LG

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WASHING MACHINE
SERVICE MANUAL

⚠ CAUTION

READ THIS MANUAL CAREFULLY TO DIAGNOSE
PROBLEMS CORRECTLY BEFORE SERVICING THE UNIT.

MODEL: WM2016CW

LG Electronics Inc.

NOV. 2006 PRINTED IN KOREA P/No.: MFL30599104

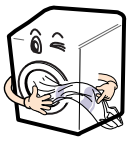
CONTENTS

1. SPECIFICATIONS

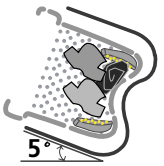
ITEM		WD2016CW	WM2233H*
COLOR		W:BLUE WHITE, B:BLACK PEARL, S:TITANIUM	
POWER SUPPLY		AC 120 V, 60 Hz	
PRODUCT WEIGHT		179 lbs. (81 kg)	190 lbs. (86 kg)
ELECTRIC POWER CONSUMTION	WASHING	280 W	
	DRAIN MOTOR	80 W	
	WASH HEATER	–	1000W
REVOLUTION SPEED	WASH	46 rpm	42 rpm
	SPIN	0-1050 rpm	0-1100 rpm
CYCLES		5	7
WASH/RINSE TEMPERATURES		5	
SPIN SPEEDS		5	
OPTIONS		Prewash, Rinse+Spin, Quick Cycle, Stain Cycle, Tub Clean,	
		Delay Wash, Water Plus, Extra Rinse, Spinsense	
CUSTOM PROGRAM		–	
WATER CIRCULATION		–	
OPERATIONAL WATER PRESSURE		14.5−116 psi (800 kPa)	
CONTROL TYPE		Electronic	
DIMENSIONS		27” (W) X $30\frac{1}{32}$” (D) X $38\frac{11}{16}$” (H), $50\frac{13}{16}$” (D, door open)	
DELAY WASH		up to 9 hours	
DOOR SWITCH TYPE		PTC + Solenoid	
WATER LEVEL		12 Step(by sensor)	
LAUNDRY LOAD SENSING		Incorporated	
ERROR DIAGNOSIS		Incorporated	
AUTO POWER OFF		Incorporated	
CHILD LOCK		Incorporated	

2. FEATURES & TECHNICAL EXPLANATION

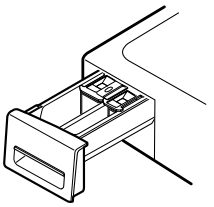
2-1. FEATURES



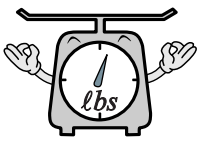
- **Direct Drive System**
  The advanced Brushless DC motor directly drives the drum without belt and pulley.



- **Tilted Drum and Large Door Opening**
  Tilted drum and large opening make it possible to load and unload clothing more easily.



- **Time-Released Dispenser**
  Detergent, fabric softener and bleach are dispensed separately at the right time during wash cycle.

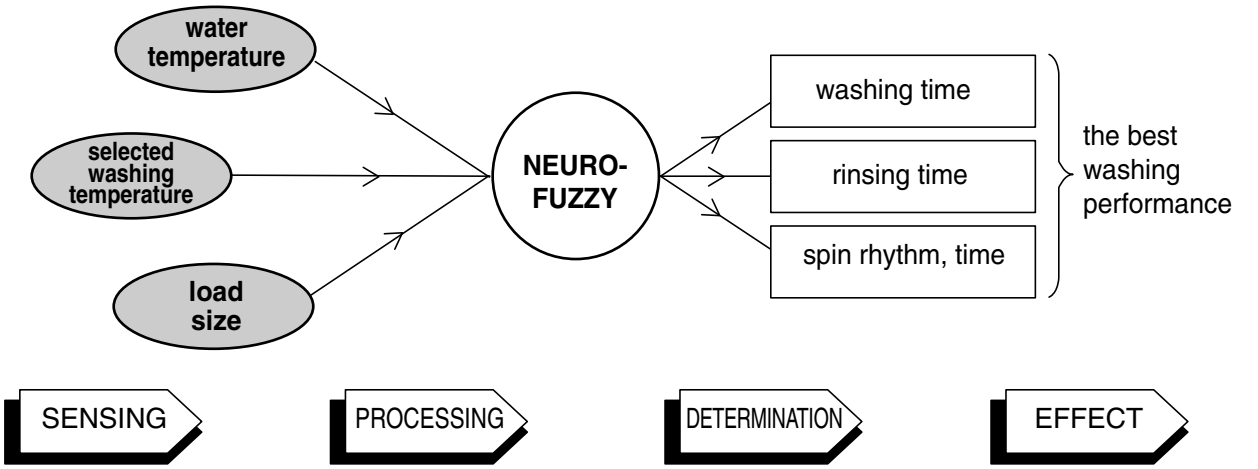


- **Automatic Wash Load Detection**
  Automatically detects the load and optimizes the washing time.

- **Child Lock**
  The Child lock prevents children from pressing any button to change the settings during operation.

2-2. NEURO FUZZY WASHING TIME OPTIMIZATION

To get the best washing performance, optimal time is determined by the water temperature, the selected washing temperature, and the size of the load.



2-3. WATER LEVEL CONTROL

- This model incorporates a pressure sensor which can sense the water level in the tub.
- The water supply is stopped when the water level reaches the preset level, the washing program then proceeds.
- Spinning does not proceed until the water in the tub drains to a certain level.

2-4. DOOR CONTROL

- The door can be opened by pulling the door handle whenever washer is not in operation.
- When the cycle is completed, the DOOR LOCKED light will turn off.
- If a power failure has occurred while in operation, the door will unlock after 5 minutes.
- Clicking sounds can be heard when the door is locked/unlocked.

2-5. THE DOOR CAN NOT BE OPENED

- While program is operating.
- When a power failed and power plug is taken out in operation.
- While Door Lock lights turn on.
- White the motor is in the process of intertial rotating, through the operation is paused.

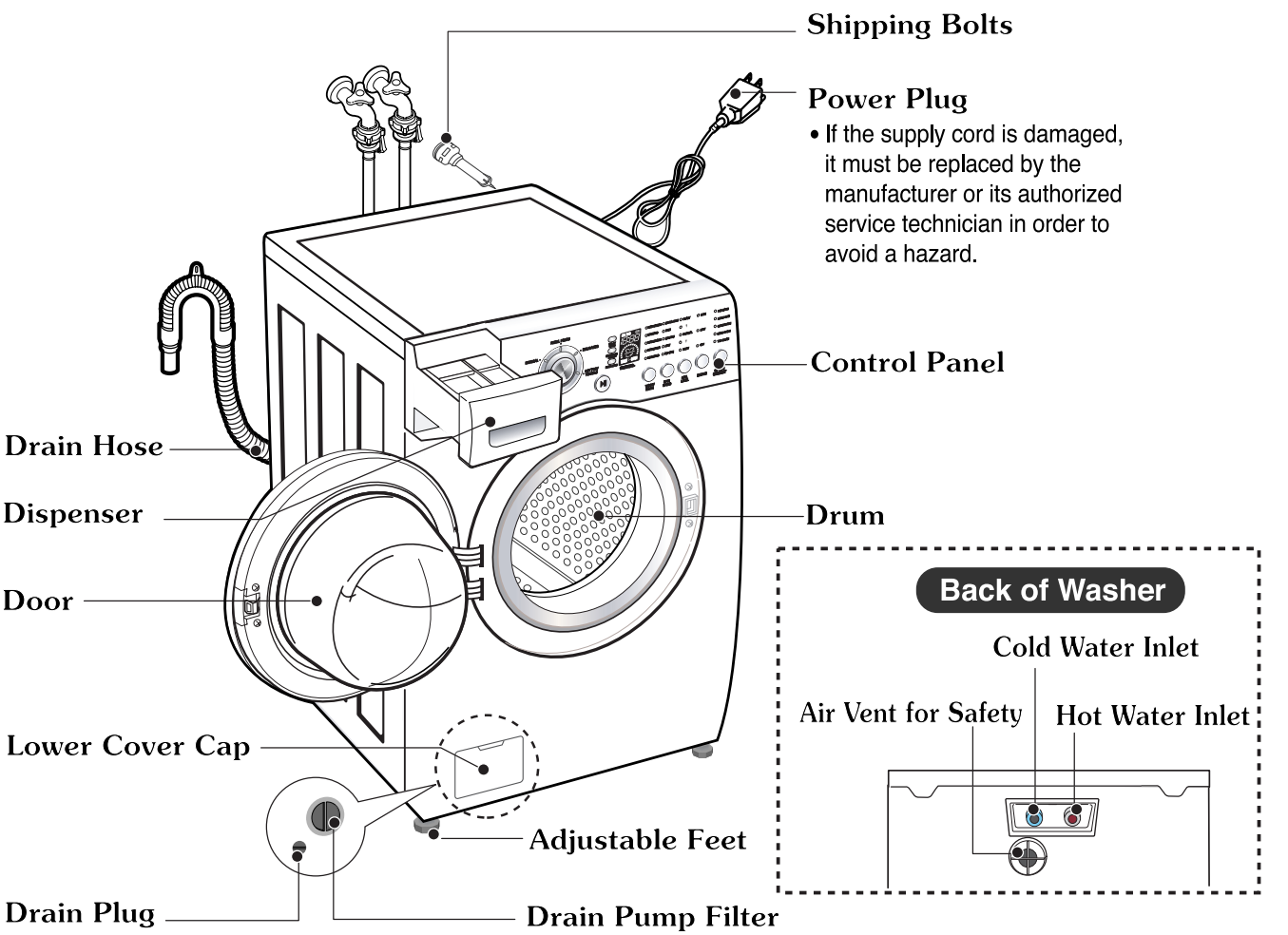
2-6. DOOR LOCKED LAMP LIGHTS

- When the frequency of water level is lower than 22.9 kHz
  (It can be canceled when the frequency is more than 23.8 kHz)
- When the temperature inside the tub is higher than 45 °C and water level is not 25.5 kHz
  (It can be canceled when the water level is 25.5 kHz or the temperature inside the tub is lower than 40 °C)

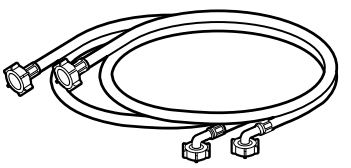
2-7. CHILD LOCK

- Use this option to prevent unwanted use of the washer. Press and hold OPTION button for 3 seconds to lock/unlock control.
- When child lock is set, "CL" blinks and all buttons are disabled except the Power ⏻ button. You can lock the controls of the washer while washing.

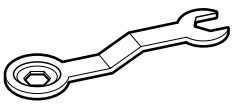
3. PARTS IDENTIFICATION



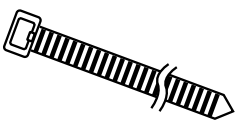
■ ACCESSORIES



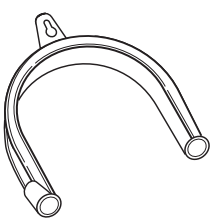
Hot/Cold (1 each) Hose



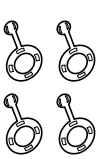
Wrench
for removing shipping bolts and leveling the washer



Tie strap
to secure drain hose to standpipe, inlet hose, or laundry tub



Hose retainer



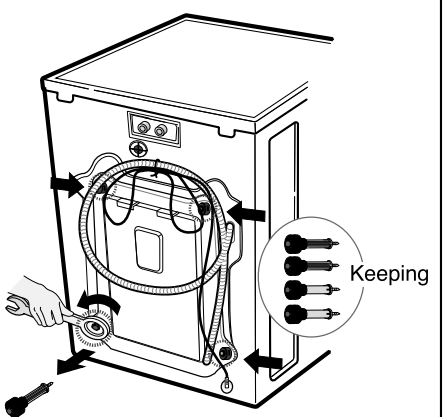
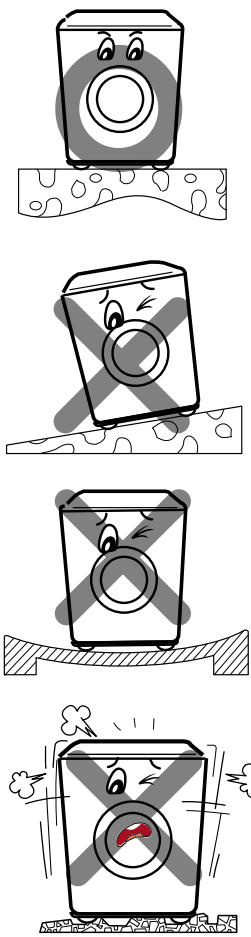
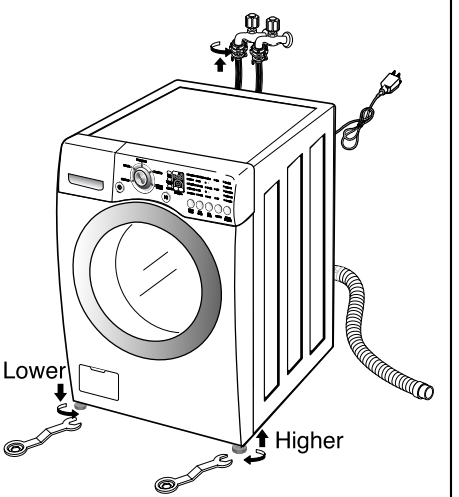
Cap (4 each)
to cover the holes created after removing the shipping bolts

4. INSTALLATION & TEST

1 Before servicing, ask the customer what the trouble is.
2 Check the setup (power supply is 120V, remove the transit bolts, level the washer...)
3 Check with the troubleshooting guide.
4 Plan your service method by referring to the disassembly instructions.
5 Service the unit.
6 After servicing, operate the appliance to see whether it functions correctly.

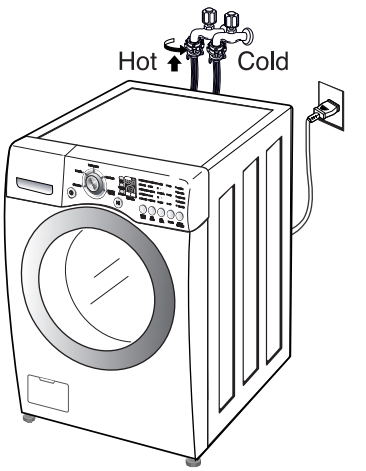
■ STANDARD INSTALLATION

The appliance should be installed as follows:

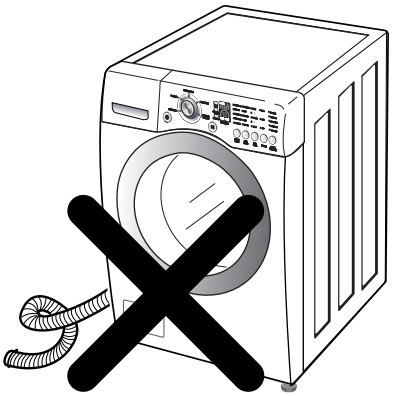
REMOVE THE SHIPPING BOLTS	INSTALL THE APPLIANCE ON A FLAT AND FIRM SURFACE	ADJUST THE LEVELING
• Remove the 4 shipping bolts with the supplied wrench. ※ Do first lower side to remove easily. • Keep the shipping bolts and spanner for future use. • Insert the 4 caps (provided) into the hole. 		• Turn the leveling feet to adjust the appliance.  • Turn clockwise to raise; counterclockwise to lower.

■ HOW TO CONNECT THE INLET HOSE

- Verify that the rubber washer is inside of the valve connector.
- Tighten the inlet hose securely to prevent leaks.



■ CONNECT THE DRAIN HOSE

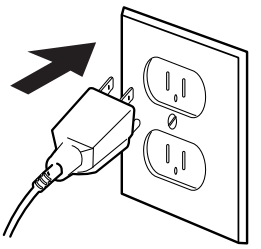


· Make sure that the hose is not twisted.

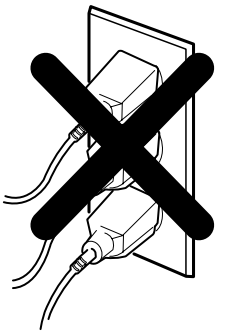
· Avoid submerging the end of the hose.

※ The end of the drain hose should be placed less than 96” from the floor.

■ CONNECT POWER PLUG



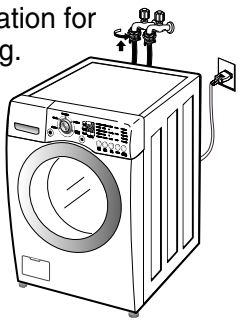
· Connect the power plug to the wall outlet.



· Avoid connecting several electric devices, as doing so may cause a fire.

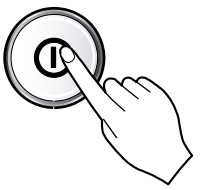
7 TEST OPERATION

1 Preparation for washing.

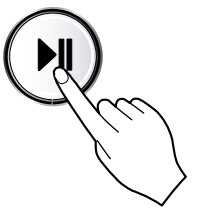


- Connect the power plug to the outlet.
- Connect the inlet hose.

2 Press the POWER button.

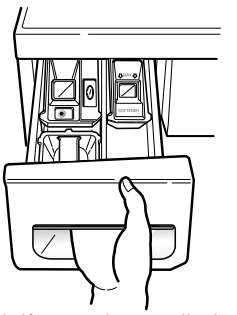


3 Press the Start/Pause button.



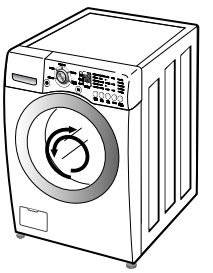
- Listen for a click to determine if the door has locked.

4 Check the water supply.



- Check if water is supplied through the detergent dispenser.

5 Check the automatic reverse rotation.



- Check if the drum rotates clockwise and counterclockwise.

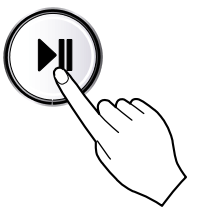
6 Check the water temperature.

- Press the WASH/RINSE button and the present temperature will be displayed.

7 Check the drain and spin functions.

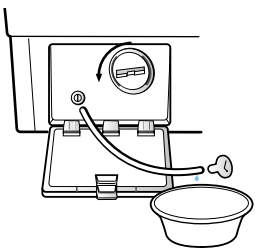
- Power off and the power on.
- Press the SPIN SPEED button.
- Press the START/PAUSE button.
- Check the spin and drain functions.

8 Press the START/PAUSE button.



- Listen for a click to determine if the door is unlocking.

9 Water removal.

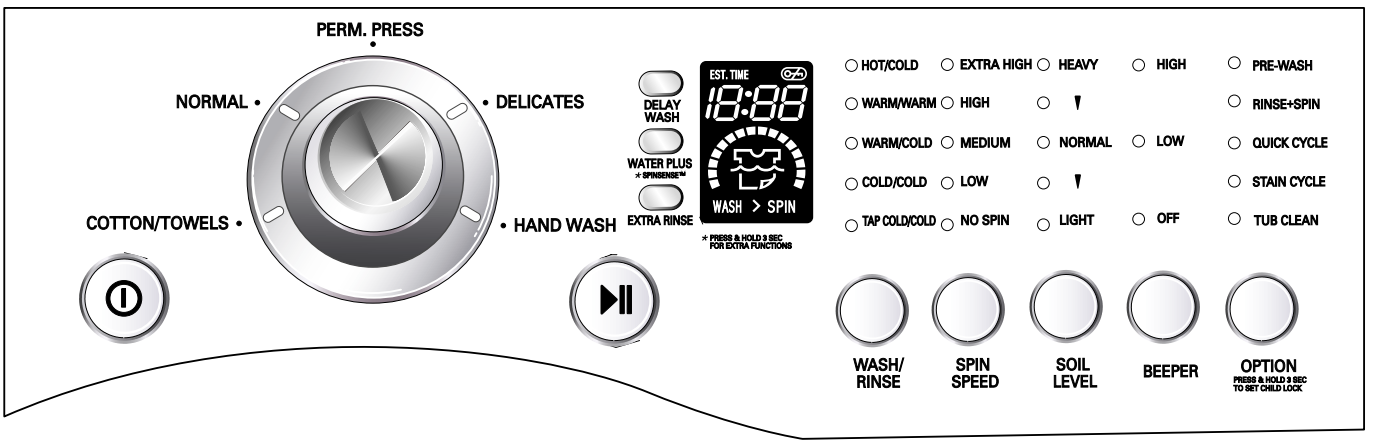


- If SERVICE is needed during check, remove the remaining water by pulling out the hose cap.

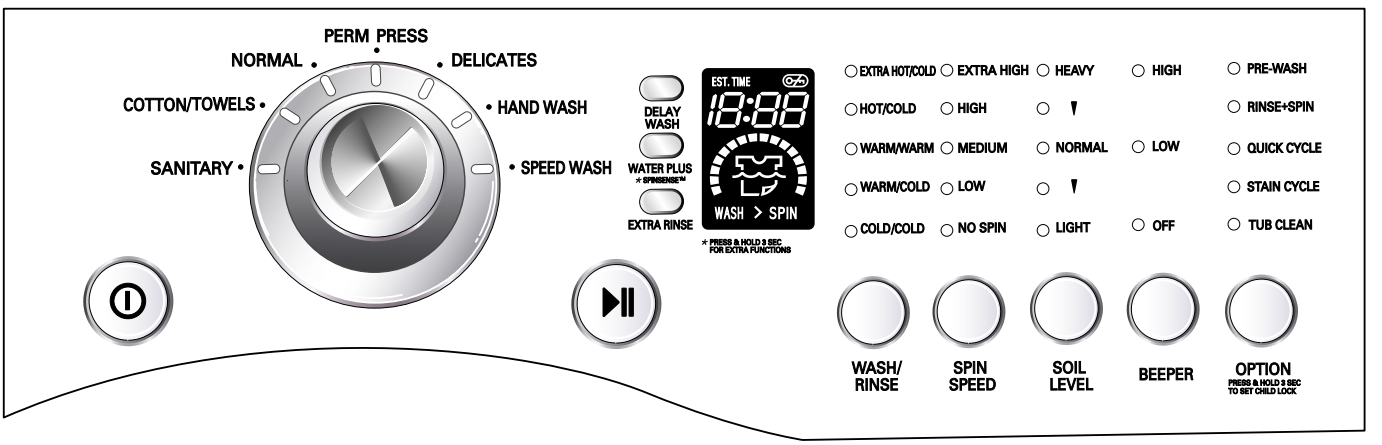
5. OPERATION

5-1. CONTROL PANEL FEATURES

■ WM2016CW



■ WM2233H*



Delay Wash, Water Plus/*Spinsense, Extra Rinse

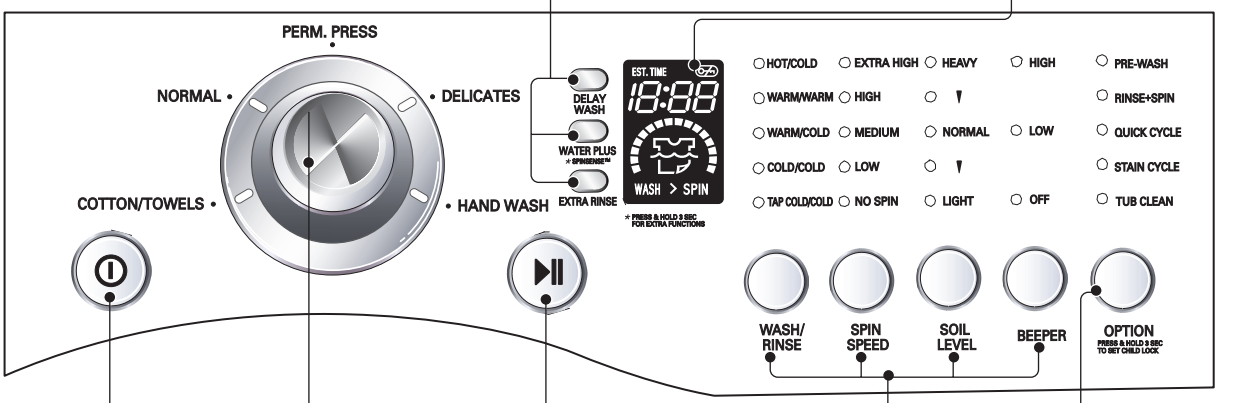
- Delay Wash allows the start of any cycle to be delayed for 1~9 hours
- Water Plus adds extra water to the wash and rinse cycles for superior results
- Extra rinse Provides an additional rinse

EST. TIME REMAINING

- This display shows:
  a) the estimated time remaining in the cycle when operation.
  b) an error code when an error has been detected.

DOOR LOCKED lamp

- Light whenever the door of the washer is locked.
- The door can be unlocked by pressing the **Start/Pause** button to stop the washer.



POWER button

- Use this button to turn power **On/Off.**

START/PAUSE button

- Use this button to **start/stop** the washer.

OPTION button

- **Prewash:** Use this option for loads that need pretreatment.
  It adds 16 minutes prewash and drain.
- **Rinse + Spin:** Use this option to rinse and then spin.
- **Quick Cycle:** The Quick offers a quick cycle time.
- **Stain Cycle:** Add time to the wash and rinse for better stain removal. Automatically provide a rinse.
- **Tub Clean:**?(Use this option to clean tub.)

CYCLE SELECTOR

- Rotate the cycle selector knob to select the cycle designed for different types of fabric and soil level.

Wash, Rinse temp., Spin speed, Soil Level, Beeper Button.

- Select a water temperature based on the type of load you are washing.
- To change the spin speed, press the Spin Speed button repeatedly to cycle through available options.
- To change the soil level, press the Soil Level button repeatedly until the desired setting is on.
- Press Repeatedly to adjust the Volume

5-2. CYCLE GUIDE

■ Select cycles designed for different types of fabric and soil levels.

Cycle	Fabric type	Wash/Rinse Temp.	Spin Speed	Soil Level	Pre-Wash	Quick Cycle	Extra Rinse	Rinse + Spin	Stain Cycle	Water Plus
Cotton/ Towels	Cotton, linen, towels, shirts, sheets	Warm/Cold	Extra High	Normal	○	○	○	○	○	○
		Warm/Warm Hot/Cold Tap Cold/Cold Cold/Cold	No Spin Low Medium High	Heavy Light						
Normal	mixed loads, work clothes, jeans, shirts	Warm/Cold	High	Normal	○	○	○	○	○	○
		Warm/Warm Hot/Cold Tap Cold/Cold Cold/Cold	Extra High No Spin Low Medium	Heavy Light						
Perm Press	Dress shirts/ pants, wrinkle free clothing,poly/ cotton blend clothing, table cloths	Warm/Cold	Medium	Normal	○	○	○	○	○	○
		Warm/Warm Hot/Cold Tap Cold/Cold Cold/Cold	High No Spin Low	Heavy Light						
Delicates	Dress shirts/ blouses nylons, sheer or lacy garment	Cold/Cold	Medium	Normal	○	○	○	○		○
		Warm/Cold Warm/Warm Tap Cold/Cold	No Spin Low	Heavy Light						
Hand Wash	Items labeled “hand washable”	Cold/Cold	Low	Normal		○	○	○		○
		Warm/Cold Warm/Warm Tap Cold/Cold	Medium No Spin	Light						

5-3. SPECIAL FUNCTIONS

The option buttons also activate special functions, including CHILD LOCK, TUB CLEAN, and SPIN SENSE.

CHILD LOCK

Use this option to prevent unwanted use of the washer or to keep cycle settings from being changed while the washer is operating. Press and hold the **OPTION** button for 3 seconds to activate or deactivate CHILD LOCK. **CL** will be shown in the display, and all controls are disabled except the ON/OFF button. The washer can be locked during a cycle.

TUB CLEAN

Remove any clothing or items from the washer and close the door. Open the dispenser drawer and add liquid chlorine bleach to the bleach compartment.

NOTE : Do not add any detergent to the detergent compartments. Excessive suds may be produced and leak from the washer.

Close the dispenser drawer slowly. Power on the machine, press the **OPTION** button and then select the **TUB CLEAN**. Press the **Start/Pause** button to start. After the cycle is complete, leave the door open to dry around the washer door opening, door seal and door glass.

⚠ **CAUTION : If there are small children in the house, care must be taken so that they can not climb into or play inside the washer while it is open for drying.**

SPIN SENSE

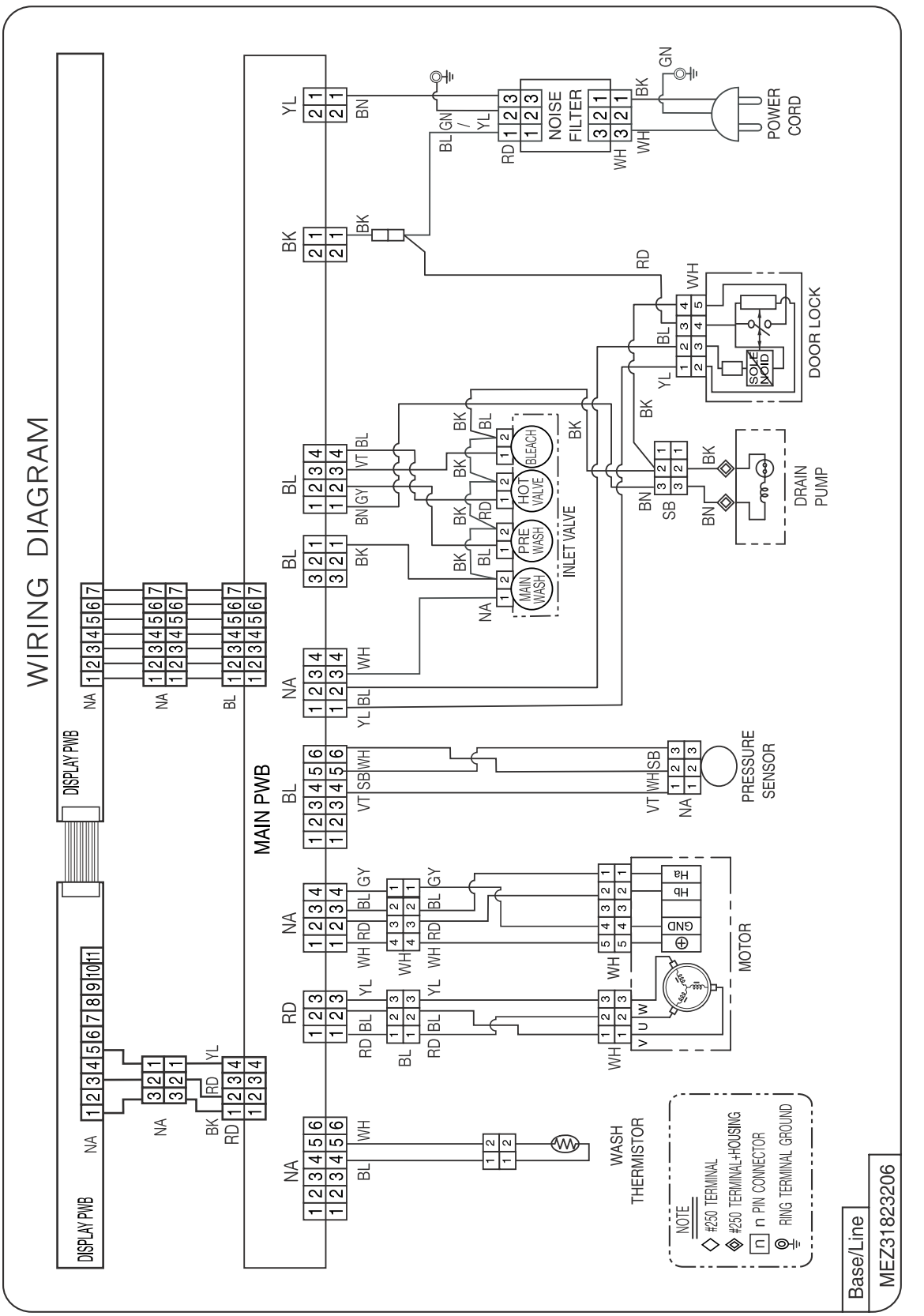
SPINSENSE can be used when there is a vibration problem, especially on wood floor installations. To operate **SPINSENSE** press and hold the **WATER PLUS** button for 3 seconds when the washing machine is running on any cycle. When **SPINSENSE** has been selected, the **SPIN SPEED** button light will blink on and off continually to indicate that the **SPINSENSE** function has been selected. Push and hold the **WATER PLUS** button again for 3 seconds to cancel SPINSENSE. Once **SPINSENSE** has been selected, if will continue to function even if interrupted by a power failure. **SPINSENSE** option cannot be selected during the spinning cycle.

5-4. EXPLANATION OF EACH PROCESS

No.	Process	Explanation
1.	Stay	• Electrical power is supplied • Washer is ready to work and the micom is in the active mode.
2.	Water supply	• After loading laundry and selecting a course and a cycle, water is supplied and drum rotates. • When a user selects Pre-wash course, water is supplied through pre wash valve.
3.	Soaking & washing laundry	• To get laundry wet, drum rotates clockwise and counterclockwise. • If water amount is insufficient at this time, the Inlet valve will supply water again.
4.	Washing	• Fuzzy Logic decides washing time according to the laundry load, water temperature, and other factors.
5.	Drainage	• A pump motor drains the water from the drum. • After sensing drained water amount by water level frequency, spin starts. • When a heating course is selected, stay cooling process is performed to decrease the water temperature gradually to prevent laundry from being damaged and for safety reasons.
6.	Untangling (Sensing eccent-ricity)	• It balances laundry load and senses the eccentricity of the load, to only allow spinning without vibration • If the eccentricity is worse than the allowed level, it repeats the disentangling process. When the repeated time is more than allowed level, it displays UE. • If the eccentricity is good, the intermittent spin starts. • During this process, the drain pump works for drainage intermittently.

No.	Process	Explanation
A.	Intermittent spin	• To reach the correct set speed, the motor rotates clockwise and counterclockwise directions after spin process starts. • If the water level frequency is lower than 23.0 kHz, a washer senses suds and starts suds removal process.
B.	Rinse spin	• In this process, the remaining water during washing process is extracted and the selected speed is kept. • Removing suds process is in active mode at this cycle.
C.	Remaining spin	• After spin finishes, the drum rotates by remaining spin power until it stops. Motor power is off. • This process is overlapped with next process.
D.	Rinse water supply	• Water supply for rinse process
E.	Rinse	• Rinsing process.
F.	Last drainage	• After spin finishes and power is not supplied to motor, the drum rotates by remaining spin power • If rinse hold is selected, the drainage is not proceeded after rinse finishes.
G.	Disentangling	• The same as item 6.
H.	Intermittent spin	• The same as item A.
I.	Main spin1	• The same as item B.
J.	Main spin2	• At the end of a main spin, the spin speed will reach the selected rpm.
K.	Remaining spin	• The same with item C.
L.	Disentangling	• After spin finishes, disentangling starts to remove unbalanced laundry.
M.	End	• After 'end' signal is displayed, it stays for 8 seconds and power is automatically turned off. (Auto type door switch) • After door switch is off, end signal is displayed in the case of manual type and it takes around 2 minute to turn off door switch.

6. WIRING DIAGRAM/PROGRAM CHART



PROGRAM CHART

* Water Supply: W–S　　* Intermittent Spin: I–S　　* Disentangle: D–T

COURSE / CYCLE / STEP / Time (SEC)	Wash										Rinse																Spin			END	AUTO OFF	**Approx. Working Time (Minutes)
	Pre				Main						Normal								Extra or Stain				Extra & Stain										
						Wash		Cool-down			1				2				3				3										
	W – S	Wash	Drain	I – S	W – S	Heat	Wash	W – S	Rinse	Drain	Drain	I – S	W – S	Rinse	Drain	I – S	W – S	Rinse	Drain	I – S	W – S	Rinse	Drain	I – S	W – S	Rinse	Drain	Spin	D – T	END	AUTO OFF	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	20	20	
Time (SEC)	60	*	60	300	60			60	60	60	60	360	60	240	60	360	60	240	60	300	60	240	60	300	60	240	60	360 ~ 660	60 ~ 180	20	20	
Cotton /Towels		16					32 / 14																									58
Normal		16					49 / 15																									57
Perm Press		16					48 / 14																									55
Delicates		16					26 / 8																									34
Hand Wash							8																									34
Wash + Rinse		8					19																									45
Rinse + Spin																																31

Basic Cycle
Optional Cycle
Pre-Setting Time : Water Supply - 60 sec.
Drain - 60 sec.

* Wash time is in minutes.

** The total working time will vary with the load size, water temperature and ambient temperature.

7. TEST MODE

7-1. SAFETY CAUTION

- ■ There's built-in AC 120V and DC power in output terminal of PWB assembly in common. Be careful electric shock when disconnecting parts while trouble shooting. (Wear Electro Static Discharge gloves when working.)
- ■ After cutting off the power when changing PWB assembly, disconnect or assemble.
- ■ Be careful static when handling PWB assembly, and use Electro Static Discharge plastic pack when delivering or keeping it.

7-2. LOAD TEST MODE

The washer must be empty and the controls must be in the off state.

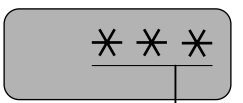
1. Press the SPIN SPEED and SOIL LEVEL buttons simultaneously.
2. Press the Power ⏻ button, while the above condition. Then buzzer will sound twice.
3. Press the Start/Pause ⏯ button repeatedly to cycle through the test modes.
4. 18:88 [1] Alternate blinking of 18:88 [1] and 11:00

Number of times the Start/Pause button is pressed	Check Point	Display Status
None	Turns on all lamps and locks the door.	18:88 [1]
1 time	Tumble clockwise.	rpm (40~50)
2 times	Low speed Spin.	rpm
3 times	High speed Spin.	rpm
4 times	Inlet valve for prewash turns on.	Water level frequency (25~65)
5 times	Inlet valve for main wash turns on.	Water level frequency (25~65)
6 times	Inlet valve for hot water turns on.	Water level frequency (25~65)
7 times	Inlet valve for bleach turns on.	Water level frequency (25~65)
8 times	Tumble counterclockwise.	rpm (40~50)
9 times	Water Temperature (Thermistor)	Water temperature [°C]
10 times	Drain pump turns on.	Water level frequency (25~65)
11 times	Power off and unlock the door.	Turn off all lamps.

1) 1n:80 : WM2016CW / 1n:81 : WM2233H*

7-3. HOW TO CHECK THE WATER LEVEL FREQUENCY

* Press the Delay and Beeper button simultaneously.



The digits indicate the water level frequency (x.1 kHz).

For example, if the display indicate 241,
the water level frequency is 241x0.1kHz = 24.1 kHz.

8. TROUBLESHOOTING

8-1. SAFETY CAUTION

- There's built-in AC 120V and DC power in output terminal of PWB assembly in common. Be careful electric shock when disconnecting parts while trouble shooting. (Wear Electro Static Discharge gloves when working.)
- After cutting off the power when changing PWB assembly, disconnect or assemble.
- Be careful static when handling PWB assembly, and use Electro Static Discharge plastic pack when delivering or keeping it.

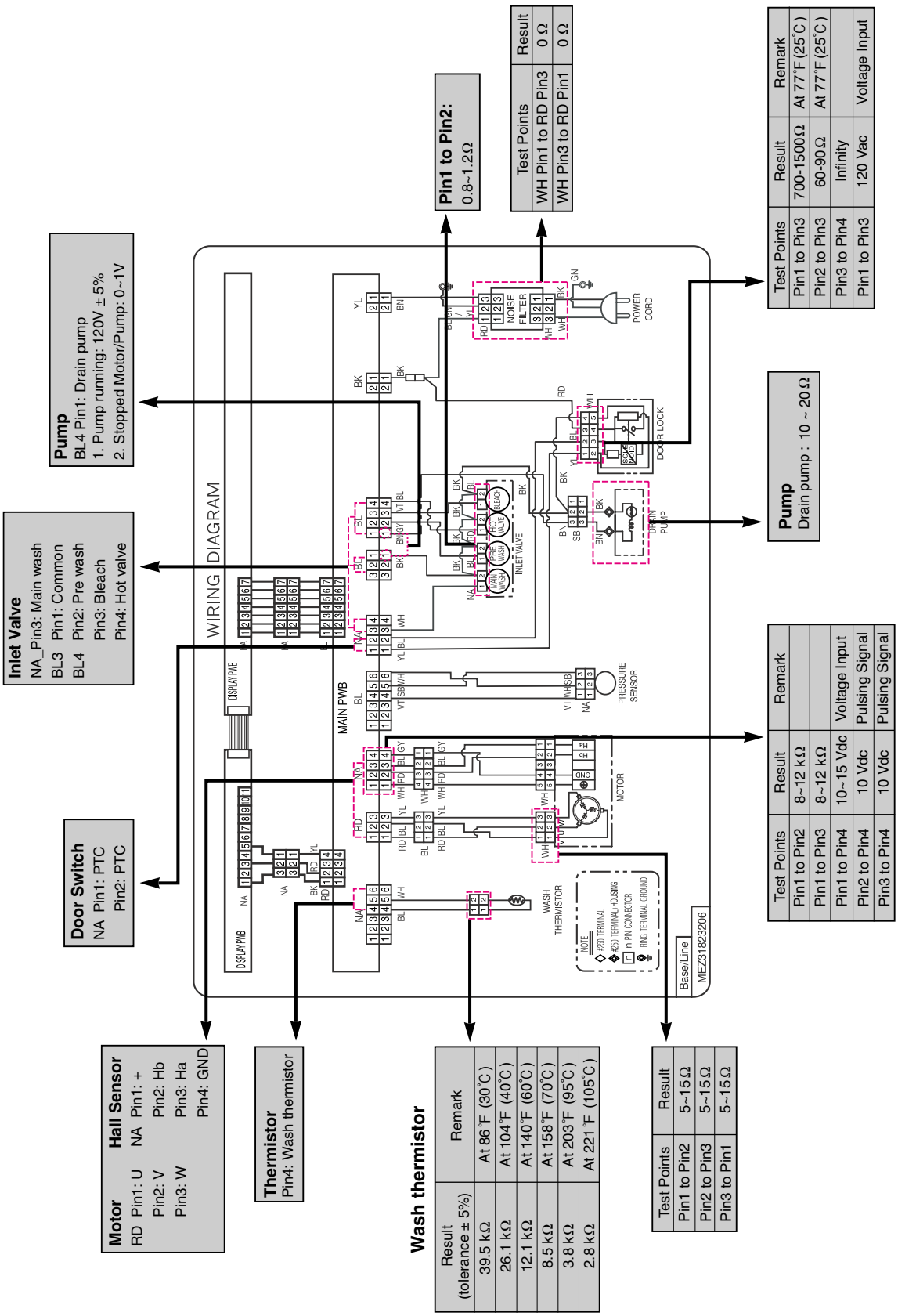
8-2. ERROR MODE SUMMERY

- If you press the START/PAUSE button when an error is displayed, any error except 『PE』 will disappear and the machine will go into the pause status.
- In case of 『PE』, 『tE』, 『dE』 if the error is not resolved within 20 sec., or the in case of other errors, if the error is not resolved within 4 min., power will be turned off automatically and the error code will blink. But in the case of 『FE』, power will not be turned off.

	ERROR	SYMPTOM	CAUSE
1	WATER INLET ERROR	1E	• Correct water level (246) is not reached within 8 minutes after water is supplied or it does not reach the preset water level within 25 minutes.
2	IMBALANCE ERROR	UE	• The load is too small. • The appliance is tilted. • Laundry is gathered to one side. • Non distributable things are put into the drum.
3	DRAIN ERROR	OE	• Not fully drained within 10 minutes.
4	OVER FLOW ERROR	FE	• Water is overflowing (water level frequency is over 213). ※ If FE is displayed, the drain pump will operate to drain the water automatically.
5	PRESSURE SENEOR ERROR	PE	• The SENSOR SWITCH ASSEMBLY is out of order.
6	DOOR OPEN ERROR	dE	• Door not all the way closed. • Loose electrical connections at Door switch and PWB Assembly. • The DOOR SWITCH ASSEMBLY is out of order.
7	THERMISTOR ERROR	tE	• The THERMISTOR is out order.

	ERROR	SYMPTOM	CAUSE
8	LOCKED MOTOR ERROR		• The connector (3-pin, male, white) in the MOTOR HARNESS is not connected to the connector (3-pin, female, white) of STATOR ASSEMBLY. • The electric contact between the connectors (3-pin, male, white) in the MOTOR HARNESS and 4-pin, female, white connector in the MAIN PWB ASSEMBLY is bad or unstable. • The MOTOR HARNESS between the STATOR ASSEMBLY and MAIN PWB ASSEMBLY is cut (open circuited). • The hall sensor is out of order/defective.
9	EEPROM ERROR		• EEPROM is out of order. ※ Displayed only when the START/PAUSE button is first pressed in the Load Test Mode.
10	POWER FAILURE		• After the power supply is stopped while washing machine is working, the power is supplied rapidly

8-3. TROUBLESHOOTING SUMMARY



8-4. TROUBLESHOOTING WITH ERROR

INLET VALVE ERROR

Is 1E displayed?

Yes

When you press both **DELAY WASH** button and **BEEPER** button simultaneously, is the water level frequency below 24.6 kHz?(Refer to 7-3.)

Yes → Check the AIR CHAMBER and the tube (clogged).

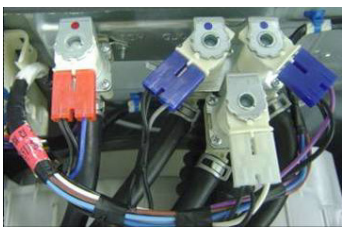
No

Is filter inlet valve clogged with foreign material?

Yes → Clean or replace the filter.

No

Is the connector connected to inlet valve assembly disconnected or disassembled?



Yes → Reconnect or repair the connector.

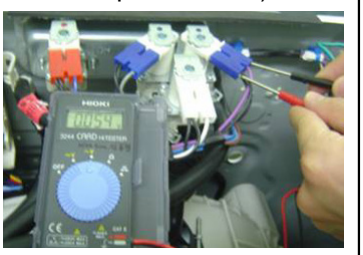
No

Is resistance between each terminal of INLET VALVE ASSEMBLY 0.8-1.2 kΩ? (Refer to 9-5 inlet valve assembly)

No → Replace the INLET VALVE ASSEMBLY.

Yes

Is the voltage of the inlet valve connector 120 V AC? (Check the all terminal of INLET VALVE ASSEMBLY while the power is on.)



Yes → Replace the INLET VALVE ASSEMBLY.

No

Is the connector connected to MAIN PWB assembly disconnected or dis-assembled?(NA4, BL3, BL4)

Yes → Reconnect or repair the connector.

No

Is Electrical connection correct? (Refer to 9-5 wiring diagram)

No → Replace the MAIN HARNESS.

Yes

After checking connector, is the water level frequency below 24.6 kHz?(Refer to 7-3)

Yes → Check the PRESSURE SWITCH.

No

Replace the MAIN PWB ASSEMBLY.

[Note] Environmental safety check list

1) No water tap leakage
2) No water tap freeze
3) No entanglement of water supply hose
4) No water shortage
5) No shrinkage on water supply hose due to a possible misuse of hot and cold water
6) No water supply hose leakage

DRAIN ERROR

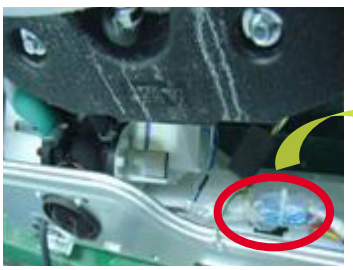
Is 0E displayed?

Yes

Is the connector connected to pump motor assembly disconnected or disassembled?

Yes → Reconnect or repair the connector.

Drain pump



Connection connector

No

When you press both **DELAY WASH** button and **BEEPER** button simultaneously, is the water level frequency below 26.0 kHz? (Refer to 7-3)

Yes → Check the AIR CHAMBER, the tube (clogged), and press switch

No

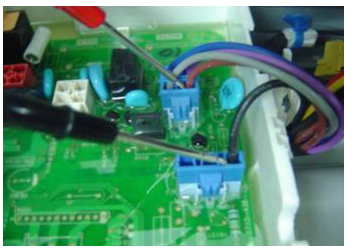
Is the coil of the drain pump too high or low? (resistance of the coil is 10-20Ω) (Refer to 9-4 Pump motor assembly)

Yes → Replace the DRAIN PUMP ASSEMBLY.

No

Is the voltage between connectors out of range? (BL4 pin1~ BL3 pin1)
- After remove Terminal Position Assurance (TPA) of connector, check as follows.
- And if you finish to measure the valve, You should put TPA as original form.

Yes → Replace the MAIN PWB ASSEMBLY.



- Pump running : 120V±5%
- Stopped Motor/Pump : 0~1V Method

1. Press the Power button, while the **SPIN SPEED** button and **SOIL LEVEL** button is pressed simultaneously.
2. Press Start/Pause button.
   : 1 time → Pump slow-speed running
   : 2 times → Pump mid-speed running
   : 3 times → Pump high-speed running
   : 4 times → Stop the Motor/Pump

[Note] Environmental check list

1) The drainage hose must not stay in a lower position.
2) The drainage hose must not be bent or clogged in any way due to the surrounding physical configuration.
3) The drainage hose must not get frozen at all times.
4) The drainage pump must not have any improper substance or material inside that may cause a machine breakdown.

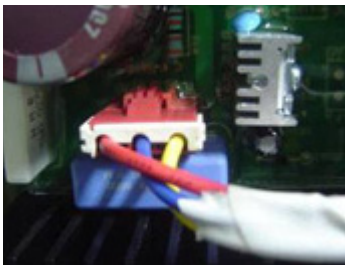
LOCKED MOTOR ERROR

Is LE displayed?

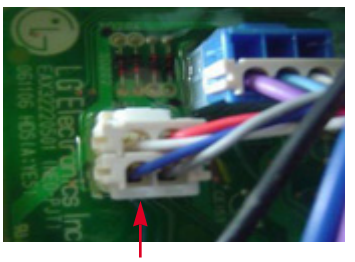
Yes

Check the connectors below.
Is the connector disconnected or disassembled?
(motor hall sensor connector, motor drive connector)

- **part of main PWB assembly (RD4, NA1)**

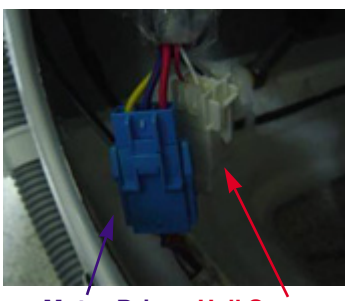


Motor Drive (RD4)



Hall sensor (NA1)

- **part of wire**



Motor Drive **Hall Sensor**

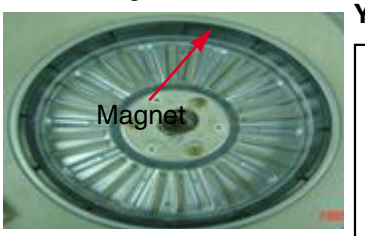
Yes → Reconnect the connector. (connector / wire / motor)

- **part of motor**

Motor

Yes

Is rotor magnet cracked?

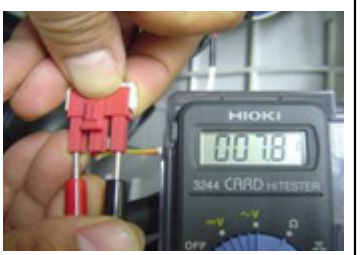


Yes → Replace the ROTOR

No

Is the resistance values in the range of 5 to 15 Ω?
(U-V, V-W, W-V
:U=1, V=2, W=3)

- After pull out the RD4 connector, check the terminal of the connector in wire. (Red 3P, male)



No → Replace the STATOR

Yes

Is hall sensor out of order? (Refer to 9-3 Stator assembly/Hall sensor.)

Yes → Replace the Hall sensor

No

Check the IPM in the controller.

No → Replace the MAIN PWB ASSEMBLY

DOOR OPEN ERROR

Is dE displayed?

Yes

Is the connector connected to door switch or main PWB disconnected?

No → Reconnect or repair the connector

Yes

Does the spring of Latch Hook actuate?

No → Replace Door Assembly

Yes

Is there clicking sound once or twice when the **START/PAUSE** button is pressed to start the cycle?

No → Replace the PCB ASSEMBLY.

Yes

Is DOOR SWITCH ASSEMBLY broken?

No → Replace the DOOR SWITCH ASSEMBLY.

[Note] Environmental check list

1) The machine must operate with all the doors completely closed and locked.
2) The washing area must operate with a water temperature not higher than 45 Celsius and must not have more amount of supplied water than it should.

UNBALANCE ERROR

Is UE displayed?

Yes

Does the laundry lean toward one side, not evenly put in the DRUM assembly?

Yes → Put laundry evenly In the DRUM assembly

No

Is the washing machine installed at an angle?

Yes → Adjust the height of washing machine to be kept horizontally

[Note] Environmental check list

1) Removal of transportation-based fixed bolt.
2) Confirmation on the material to see if it is capable of handling two different types of blanket materials.

OVER FLOW ERROR

Is FE displayed?

Yes

When you press both **DELAY WASH** button and **BEEPER** button simultaneously, is the water level frequency over 21.3kHz? (Refer to 7-3)

No → Check the AIR CHAMBER and the tube (clogged).

Yes

Does the inlet valve work when the power is not applied?

No → If the inlet valve work continuously when the power is applied, Replace the MAIN PWB ASSEMBLY

Yes

Replace the INLET VALVE ASSEMBLY

PRESSURE SENSOR ERROR

Is PE displayed?

Yes

Is the connector connected to pressure sensor disconnected or disassembled?

Yes → Reconnect or repair the connector

No

Is the resistance of the pressure sensor out of range?
(pin 1~ pin 3)
(21~23 Ω ±10%)

Yes → Replace the pressure switch

No

Is the AIR CHAMBER and the tube clogged?

Yes → Fix the air chamber and remove the foreign material.

No

Replace the MAIN PWB assembly.

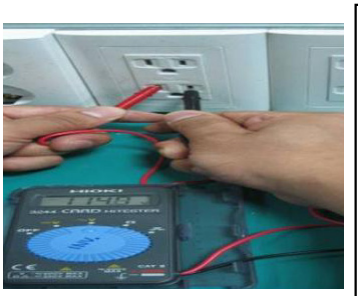
8-5. TROUBLESHOOTING ELSE

⚠ CAUTION

1. Be careful of electric shock if disconnecting parts while troubleshooting.
2. First of all, check the connection of each electrical terminal with the wiring diagram.
3. If you replace the MAIN PWB ASSEMBLY, reinsert the connectors correctly.

NO POWER

Is the supplied voltage 120V AC?(+10%, -15%)



No → Check the fuse or reset the circuit breaker

Yes

Is the current rating of multi-outlet power strip enough?
(Avoid connecting several electric devices.)

No → Alternate with explanation

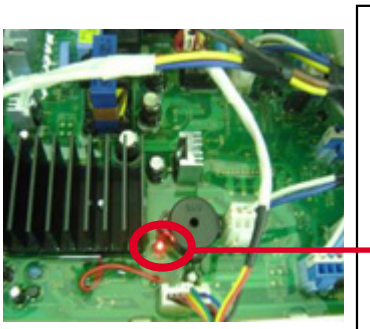
Yes

Is the connector connected to PCB/Noise filter disconnected or disassembled?

No → Reconnect or repair the connector

Yes

Is LED on while the power is on?



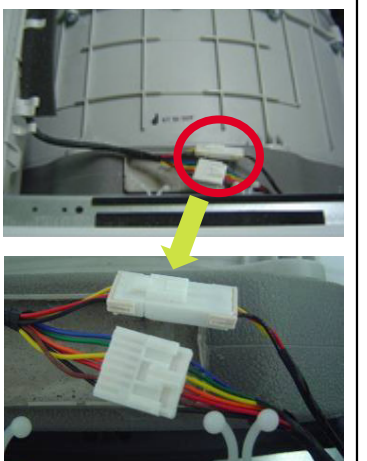
No → Replace the MAIN PWB ASSEMBLY

Yes

Is three pin wire of display PWB broken?

Display PWB

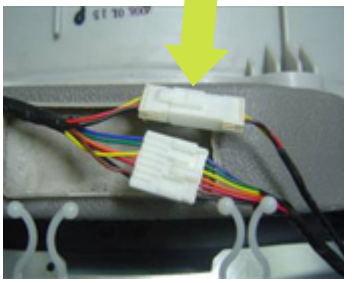
No → Replace the DISPLAY PWB ASSEMBLY



Connecting connector MAIN PWB~ Display PWB

BUTTON DOESN'T WORK

Is the connector connected to Main PWB / Display PWB disconnected or disassembled?



Yes → Reconnect or Repair the connector

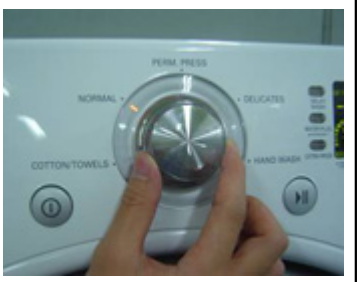
No

Is the button of panel stuck?

Yes → Repair the button

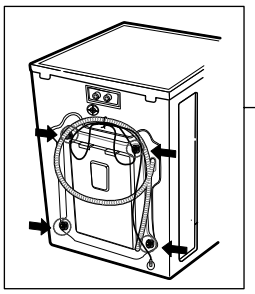
No

Is the display PCB broken? (check the buzzer sound and LED light while push the button.)



Yes → Replace the DISPLAY PWB ASSEMBLY

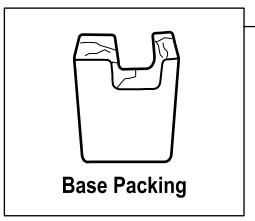
VIBRATION & NOISE IN SPIN



Have all the transit bolts and base packing been removed?

NO → Remove the transit bolts and Base packing.

YES

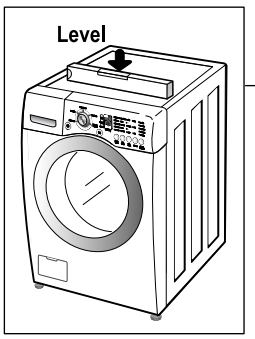


Is the washer installed on a solidly constructed floor?

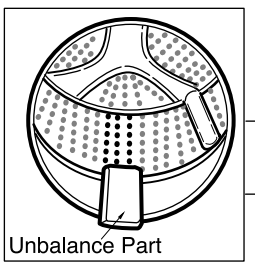
NO → Move the washer or reinforce the floor.

YES

Check if the washer is perfectly level as follows:



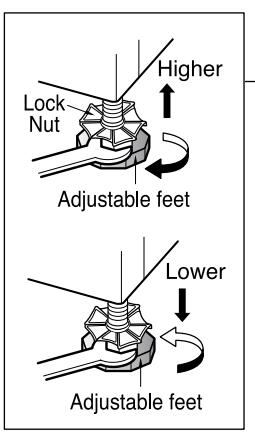
Check the leveling of the washer with a level and check that the washer is stable.



Put an unbalance part (rubber) inside of drum and start QC test mode and run in high spin (Refer to section 7-2).
When the machine is spinning in high speed, verify that it is stable.

If you do not have the unbalance part, put 4.5 to 6.5 lbs (2 to 3 kg) of clothing. Once loaded, press power, Rinse+Spin and the start/pause button in sequence.
When the machine is spinning in high speed, verify that it is stable.

YES



If it is not stable, adjust feet accordingly. After the washer is level, tighten the lock nuts up against of the base of the washer. All lock nuts must be tightened.

If it still has severe vibration and noise, regulate a specific spin speed that generates excessive vibration and noise as follows:

1) Put an unbalance part (rubber) inside of the drum.

2) Start the QC test mode (Refer to section 7-2).

3) Press Delay Wash button, then ' E5E ' is displayed.

4) Press the Spin Speed button repeatedly to select EXTRA HEIGH.

5) Press the Start/Pause button.

6) Press the Beeper button repeatedly to set spin speed (600, 700, 800, 900, 1000, 1100 rpm) and check if there is vibration and noise.

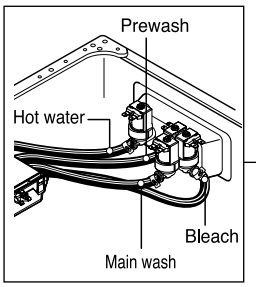
7) If there is no vibration and noise, increase the spin speed by pressing Beeper button.

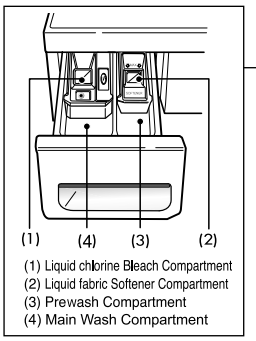
8) If there is vibration and noise, press the Cycle selector button to reduce the Spin Speed (reduce by 50 and 100 rpm). In case of 600 rpm, it can not reduce the spin speed.

9) If vibration and noise are reduced, press the WASH/RINSE button to store (2 beep sounds).

* If you want to return to factory default spin speed setting, repeat above steps except step 8).

DETERGENT DOES NOT FLOW IN

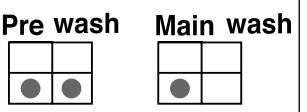




Is water supplied?
- NO → Refer to NO WATER SUPPLY
- YES ↓

Are receptacles correctly connected to the terminals of the INLET VALVE ASSEMBLY?
- NO → Check the wiring.
- YES ↓

Has detergent been put in the correct compartment of the dispenser?
- NO → Put the detergent in the correct place.

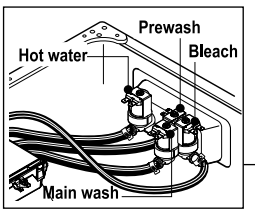


● : Detergent

- YES ↓

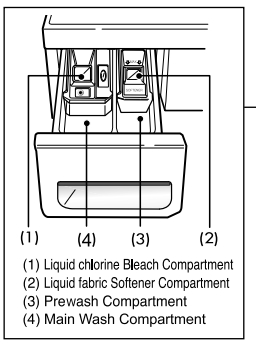
Is the detergent caked or hardened?
- YES → Clean the dispenser.

SOFTENER/BLEACH DOES NOT FLOW IN

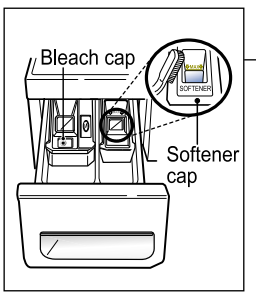


Is water supplied?
NO → Refer to NO WATER SUPPLY
YES

Are the plugs correctly connected to the terminals of the INLET VALVE ASSEMBLY?
NO → Check the wiring on the dispenser.
YES

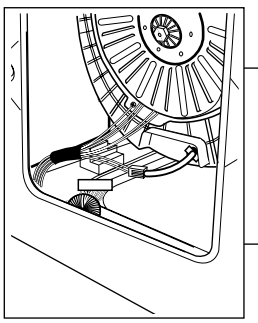


Is liquid softener/bleach put in the correct compartment of the drawer?
NO → Put it in the correct compartment.
YES



Is the softener/bleach cap clogged?
YES → Clean the cap and container.

ABNORMAL SOUND



Is the motor bolt loosened?
YES → Secure the bolt.
NO

Is there friction noise coming from the motor?
YES → Check hall sensor.
Replace If defective.
Then check stator.
Replace if necessary.
Check rotor for broken magnets.
Replace rotor if necessary.

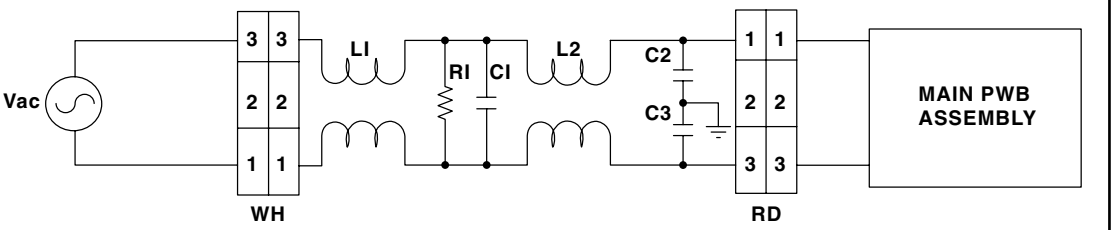
9. COMPONENT TESTING INFORMATION

⚠ WARNING When Resistance (Ohm) checking the Component, be sure to turn the power off, and do voltage discharge sufficiently.

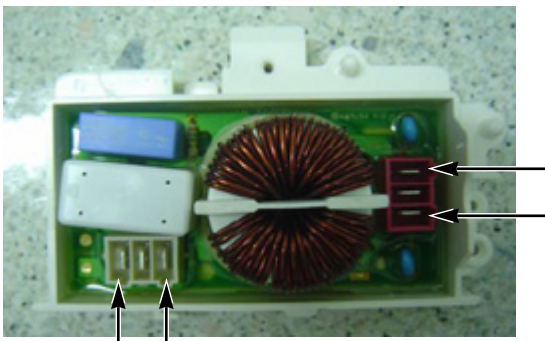
9-1. FILTER ASSEMBLY (LINE FILTER)

Wiring diagram

Circuit in the MAIN PWB / Wiring Diagram



Test points and Result

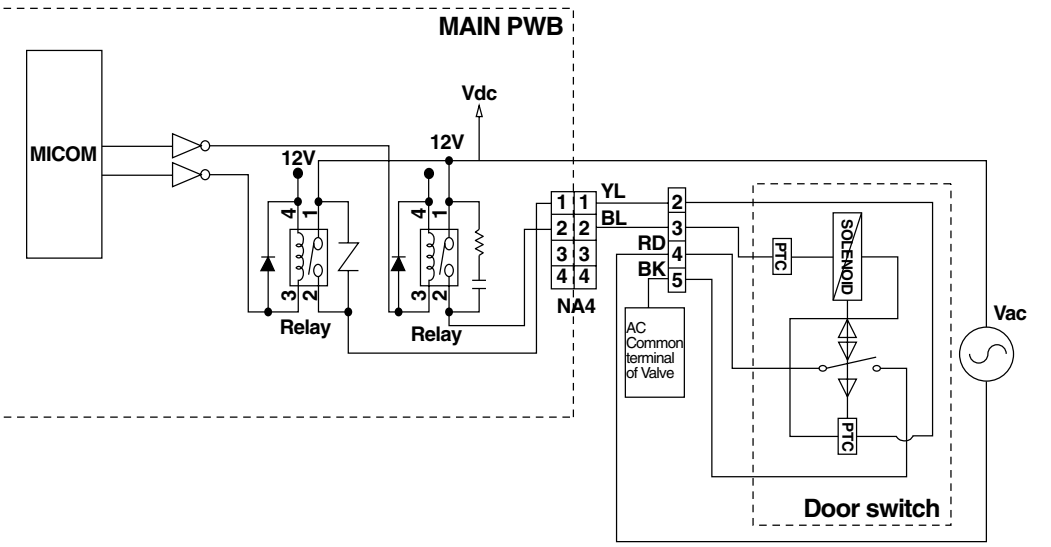


Test Points	Result
WH (1) to RD (3)	0 Ω
WH (3) to RD (1)	0 Ω

9-2. DOOR LOCK SWITCH ASSEMBLY

Wiring diagram

Circuit in the MAIN PWB / Wiring Diagram



Function

The Door Lock Switch Assembly consists of a Heating PTC, a Bimetal, a Protection PTC, and a Solenoid. It locks the door during a wash cycle.

1. Operation for door closing
   - After the system turns on, PTC heating starts up through terminal 2~4's authorizing the power on.
   - After PTC heating starts up and before solenoid operation is driven, force the system to the off position through CAM.

   ⇒ Door close
   - Authorizing one impulse through terminal 3~4 (PTC & solenoid) will make the door locked.
   - Door lock is detected when switches in terminal 4~5 are set closed.

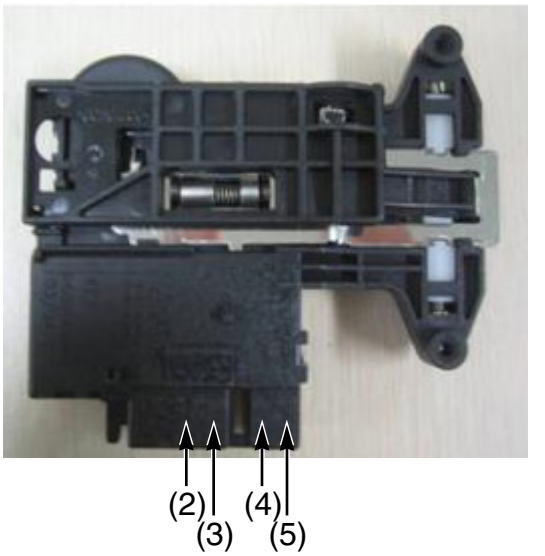
   ⇒ CAM rotation will forcibly clear off the connection. The maximum, allowable number of impulse authorizations is 2.

   ⇒ Upon the third authorization of the impulse, the position of CAM goes back to the door-open position.
   - Authorizing the impulse occurs in 4.5 seconds upon input for max performance and two authorization processes are allowed at most.

   ⇒ Normal operation period of PTC heating: 1.5 – 5 seconds. (Defects from the development process.)

2. Operation for door opening
   - With a temporary stop, door automatically opens by CAM rotations after authorizing the impulse from the terminal 3 ~ 4 and the power turns off – maximum of 3 times of the authorizing period.
   - Upon the fourth authorization of the impulse, the position of CAM goes back to the door-close position.

Test points



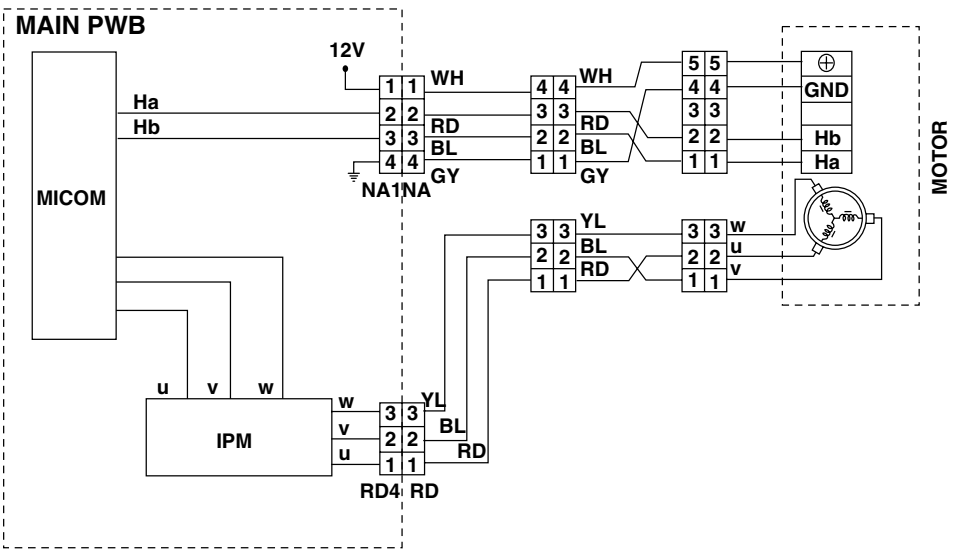
Result

Test Points	Result	Remarks
(2) to (4)	700-1500 Ω	At 77°F (25°C)
(3) to (4)	60-90 Ω	At 77°F (25°C)
(4) to (5)	Infinity	
(2) to (4)	120 Vac	Voltage Input

9-3. STATOR ASSEMBLY

Wiring diagram

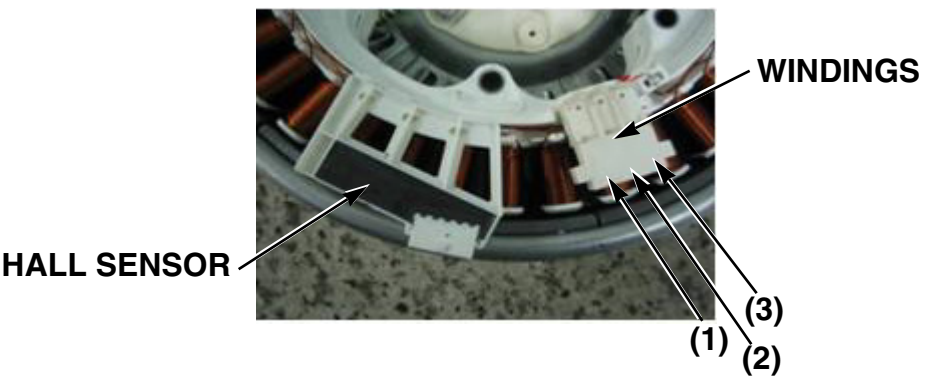
Circuit in the MAIN PWB / Wiring Diagram



Function

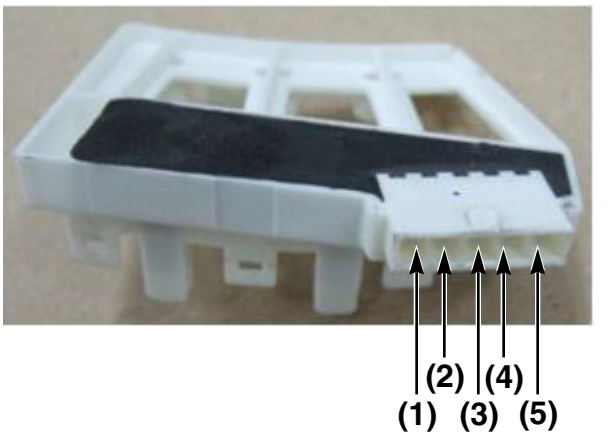
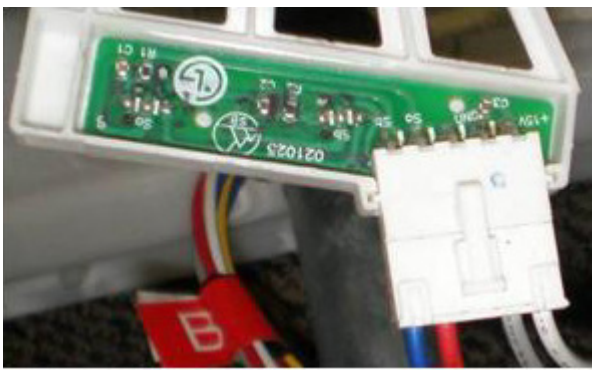
The DD motor can be driven from stopped to maximum speed in infinite steps in either direction.
There are 36 poles on the stator; 12 permanent magnets spaced around the rotor. There are no brushes to wear out. Unlike a more traditional brushless motor, the rotor surrounds the stator rather than being attached to it.

Test points (Windings)



Result (Windings)

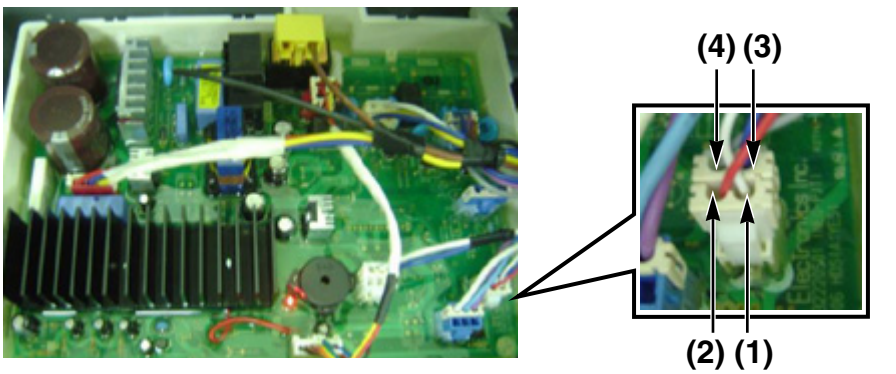
Test Points	Result
(1) to (2)	5-15 Ω
(2) to (3)	5-15 Ω
(3) to (1)	5-15 Ω

	The hall sensor determines the speed and direction of the motor. It also can read that the load is off balance when the drum speed fluctuates.
Test point **and** **Result (Hall Sensor)**	**- Voltage Testing Hall Sensor at Stator**   If measuring voltage from the Main PCB Assembly to the Hall Sensor, use the following steps: 1. Unplug power cord. 2. Remove rear washer panel. 3. Locate Hall sensor connector on the stator behind the rotor. 4. Place meter leads on terminals 5 to 4, white to gray. 5. Plug in power cord, close door, and press power button. DO NOT PRESS START! 6. You should measure 10 to 15 Vdc. If 10 to 15 Vdc is present, control board, white wire, and gray wire are OK! If not follow testing output voltages on control board in next section.

7. To measure output signal voltage from the hall sensor, carefully move test leads to terminals 1 to 4, blue and gray. Slowly rotate motor rotor by hand. You should read a pulsing 10 Vdc. If 10 Vdc is measured from 1 to 4, move lead on blue wire to red wire, terminal 2. Repeat rotating motor rotor by hand. You should read a pulsing 10 Vdc from red to gray.
8. If pulsing 10 Vdc is measured from 1 to 4 and 2 to 4, hall sensor is OK! If either test netted only 9 to 10 Vdc without changing (no pulsing) the hall sensor is likely defective. Disconnect power by unplugging washer and ohm check hall sensor to verify failure of the hall sensor.

Test Point and Result (Hall Sensor)

- Voltage Testing Hall Sensor from the Main PCB Assembly



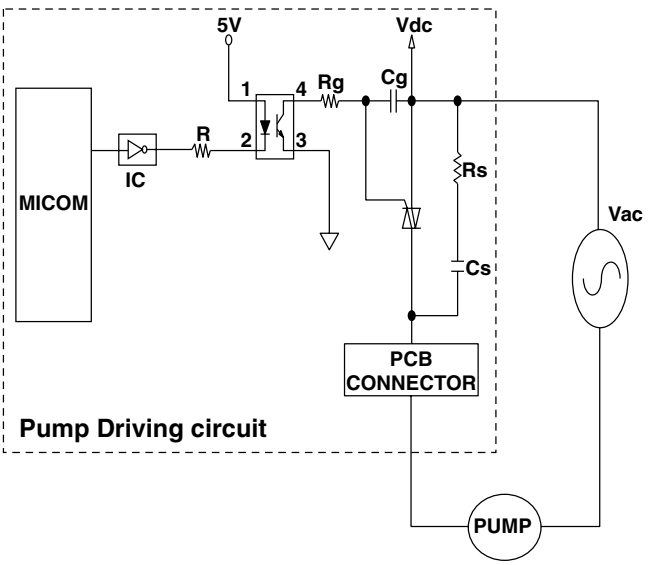
1. Unplug power cord.
2. Remove rear panel.
3. Remove Washer Top.
4. Remove Main PCB Assembly cover as shown in Figure below.
5. Locate the white Hall Sensor 4 wire connector using wiring diagram wire colors as your guide.
6. Plug in power cord, close door, and press power button. DO NOT PRESS START!
7. Place meter leads on White & Gray wires. You should read 10 to 15 Vdc output from the Main PCB Assembly to the Hall sensor. If no 10 to 15 Vdc is measured the control board is defective.
8. Place meters leads on Blue to Gray. Turn motor rotor slowly by hand. You should measure a pulsing 10 Vdc. Place meter leads on Red to Gray. Turn motor rotor slowly by hand. You should measure a pulsing 10 Vdc. If both tests measure a pulsing 10 Vdc, hall sensor and harness OK. If either or both tests measures 9 to 10 volts, but does not pulse or change, Hall sensor has failed and must be replaced. IF zero (0) voltage is measured on either test, check red & blue wires for continuity. Repair or replace harness as needed.

Test Points	Result	Remarks
(1) to (2)	8-12 kΩ	
(1) to (3)	8-12 kΩ	
(1) to (4)	10-15 Vdc	Voltage Input
(2) to (4)	10 Vdc	Pulsing Signal
(3) to (4)	10 Vdc	Pulsing Signal

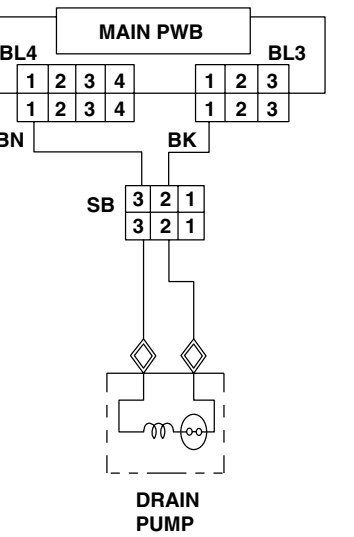
9-4. PUMP MOTOR ASSEMBLY

Wiring diagram

Circuit in the MAIN PWB

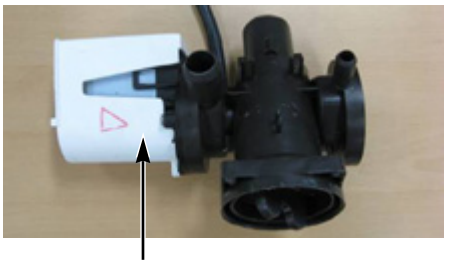


Wiring Diagram



* Each circuits of loads in wiring diagram are all same.

Object



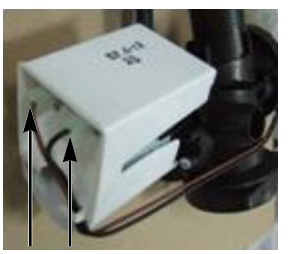
For Drain

Function

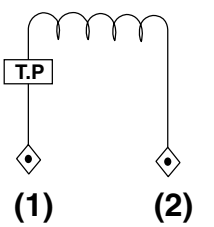
Two pump motors are used to drain the tub and to circulate the water / detergent solution.

Test points

Drain Pump



(1)(2)



Result

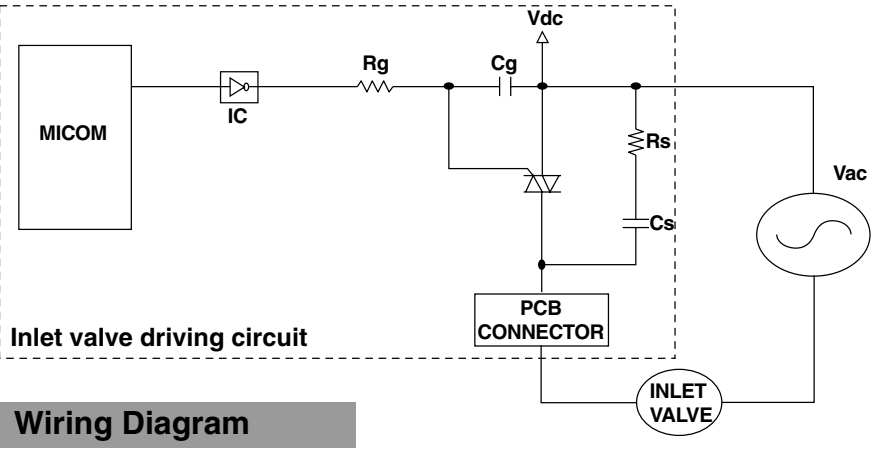
Drain Pump

Test Points	Result
(1) to (2)	10-20 Ω

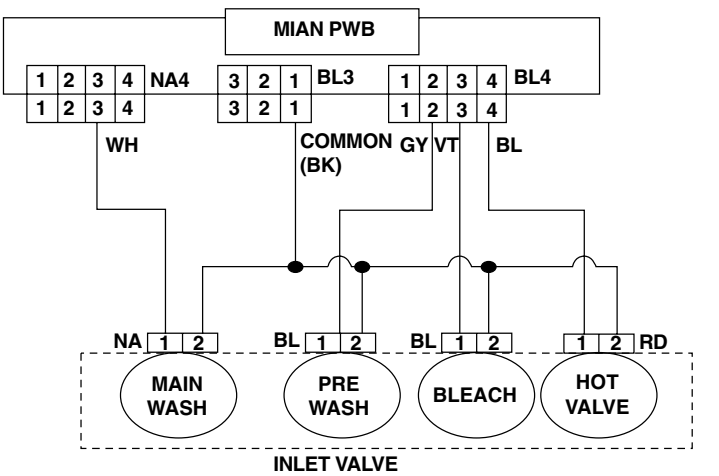
9-5. INLET VALVE ASSEMBLY

Wiring diagram

Circuit in the MAIN PWB



Wiring Diagram



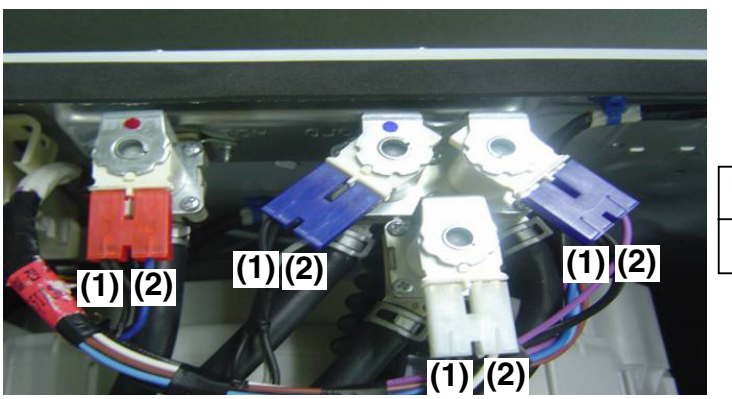
* Each circuits of loads in wiring diagram are all same.

Function

Depending on the cycle and water temperature, the controller will energize the hot or cold water valve solenoids to meet the selected water temperature.

Test points and Result

After pull out the connector of defective valve, check the resistance.

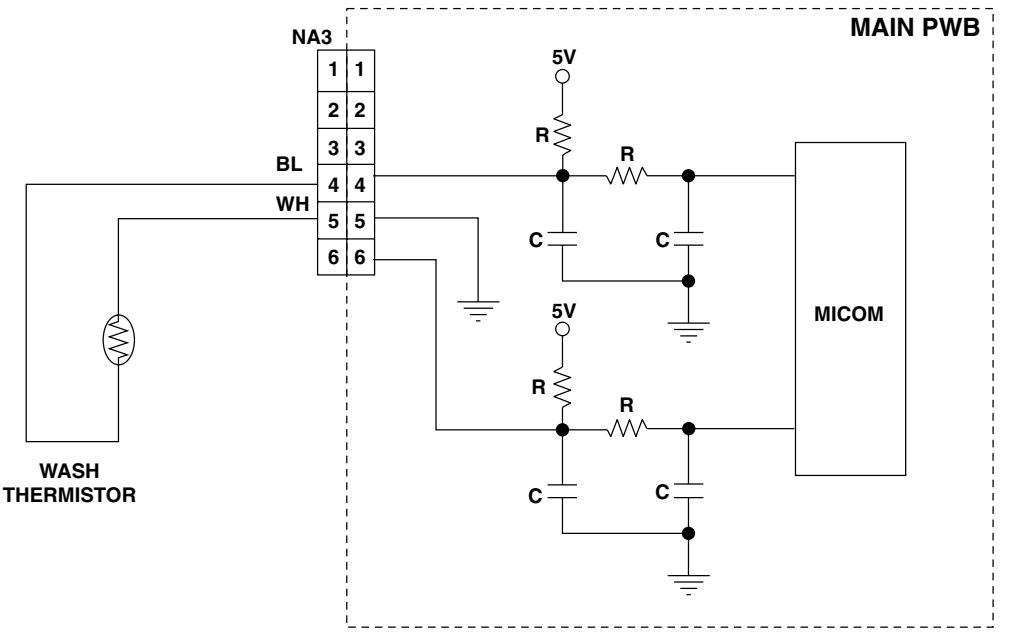


Test points	(1)-(2)
Result	0.8-1.2 kΩ

9-6. THERMISTOR ASSEMBLY

Wiring diagram

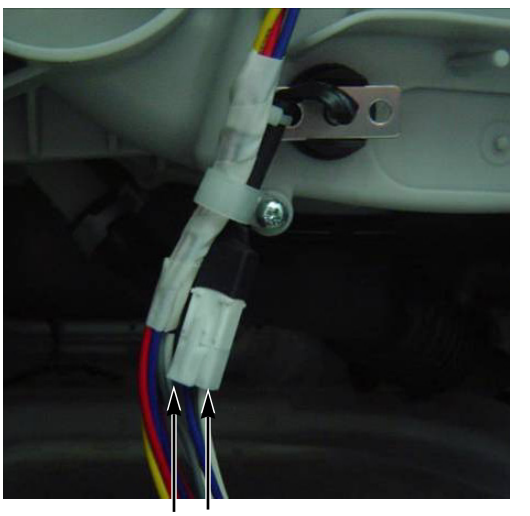
Circuit in the MAIN PWB / Wiring Diagram



Function

The thermistor (temperature sensor) is used to monitor water temperature in the tub or Steam Generator.

Test points



(1) (2)

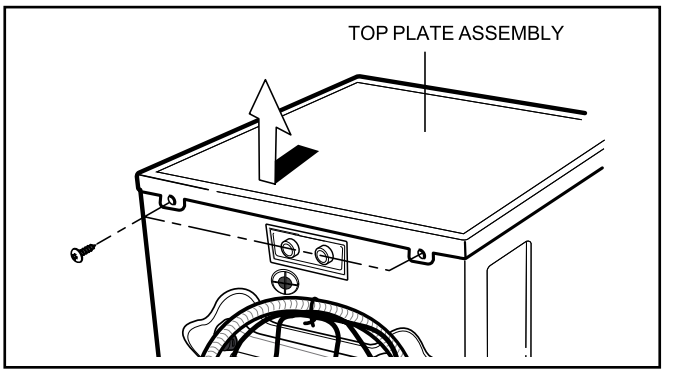
Wash Thermistor

Test Points	Result (tolerance ±5%)	Remarks
(1) to (2)	39.5 kΩ	At 86°F (30°C)
	26.1 kΩ	At 104°F (40°C)
	12.1 kΩ	At 140°F (60°C)
	8.5 kΩ	At 158°F (70°C)
	3.8 kΩ	At 203°F (95°C)
	2.8 kΩ	At 221°F (105°C)

10. DISASSEMBLY INSTRUCTIONS

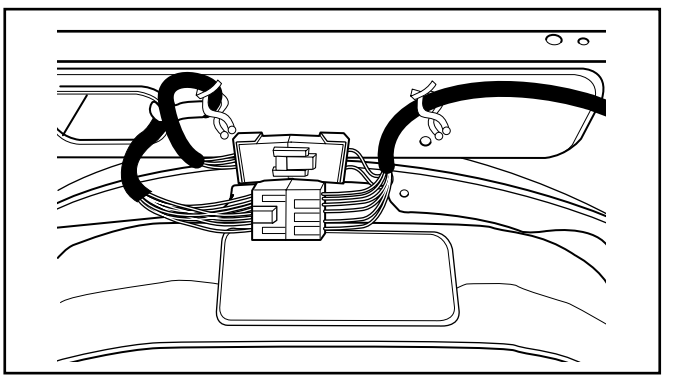
* Be sure to unplug the machine before disassembling and repairing the parts.

CONTROL PANEL ASSEMBLY

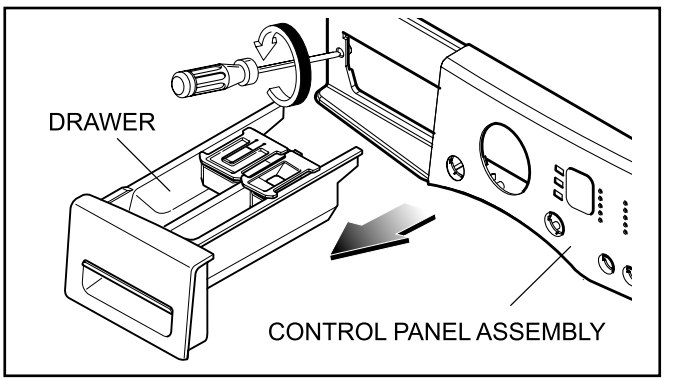


① Remove two screws on the back of the top plate.

② Pull the top plate backward and upward as shown.

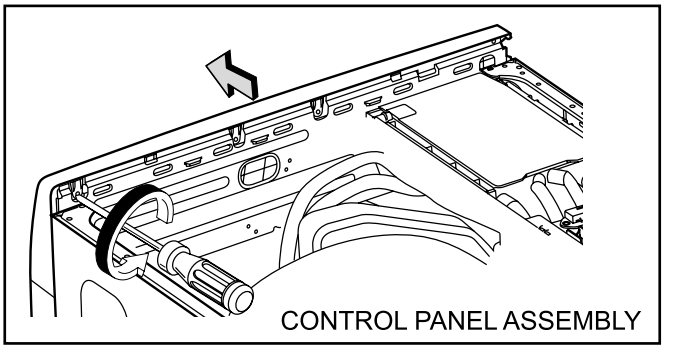


③ Disconnect the connectors from the Main PWB assembly.

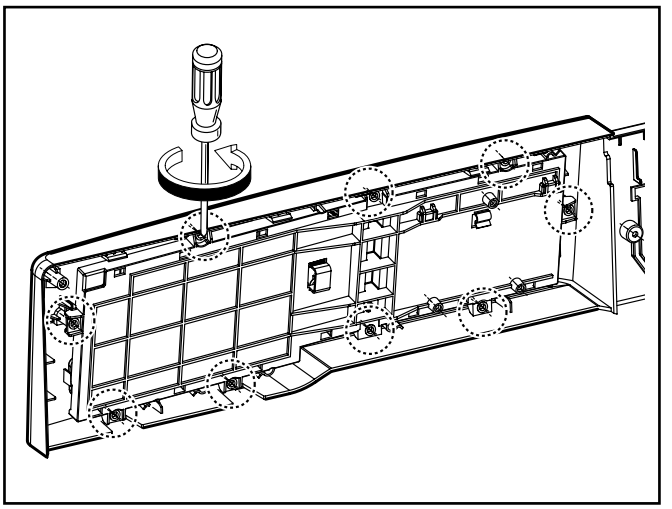


④ Pull out the drawer and Remove two screws.

⑤ Lift the left side of the control panel assembly and pull it out.



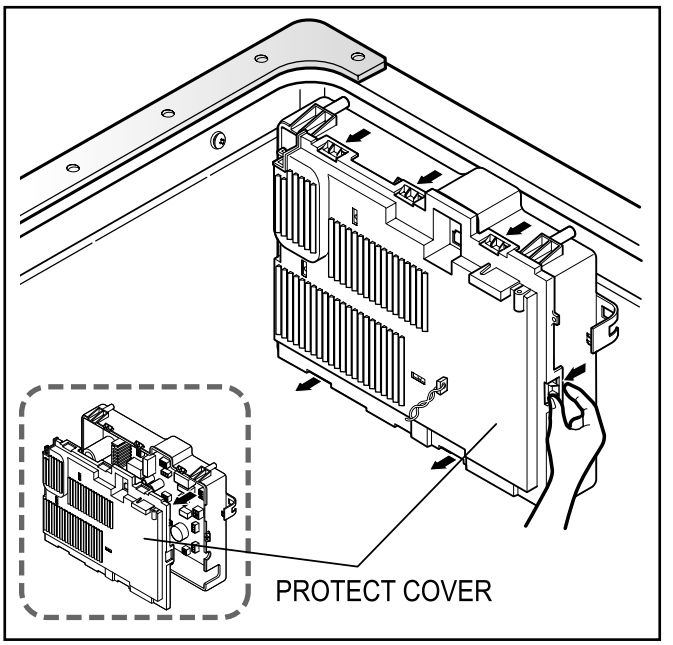
⑥ Pull out the control panel Remove one screws.



⑦ Remove nine screws from the control panel assembly.

⑧ Disassemble the Display PWB Assembly.

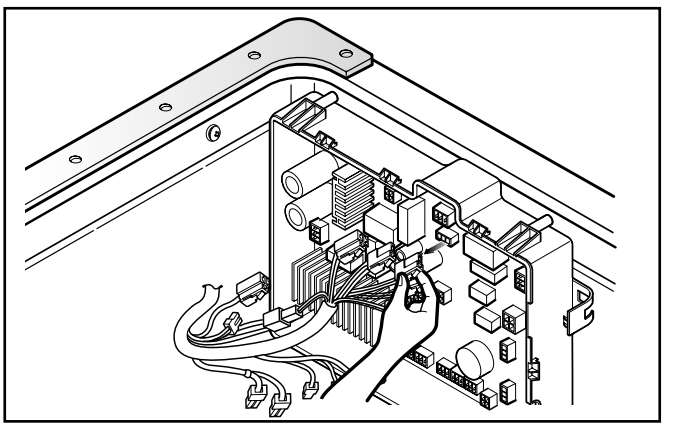
MAIN PWB ASSEMBLY



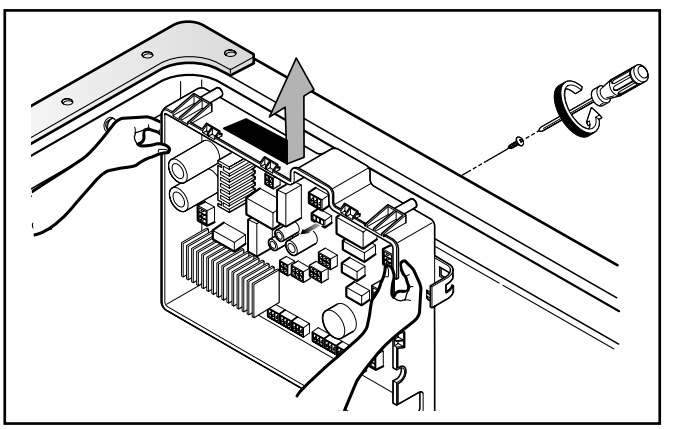
① Disconnect the POWER connector and SENSOR SWITCH ASSEMBLY.

② Remove the Protective cover.

③ Disassembled keeping wire.



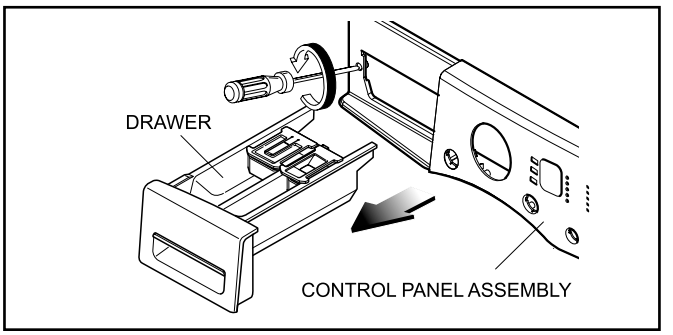
③ Disconnect the connectors.



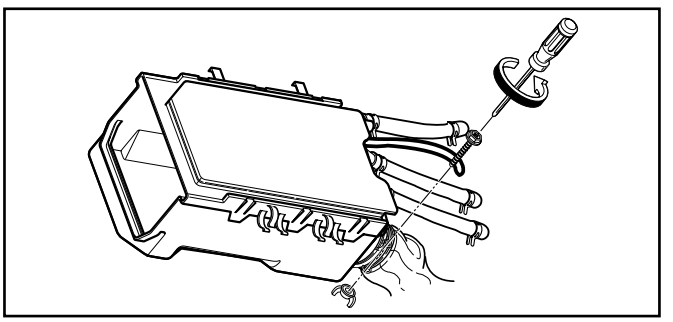
④ Remove one screw on the back.

⑤ Remove the Main PWB.

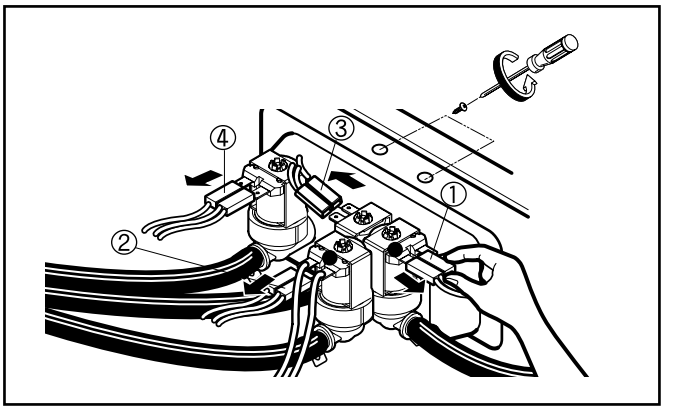
DISPENSER ASSEMBLY



① Disassemble the top plate assembly.
② Pull out the drawer.
③ Push out the DISPENSER ASSEMBLY after unscrewing 2 screws.



④ Unscrew the Clamp nut at the lower part of the dispenser.

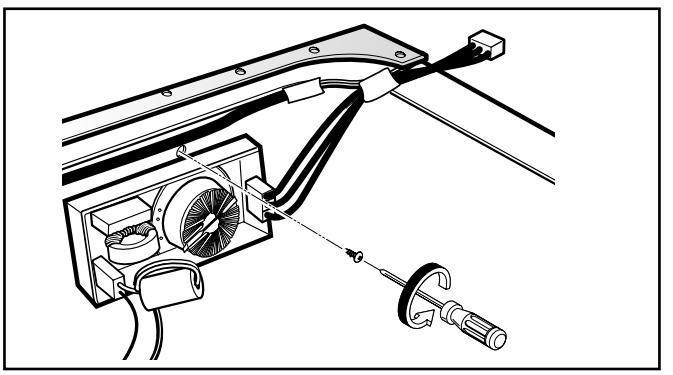


⑤ Disassemble the 4 connectors from the valves.

※ Wire Color
① Blue Housing (OR-BK)
② White Housing (WH-BK)
③ Blue Housing (GY-BK)
④ Red Housing (BL-BK)

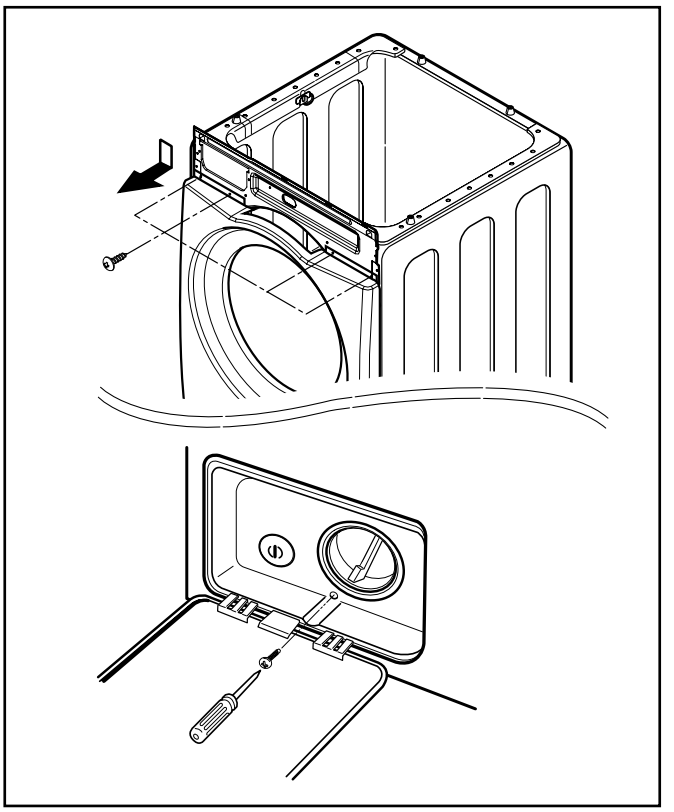
⑥ Unscrew 2 screws from the back of the cabinet.

NOISE FILTER

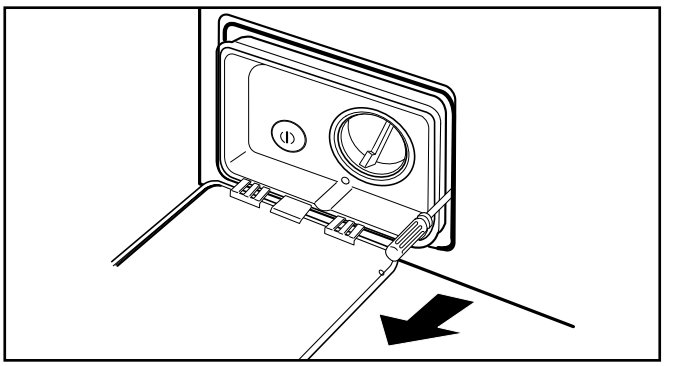


① Disassemble two connectors from the Filter Assembly.
② Unscrew a screw from the TOP BRACKET.

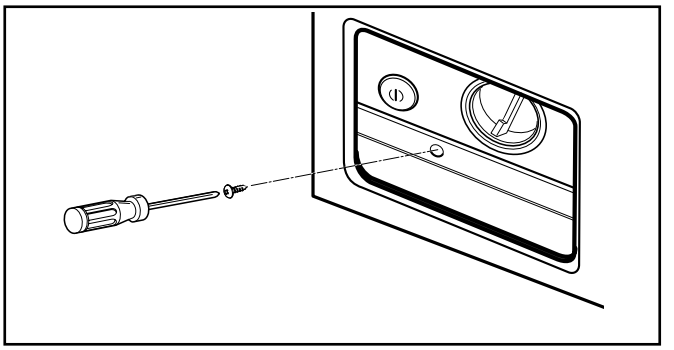
CABINET COVER



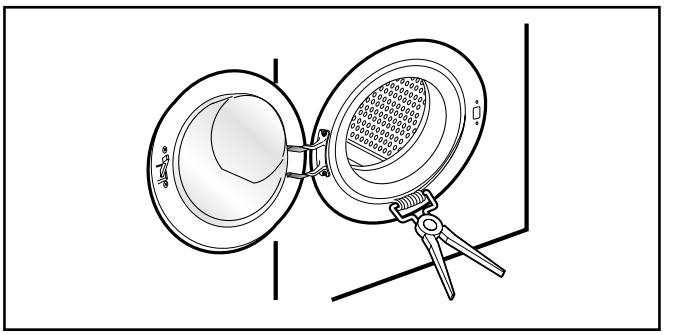
① Unscrew the 3 screws from upper of the canbinet cover.
② Unscrew the screw from filter cover.



③ Put a flat (-) screwdriver or putty knife into the hinge slots at the bottom of the cover and pry it out.

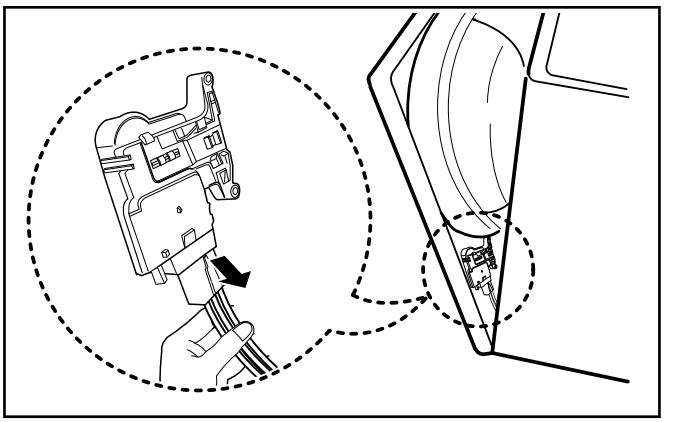


④ Unscrew the screw from the lower side of the cabinet cover.



⑤ Open the door.

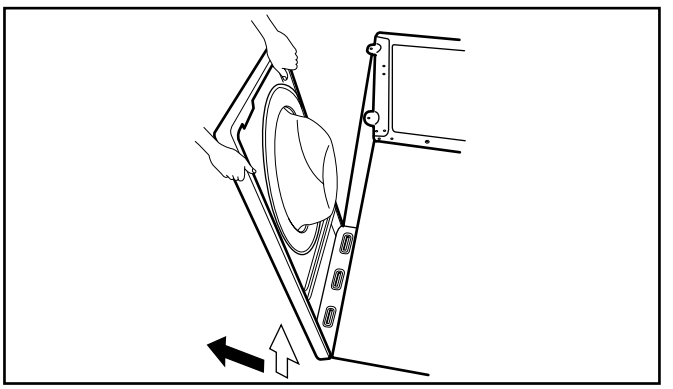
⑥ Disassemble the clamp assembly.



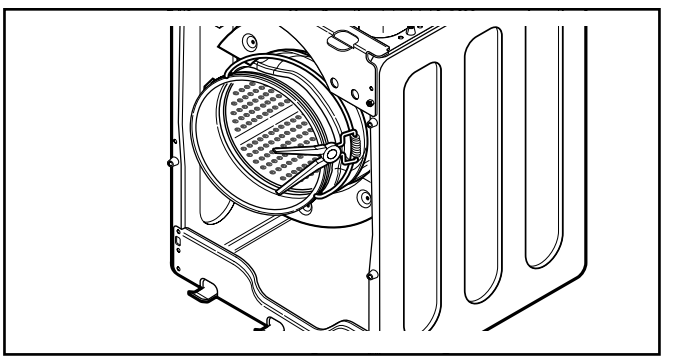
⑦ Tilt the cabinet cover.

⑧ Disconnect the door switch connector.

※ **NOTE:** When assembling the CABINET COVER, connect the door switch connector.



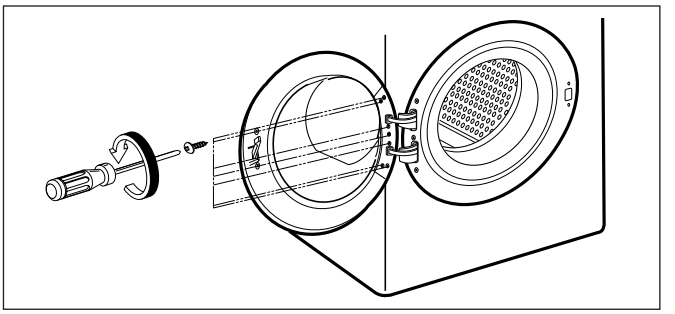
⑨ Lift and separate the cabinet cover.



⑩ Disassemble the clamp assembly.

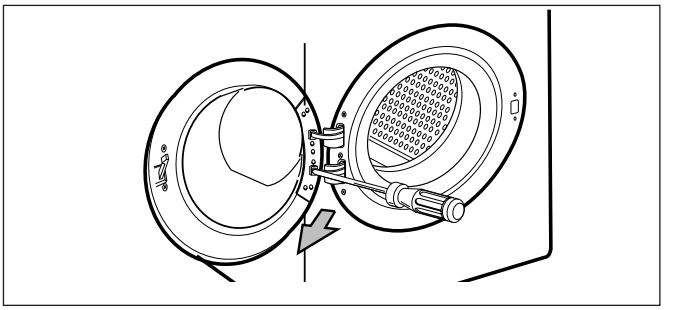
⑪ Disassemble the gasket.

DOOR

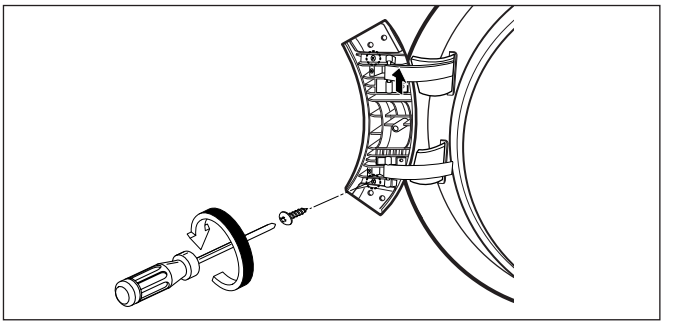


① Open the door.

② Unscrew the 7 screws from the HINGE COVER.



③ Put a flat (-) screwdriver into the openng of the hinge, and pull out the hinge cover.

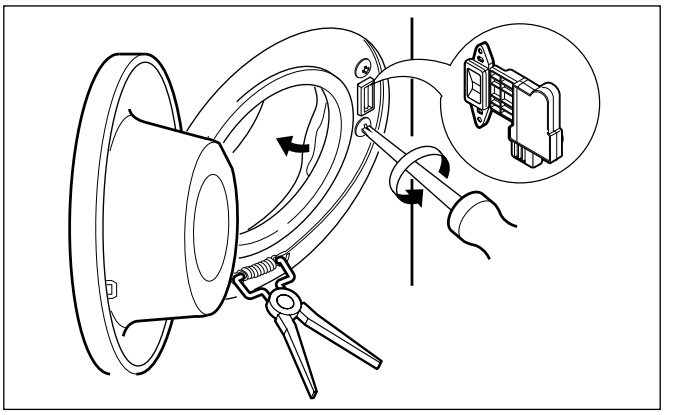


④ Unscrew a screw from the lower side of door.

⑤ Disassemble the door upward.

※ **Be careful!** The door is heavy.

DOOR LOCK SWITCH ASSEMBLY



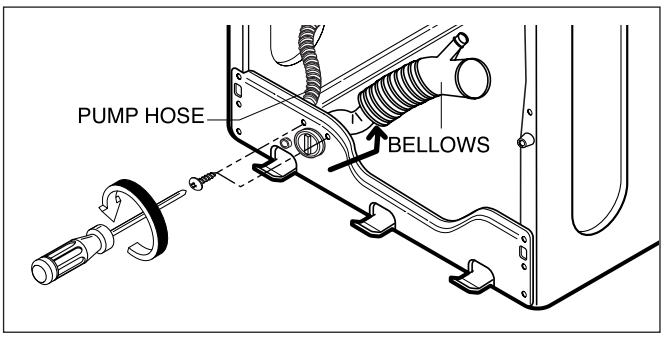
① Open the door and disassemble the CLAMP ASSEMBLY.

② Unscrew the 2 screws.

※ **NOTE**

- Reconnect the connector after replacing the DOOR SWITCH ASSEMBLY.

PUMP

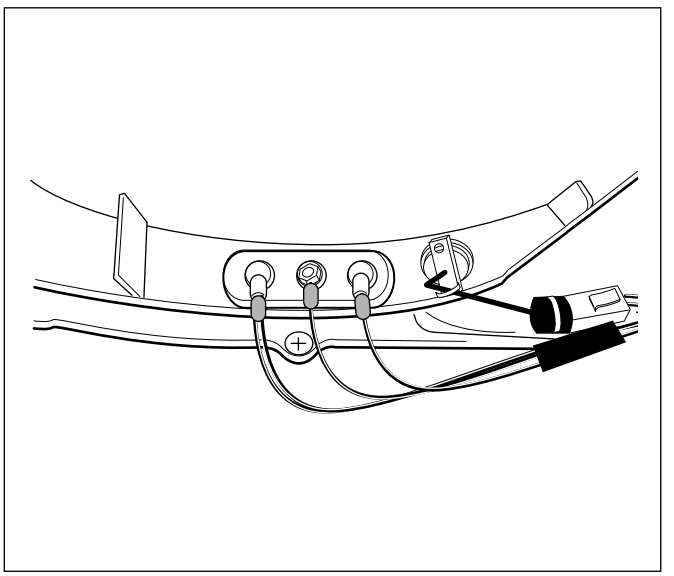


① Disassemble the cabinet cover.

② Separate the pump hose, the bellows and the circulation hose assembly from the pump assembly.

③ Disassemble the pump assembly in arrow direction.

HEATER



① Disassemble the cabinet cover.

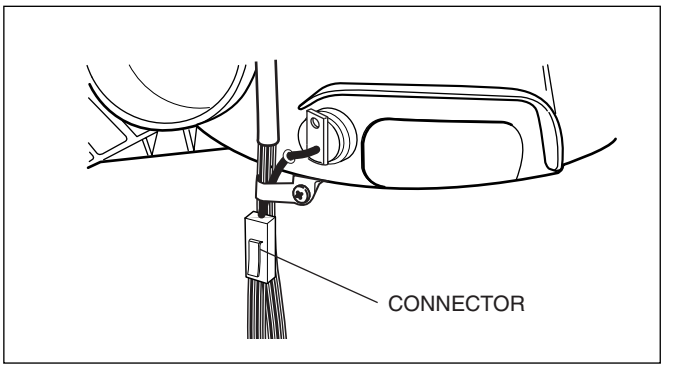
② Separate 2 connectors from the heater.

③ Loosen the nut and pull out the heater.

※ CAUTION

- When assembling the heater, insert the heater into the heater clip on the bottom of the tub.
- Tighten the fastening nut so the heater is secure.

THERMISTOR



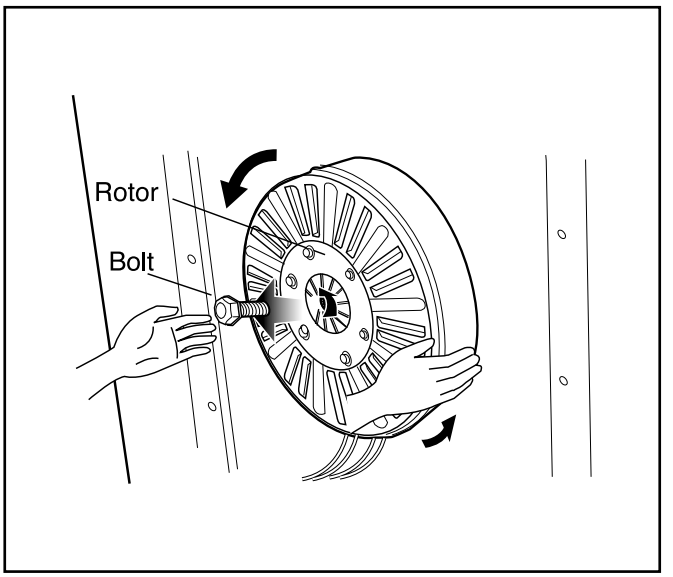
① Disassemble the Back cover.

② Unscrew a screw from the Tub.

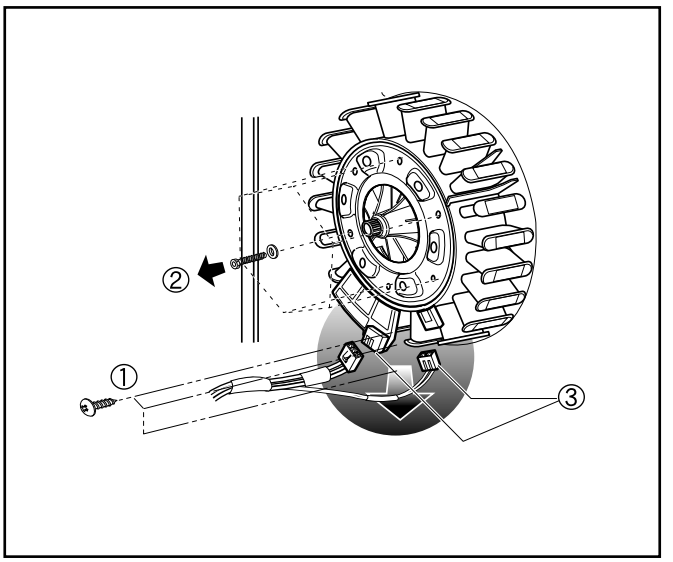
③ Unplug the white connector from the thermistor.

④ Pull it out by holding the bracket of the thermistor.

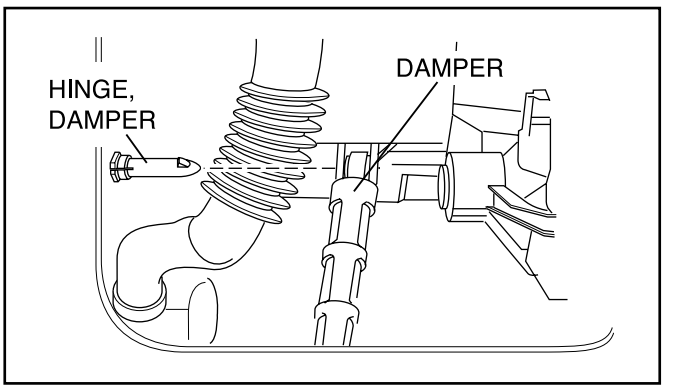
MOTOR/DAMPER



① Disassemble the back cover.
② Remove the bolt.
③ Pull out the Rotor.



① Unscrew the 2 screws from the tub bracket.
② Remove the 6 bolts on the stator.
③ Unplug the 2 connectors from the stator.



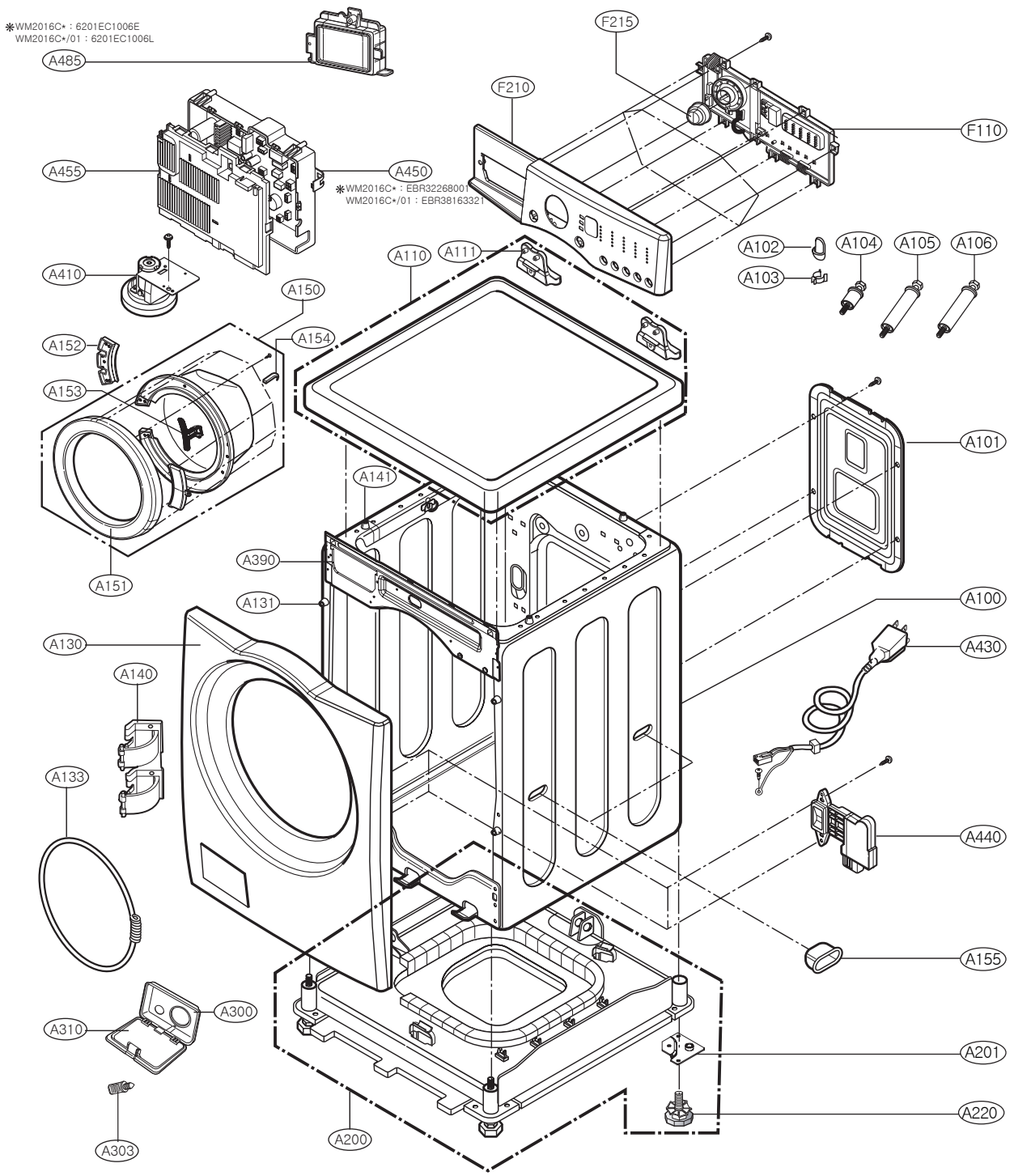
① Disassemble the damper hinges from the tub and base.

※ NOTE
If you pull the dampers apart, the must be replaced. If you do not separate them, they can be re-used.

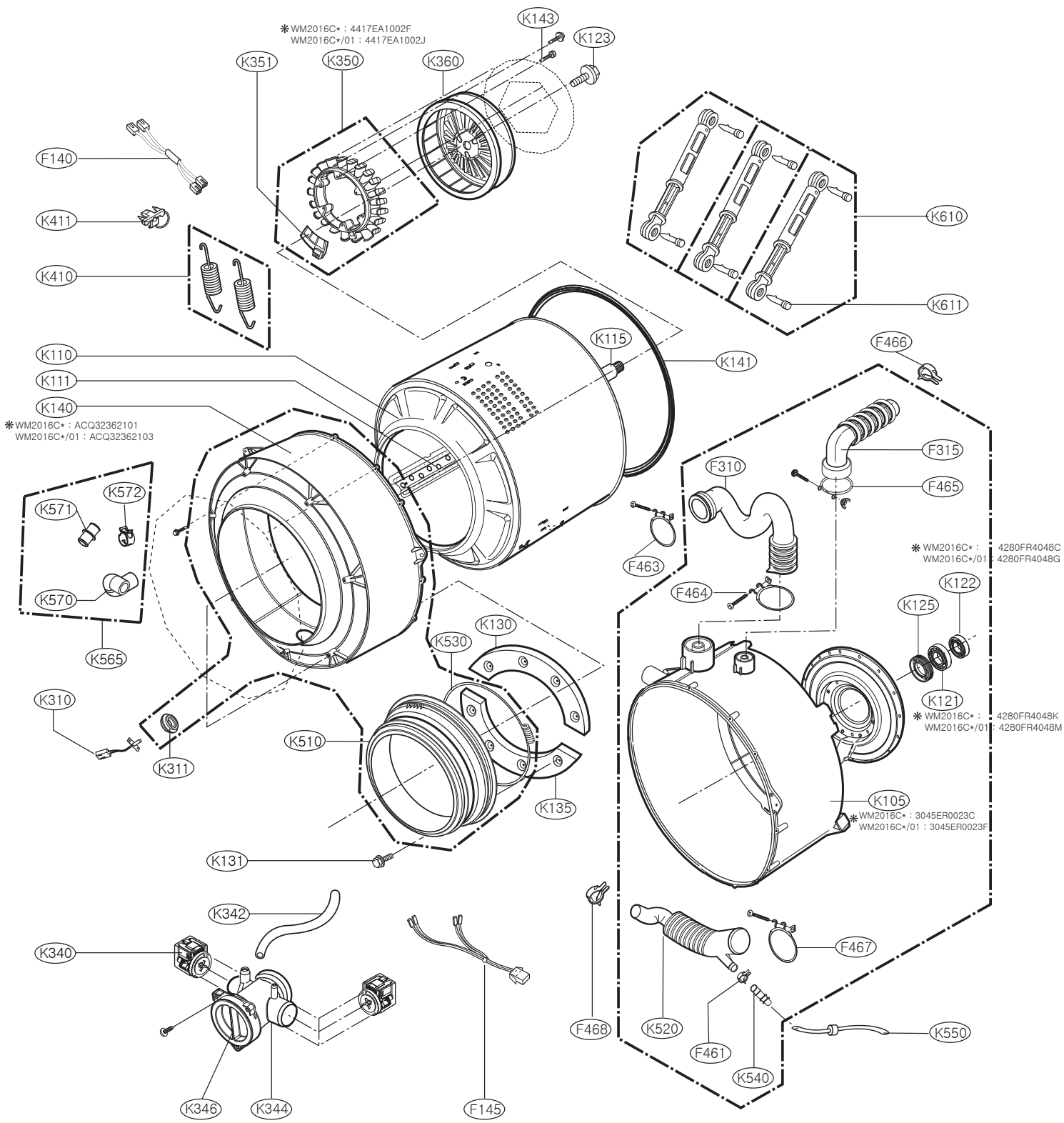
11. EXPLODED VIEW

11-1. CABINET & CONTROL PANEL ASSEMBLY

"The following parts are not illustrated"		
	Description	Loc No.
Printed materials	*Owner's Manual	G001
	*Energy Label	G002
	*Service Manual	G004
	*Wiring Diagram	G005
	*Quick Start Guides	G006
	*Installation Sheet	G007



11-2. DRUM & TUB ASSEMBLY



11-3. DISPENSER ASSEMBLY