

WD000552

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Publication No.

**599 33 46-57/5**

980220  
IT/SERVICE/EB

**WASHING MACHINES  
WITH TIMERS**  
124 9214 0.. / 124 9214 1..

**FUNCTIONS:**  
VD50 - VD50J - VD51  
VD52 - VD53 - VD53J



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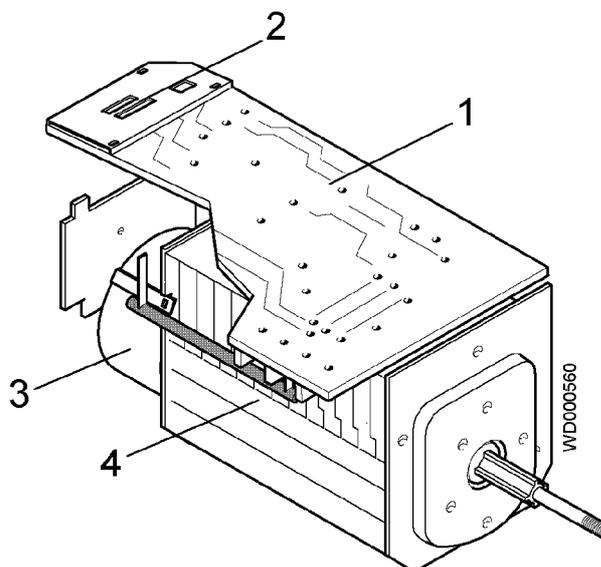
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## GENERAL CHARACTERISTICS

The VD50, VD50J, VD51, VD52, VD53 and VD53J timers manufactured by AKO are used in certain washing machine models with spin speeds from 600 rpm to 1000 rpm.

These timers consist of two main components: an electromechanical timer and an electronic control board. The electronic control board is connected directly by soldering to the timer connectors, and performs the following functions:

- control of the washing programmes and the
- power supply to timer motor
- power supply and control of the drum moto



1. Electronic control board
2. Microprocessor
3. Timer motor
4. Electromechanical timer

### ON/OFF button

- "push-pull" type on timer knob (timer code 124 9214 0..)
- separate switch (timer code 124 9214 1..)

### Tub

- stainless steel or carboran

### Water fill

- cold water

### Type of motor

- commutator

### Water level control

- two-level pressure switch (models with adjustable thermostat)
- single-level pressure switch (models with fixed-temperature thermostats)

### Spin speeds

- 600 rpm - 1000 rpm

### Heating element

- 1950 W

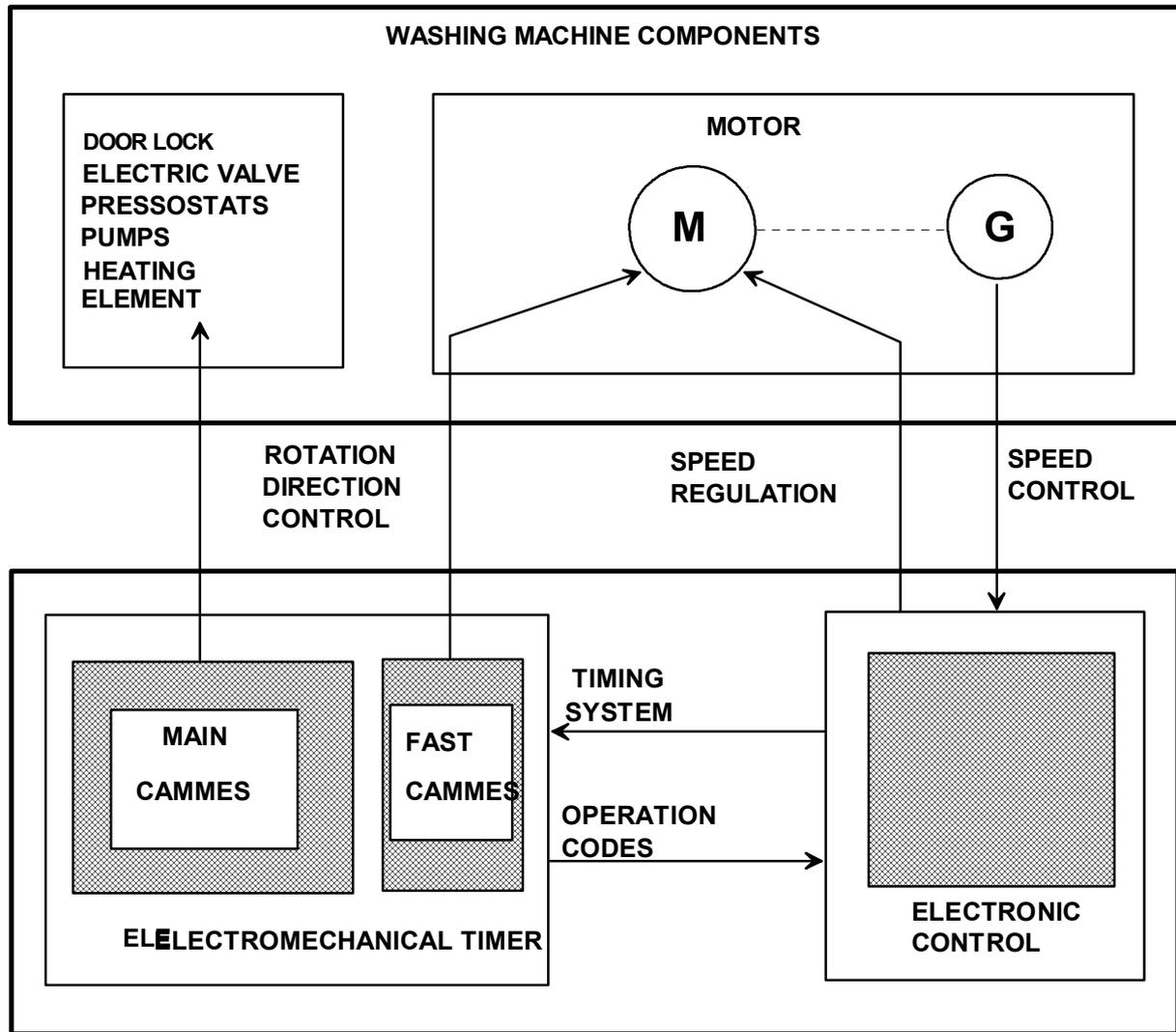
### Temperature control

- by adjustable thermostat (0 - 90°C)
- fixed-temperature thermostats

The characteristics of the various types of timer are shown in the table below.

TIMER	POSITION OF PRESSURE SWITCH PRESSURE CHAMBER	TYPE OF WASH	N° RINSES IN COT PROGRAMME
VD50	on filter body	traditional	4
VD50J	near tub	jetsystem	4
VD51	near tub	traditional	4
VD52	on filter body	traditional	3
VD53	near tub	traditional	3
VD53J	near tub	jetsystem	3

## OPERATING PRINCIPLES



The electronic control board powers the timer motor via a TRIAC. The timer, by closing a series of contacts, transmits to the electronic control board the codes which identify the operations to be performed at each timer step.

Via a second TRIAC, the electronic control board directly powers the drum motor, and controls its speed according to a signal received from the tachymetric generator.

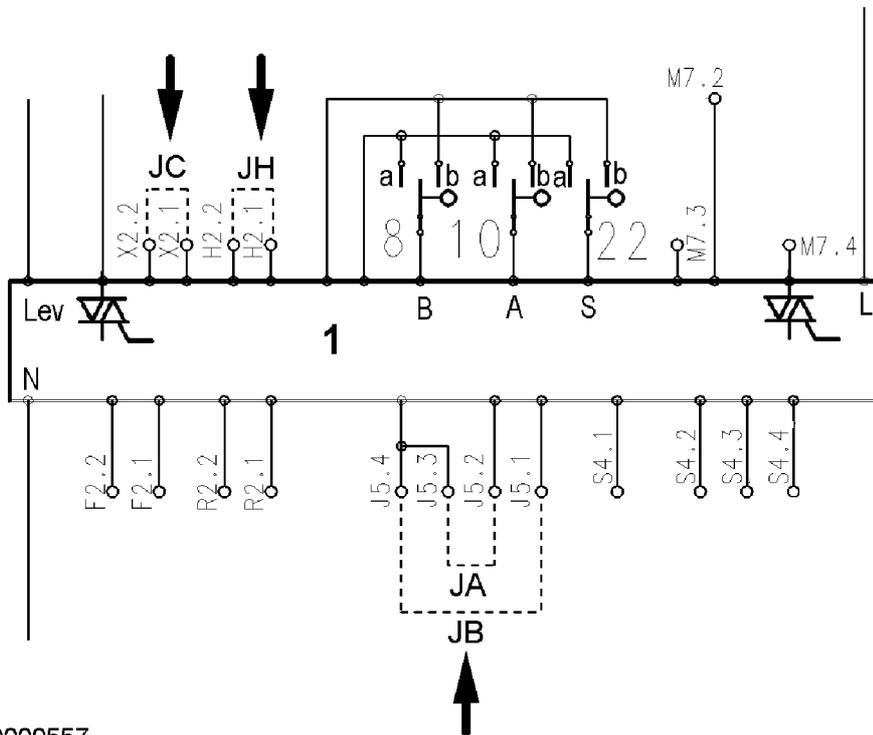
The direction of rotation and the operating sequence (pause - rotation) are controlled by the closure of four contacts on the fast camme of the timer.

All the other electromechanical components of the washing machine are powered by the contacts of the timer's main cammes.

The duration of the heating phases is fixed; the thermostat (if fitted) serves only to reduce the temperature for the selected programme.

## CONFIGURATION OF TIMER FUNCTIONS

The various types of timer, and thus its functions, are configured according to the wiring connectors.



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**1** Electronic control board

**JC** Connector which determines the timer functions:  
**VD50 - VD50J - VD51** if there is no jumper between X2.1 and X2.2  
**VD52 - VD53 - VD53J** if a jumper is fitted between X2.1 and X2.2

**JH** This connector is used in conjunction with the "rinse hold" button.  
 If there is no jumper between H2.1 and H2.2, the "rinse hold" option can be selected (by pressing the button) in cycles for SYNTHETICS, DELICATES and WOOL.  
 If a jumper is inserted between H2.1 and H2.2, this function is enabled at the end of the rinses in COTTON cycles, too.

**JA - JB** Depending on the type of model, these connectors determine the transmission ratio between the motor pulley and the drum pulley, and thus the speed of the final spin cycle:

JB	JA	Ratio	Max. speed
0	0	1 / 18	600
0	1	1 / 18	800
1	0	1 / 14	900
1	1	1 / 14	1

## **SAFETY FEATURES**

### **ANTI-UNBALANCING DURING SPINNING**

Control of the balance of the load is performed while the drum rotates at a speed of 85 rpm, i.e. before the spin cycle. If the load is particularly unbalanced, the spin cycle is not performed, and the ramp is repeated at 85 rpm.

If the load remains unbalanced, this procedure is repeated approximately 10 times. After this period, the timer passes to the next step, and the spin cycle is skipped.

### **MOTOR PROTECTION**

#### **Power TRIAC for motor short-circuited**

If the TRIAC which powers the motor is short-circuited, the electronic control board moves the fast cammes to the position in which the motor is not powered. After 30 seconds, the motor is again powered; if the defect persists after three attempts, the power to the motor is disconnected and the timer remains in its current position.

#### **Tachymetric generator short-circuited or disconnected**

If a malfunction is detected in the tachymetric generator, the electronic control board disconnects the motor for 30 seconds, and then restores power. If the malfunction persists, this sequence is repeated every 30 seconds until the end of the cycle.

## WASHING PROGRAMMES

MODELS WITH ADJUSTABLE THERMOSTAT				
	PROGRAMMES		RINSES	
		WASHING TEMPERATURE	VD50 - VD51 - VD50J	VD52 - VD53 - VD53J
<b>n°</b>	<b>COTTON - LINEN</b>			
<b>1</b>	Whites / Coloureds with pre-wash	30-95	4	3
<b>2</b>	Whites / Coloureds	30-95	4	3
<b>3</b>	Delicate coloureds / Light soiling	30-60	4	3
<b>4</b>	Short cycle	40	4	3
<b>5</b>	Rinses	-	4	4
<b>6</b>	Conditioner	-	1	1
<b>7</b>	Spin	-	-	
	<b>SYNTHETICS</b>			
<b>8</b>	Whites / Coloureds with pre-wash	30-60	3	3
<b>9</b>	Whites / Coloureds	30-60	3	3
<b>10</b>	Delicate coloureds / Short cycle	30-40	3	3
<b>11</b>	Rinses	-	3	3
<b>12</b>	Conditioner	-	1	1
	<b>DELICATES - WOOL</b>			
<b>13</b>	Delicates	30-40	3	3
<b>14</b>	Wool	40	3	3
<b>15</b>	Rinses	-	3	3
<b>16</b>	Conditioner	-	1	1
<b>17</b>	Short spin	-	-	-
<b>18</b>	Drain	-	-	-

MODELS WITH FIXED-TEMPERATURE THERMOSTAT				
	PROGRAMMES		RINSES	
		WASHING TEMPERATURE	VD50 - VD51 - VD50J	VD52 - VD53 - VD53J
<b>n°</b>	<b>COTTON - LINEN</b>			
<b>1</b>	Whites / Coloureds with pre-wash	60	4	3
	Whites with pre-wash *	95	4	3
<b>2</b>	Whites / Coloureds	60	4	3
	Whites *	95		
<b>3</b>	Coloureds	60	4	3
<b>4</b>	Delicate coloureds	40	4	3
<b>5</b>	Rinses	-	4	4
<b>6</b>	Conditioner	-	1	1
<b>7</b>	Spin	-	-	
	<b>SYNTHETICS</b>			
<b>8</b>	Whites with pre-wash	60	3	3
<b>9</b>	Whites	60	3	3
<b>10</b>	Coloureds	40	3	3
<b>11</b>	Rinses	-	3	3
<b>12</b>	Conditioner	-	1	1
	<b>DELICATES - WOOL</b>			
<b>13</b>	Delicates	40	3	3
<b>14</b>	Wool	40	3	3
<b>15</b>	Rinses	-	3	3
<b>16</b>	Conditioner	-	1	1
<b>17</b>	Short spin	-	-	-
<b>18</b>	Drain	-	-	-





## KEY FUNCTIONS

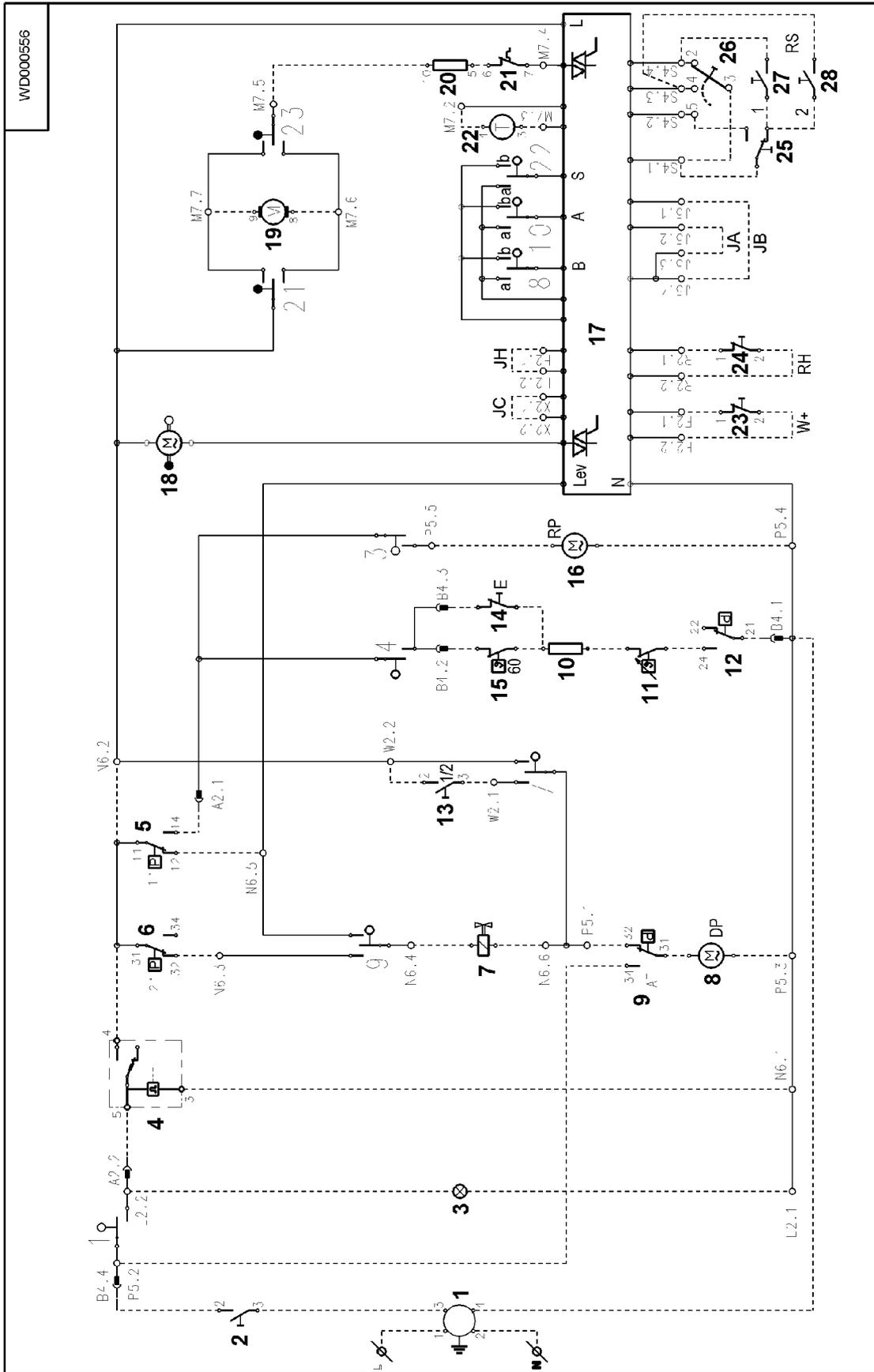
### BASIC CIRCUIT DIAGRAM

<b>START/STOP</b>	switches the appliance ON and OFF (timer 124.92141... only)
<b>1/2 LOAD</b>	with timers VD50/VD51, reduces the number of rinses from 4 to 3 in COTTON cycles; with timers VD52/VD53, reduces the number of rinses from 3 to 2 in COTTON cycles.
<b>SUPER RINSE</b>	increases the water fill in the second and third rinses in COTTON cycles (first and second rinses for timers VD51/VD52).
<b>ECONOMY</b>	reduces the washing temperature to 60°C in the 95°C COTTON programmes (the duration of the programme remains unaltered).
<b>COTTON 90°</b>	in models with fixed-temperature thermostats, performs the heating phase in COTTON cycles (n° 1 and 2) at 90°C instead of 60°C.
<b>SELECT TEMPERATURE 30° - 40° - 60° - 90°</b>	in models with fixed-temperature thermostats, these keys are used to select the washing temperature.
<b>COLD WASH</b>	in models with fixed-temperature thermostats, disconnects the power supply to the heating elements.
<b>RINSE HOLD</b>	stops the appliance leaving water in the tub at the end of the final rinse (in cycles for SYNTHETICS, DELICATES and WOOL). If a jumper is fitted between timer contacts H2.1 and H2.2, this option can also be selected in cycles for COTTON.
<b>DELICATE SPIN</b>	the function of this key is opposite to that of the "RINSE HOLD" key.
<b>NO SPIN</b>	excludes all the spin phases
<b>REDUCED SPIN</b>	reduces the spin speeds as shown in the table below. The two different types of reduced spin depend on the way in which the electronic control board is connected.
<b>SPIN SPEED SELECTOR</b>	reduces the speed in the final spin as shown in the table below.

POSITION OF SELECTOR	0	7	6	5	4	3	2	1
<b>REDUCTION KEY</b>					<b>Type 2</b>		<b>Type 1</b>	
<b>SPIN C1 (rpm)</b>	<b>600</b>	500	460	420	<b>380</b>	340	<b>300</b>	0
	<b>800</b>	700	600	500	<b>400</b>	350	<b>300</b>	0
	<b>900</b>	800	700	600	<b>500</b>	400	<b>300</b>	0
	<b>1.000</b>	900	800	700	<b>600</b>	500	<b>300</b>	0
<b>SPIN C2 (rpm)</b>	<b>540</b>	500	460	420	<b>380</b>	340	<b>300</b>	0
<b>SPIN C3 (rpm)</b>	<b>740</b>	500	460	420	<b>380</b>	340	<b>300</b>	0



# BASIC CIRCUIT DIAGRAM



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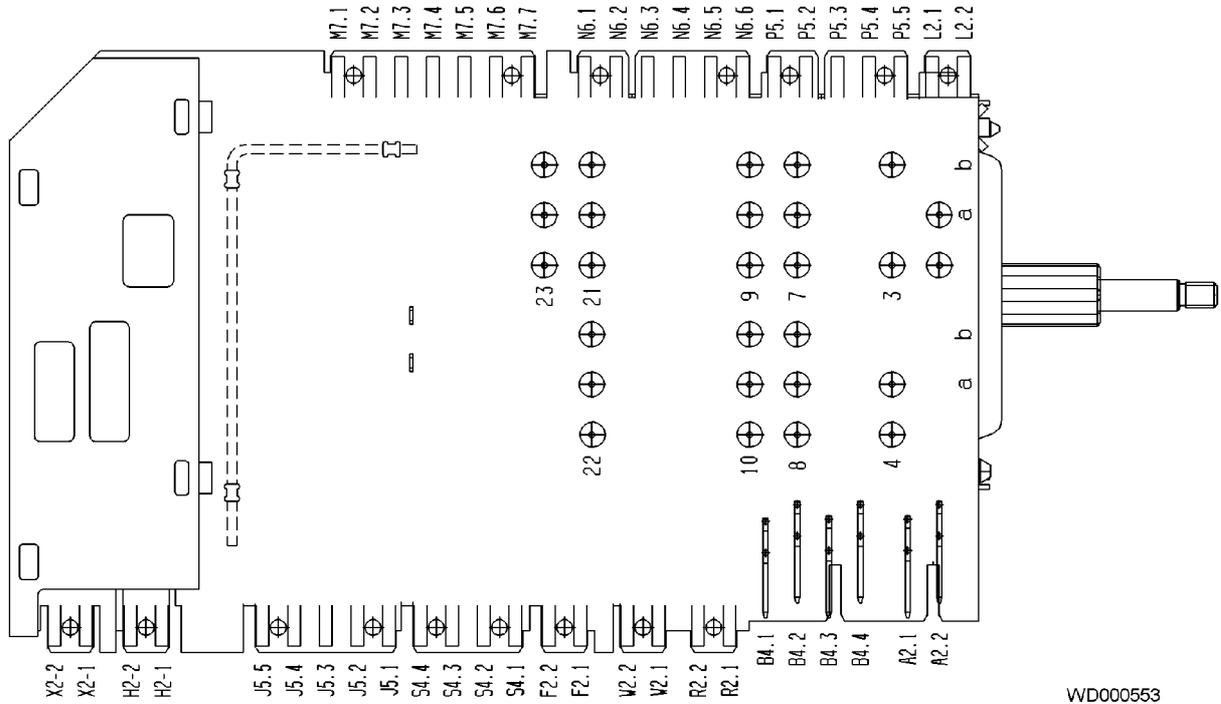
## KEY TO CIRCUIT DIAGRAM

1. Anti-disturbance capacitor
2. START/STOP key
3. Pilot lamp
4. Door interlock
5. Pressure switch (1st level)
6. Pressure switch (2nd level)
7. Cold water solenoid
8. Drain pump
9. Pressure switch (anti-overflow)
10. Washing heater
11. Adjustable thermostat
12. Pressure switch (anti-boiling device)
13. 1/2 LOAD key
14. ECONOMY key
15. 60°C thermostat
16. Circulation pump
17. Electronic control board
18. Timer motor
19. Rotor
20. Stator
21. Safety cut-out for motor
22. Tachymetric generator
23. SUPER-RINSE key
24. NO DRAIN key

## TROUBLESHOOTING

TYPE OF FAULT	POSSIBLE CAUSES
<b>WM DOES NOT START</b>	PILOT LAMP OFF: power cable, suppressor, (main switch), wiring between suppressor and timer (B4.4 - B4.1), timer (B4.4 - A2.2)
	PILOT LAMP ON: door interlock, wiring between door interlock and timer (A2.2 - N6.2 - N6.1), timer
<b>DOES NOT FILL</b>	tap closed, mains pressure insufficient, solenoid valve, wiring between solenoid and timer (N6.4 - N6.6), 1st level pressure switch, pressure switch hydraulic circuit, wiring between pressure switch and timer (N6.5), drain pump winding broken, wiring between drain pump and timer (P5.1 - P5.3), timer (N6.5 - N6.4)
<b>DOES NOT FILL TO 2nd LEVEL</b>	2nd level pressure switch, wiring between pressure switch and timer (N6.3), timer (N6.3 - N6.4)
<b>FILLS CONTINUOUSLY</b>	solenoid valve jammed; pressure switch, pressure switch hydraulic circuit
<b>FILLS CONTINUOUSLY (without reaching level)</b>	drain hose too low, leakage from hydraulic circuit
<b>WATER LEVEL INCORRECT</b>	pressure switch, pressure switch hydraulic circuit
<b>DOES NOT HEAT</b>	heating element, anti-boiling pressure switch, thermostats, wiring between heating element - thermostats - pressure switches - timer (A2.1 - B4.2 - B4.3 - B4.1), timer (A2.1 - B4.2 - B4.3)
<b>INCORRECT TEMPERATURE</b>	thermostats, timer
<b>CIRCULATION PUMP INOPERATIVE (Jetsystem)</b>	circulation pump, wiring between circulation pump and timer (P5.4 - P5.5), timer (A2.1 - P5.4)
<b>MOTOR INOPERATIVE</b>	motor (stator, rotor, circuit-breaker, brushes), wiring between motor and timer (M7.4 - M7.5 - M7.6), timer
<b>MOTOR STARTS FOR A MOMENT, THEN STOPS FOR 30 SECONDS (sequence repeated up to 3 times, then timer stops)</b>	timer
<b>MOTOR STARTS FOR A MOMENT, THEN STOPS FOR 30 SECONDS (cycle continues)</b>	motor (tachymetric generator), wiring between tachymetric generator and timer (M7.2 - M7.3), timer
<b>MOTOR ROTATES IN ONE DIRECTION ONLY</b>	timer
<b>ONLY SPINNING INOPERATIVE</b>	timer, wiring (S4.1 - S4.4, S4.1 - S4.3), spin speed selector, reduced spin key, no spin key
<b>MOTOR DOES NOT OPERATE AT CORRECT SPEED</b>	timer wiring 4J5.1 - J5.4, J5.2 - J5.3) (see specific circuit diagram for each model); wiring (S4.1 - S4.4, S4.1 - S4.3), spin speed selector, reduced spin key, timer
<b>DOES NOT DRAIN</b>	drain pump, wiring between drain pump and timer (P5.1 - P5.3), timer (N6.2 - P5.1)
<b>TIMER DOES NOT ADVANCE</b>	timer
<b>CYCLE INCORRECT</b>	timer
<b>CYCLE OPTIONS INCORRECT</b>	check the various option keys and their wiring; timer

# TIMER CONNECTORS



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