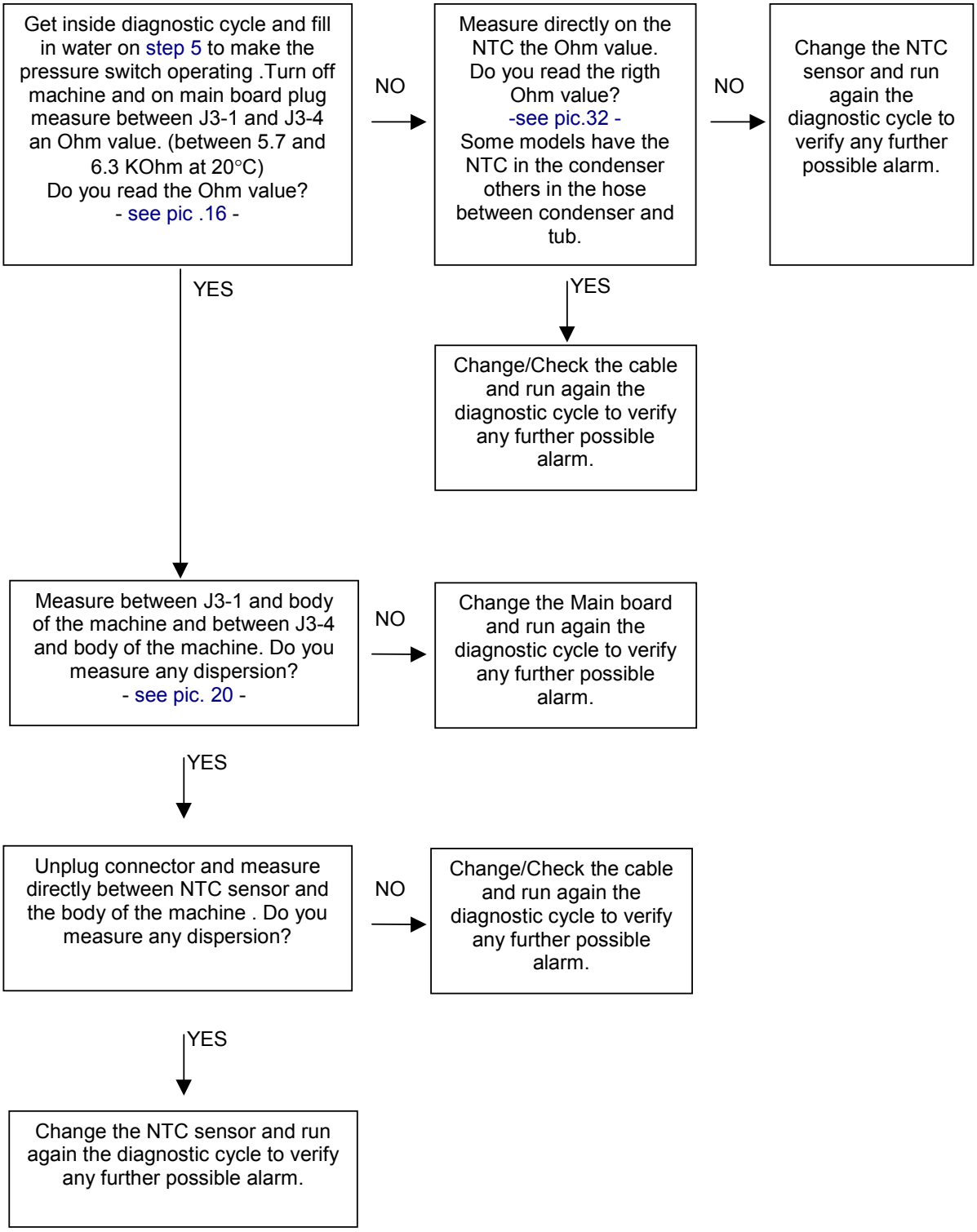
If there are burn marks on electronic board, see page 13.1-2

E72

Drying NTC sensor on condenser failure.

(ohm value of the NTC out of limits)

Checks to do:



If there are burn marks on electronic board, see page 13.1-2

E73 Drying NTC sensor on duct near heating element failure.

(ohm value of the NTC out of limits)

Checks to do:

Get inside diagnostic cycle and fill in water on step 5 to make the pressure switch operating .Turn off machine and on main board plug measure between J3-2 and J3-3 an Ohm value. (between 5.7 and 6.3 KOhm at 20°C)
Do you read the Ohm value?
- see pic .16 -

NO →

Measure directly on the NTC the Ohm value.
Do you read the right Ohm value?
– see pic.29 -

NO →

Change the NTC sensor and run again the diagnostic cycle to verify any further possible alarm.

YES ↓

Change/Check the cable and run again the diagnostic cycle to verify any further possible alarm.

YES ↓

Measure between J3-2 and body of the machine and between J3-3 and body of the machine. Do you measure any dispersion?
- see pic. 20 -

NO →

Change the Main board and run again the diagnostic cycle to verify any further possible alarm.

YES ↓

Unplug connector and measure directly between NTC sensor and body of the machine . Do you measure any dispersion?
- see pic. 33 -

NO →

Change/Check the cable and run again the diagnostic cycle to verify any further possible alarm.

YES ↓

Change the NTC sensor and run again the diagnostic cycle to verify any further possible alarm.

If there are burn marks on electronic board, see page 13.1-2

E84 **The sensing of the component (triac) that commands the recirculation pump on the electronic board is not working properly.**

Checks to do:

Change the Main board and run again the diagnostic cycle to verify any further possible alarm.

If there are burn marks on electronic board, see page 13.1-2

E85 The component (triac) that commands the recirculation pump on the electronic board is not working properly.

Checks to do:

Unplug connector on main board and measure directly between J1-1 and J1-9 (**WM)** or between J1-1 and J1-10 for **WD**, you should measure ohm value of the recirculation pump (about 200 Ohm). Do you measure the ohm value?
- see pic. 16 -

NO → Unplug the connector on recirculation pump and measure ohm value of the recirculation pump (about 200 Ohm). Do you measure the ohm value?
- see pic. 34 -

NO → Change the recirculation pump and run again diagnostic cycle to verify any further possible alarm

YES → Check / change the cables and run again diagnostic cycle to verify any further possible alarm

YES → Measure between the same connectors of previous step and the body of the machine. Do you measure any dispersion?
- see pic. 20 -

NO → Change the Main board and run again diagnostic cycle to verify any further possible alarm

YES → Unplug the connector on recirculation pump and measure between recirculation pump and body of the machine. Do you measure any dispersion ?
- see pic. 35 -

NO → Check / change the cables and run again diagnostic cycle to verify any further possible alarm

YES → Change the recirculation pump and run again diagnostic cycle to verify any further possible alarm

If there are burn marks on electronic board, see page 13.1-2

E91 Communication error between user interface and main board.

Checks to do:

Verify the connector between the main board and user interface board by plugging and unplugging the connector few times on both sides, OR replace the cable and run diagnostic cycle to verify any further possible alarm.Is the machine working correctly?

NO →

Change the main board and run diagnostic cycles to verify any further possible alarm. Is the machine working correctly?

NO →

Change the User interface board and run diagnostic cycle to verify any further possible alarm

YES ↓

The fault could have been caused by oxidized contacts in user interface plugged in the main board.

E93 Machine configuration error.

Wrong machine configuration string at power ON

Checks to do:

Verify the configuration string in the board box label and reconfigurate the machine.
Remember to confirm configuration at the end of the process with the appropriate operation .
(see at the beginning of the manual the correct operation related to the different aestetics).
Turn Off and On the machine again. Does the alarm appear again?

YES ↓

Change the main board and run diagnostic cycles to verify any further possible alarm.

E94 Cycle configuration error.

Wrong Cycle configuration checksum at power ON

Checks to do:

Change the main board and run diagnostic cycles to verify any further possible alarm.

EF1 Drain filter blocked.

Checks to do:

It is a warning that appears only at the end of the cycle. The machine has detected long draining phases during the cycle (Es. More then 20 seconds during draining after rinsing phase).
Verify that drain filter and all drain system is clean.

EF2 Overdosing of detergent.

Checks to do:

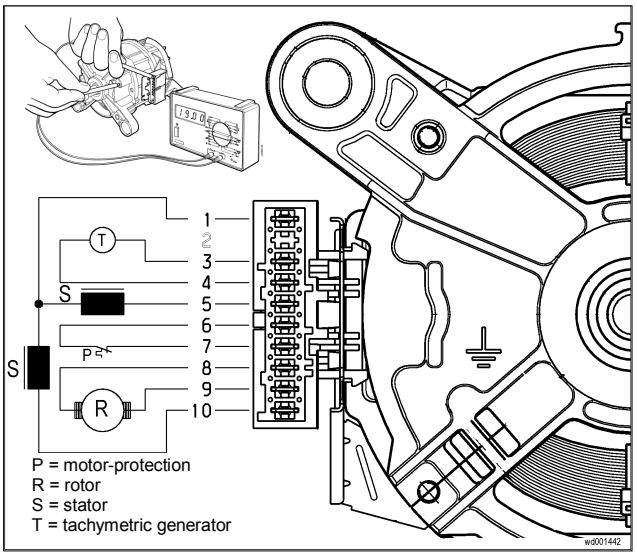
Overdosing of detergent. The system has detected an over foaming during draining phases.
Advice Customer to use the right quantity of detergent and verify that drain filter and all drain system are clean.

How to check commutator motors

How to check commutator motors

1) Check connecting blocks (wiring) and if there are any stuck out / folded terminals
2) Check if there are any water or detergent traces / remaining / deposits and where they come from
3) Control any windings / mass particulars or with a very low ground insulation by using a tester with minimum capacity of 40 Mohm between every single terminal and the housing (read ∞).
4) Check every single winding according to the following table

	Motor junction box terminals	Check of:	SOLE Motor [Ohms]	F.H.P. Motor [Ohms]	CE.SE.T.Motor [Ohms]
A	3 - 4	Tachymetric generator winding	171 ÷ 196 469 ÷ 540	126 ÷ 147	64 ÷ 73
B	5 - 10	Stator winding (all field)	1.0 ÷ 2.2	1.0 ÷ 3.0	1.0 ÷ 2.0
C	6 - 7	Thermo-protection (cut - off)	0	0	0
D	8 - 9	Rotor winding	1.5 ÷ 3.0	1.5 ÷ 3.0	1.5 ÷ 3.0
E	1 - 10	Stator winding (half field, terminal 1)	0.5 ÷ 1.0	0.5 ÷ 1.5	0.5 ÷ 1.0

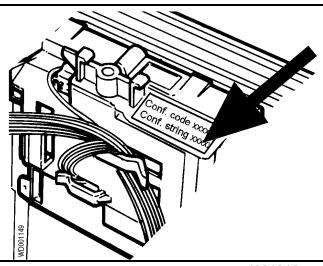


Note: while controlling rotor winding, you have to measure all the section by rotating the shaft very slowly and check if there are any short-circuits between the visible bars.
Check also the wear state of brushes.

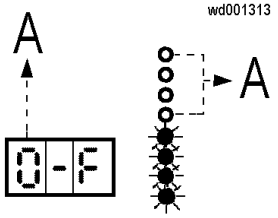
CONFIGURATION CODE

The configuration code (16 alphanumeric digits) is shown on a label affixed to the casing of the main PCB and in the Service Notes describing the various models.

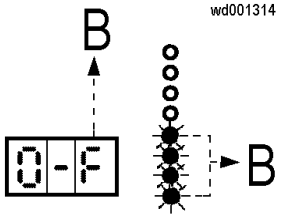
It is advisable to note the configuration code on the casing of the new PCB fitted to the washing machine.



A = The first digit shown on the display (if featured) indicates the **position** of the value to be entered.
On models not fitted with a display window, the same information is displayed in binary format on the first four washing phase LEDs.
(the first position displayed is "0").



B =The last digit on the display (if featured) indicates the **value** of the configuration character to be entered in a given position.
On models not fitted with a display window, the same information is displayed in binary format on the second set of four washing phase LEDs.



EXAMPLES OF CONFIGURATION CODE

Configuration code: **A2A7808080E691F2**

POSITION:	0	1	2	3	4	5	6	7	8	9	10 (A)	11 (B)	12 (C)	13 (D)	14 (E)	15 (F)
	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
VALUE:	**A**	**2**	**A**	**7**	**8**	**0**	**8**	**0**	**8**	**0**	**E**	**6**	**9**	**1**	**F**	**2**

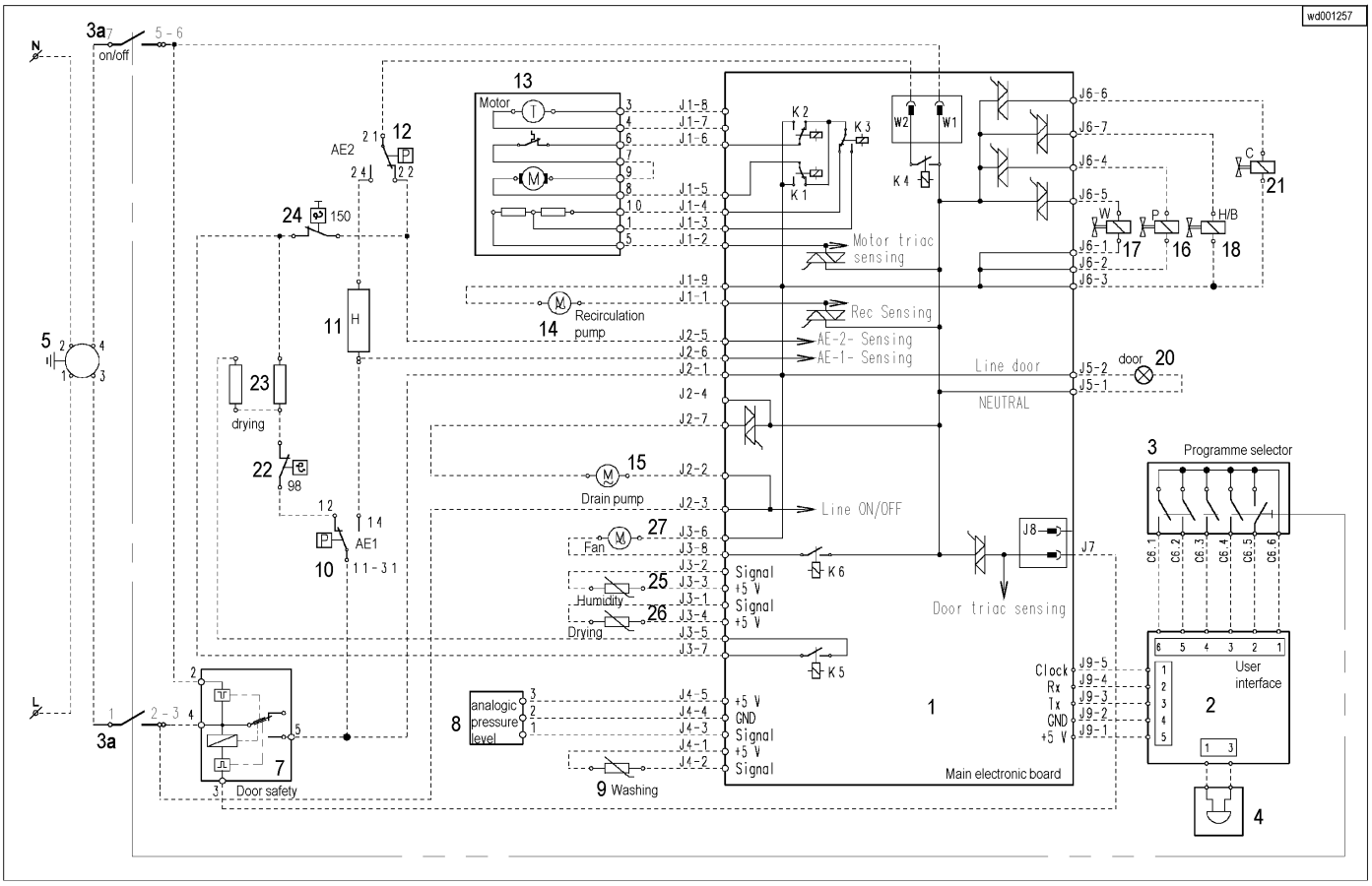
TABLE OF CYCLE PHASE LEDS

On models not featuring the display window, it is advisable, before beginning the configuration procedure, to convert the digits of the configuration code into binary format. To do this, prepare a table of the values to be entered, which will be displayed by the second group (B) of washing phase LEDs (the positions, indicated by the first group of 4 LEDs, are not modified).

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
											A	b	C	d	E	F	
POSITION	○	○	○	○	○	○	○	○	●	●	●	●	●	●	●	●	8
	○	○	○	○	●	●	●	●	○	○	○	○	●	●	●	●	4
	○	○	●	●	○	○	●	●	○	○	●	●	○	○	●	●	2
	○	●	○	●	○	●	○	●	○	●	○	●	○	●	○	●	1
VALUE																	
	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	8
	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	4
	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	2
	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	1

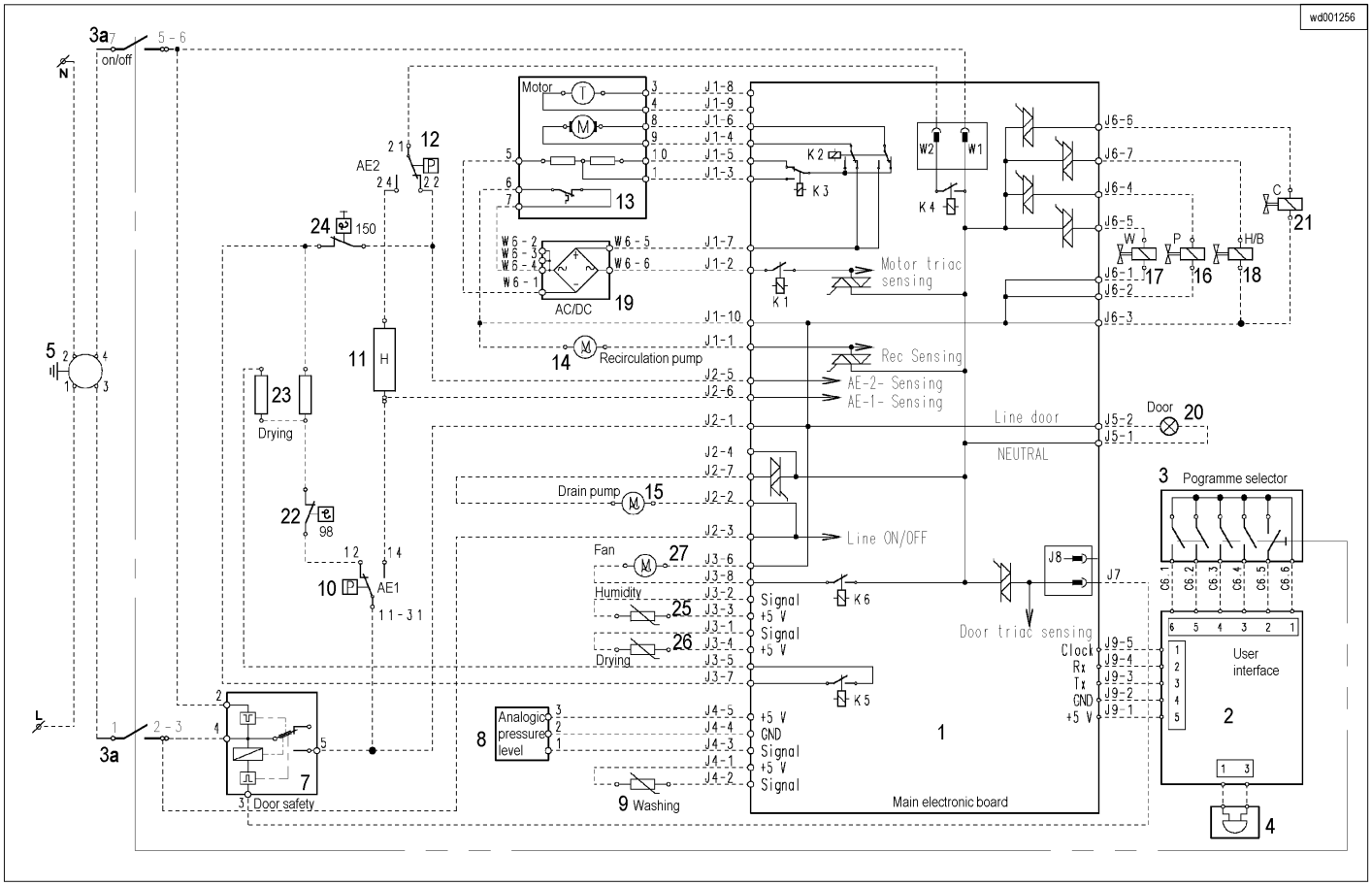
BASIC CIRCUIT DIAGRAM

AC MOTOR



BASIC CIRCUIT DIAGRAM

DC MOTOR



BASIC CIRCUIT DIAGRAM

Key to circuit diagram

1. Main PCB
2. User interface
3. Programme selector
3a. ON/OFF (programme selector)
4. Buzzer (certain models only)
5. Anti-interference filter
7. Door interlock
8. Electronic pressure switch
9. NTC temperature sensor (washing)
10. Anti-boiling pressure switch 1
11. Heating element (washing)
12. Anti-boiling pressure switch 2
13. Motor
14. Recirculation pump (Jetsystem models)
15. Drain pump
16. Pre-wash solenoid
17. Wash solenoid
18. Bleach solenoid or hot water solenoid (certain models only)
19. AC/DC converter (certain models only)
20. Door lamp

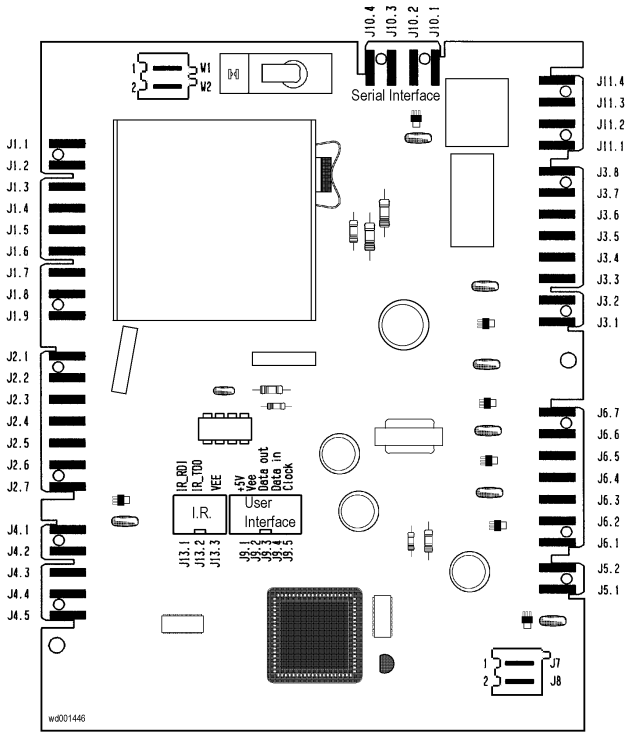
Washer/dryers only

21. Condensation solenoid
22. Safety thermostat
23. Heating element (drying)
24. Manual-reset safety thermostat
25. NTC temperature sensor (drying time control)
26. NTC temperature sensor (drying)
27. Fan motor

MAIN ELECTRONIC BOARD CONNECTORS

Washing machines and washer dryers with alternate current motor

W1 ON/OFF (neutral) W2 Heating element (relays)	J10.4 Serial interface (GND) J10.3 Serial interface (+5V) J10.2 Serial interface (TX) J10.1 Serial interface (RX)
J1.1 Circulation pump (triac) J1.2 Motor (triac) J1.3 Motor (stator - 1/2) J1.4 Motor (stator - full) J1.5 Motor (rotor) J1.6 Motor (protection) J1.7 Motor (tachymetric generator) J1.8 Motor (tachymetric generator) J1.9 Circulation pump (line)	J11.4 DPS drum positioning (sensing) J11.3 DPS motor (sensing) J11.2 DPS motor (line) J11.1 DPS motor (triac) J3.8 Fan motor (relay) J3.7 Drying heater J3.6 Fan motor (line) J3.5 Drying heater J3.4 NTC drying sensor (+5V) J3.3 NTC drying time sensor (+5V) J3.2 NTC drying time sensor J3.1 NTC drying sensor
J2.1 Door safety device (line-sensing) J2.2 Drain pump (line) J2.3 ON/OFF (line) J2.4 (Anti-overflow pressure switch) J2.5 Safety pressure switch 2 (sensing) J2.6 Safety pressure switch 1 (sensing) J2.7 Drain pump (TRIAC)	J6.7 Bleach/hot water solenoid J6.6 Condensation solenoid J6.5 Washing solenoid J6.4 Pre-wash solenoid J6.3 Solenoid (line) J6.2 Solenoid (line) J6.1 Solenoid (line)
J4.1 NTC sensor (washing) J4.2 NTC sensor (washing) J4.3 Electronic pressure switch (output) J4.4 Electronic pressure switch (GND) J4.5 Electronic pressure switch (+5V)	J5.2 Door lamp J5.1 Door lamp
J13.1 (IR_RDI) J13.2 (IR_TDD) J13.1 (Vee)	J7 Door safety device J8 ON/OFF (sensing)
J9.1 User interface (+5 V) J9.2 User interface (GND) J9.3 User interface (Data Out) J9.4 User interface (Data In) J9.5 User interface (Clock)	

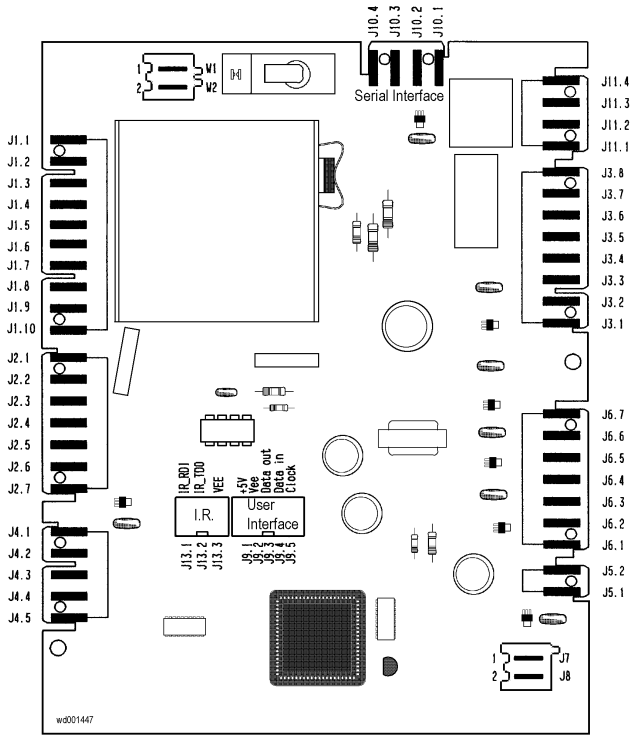


*N.B. Modules for washing machines do not have **J3** connector.*

MAIN ELECTRONIC BOARD CONNECTORS

Washing machines and washer dryers with direct current motor (through AC/DC converter)

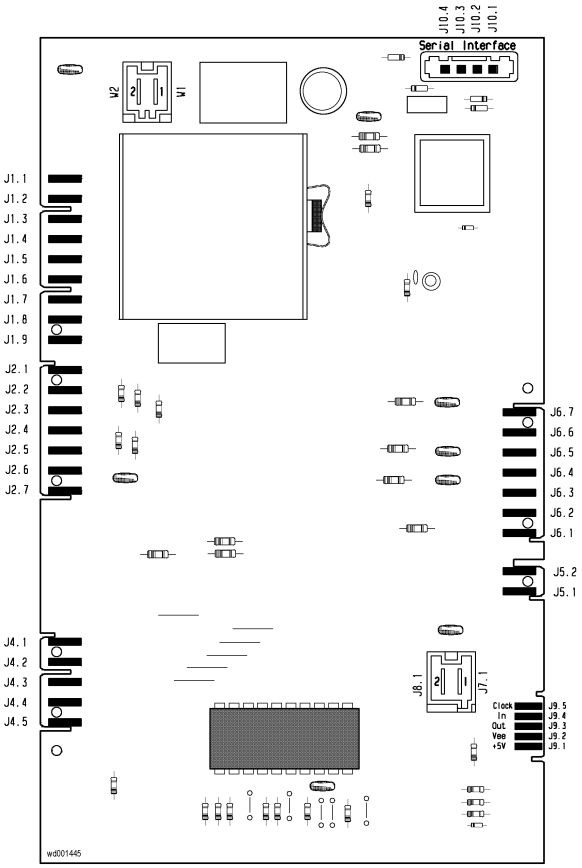
W1 ON/OFF (neutral) W2 Heating element (relays)	J10.4 Serial interface (GND) J10.3 Serial interface (+5V) J10.2 Serial interface (TX) J10.1 Serial interface (RX)
J1.1 Circulation pump (triac) J1.2 Motor (triac) J1.3 Motor (stator - 1/2) J1.4 Motor (stator - full) J1.5 Motor (rotor) J1.6 Motor (protection) J1.7 Motor - AC/DC converter (line) J1.8 Motor (tachymetric generator) J1.9 Motor (tachymetric generator) J1.10 Circulation pump and door interlock	J11.4 DPS drum positioning (sensing) J11.3 DPS motor (sensing) J11.2 DPS motor (line) J11.1 DPS motor (triac)
J2.1 Door safety device (line-sensing) J2.2 Drain pump (line) J2.3 ON/OFF (line) J2.4 Anti-overflow pressure switch (neutral) J2.5 Safety pressure switch 2 (sensing) J2.6 Safety pressure switch 1 (sensing) J2.7 Drain pump (TRIAC)	J3.8 Fan motor (relay) J3.7 Drying heater J3.6 Fan motor (line) J3.5 Drying heater J3.4 NTC drying sensor (+5V) J3.3 NTC drying time sensor (+5V) J3.2 NTC drying time sensor J3.1 NTC drying sensor
J4.1 NTC sensor (washing) J4.2 NTC sensor (washing) J4.3 Electronic pressure switch (output) J4.4 Electronic pressure switch (GND) J4.5 Electronic pressure switch (+5V)	J6.7 Bleach/hot water solenoid J6.6 Condensation solenoid J6.5 Washing solenoid J6.4 Pre-wash solenoid J6.3 Solenoid (line) J6.2 Solenoid (line) J6.1 Solenoid (line)
J13.1 (IR_RDI) J13.2 (IR_TDD) J13.1 (Vee)	J5.2 “Door” lamp J5.1 “Door” lamp
J9.1 User interface (+5 V) J9.2 User interface (GND) J9.3 User interface (Data Out) J9.4 User interface (Data In) J9.5 User interface (Clock)	J7 Door safety device J8 ON/OFF (sensing)



MAIN ELECTRONIC BOARD CONNECTORS

Washing machines with first version electronic board (bigger size than the current board)

W1 ON/OFF (neutral) W2 Heating element (relays)	J10.4 Serial interface (GND) J10.3 Serial interface (+5V) J10.2 Serial interface (TX) J10.1 Serial interface (RX)
J1.1 Circulation pump (triac) J1.2 Motor (triac) J1.3 Motor (stator - 1/2) J1.4 Motor (stator - full) J1.5 Motor (rotor) J1.6 Motor (protection) J1.7 Motor (tachymetric generator) J1.8 Motor (tachymetric generator) J1.9 Circulation pump (line)	
J2.1 Door safety device (line-sensing) J2.2 Drain pump (line) J2.3 ON/OFF (line) J2.4 Anti-overflow pressure switch J2.5 Safety pressure switch 2 (sensing) J2.6 Safety pressure switch 1 (sensing) J2.7 Drain pump (TRIAC)	J6.7 Bleach/hot water solenoid J6.6 (Condensation solenoid) J6.5 Washing solenoid J6.4 Pre-wash solenoid J6.3 Solenoid (line) J6.2 Solenoid (line) J6.1 Solenoid (line)
	J5.2 “Door” lamp J5.1 “Door” lamp
J4.1 NTC sensor (washing) J4.2 NTC sensor (washing)	J7 Door safety device J8 ON/OFF (sensing)
J4.3 Electronic pressure switch (output) J4.4 Electronic pressure switch (GND) J4.5 Electronic pressure switch (+5V)	J9.5 User interface (Clock) J9.4 User interface (Data In) J9.3 User interface (Data Out) J9.2 User interface (GND) J9.1 User interface (+5 V)

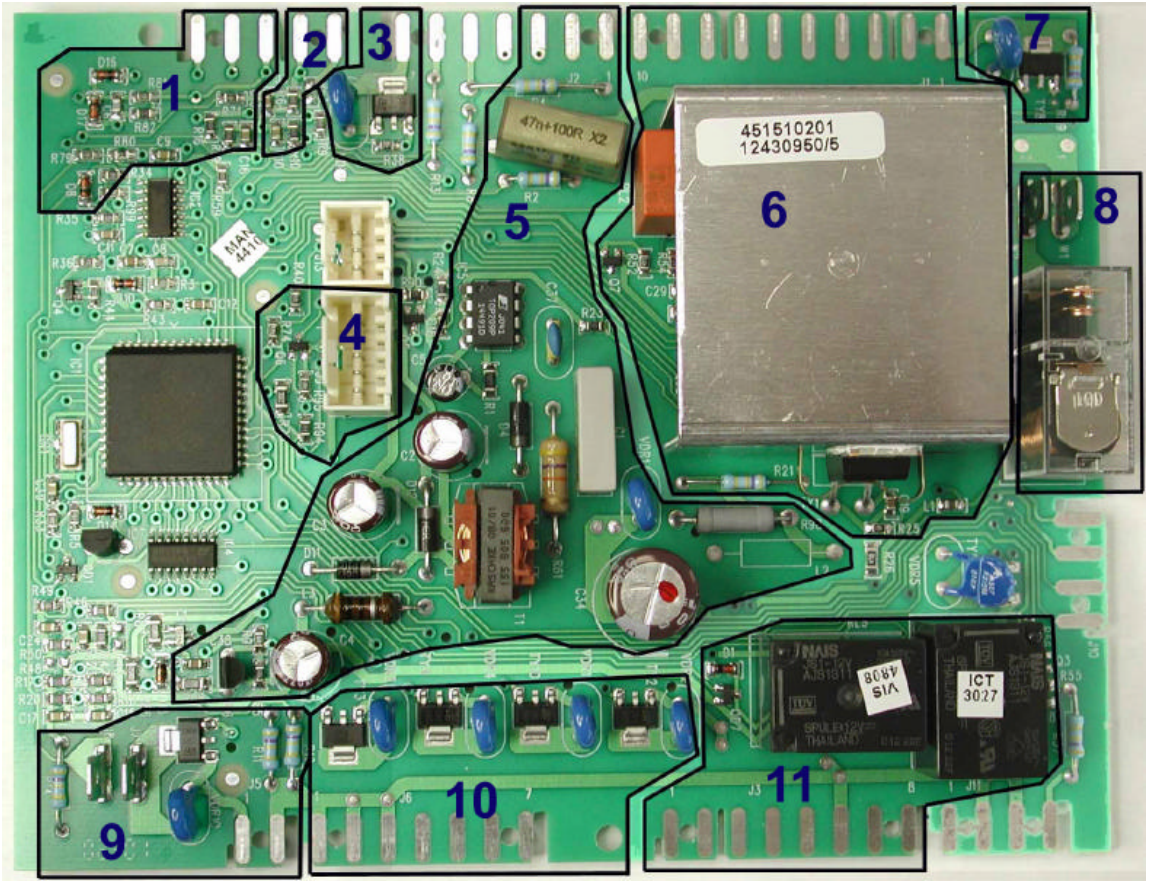


BURNING MARKS ON MAIN ELECTRONIC BOARD

In case of burning marks on main electronic board, check that the fault has not been caused by another electric component (short-circuits, poor insulation, water leakage). Use the following pictures to identify, on the basis of the burnt area, the component that could have caused the problem.
The type of board represented is the one with the most components (washer-dryers with DC motor); other boards are lacking in some components.

FRONT

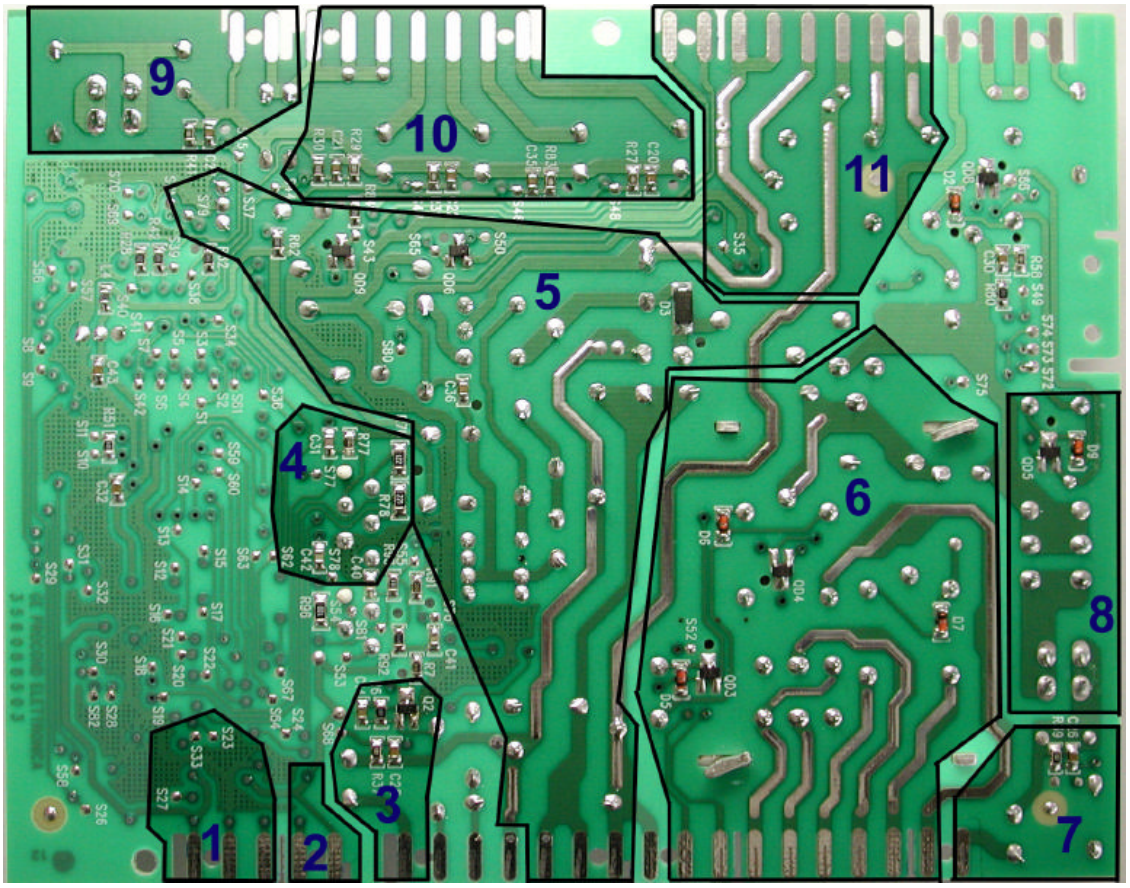
1. Analogic pressure switch area
2. NTC sensor (washing) area
3. Drain pump area
4. User interface area
5. Power supply area
6. Motor area
7. Recirculation pump area
8. Heating elements area
9. Door safety interlock area
10. Water inlet valves area
11. Drying area (for washer-dryers only)



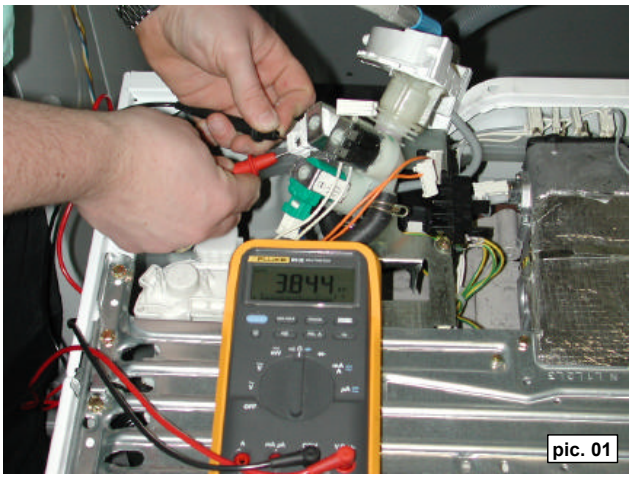
BURNING MARKS ON MAIN ELECTRONIC BOARD

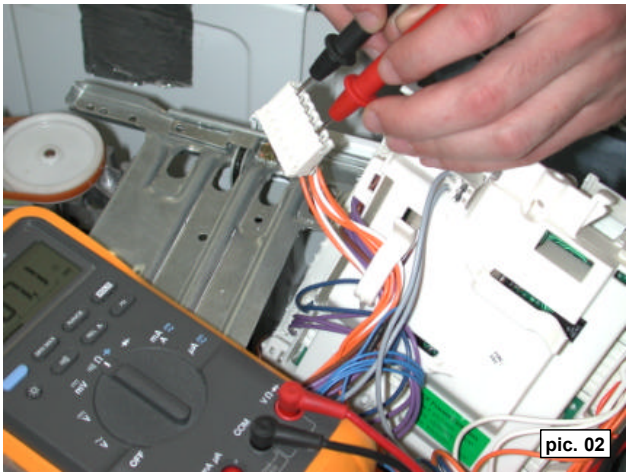
REAR

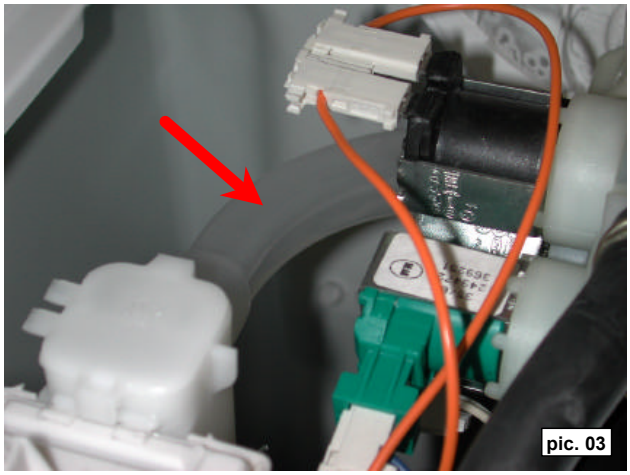
1. Analogic pressure switch area
2. NTC sensor (washing) area
3. Drain pump area
4. User interface area
5. Power supply area
6. Motor area
7. Recirculation pump area
8. Heating elements area
9. Door safety interlock area
10. Water inlet valves area
11. Drying area (for washer-dryers only)

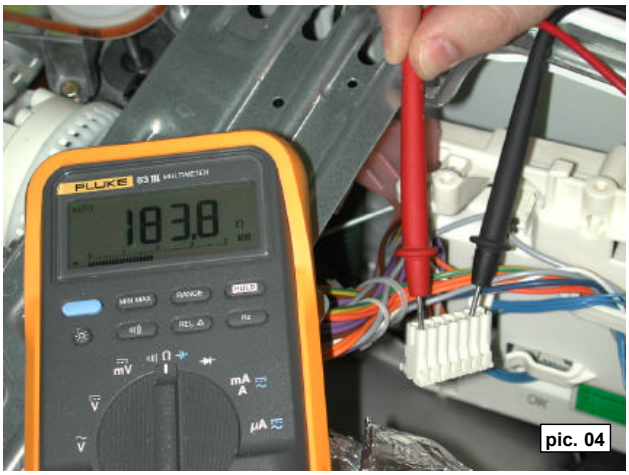


PICTURES LINKED TO FAULT FINDING









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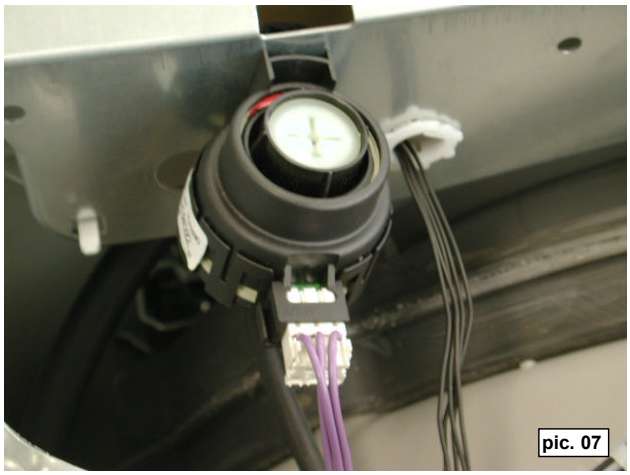
pic. 05


pic. 06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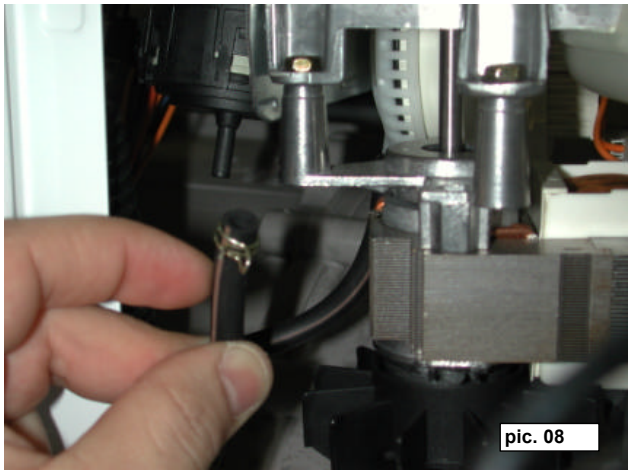
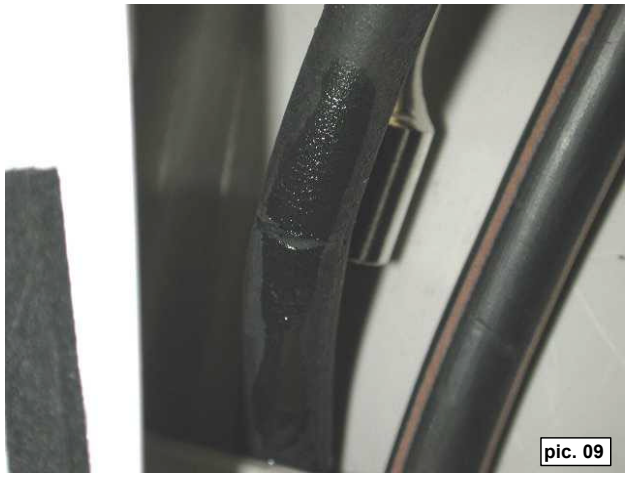

pic. 08


pic. 08a


pic. 08b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pic. 10

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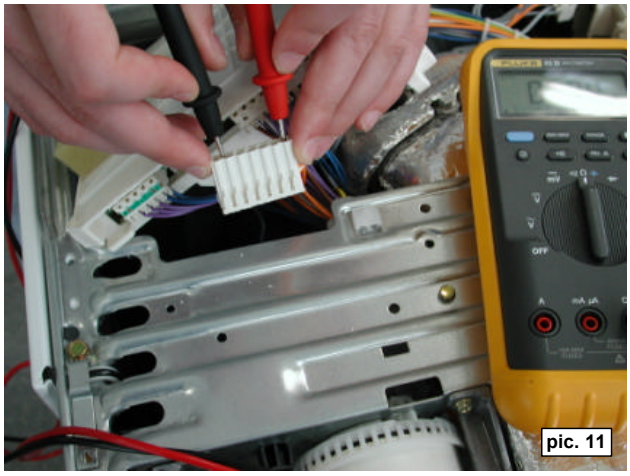
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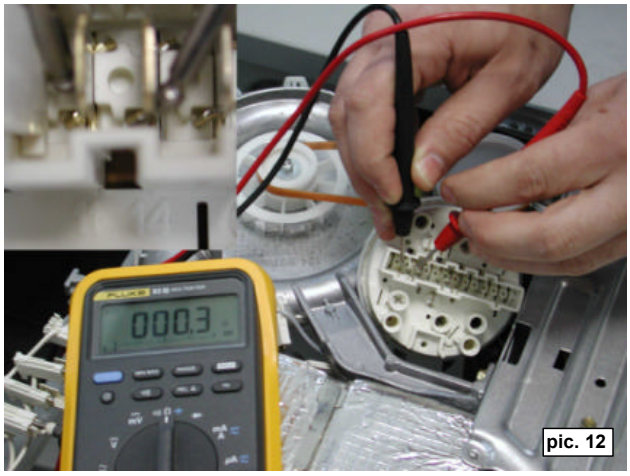
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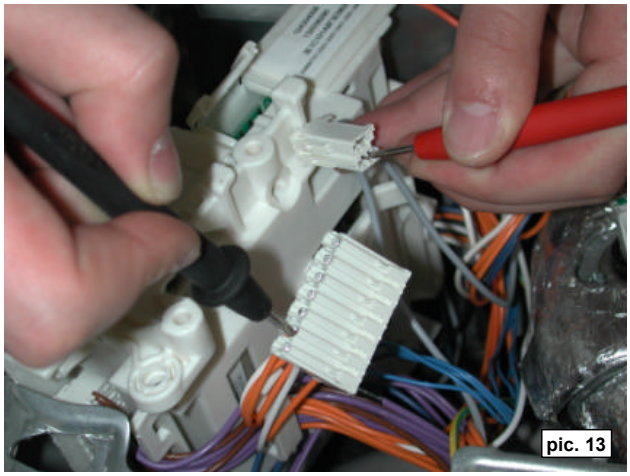
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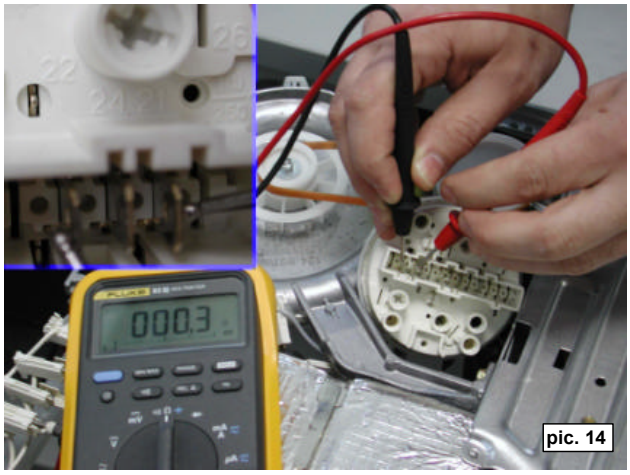
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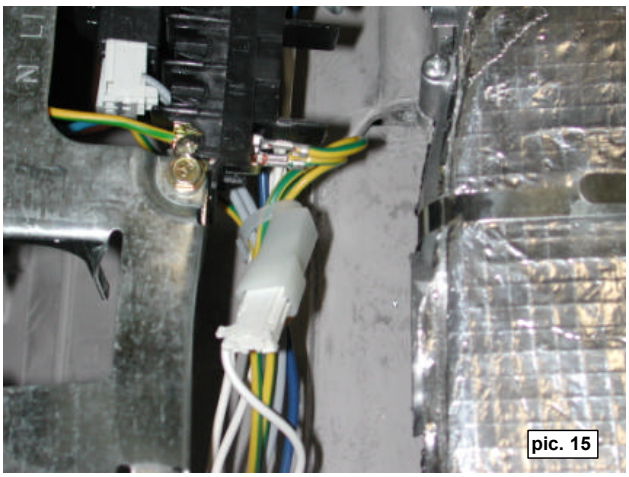
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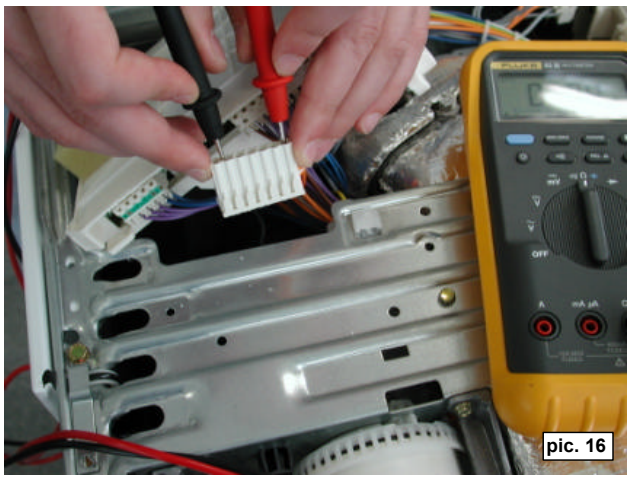
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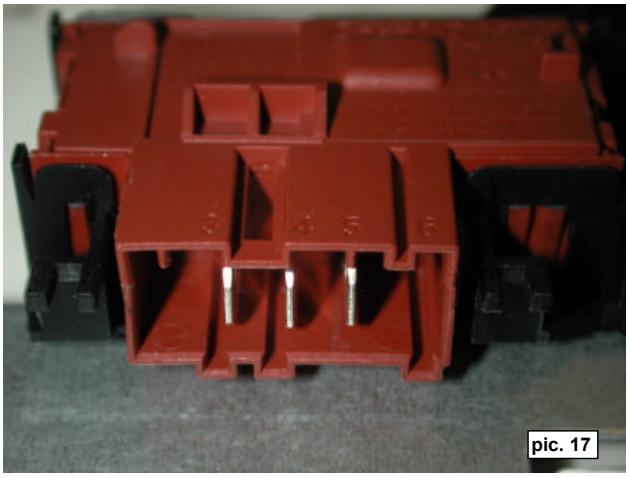
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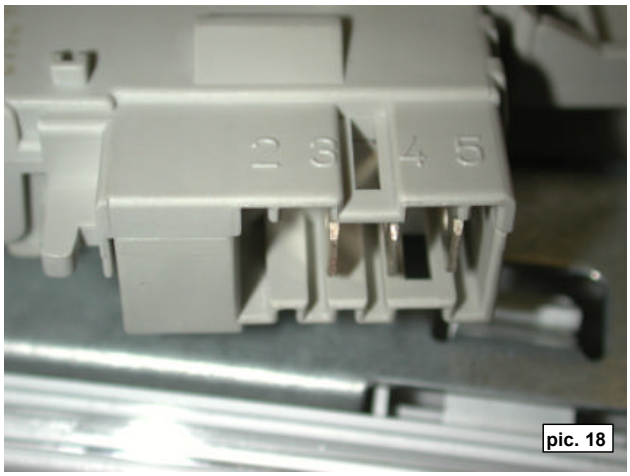

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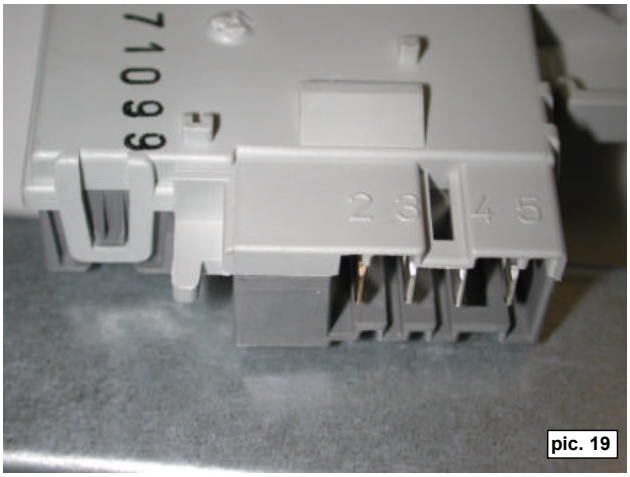

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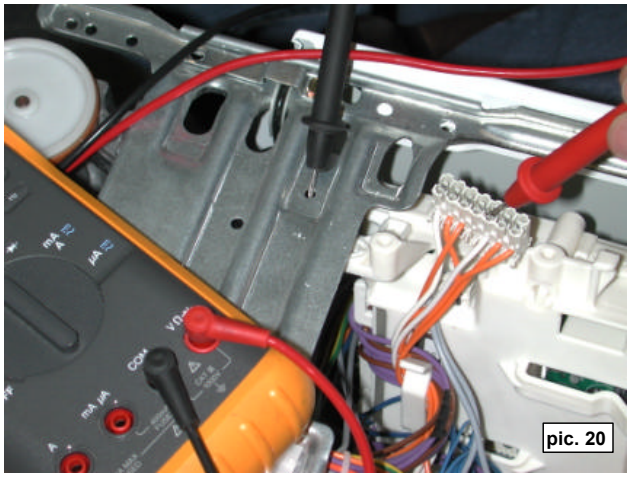
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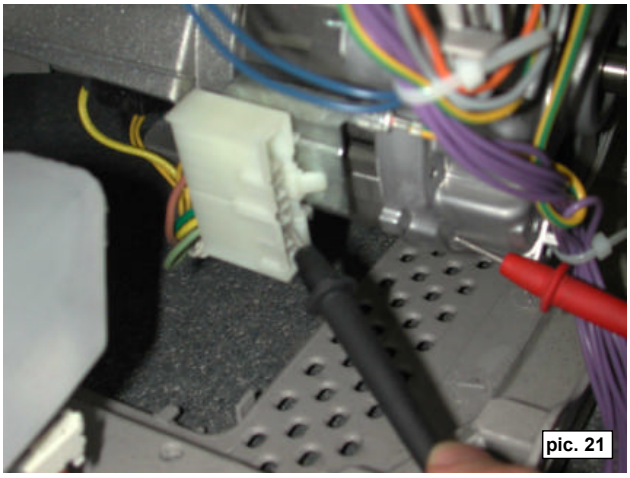
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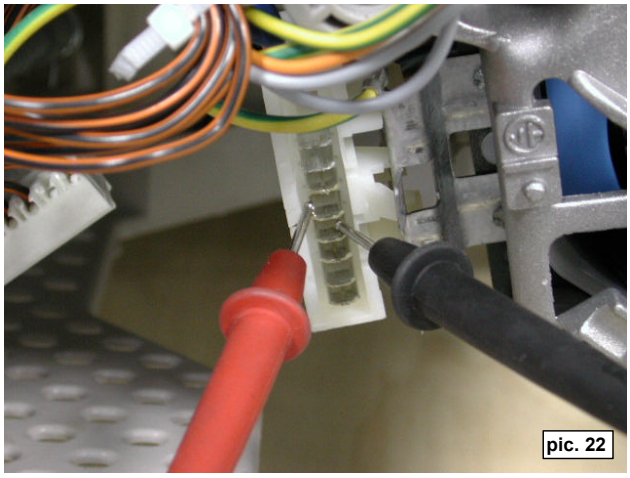
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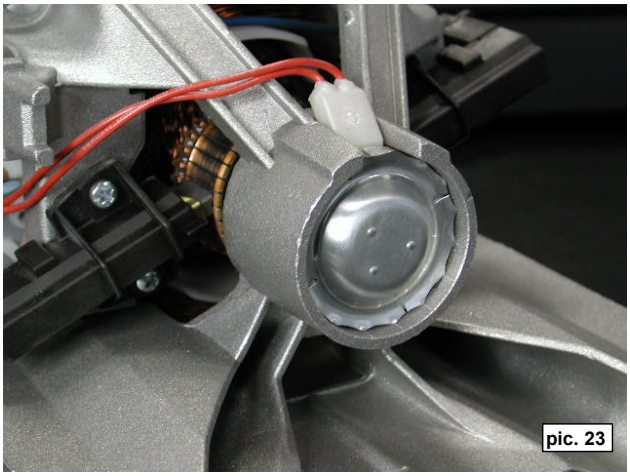
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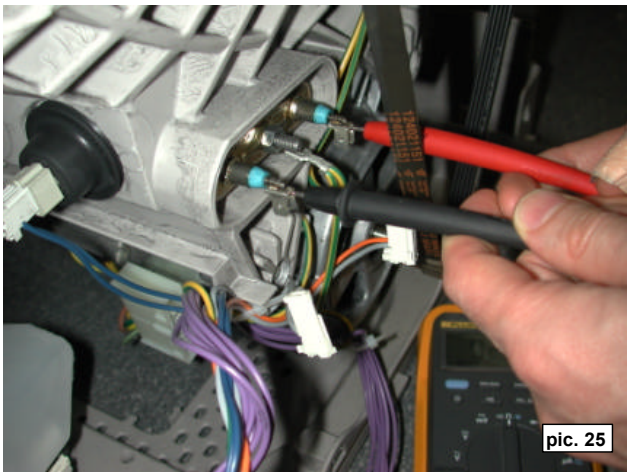
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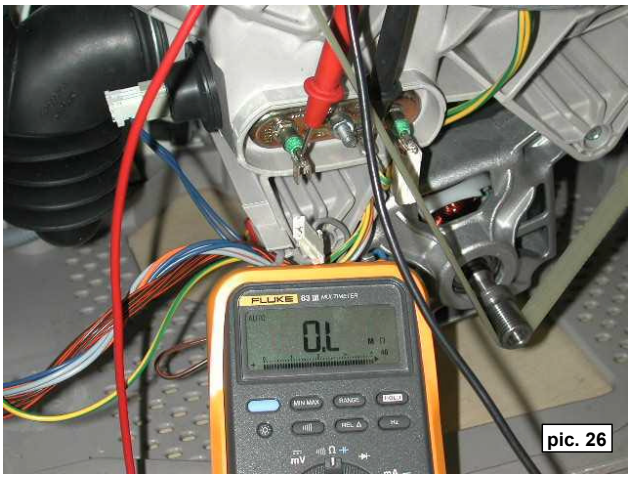

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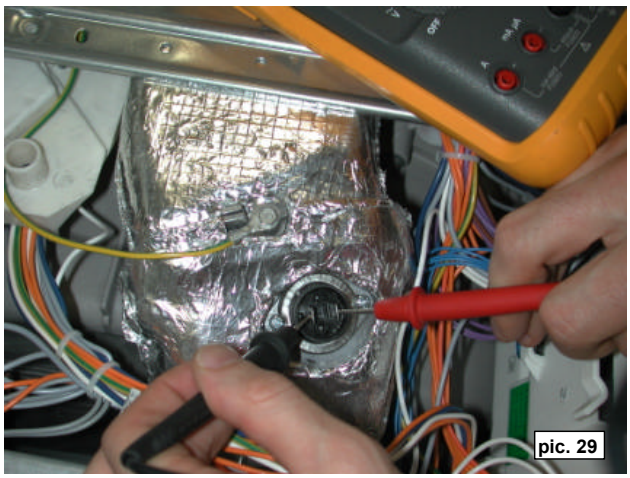
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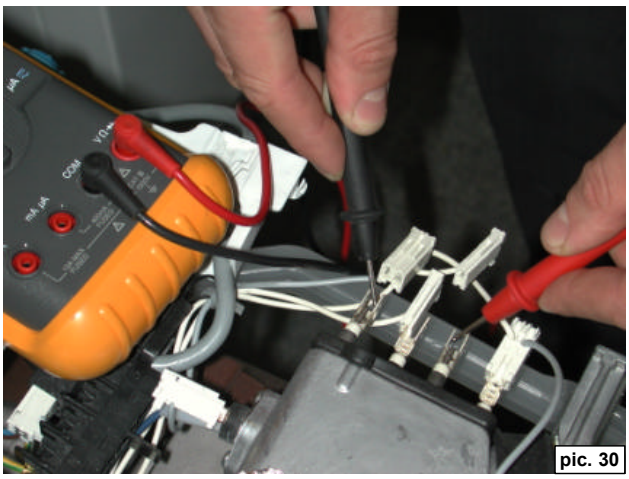
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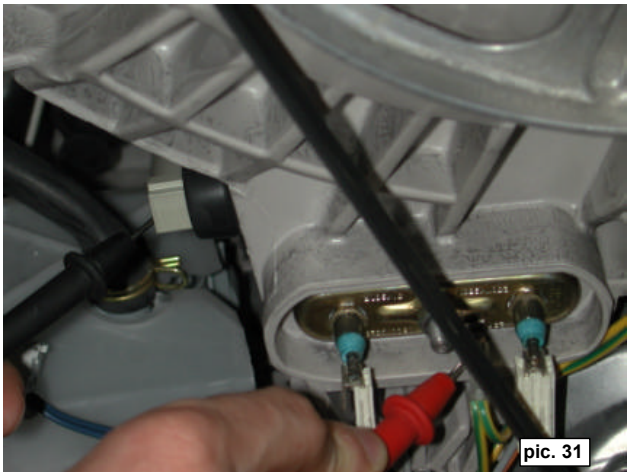
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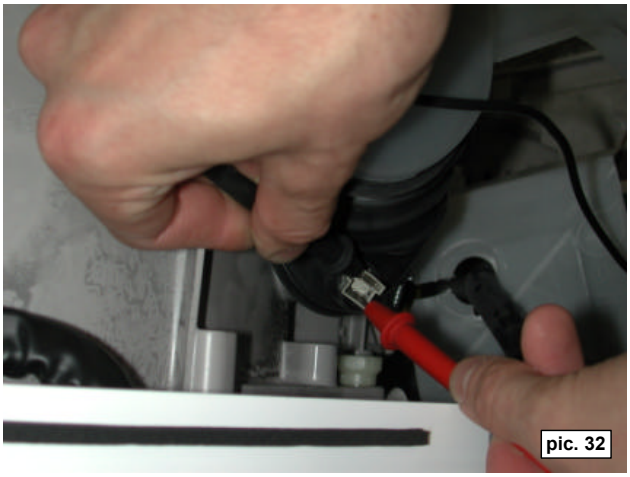
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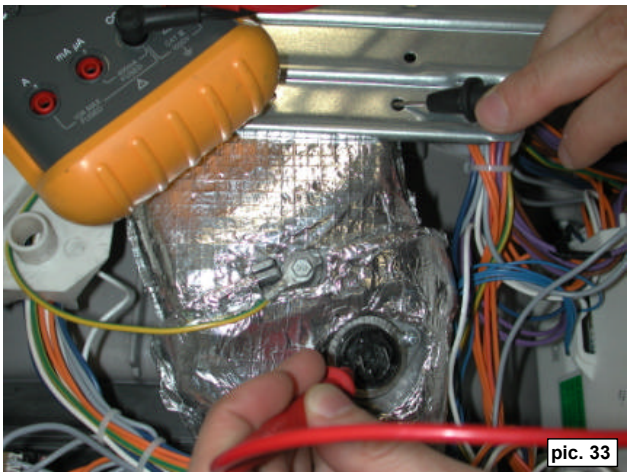
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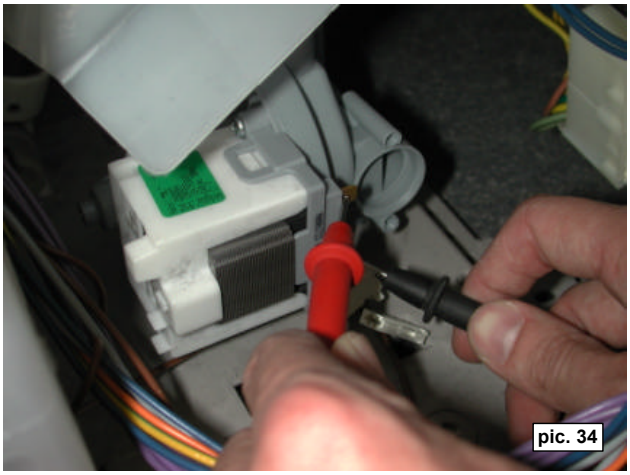
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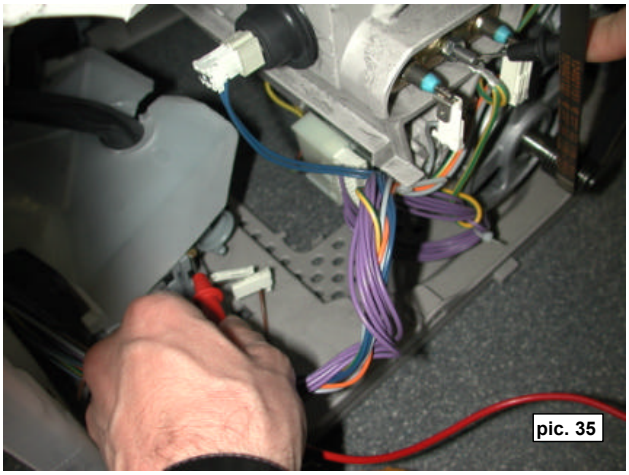
pic. 35

NOTES