Version1
2008.02.13

Service Guide
Washing Machine

Asko WL6511XXLW
WL6511XXLT

ASKO

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▣Front Loading Washing Machine Basics

1. Front Load Theory

Front loading washing machines get laundry cleaner and use less water than top load machines. Cleaning is achieved with the mechanical action of the drum lifting the laundry up and dropping it into the wash water in the bottom of the drum. Our temperature control system aids wash performance and improves energy efficiency.

2. Key Features

◈ Hot and cold water hookups.
As cold and hot water is supplied at the same time, heating time and energy is saved.

◈ Paddle filter
Filter to trap lint and hair during the wash cycle.

◈ Direct Drive inverter motor
The motor is connected directly to the drum without a belt or transmission, significantly reducing noise and vibration.

◈ Heating element to provide optimal wash temperatures.

◈ Large door opening makes it easy to move laundry in and out of the unit..

◈ A powerful auto reversing drain pump and coin trap helps prevent clogs.

4. Major Functions

① Washing

The laundry is tumbled during the wash cycle by the rotation of the drum and the drum paddles. This process is more gentle on clothing than turning them with an agitator.

② Rinsing

Rinsing cleanly washes out detergent and dirt removed from the laundry after washing cycle.

③ Spin-drying

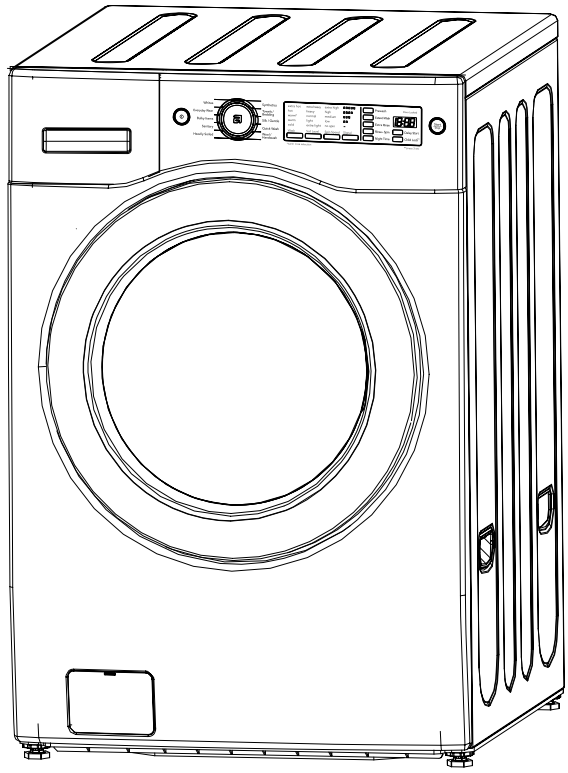
Variable spin speeds can be selected according to types of fabrics to be washed. Spin-drying is carried out by rotation (the centrifugal force) of drum according to the program selected.

④ Draining

Drain Pump: Powerful pump with coin trap to remove foreign material such as coins or buttons.

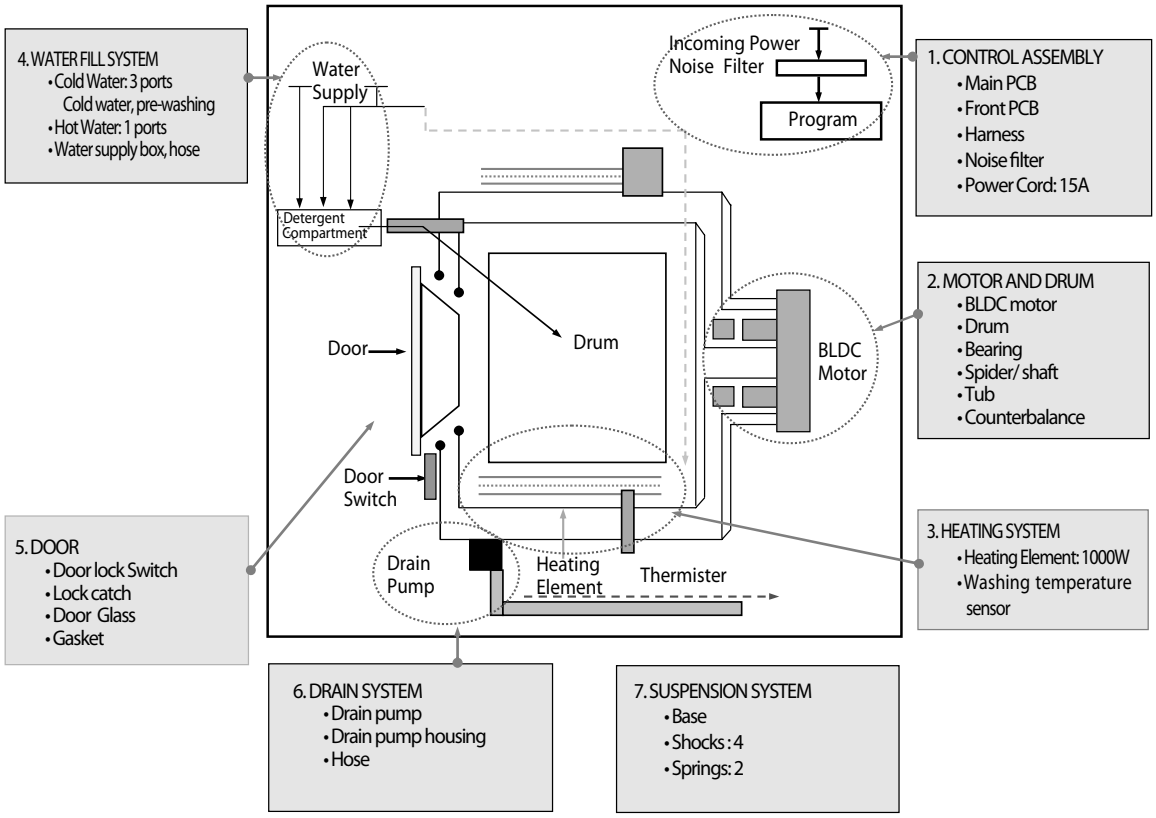
Washer Specification

1. Product Specification



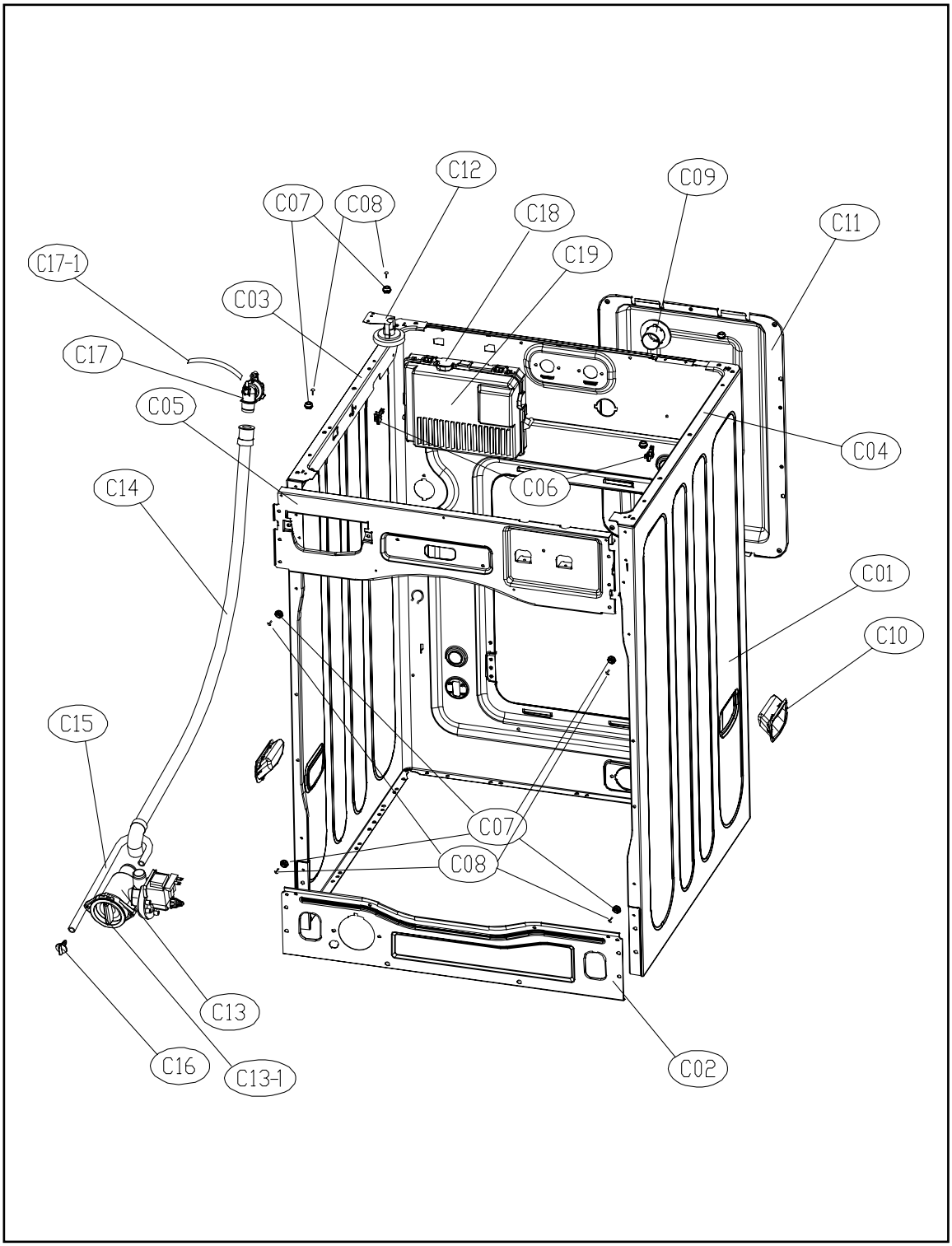
External Measurements (inches)		27"(width) x 32" (depth) x 40 3/8" (height) 52" Depth with door open
Weight		198.4lbs
Rated Supply Power		120V 60Hz
Rated Consumption Power	Washing	200W (1100W during heating)
Washing Method		Drum type
Water Pressure		Water Pressure 29kPa ~ 784kPa(0.3kgf/㎠ ~ 8kgf/㎠)

▣ Operating Mechanism Diagram



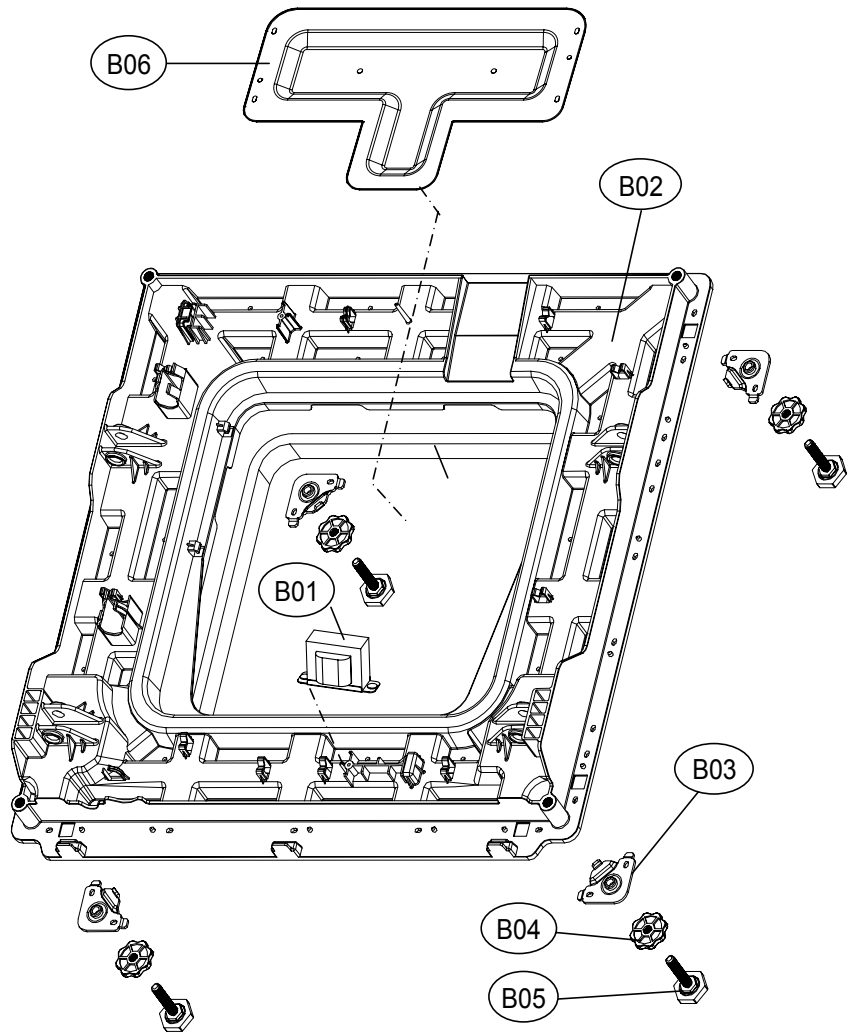
▣ PARTS LIST BY ASSEMBLY

1. CABINET ASSEMBLY



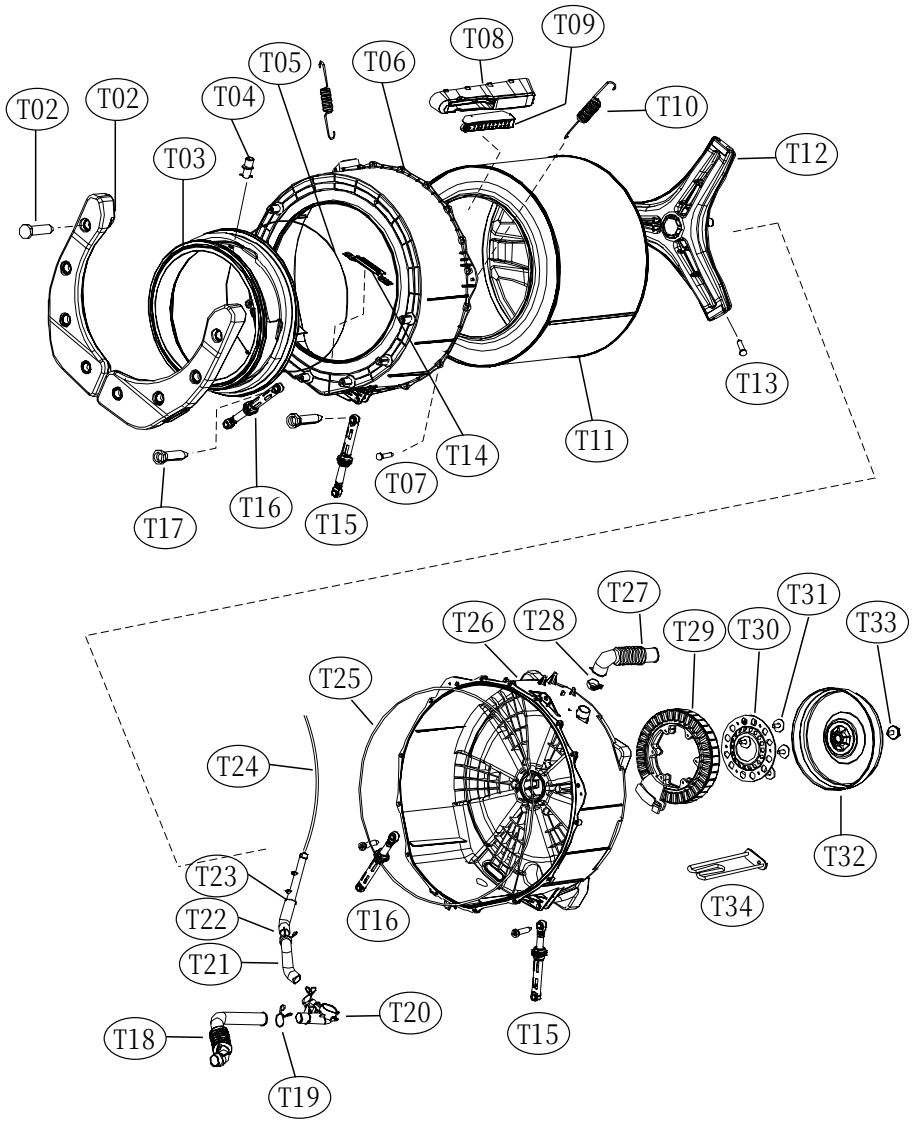
No.	Part Name	Part Code	Qt'y	Specifications	Color	Cost in USD($)	Remarks
C01	CABINET	3610811740	1	SGCC 0.8t, Pump washer	White		
			1	SGCC 0.8t, Pump washer	Titanium		
C02	FRAME LOWER	3612206700	1	SBHG 1.2T	NA		1 Piece SVC Part
C03	FRAME TOP L	3612206500	1	SGCC 1.6T	NA		
C04	FRAME TOP R	3612206600	1	SGCC 1.6T	NA		
C05	FRAME UPPER	3612208200	1	SBHG 1.2T	NA		
-	SCREW TAPPING	7122401411	6	T2S TRS 4x14 MFZN	NA		Fix Frame Upper to Cabinet
C06	STOPPER SPRING	3615202200	2	POM	NA		
C07	FIXTURE PLATE	3612008000	8	POM	NA		
C08	SCREW TAPPING	7121401211	8	T2S PAN 4X12 MFZN	NA		
C09	NOZZLE AIR	3618103110	1	PP	White		
C10	HANDLE CABINET	3612608100	2	PP	White		
			2	PP	Titanium		
C11	COVER BACK AS	3611425530	1	COVER B + PAD CABINET	NA		
-	SCREW TAPPING	7122401411	4	T2S TRS 4x14 MFZN	NA		Fix Cover Back to Cabinet
C12	SENSOR PRESSURE	3614825220	1	DWD-130RP	NA		
-	SCREW TAPPING	7122401411	1	T2S TRS 4x14 MFZN	NA		Fix Senser Pressure to Cabinet
C13	UNIT DRAIN PUMP AS	36189L5600	1	UL,Plaset+Hanyu as	NA		
C13-1	FILTER PUMP	3611910200	1	13kg, HanYu Filter	NA		
-	SCREW TAPPING	7122401411	2	T2S TRS 4x14 MFZN	NA		Fix Drain pump to Frame Lower
C14	HOSE DRAIN I	3613271300	1	ST+EL 1,010mm	NA		1 Piece SVC Part
-	ABSORBER HOSE DRAIN	3610115600	1	T10, 60x130	NA		
-	CLAMP HOSE	3611203900	2	SK5 D=26	NA		Fix Hose drain I
C15	HOSE WATER REMAIN	3613271410	1	EPDM, 13kg, UL 3t Round bending	NA		
C16	CAP WATER REMAIN	3610916800	1	PP	NA		
C17	CUFF DRAIN HOSE	3616802600	1	PP, Pump	NA		
C17-1	HOSE SIPHON	3613272210	1	EPDM, 13kg, UL 3t L=270	NA		
-	SCREW TAPPING	7122401411	1	T2S TRS 4x14 MFZN	NA		Fix Cuff Drain Hose to Cabinet
C18	PCB INVERTER AS	PRPSSWAD09	1	ASKO 13K Washer Pair Main	NA		1 Piece SVC Part
-	CASE PCB M	3611141610	1	ULl, ABS VE-0856	NA		
C19	COVER PCB M	3611427700	1	UL,ABS VE-0856, MAIN PCB	NA		
-	HARNESS AS	3612796T00	1	UL, 13kg Wash, Non bubble	NA		
-	SCREW TAPPING	7122401411	1	T2S TRS 4x14 MFZN	NA		Fix PCB Main to Cabinet
-	LOCK HARNESS M	3613802300	6	M Type (18*18), Nylon66	NA		Cabinet rear
-	LOCK HARNESS	3613802100	2	DASTL-20NA	NA		Frame Top right
-	LABEL WIRING UL	3613557100	1	UL Only, Wiring diagram+Waring	NA		English&French

2. BASE ASSEMBLY



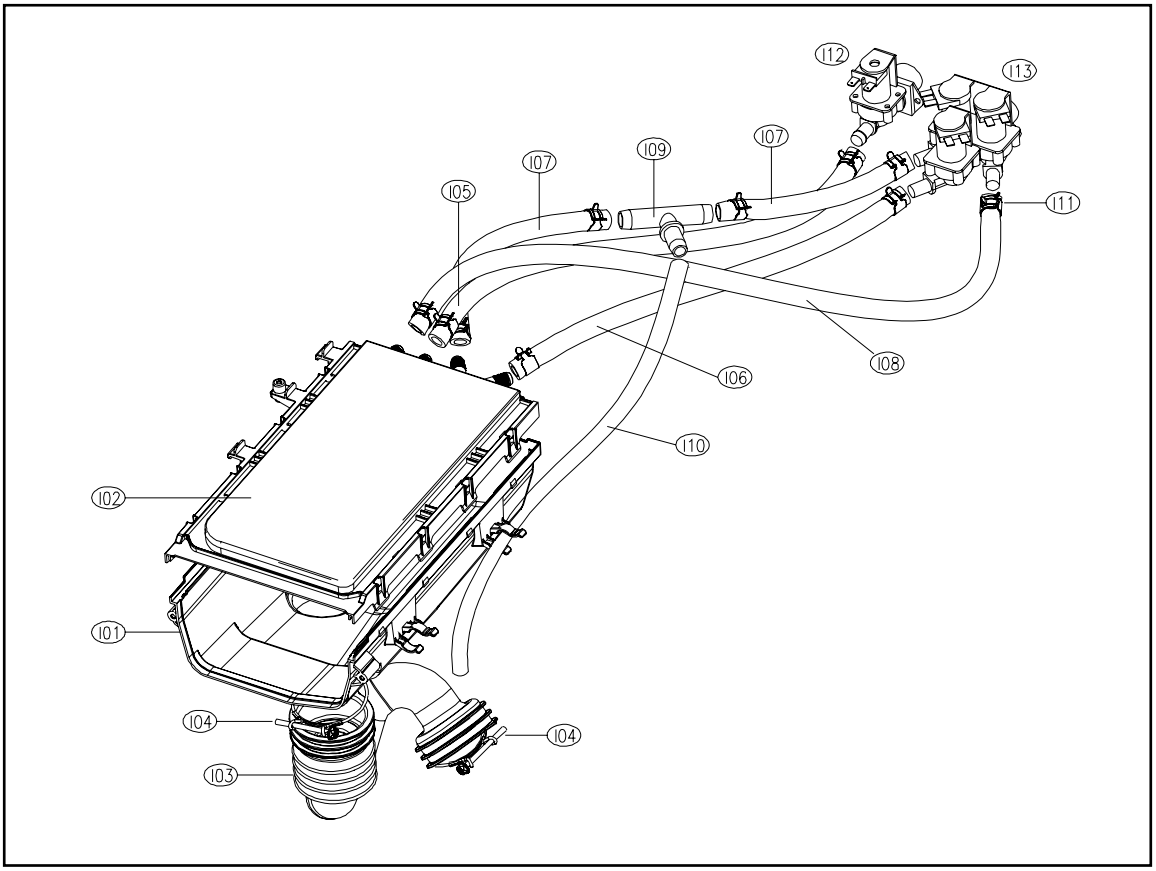
No.	Part Name	Part Code	Qt'y	Specifications	Color	Cost in USD($)	Remarks
B01	REACTOR	52G043A110	1	RT-047K L=150	NA		
B02	BASE U	3610392700	1	PP	NA		
B03	SUPPORTER LEG	3615303600	4	PO+Coating 3.0T	NA		
B04	FIXTURE LEG	3612006400	4	ABS, DWD-100DR	NA		
B05	FOOT AS	3612100700	4	Foot+Special bolt, Double insert type Hybra-Nylon66	NA		
B06	PROTECTOR HEATER	3618304600	1	SECC 0.35T	NA		
-	SCREW TAPPING	7122401411	4	T2S TRS 4x14 MFZN	NA		Fix Protector Heater to Base U
-	SCREW TAPPING	7122401411	20	T2S TRS 4x14 MFZN	NA		Fix Base U to Cabinet

3. REAR DRUM SUPPORT ASSEMBLY



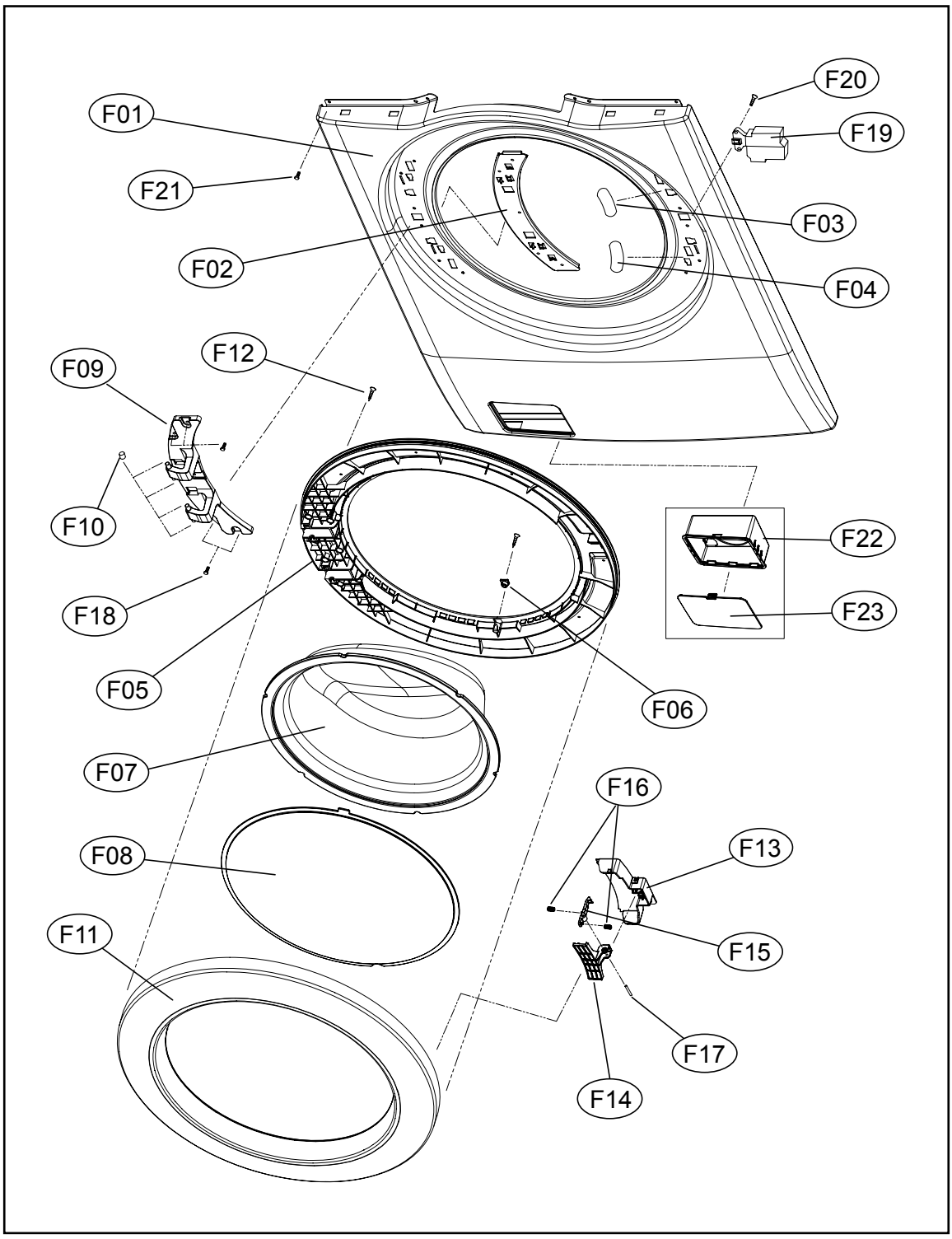
No.	Part Name	Part Code	Qt'y	Specifications	Color	Cost in USD($)	Remarks
T01	SPECIAL SCREW	3616029400	8	SWCH 8.5x30	NA		Fix Balance W.to Tub F
T02	BALANCER WEIGHT AS(L)	3616106900	1	13kg Drum	NA		
-	BALANCER WEIGHT AS(R)	3616106800	1	13kg Drum	NA		
T03	GASKET	3612322000	1	EPDM, 13kg, Wash only Nozzle shower	NA		
T04	NOZZLE SHOWER	3618104000	1	PP	NA		
T05	CLAMP GASKET AS	3611205300	1	Gasket, 13kg Drum	NA		
T06	TUB FRONT	3618828Y00	1	FRPP, 13kg Drum	NA		
T07	SPECIAL SCREW(TUB)	3616029800	15	SWCH 6.5x30	NA		Fix Tub F & R
T08	LIFTER BODY	361A400700	3	PP, 13kg Drum	Gray		
T09	CAP FILTER	3610917310	3	ABS, Non-Nano, 13kg	Gray		
-	FILTER	3611908410	3	ABS, Non-Nano, 13kg	Gray		STS mesh insert injection
T10	SPRING SUSPENSION	3615114800	2	13KG DRUM	NA		
T11	DRUM AS	3617008X00	1	SUS, 13kg	NA		
T12	SPIDER AS	361A300600	1	13kg, ALDC+S45C	NA		
T13	SPECIAL SCREW(SPIDER)	3616029500	6	STS 430, 8x25	NA		
T14	FIXTURE HEATER	3612006700	1	STS 430	NA		
T15	DAMPER FRICTION	361A700300	2	AWECO,HP3 60N/9mm Buffer4.0	NA		Tub F&R right
T16	DAMPER FRICTION	361A700110	2	70N AKS ST=170-260 DL=197.5	NA		Tub F&R left
T17	DAMPER PIN	361A700200	8	AKS D=14.5	NA		Tub & Base U
T18	HOSE DRAIN	3613269000	1	EPDM,PUMP	NA		
T19	CLAMP HOSE	3611203410	2	SK5, D=33	NA		
T20	DRAIN HOUSING I	36196TAM00	1	PP, Pump	NA		
T21	HOSE AIR TRAP	3613269700	1	EPDM, 13kg Drum	NA		
T22	CLAMP HOSE	3611204700	2	SK5, D=26	NA		
T23	AIR TRAP	361A500101	1	PP	NA		
T24	HOSE AIR	3613270600	1	ID=3.0, D=8, L=960mm	NA		
T25	GASKET TUB	3612321100	1	EPDR FORM, 13kg	NA		
T26	TUB REAR	3618828Z00	1	FRPP, 13kg Drum	NA		
T27	HOSE AIR	3613266300	1	EPDM,DWD-110RP	NA		
T28	CLAMP HOSE	3611203400	2	SK5, MFZN, D=35	NA		
T29	UNIT STATOR BLDC	36189L4840	1	30T,36Slot,2Snesor, WS2A30G011	NA		
T30	BRACK HOUSING	3610609700	1	SESEN, 2.5T	NA		
T31	SPECIAL BOLT AS	3616063400	6	SWCH M8+Silock, 58mm	NA		Fix Stator to Tub R
T32	UNIT ROTOR BLDC	36189L4900	1	Magnet24,Serration,WR1238F001	NA		
T33	SPECIAL BOLT AS	3616029600	1	SWCH,10x30,F/L Bolt,S.P/W	NA		Fix Rotor to Spider Shaft
T34	HEATER WASH	3612801740	1	UL.120V1.0KW6.7W/SQ.STS.1R3A515003.L/W	NA		

4. INLET BOX ASSEMBLY



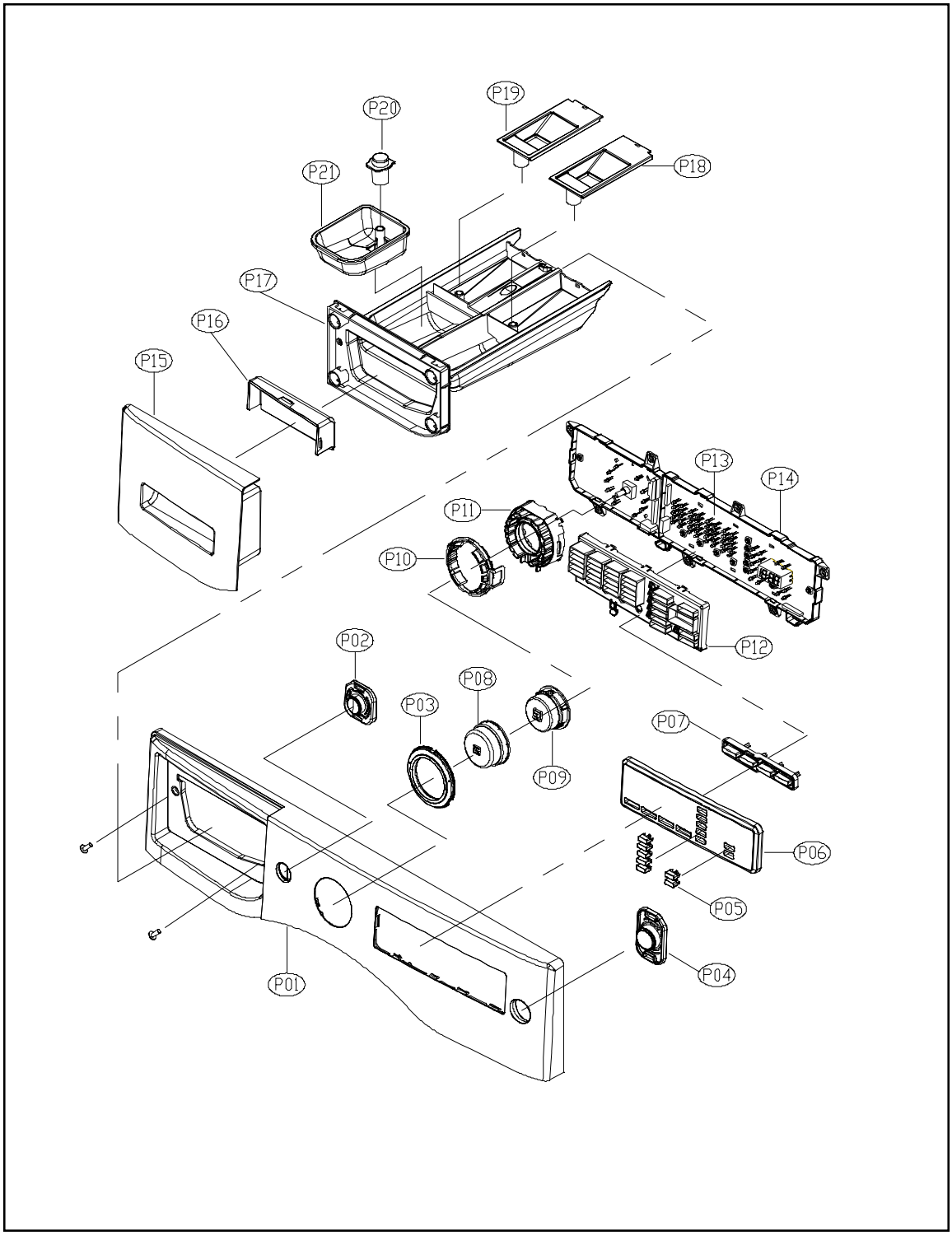
No.	Part Name	Part Code	Qt'y	Specifications	Color	Cost in USD($)	Remarks
I01	INLET BOX	3617510800	1	PP	NA		
I02	NOZZLE AS	3618104800	1	WD1131'S, Top + Under	NA		
I03	HOSE INLET	3613270300	1	EPDM	NA		1 Piece SVC Part
-	CUSHION HOSE INLET	3611567300	1	SPONGE 110x50x3t	NA		
I04	CLAMP AS	3611203200	2	ID= Φ 60, wire+bolt+nut	NA		
I05	HOSE WATER SUPPLY	3613270900	1	EPDM, ID9.9 0D14.5 L=410mm	NA		
I06	HOSE WATER SUPPLY	3613270900	1	EPDM, ID9.9 0D14.5 L=380mm	NA		
I07	HOSE WATER SUPPLY	3613270900	2	EPDM, ID9.9 0D14.5 L=230mm	NA		
I08	HOSE WATER SUPPLY	3613270900	1	EPDM, ID9.9 0D14.5 L=530mm	NA		
I09	PIPE JOINT(HOSE INLET)	3614413300	1	PP	NA		
I10	HOSE SHOWER	3613270110	1	EPDM, ID=8.5 L=550	NA		
I11	CLAMP SPRING	3611203800	10	WD1131's ID15.5, T0.6 B=10	NA		
I12	VALVE INLET	3615416700	1	120/60Hz UL BITRON 1WAY	NA		Hot
I13	VALVE INLET	3615416940	1	120/60Hz UL BITRON 3WAY	NA		Cold
-	SCREW TAPPING	7002400811	4	TRS 4x8 MFZN	NA		Fix Valve Inlet to Cabinet
-	SCREW TAPPING	7122401411	1	T2S TRS 4x14 MFZN	NA		Fix Inlet Box to Frame T(Side)

5. CABINET FRONT ASSEMBLY



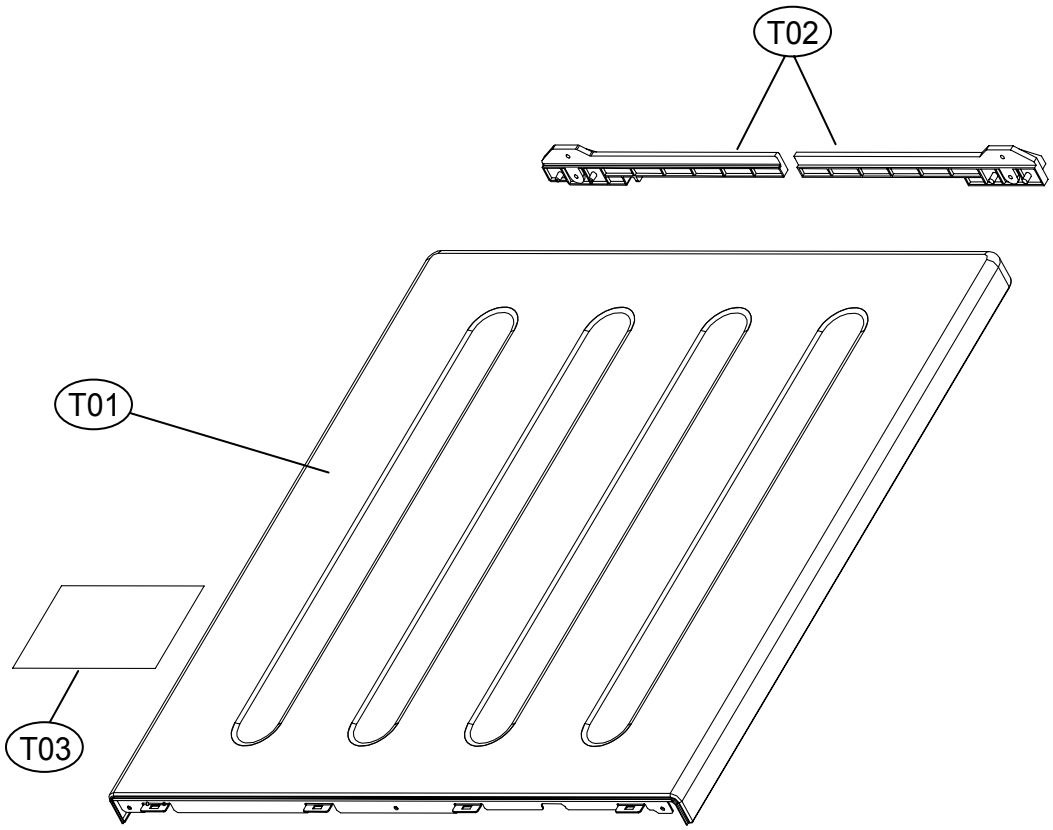
No.	Part Name	Part Code	Qt'y	Specifications	Color	Cost in USD($)	Remarks
F01	CABINET F	3610811820	1	SECD 1.0T, 13kg PUMP	White		
			1	SECD 1.0T, 13kg PUMP	Titanium		
F02	SUPPORT HINGE	3615304000	1	SGCC 1.6T	NA		
F03	LABEL SAFETY R	3613555800	1	PVC,130RP'S Cab. F Safety Label	NA		English/French
F04	LABEL WARNING	3613558500	1	PVC,130RP'S Cab. F Warning Label	NA		English/French
-	LABEL RATING	3613558200	1	PVC, UL ASKO Rating label	NA		English/French
F05	FRAME DOOR IN	3612206800	1	PP(Heat resisting)	Gray		
F06	STOPPER DOOR	3615202300	1	PP(Heat resisting)	Gray		
F07	DOOR GLASS	361A110600	1	GLASS	NA		
F08	PROTECTOR GLASS	3618304300	1	ABS(Transparent)	NA		
F09	HINGE DOOR	3612902900	1	ALDC, Spray	White		
			1	ALDC, Spray	Titanium		
F10	CAP HINGE DOOR	3610916500	4	POM	NA		
F11	FRAME DOOR OUT	3612206900	1	ABS, ASKO Spray	Silver		
			1	ABS, ASKO Spray	Titanium		
F12	SCREW TAPPING	7115402008	16	T1S FLT 4x20 SUS430	NA		
F13	COVER HANDLE	3611426700	1	ABS, ASKO Spray	Silver		
			1	ABS, ASKO Spray	Titanium		
F14	HANDLE DOOR	3612609000	1	ABS, ASKO Spray	Silver		
			1	ABS, ASKO Spray	Titanium		
F15	HOOK DOOR	3613100800	1	ZNDC	NA		
F16	SPRING HOOK	3615113700	2	SUS ID=4.3, NI=7, D=®™0.9	NA		
F17	PIN HANDLE	3618200100	1	SUS D=3.0	NA		
F18	SCREW TAPPING	3616030000	4	F/L BOLT(SE) 5*12 STS	NA		
F19	SWITCH DOOR LOCK	3619046410	1	DF F11 110 125V 16A PTC-SOLENOID	NA		
F20	SCREW TAPPING	7122401608	2	T2S TRS 4X16 STS 430	NA		Fix Door S/W to Cabinet F
F21	SCREW TAPPING	3616029950	4	TTS"S" HEX F/L 4*8	NA		Fix Cabinet F to Cabinet
F22	CASE PUMP	3611141400	1	PP	NA		
F23	COVER PUMP	3611426800	1	ABS, ASKO Spray	White		
			1	ABS, ASKO Spray	Titanium		

6. FRONT PANEL ASSEMBLY



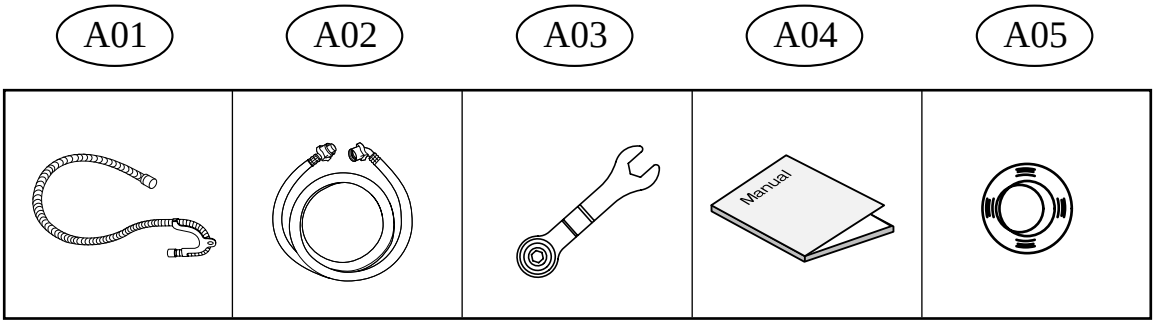
No.	Part Name	Part Code	Qt'y	Specifications	Color	Cost in USD($)	Remarks
P01	PANEL F	3614288800	1	ABS + SILK PRINT	White		
			1	ABS + SILK PRINT	Titanium		
P02	BUTTON POWER	3616637800	1	ABS + SILK PRINT	White		
			1	ABS + SILK PRINT	Titanium		
P03	WINDOW COURSE	3615506300	1	ABS(Transparent) + Film	White		ABS + Film in-mold injection
			1	ABS(Transparent) + Film	Titanium		
P04	BUTTON START	3616637900	1	ABS + SILK PRINT	White		
			1	ABS + SILK PRINT	Titanium		
P05	BUTTON OPTION	3616638100	7	ABS	White		
			7	ABS	Titanium		
P06	WINDOW DISPLAY	3615506400	1	ABS(Transparent) + Film	White		ABS + Film in-mold injection
			1	ABS(Transparent) + Film	Titanium		
P07	BUTTON FUNCTION	3616638000	1	ABS	White		
			1	ABS	Titanium		
P08	DIAL KNOB OUTER	3616638200	1	ABS	White		1 Piece SVC Part
			1	ABS	Titanium		
P09	DIAL KNOB INNER	3616638300	1	ABS	White		
			1	ABS	Titanium		
P10	LED COURSE	3613054700	1	ABS(Transparent)	NA		
P11	HOLDER COURSE	3613054500	1	ABS	NA		1 Piece SVC Part
P12	HOLDER FUNCTION	3613054600	1	ABS	NA		
P13	PCB F AS	PRPSSWAD29	1	ASKO Washer Front PCB As	NA		
P14	CASE PCB FRONT	3611147600	1	ABS	NA		
-	SCREW TAPPING	7122401829	2	T2S TRS 4x18 STS	NA		Fix Panel F to Frame Upper
-	SCREW TAPPING	71224012411	7	T2S TRS 4x12 MFZN	NA		Fix Case PCB F to Panel F
P15	CASE HANDLE	3611147700	1	ABS, Silk print	White		
			1	ABS, Silk print	Titanium		
P16	HANDLE CAP	3612611400	1	ABS, Silk print	White		
			1	ABS, Silk print	Titanium		
P17	CASE DETERGENT	3611145600	1	PP	White		
P18	CAP SOFTENER	3610917800	1	PP	Blue		
P19	CAP BLEACH	3610917900	1	PP	Blue		
P20	CAP LIQUID	3610918000	1	PP	Blue		
P21	CASE LIQUID	3611145700	1	PP	Blue		

7. TOP PLATE ASSEMBLY



No.	Part Name	Part Code	Qt'y	Specifications	Color	Cost in USD($)	Remarks
T01	PLATE TOP	3614533010	1	SECD 1.2T	White		
			1	SECD 1.2T	Titanium		
T02	PLATE SUPPORTER AS	3615304110	2	ABS + EPDM	White		
			2	ABS + EPDM	Titanium		
-	SCREW TAPPING	7122401411	4	T2S TRS 4x14 MFZN	NA		Fix Plate Sup. to Plate T
T03	LABEL CAUTION	3613558600	1	PET(White) 70x116, US Wash only	NA		English & French
-	ENERGY GUIDE	3613558310	1	Energy Label, 13kg Drum	NA		English & French

8. ACCESSORIES



No.	Part Name	Part Code	Qt'y	Specifications	Color	Cost in USD($)	Remarks
A01	HOSE DRAIN O AS	3613268500	1	DWD-800W, L=1,500	NA		
	GUIDE DRAIN HOSE	3612502300	1	PP	NA		
A02	HOSE INLET AS	3613271500	1	REFLEX, PVC 1.3M	NA		Cold
	HOSE INLET AS	3613271510	1	REFLEX, PVC 1.3M	NA		Hot
A03	UNIT SVC WRENCH	36189L3X00	1	PO+Coating, 2.3T DWD-110RP	NA		
A04	MANUAL OWNERS	4589A61600	1	ASKO Manual	NA		English & French
A05	CAP HOLDER	3610916400	4	PP, DWD-10RP	White		

▣ Control Unit Function Spec

1. SEQUENCE CHART

Classification		Processing Time	Everyday Wear		Towel/Bedding		Sanitary		Bulky Items	Syntheics
			Small	Low	Small	Low	Small	Low		
Pre Wash	Sensing	10sec								
	Water Supply	2min								
	Prewash	10min								
		8min								
	Drain	1min								
	Balancing Spin	2min								
	Meduim Spin	3min								
Wash	Sensing	20sec								
	Water Supply	2min								
	Washing1 (Heating)	50min					53min	57min		
		45min							37min	
		30min	28min	32min						20min
		25min			16min	17min				
		15min								
Rinse	Drain	1min								
	Balancing Spin	2min								
	Meduim Spin	3min								
	Water Supply	2min								
	Rinsing 1	3min								
	Drain	1min								
	Balancing Spin	2min								
	Meduim Spin	3min								
	Water Supply	2min								
	Rinsing 2	3min								
	Drain	1min								
	Balancing Spin	2min								
	Meduim Spin	3min								
	Water Supply	2min								
	Rinsing 3	3min								
Spin	Drain	1min								
	Balancing Spin	2min								
	Main Spin	9min								
		7min								
		6min								
End	Cloths Release	60sec								
	END	10sec								
Remain Time Display			1:05	1:09	53	54	1:30	1:34	1:14	1:02

NOTE

1. Everyday wear : Warm + Wash + Soil Normal + Rinse 2 + Medium Spin
2. Towel/Bedding : Warm + Wash + Soil Normal + Rinse 2 +High Spin
3. Sanitary : Extra hot + Wash + Soil Normal + Rinse 2 + Medium Spin
4. Bulky Item : Warm + Wash + Soil Normal + Rinse 2 + Mediume Spin
5. Synthetics : Warm + Wash + Soil Normal + Rinse 2 + Mediume Spin

Classification		Processing Time	Heavily/ Soiled	Silk/Gentle	Wool/Hend wash	Whites	Quick Wash	
Pre Wash	Sensing	10sec						
	Water Supply	2min						
	Pre Wash	10min						
		8min						
	Drain	1min						
	Balancing Spin	2min						
	Meduim Spin	3min						
Wash	Sensing	20sec						
	Water Supply	2min						
	Washing1 (Heating)	50min						
		45min	37min					
		30min						
		25min				27min		
		15min		13min	6min		8min	
Rinse	Drain	1min						
	Balancing Spin	2min						
	Meduim Spin	3min						
	Water Supply	2min						
	Rinse 1	3min						
	Drain	1min						
	Balancing Spin	2min						
	Meduim Spin	3min						
	Water Supply	2min						
	Rinse 2	3min						
Spin	Drain	1min						
	Balancing Spin	2min						
	Main Spin	9min						
		7min						
		5min						
End	Cloths Release	60sec						
	END	10sec						
Remain Time Display			1:44	37	30	1:04	33	

NOTE	
	1. Heavily Soiled : Warm + Pre Wash + Wash + Soil Normal + Rinse 3 + High Spin 2. Silk / Gentle : Cold + Wash + Soil Normal + Rinse 1 + Low Spin 3. Wool / HandWash : Cold + Wash + Soil Normal + Rinse 1 + Low Spin 4. Whites : Warm + Wash + Soil Normal + Rinse 2 + Low Spin 5. Quik Wash : Cold + Wash + Soil Normal + Rinse 1 + Low Spin

2. Composition per Function

2-1. Water Supply

1) Water Temperature Selection

Water supply algorithm differs according to water temperature selected among 5 levels.
In other temperatures, with the exception of cold water, constant temperature control is executed.
Cold water and hot water operation is carried out in turn according to the target temperature.

Water Temp.	Target Temp.
Extra Hot	155°F (67°C)
Hot	105°F (41°C)
Warm	85°F (31°C)
Warm	85°F (31°C)
Cold	-

2) For Cold, valve operation does not change according to temperature and only the time unit of cold on for 7sec and off for 9sec is set to supply cold water per each unit of 16sec.

3) How to Insert Bleach

- During Washing

  Operation for 12sec after 3-minute washing in Wool, Silk and Quick wash courses
  Operation for 12sec after 5-minute washing in Towel course
  Operation for 12sec after 9-minute washing in other courses

2-2. Draining

1) Pump Operation - Washing cycle

① During the drain cycle, the pump runs continuously.

② Spin-drying Cycle after Drainage Completion

: On for 18sec and off for 3sec

2-3. Sensor Detection

1) Water Level Sensor Data

Classification / Water Level	Height (mm)	Frequency (KHz)	Remarks
Spec. Small	130	24.62	
Spec. Low	130	24.62	
Washing Small	130	24.12	
Washing Low	130	23.84	
Standard Rinsing	160	24.17	
Rinsing	160	23.3	
Additional Rinsing	175	23.92	
Tub Washing	195	23.77	
Overflow	260	22.6	
Safety	125	24.7	
Reset	125	24.68	

2) Temperature Sensor Data

Temp.	Resistance(Ω)	Voltage	Remarks
0	35.97	0.58	
10	22.76	0.86	
20	14.77	1.21	
22	13.57	1.29	
24	12.48	1.37	
25	11.98	1.41	
27	11.04	1.49	
29	10.18	1.58	
30	9.78	1.62	
32	9.04	1.71	
34	8.36	1.80	
36	7.74	1.89	
38	7.17	1.98	
40	6.65	2.07	
49	4.7	2.50	
55	3.85	2.75	
60	3.24	2.96	
65	2.74	3.16	
75	1.99	3.51	

2-4. How to Control Voltage (during abnormal operation)

1) Voltage Control

① Normal Voltage

DC-link voltage after wave rectification is directly impressed to IPM as 310 ~ 330V.
When motor starts operation, DC voltage changes with energy consumed by motor and/ or counter electromotive force of motor.

② Identifying Abnormal Voltage

A. Occurrence of counter electromotive force

☞ In case of 450V or higher

B. Instant power failure and excessive energy consumption

☞ In case of 185V or lower

2-5. How to Control Current (during abnormal operation)

1) Current Abnormality Detection

① Abnormal if DC current flowing through IPM measured during high-speed motor rotation is 10A~12A or higher

② Detection of abnormal current to be carried out by saving higher value among instant current values and updating the data

2-6. Door Switch

1) Door Switch Operation

① Door Locking

3seconds after bi-metal operation of door S/W, pulse of 20msec duty on solenoid is impressed twice until door is locked. Bi-metal begins operation simultaneously as start button is pressed.

② Door Unlocking

Bi-metal plate of door S/W is turned off and pulse of 20msec duty on solenoid is impressed until door is unlocked.

③ Motor and other electronic parts begin operation to execute normal cycles only when door is locked.

④The door will remain locked during a cycle as long as the temperature is 131°F(55°C) or higher and the water level is at or higher than the safety level.

2) Door Unlocking System

① Door is unlocked immediately when cycle is finished.

② During a cycle, the unit may be paused and the door unlocked and opened as long as the temperature is below 131°F(55°C) or higher and the water level is below the safety level.

2-7. Load Sensing

1) Load Sensing to Determine Water Level

① Load sensing is carried out when the Everyday wear, Sanitary, and Towels/bedding wash cycles are selected.

② Sensing is administered when the laundry is dry before starting the wash cycle.

③ Once a wash cycle is started, the motor tumbles at 75 r.p.m. for 10 seconds and calculates the load on the motor. The water levels and wash times are set based on these calculations.

2) Load Sensing for the spin cycle.

① Load sensing is done after the main wash cycle while the laundry is still wet.

② Once a drain cycle is completed, the motor tumbles at 75 r.p.m. for 10 seconds and calculates the load on the motor.

③ The base value for the intermediate spin, unbalance, and final spin are calculated based on the load on the motor.

2-8. Child Lock

① Child lock is activated by pressing the “Child Lock” for 3 seconds once a program has been started.

② In child lock mode, all buttons except the power button, are not deactivated.

③ In child lock mode, the “Child Lock” indicator will be lit to show that child lock has been activated.

④ The Child Lock mode is cleared after the cycle is completed, but can be manually deactivated by pressing the “Child Lock” button for 3 seconds before the cycle is completed.

3. Functions per Cycle

3-1. Washing Cycle

1) Classification of Washing

① Pre-wash uses only cold water. It is the default option on the Heavily Soiled program and can be selected as an option on all cycles except Quick wash and Wool/Handwash.

② The main wash cycle time and water consumption for Everyday wear, Towel/Bedding, and Sanitary programs are set according to the motor load during the load sensing phase. All other programs use predetermined wash times and water levels based on the pressure sensor.

2) Heater Operation

① Once temperature has been satisfied, the hating element won't cycle back on.

② Even if the target water temperature has not been satisfied, the wash cycle will finish according to the preset wash time.

3) Refilling supply of water

① Refilling occurs if the water level drops below the set level within 2 minutes after the initial fill.

② The motor stops tumbling during the refilling phase.

③ During washing, the machine will refill up to 10 times. After the 10th time, the machine will not add additional water even if water level drops.

④ The machine will not add water if more than half of washing time has passed or the heating element has been turned off.

3-2. Rinsing Cycle

1) Water Supply Cycle

① Only cold water is supplied in rinsing cycle.

② Only cold water is supplied in rinsing cycle.

③ In the final rinse, fabric softener is added by opening both the cold water inlet valve V/V, and pre-washing V/V at and the pre-wash inlet valve V/V at the same time.

2) Refilling Rinse Water

① Water level is checked 1 minute after starting the rinse cycle. Water will be added to once again reach the designated water level.

3) Draining

① If the water temperature is 131°F (55°C) or higher, the machine will cool the water by turning on the cold water valve until the level reaches the high water level before the machine will drain.

② When drain cycle begins, the drain pump motor will run continuously.

4) Balance Spin

① Balancing the laundry : The machine will tumble clockwise and counterclockwise at 45rpm. During this time, the machine is calculating and trying to correct the level of unbalance in the drum based on the data from the load on the motor.

② The machine will try to balance the load 20 times.

③ Once an appropriate level of balance has been achieved, the machine will advance to the medium spin.

5) Medium Spin

① The medium spin will achieve the rpm selected by the program or options to help remove rinse water and soap suds.

3-3. Main Spin Cycle

1) Drain

① Drain set time is 1 minute.

② When draining is complete, 1 minute is reduced from the overall cycle.

2) Balance Spin

① Balancing the laundry : The machine will tumble clockwise and counterclockwise at 45r.p.m. During this time, the machine is calculating and trying to correct the level of unbalance in the drum based on the data from the load on the motor.

② The machine will try to balance the load 20 times.

③ Once an appropriate level of balance has been achieved, the machine will advance to the main spin.

3) Main Spin Cycle

① The main spin cycle begins after the balance spin has achieved a properly balanced load.

② The r.p.m reached will vary due to the cycle and options selected.

③ After the spin cycle is complete, the drum will slow down to approximately 450 r.p.m. At that point, the machine will electronically stop the motor.

④ If you press the Start button to pause a spin cycle, the machine will electronically stop the motor.

Spin-Drying Classification	Max. r.p.m
Low	550 r.p.m
Medium	790 r.p.m
High	990 r.p.m
Extra High	1050 r.p.m

3-4. Ending the program

1) Clothes release

①The motor is tumbled slowly to prevent wrinkling by loosening the laundry attached to the inner wall of drum after completion of main spin. Releasing is carried out for 30sec.

2) Ending

① After completion of the clothes releasing phase, the buzzer is sounded for 10 seconds and power is turned off.

② The door is unlocked and is ready to be opened.

4. Button Functions

4-1. Power

1) This electronic power switch turns the machine off and on.

2) Automatic Power Off

① Power is turned off immediately after completion of the selected cycle.

② Power is automatically turned off in 10 minutes if no button control is made after power on.

3) Initial Display for Power Only

① The program LEDs are turned on for 1second.

② LED display shows '---'.

4-2. Start / Stop

1) The Everyday wear program can be started simply by pressing the Start/Stop button after turning on power switch.

2) Once you turn the unit on with the main power switch all wash programs are lit up. Turn the program knob to select the desired program. The corresponding light next to the program will be lit up. Press the Start/Stop button to start the program.

3) Press the Start/Stop button to pause a running wash program. If the program has not been resumed within 10 minutes, the unit will automatically turn off.

4) Once a program has been paused, you can turn the program knob to select a different program.

5) Pausing a program will allow the door to unlock which can serve as an add a sock feature provided that the water level and water temperature are within the safe limits set by the control board.

4-3. Wash

1) Avail temperatures are set based on the selected program. If you select cold, the washing temperature will be the same as that of the incoming water supply.
Temperature safeguards will prevent selection of certain temperatures.
(Refer to Washer Program Default Data and Select Option.)

2) The temperatures below indicate water temperature for washing. "Cold water is used for rinsing. When ‘Warm*’ is selected, warm temperature is maintained for both washing and rinsing."

3) Cold water and hot water supply method differs according to water temperature selection.

4) For the Sanitary program, water temperature is fixed at 'Extra Hot'.

Wash	Temperature	Wash / Rinse
Extra Hot	155°F (67°C)	Extra. Hot / Cold
Hot	105°F (41°C)	Hot / Cold
Warm*	86°F (31°C)	Warm / Warm
Warm	86°F (31°C)	Warm / Cold
Cold	-	NO Heating

4-4. Soil Level

1) Pressing the Soil Level button, changes the LED to cycle between ‘Normal, Heavy, Extra Heavy, Off, Extra Light, and Light' soil levels.

2) The Soil level can be selected only when a wash cycle has been chosen.

3) Wash time changes according to the selected soil level.

4) The Soil level can not be changed in Wool/Handwash, and Quick Wash programs.

5) The soil level can be changed once a program has begun by pausing the current program.

6) Overall cycle time is shown in display.

4-5. Spin Speed

1) Pressing the Soil Level button, changes the LED to cycle between Medium, High, Extra High, Off, No Spin, and Low.

2) The display shows the remaining time.

3) The spin speed may be changed mid cycle provided the current cycle has been paused.

4-6. Signal

1) The Signal button operates in 5 steps.
Press Signal to adjust the sound level or turn off the signal.

4-7. Pre-Wash

1) Pre-wash may only be added to a wash cycle.

2) Pre-wash is not available in Wool/Handwash, Quick Wash courses.

3) Once a pre-wash has been selected, the corresponding LED will light up. The LED will go out once the pre-wash option has been removed.

4) The Pre-wash LED is turned off when pre-wash is completed.

4-8. Extend Wash

1) When the Extend wash button is pressed, the washing time increases per the wash cycle such as by 6 minutes for Heavily Soiled, 8 minutes for Sanitary, 5 minutes for Everyday wear and Towels and bedding, and 4 minutes for the other available programs.

2) Extend wash is not available in Silk/Gentle, Quick Wash, Wool/Handwash courses.

3) The Extend wash LED is turned off when wash cycle is completed.

4-9. Extra Rinse

1) Extra rinse is not available in the Quick wash program.

2) Pressing the Extra Rinse button will add one rinse, and the LED will be lit up. Turning off the Extra Rinse option will turn off the LED and also set the number of rinses back to the program standard.

3) The Extra rinse LED is turned off when rinsing is completed.

4-9. Rinse+Spin

1) When you press Rinse + Spin, the unit will display and perform 1 cold rinse followed by a medium spin.

2) If you select Rinse + Spin, and decide you don't want to run that program, pressing Rinse + Spin again won't won't return the unit back to a cycle selection mode. You must turn the program knob to a program to cancel a Rinse + Spin. Once that happens, the Rinse + Spin LED will go out.

3) Water temperature can be changed with the Wash temperature button after rinse + spin is set. Selection can be made from Cold to Warm*.

4) When the Rinse + Spin cycle is completed, the LED will be turned off.

4-10. Night Time

1) Pressing the Night Time button, button will make the machine default to low spin speed and the middle spin speed cycle will change from 790 r.p.m. to 550 r.p.m.

2) Pressing the Night Time button again will remove the option and reset the program default values.

3) The Night Time LED will turn off when the cycle is completed.

4-11. Delay Start

1) Delay Start will delay the start of the chosen program between 1 and 12 hours..

2) When pressing the preset button, time changes in the order of 1 →2→3→ 4 …→12→1.

3) After selecting the Delay Start time, cycle options can be changed before the program has been started by pressing the start/stop button. Cycles and options can not be changed once a program has been started.

4) Once a program has been started in a delay start mode, you can check on the selected cycle by pressing the Start/Stop button. The selected program will display for 3 seconds.

4-12. Child Lock**

1) To activate the Child Lock mode, you must first start a program. Next, press the Child Lock button for 3 seconds.

2) The Child Lock LED will be lit as long as that option is active. The power button is the only active button while the unit is in Child Lock mode.

3) If you want to release this mode, press Child Lock button for 3 seconds.

4-13. Program Selector Knob

1) The program selector knob is turned either clockwise or counterclockwise to choose programs.

3) The display window will show the wash time for the selected programs.

4-14. Washer Program Default Data and Select Option

		Temp	Soil	Spin	Pre Wash	Extended Wash	Extra Rinse	Rinse+Spin, Delay start, Night time
Heavily	default	Warm*	Normal	High	O	O	O	O
	selection	Cold~Hot	Ex.light~Ex.heavy	no spin~Ex.high				
Sanitary	default	Ex.hot	Normal	Medium	O	O	O	O
	selection	X	Ex.light~Ex.heavy	no spin~Ex.high				
Bulky	default	Warm	Normal	Medium	O	O	O	O
	selection	Cold~Warm*	Ex.light~Ex.heavy	no spin~High				
Everyday	default	Warm	Normal	Medium	O	O	O	O
	selection	Cold~Hot	Ex.light~Ex.heavy	no spin~Ex.high				
White	default	Warm	Normal	Medium	O	O	O	O
	selection	Cold~Hot	Ex.light~Ex.heavy	no spin~Ex.high				
Synthetic	default	Warm	Normal	Low	O	O	O	O
	selection	Cold~Hot	Ex.light~Ex.heavy	no spin~Ex.high				
Towel /Bedding	default	Warm	Normal	Ex.High	O	O	O	O
	selection	Cold~Hot	Ex.light~Ex.heavy	no spin~Ex.high				
Silk	default	Cold	Normal	Low	O	X	O	O
	selection	X	Ex.light~Ex.heavy	no spin~Medium				
Quick	default	Cold	Ex.light	Low	X	X	X	O
	selection	Cold~Warm*	X	no spin~Medium				
Wool	default	Cold	Ex.Light	Low	X	X	O	O
	selection	X	X	no spin~Low				

5. PCB Manual Test Mode

- The PCB and other electronic parts can be tested without water supply to diagnose their operation.

1) Process

: Press the power button to turn the machine on.
Press and hold the “Wash” button.
Press the Spin button 3 times.
The display will show control version information.
Press the Signal button to cycle through the following tests.

Step	Display		Details
1	L_C		Door Lock Close
2	run	001	Running times count
3	E5	0	E5 Error count
4	E6	0	E6 Error count
5	E7	0	E7 Error count
6	E8	0	E8 Error count
7	F		Do not use
8	H		Hot Valve on
9	C		Cold Valve on
10	P		Pre Wash Valve on
11	d		Do not use
12	b		Bleach Valve
13	dr		Drainage pump on
14	L_O		Door Lock Open

2) More details

- With this test, you can see how many cycles the machine has run, and the number of E5-E8 errors. You can also activate all water valves, the door lock, as well as the drain pump. The motor is not activated through this test. To test the motor, run a spin cycle or a Rinse + Spin.

6-1. IE (Input Error) - Error in water supply

6-1. IE (Input Error) - Error in water supply

1) Conditions of Occurrence
   ① In case the designated water level is not reached in 5 minutes during water supply or re-supply

2) All LEDs are turned off and 'IE' blinks in the display.

3) An error buzzer alarm is sounded for 10 seconds every 10 minutes.

4) The error display is cleared when turning off/ on power.

6-2. OE (Output Error) - Error in drainage

1) Conditions of Occurrence
   ① In case water level does not reach reset point in 10 minutes after drainage starts

2) All LEDs are turned off and 'OE' blinks in the display.

3) An error buzzer alarm is sounded for 10 seconds every 10 minutes.

4) The error display is cleared when turning off/ on power.

6-3. UE (Unbalance Error)

1) Conditions of Occurrence
   ① In case the main spin is not reached within 20 cycles of balance spinning.
   ② In case balance spining fails during the middle spin, UE occurs as the cycle moves to the next process.

2) All LEDs are turned off and 'UE' blinks in the display.

3) An error buzzer alarm is sounded for 10 seconds every 10 minutes.

4) The error mode is cleared by opening door and organizing the laundry in drum, closing door and pressing start/stop button. The spin cycle will begin again.

6-4. LE (Lock Error) - Door opening error

1) Conditions of Occurrence
   ① When starting a cycle while door is opened

2) All LEDs are turned off and 'LE' blinks in the display.

3) An error buzzer alarm is sounded for 10 seconds every 10 minutes.

4) The error display is cleared when turning off/ on power.

6-5. E1 - Water level detection error

1) Conditions of Occurrence
   ① In case water level is below reset or overflow is detected in line test mode

2) The drain pump is kept on until water level falls below reset.

3) All LEDs are turned off and 'E1' blinks in the display.

4) An error buzzer alarm is sounded for 10 seconds every 10 minutes.

5) The error display is cleared when turning off/ on power.

6-6. E2 - Overflow error

1) Conditions of Occurrence
   ① In case water level in water tank is above overflow level due to continuous operation of water inlet valve

2) The drain pump is kept on until water level falls below reset.

3) All LEDs are turned off and 'E2' blinks in the display.

4) An error buzzer alarm is sounded for 10 seconds every 10 minutes.

5) The error display is cleared when turning off/ on power.

6-7. E4 - Water leakage during washing

1) Conditions of Occurrence
   ① In case water level falls below re-supply even after 15 times of re-supply and before temperature has been satisfied.

2) All LEDs are turned off and 'E4' blinks in the display.

3) An error buzzer alarm is sounded for 10 seconds every 10 minutes.

4) The error display is cleared when turning off/ on power.

6-8. E9 - Abnormalities in water level sensor

1) Conditions of Occurrence
   ① In case water level frequency is of 15KHz or lower and 30KHz or higher during cycle due to abnormalities in water level sensor, etc.

2) All LEDs are turned off and 'E9' blinks in the display.

3) An error buzzer alarm is sounded for 10 seconds every 10 minutes.

4) The error display is cleared when turning off/ on power.

6-9. Motor-related Error

1) E5 (DC-Link High Voltage) Error
   ① In case DC-link voltage to IPM increases to 450V or higher
   ② Motor operation is stopped and 'E5' is shown in display window.
   ③An error buzzer alarm is sounded for 10 seconds every 10 minutes.
   ④The error display is cleared when turning off/ on power.

2) E6 (EMG) Error
   ① In case current detected with EMG port is of 20A or higher
   ② Motor operation is stopped and 'E6' is shown in display window.
   ③An error buzzer alarm is sounded for 10 seconds every 10 minutes.
   ④The error display is cleared when turning off/ on power.

3) E7 (Direction) Error
   ① In case signal of Hall IC is different from the predicted signal according to direction of rotation
   ② Motor operation is stopped and 'E7' is shown in display window.
   ③An error buzzer alarm is sounded for 10 seconds every 10 minutes.
   ④The error display is cleared when turning off/ on power.

4) E8 (Initial Operation Fail) Error
   ① In case input signal of Hall IC is abnormal due to problems in motor connection, etc.
   ② Motor operation is stopped and 'E8' is shown in display window.
   ③ An error buzzer alarm is sounded for 10 seconds every 10 minutes.
   ④ The error display is cleared when turning off/ on power.

6-10. Error in Temperature Sensor

1) H2 Error - Washing temperature sensor open/ short
   ① In case washing temperature sensor is defective or not connected
   ② An error buzzer alarm is sounded for 10 seconds every 10 minutes.
   ③ The error display is cleared when turning off/ on power.

2) H4 Error - Washing temperature sensor overheating
   ① In case temperature detected by washing temperature sensor is 205°F (95°C) or higher.
   ② An error buzzer alarm is sounded for 10 seconds every 10 minutes.
   ③ The error display is cleared when turning off/ on power.

3) H5 Error - Water temperature error in wool/ delicate course

① In case water temperature in wool/ delicate course is 113°F (45℃) or higher

②An error buzzer alarm is sounded for 10 seconds every 10 minutes.

③The error display is cleared when turning off/ on power.

4) H6 Error - Abnormality in washing heater

① Within 15 minutes after heater operation begins;
In case standard temperature is of 108°F (42℃) or lower: If temperature does not increase by 2°F or more. In case standard temperature is higher than 108°F (42℃): If temperature does not increase by 2°F or more

② If temperature falls below standard temperature by 2°F or more due to re-supply of water, etc., standard temperature is reset as the current temperature and error check time of 15 minutes is reset.

③An error buzzer alarm is sounded for 10 seconds every 10 minutes.

④The error display is cleared when turning off/ on power.

5) H8 Error - Washing heater overheating

① In case washing heater temperature increases by 10°F (5°C) or more within 30 seconds when there is no water in tank, etc.

②An error buzzer alarm is sounded for 10 seconds every 10 minutes.

③The error display is cleared when turning off/ on power.

6-11. PFE (Pump Filter Error)

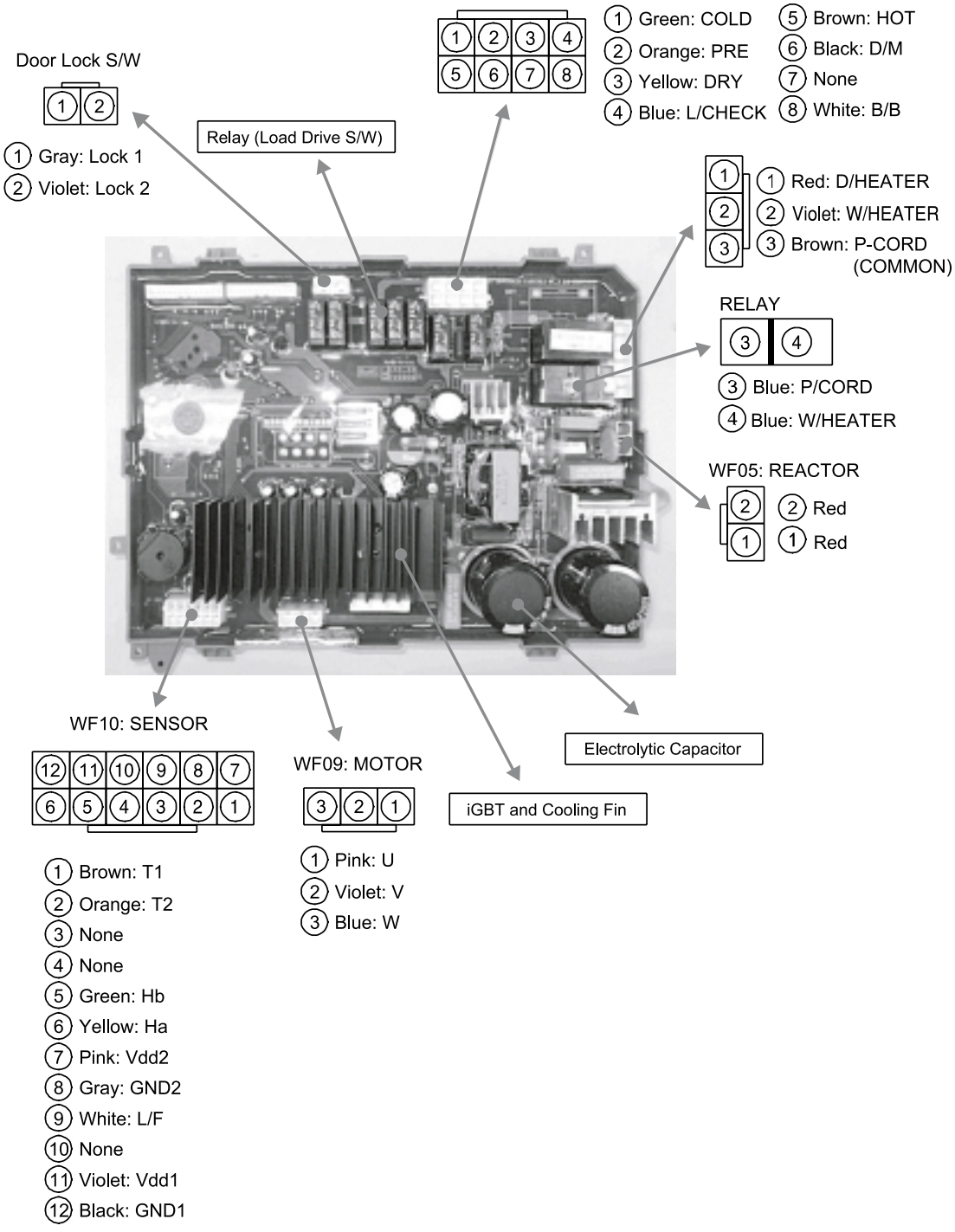
① Cycle is skipped to the next when the current r.p.m. is different from the target r.p.m by 70 during the middle spin cycle.

② Cycle is skipped to balance spin when the current r.p.m is different from the target r.p.m by 70 during main spin cycle.

③ 'PFE' error is caused if main spin cycle current r.p.m differs from the target r.p.m by by 70 occurs 10 times.

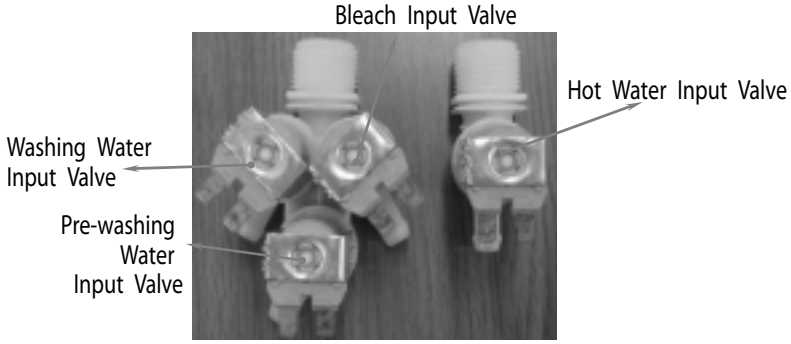
④The error display is cleared when turning off/ on power.

▣ PCB PIN ARRANGEMENT

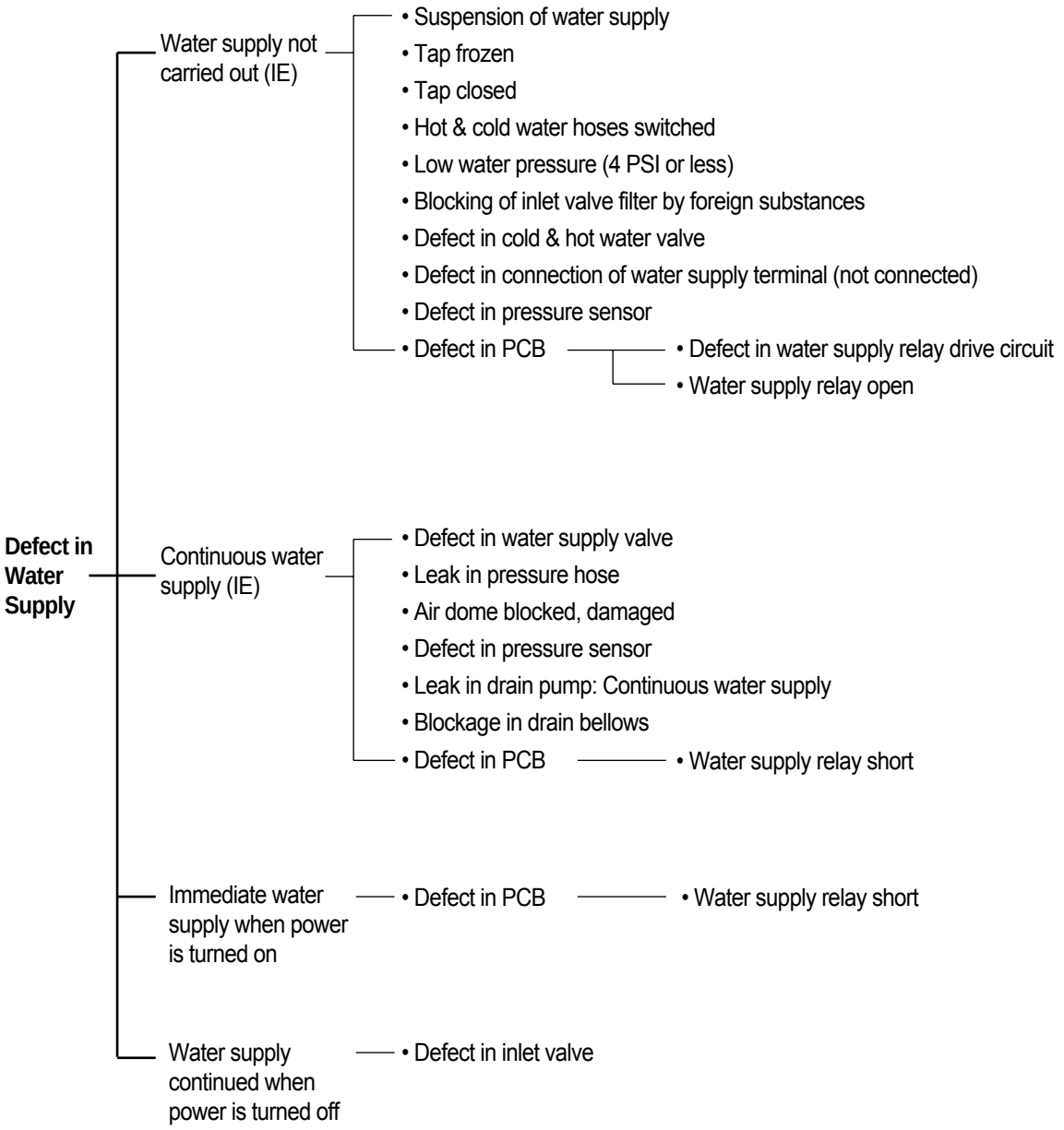


▣ Detailed Spec, Principles and Breakdown Diagnosis/ Servicing Electronic parts

1. INLET VALVES

Classification	3 way inlet valve and hot water valve
Code	3-valve: 3615416940, Hot Water: 3615416700
Color	Gray
Coil Resistance	.9 K~1.2k Ω
Use	Supplying water for washing/ pre-washing and bleach
Appearance Structure	

Symptoms of Breakdown	Detailed Symptoms	Cause	Diagnosis of Defect	Solution	PCB Error Mode
Water not supplied	Water supply not carried, only noise is heard	Water tap not opened	Check for tap opening.	Open water tap.	"IE"
		Coil short	Check if resistance between water supply valve terminals is within .9k~1.2K Ω.		"IE"
		Excessive foreign substances in SUS filter	Remove water supply hose and check for foreign substances in filter.	Clean out foreign substances from inside the filter.	"IE"
		Foreign substances in valve	-	Replace inlet valve	"IE"
	Water supply not carried out without noise	Connector loosened	Visually check connector connection status.	Tighten connector	"IE"
		Coil is shorted	Check if resistance between water supply valve terminals is within .9k~1.2K Ω.	Replace inlet valve	"IE"
		Wiring short	Wiring short -> Conduction test		"IE"
Water is continuously supplied (inside tub)	Continuous water supply in power 'on' state	Defect in water level sensor	Refer to water level sensor defect check method.	Replace water level sensor.	"E2"
		Defect in pressure hose	Check for blockage in pressure hose.	Replace defect parts.	"E2"
	Continuous water supply in power 'off' state	Defect in water supply valve	-	Replace inlet valve	-
Others	Water leakage through valve body	Defect in water supply valve assembly, etc.	Visually inspect the valve housing while filling to pinpoint leak.	Replace inlet valve	-


Defect in Water Supply
Water supply not carried out (IE)
• Suspension of water supply
• Tap frozen
• Tap closed
• Hot & cold water hoses switched
• Low water pressure (4 PSI or less)
• Blocking of inlet valve filter by foreign substances
• Defect in cold & hot water valve
• Defect in connection of water supply terminal (not connected)
• Defect in pressure sensor
• Defect in PCB
• Defect in water supply relay drive circuit
• Water supply relay open
Continuous water supply (IE)
• Defect in water supply valve
• Leak in pressure hose
• Air dome blocked, damaged
• Defect in pressure sensor
• Leak in drain pump: Continuous water supply
• Blockage in drain bellows
• Defect in PCB
• Water supply relay short
Immediate water supply when power is turned on
• Defect in PCB
• Water supply relay short
Water supply continued when power is turned off
• Defect in inlet valve

Symptoms of Breakdown	Inspection Spot	Inspection Method	Inspection Result	Problem Identified	Repair Method
Unit won't fill		1) Suspension of water supply 2) Water tap closed 3) Cold-hot water hose incorrectly connected 4) If no defect is found, dismantle water supply hose and check water supply valve filter.	- Cold/ hot water hose switched -Large amount of debris in in inlet valve filter.	-Defect in cold/ hot water hose assembly -Defect in cleaning of water supply filter (blocked)	-Assemble cold/ hot water hose correctly. -Clean water supply filter.
	Water supply valve	1) Measure coil resistance in water supply valve. 2) Remove top cover and visually check for separation of inlet valve terminal connector and wiring short/ connection status. 3) In case inlet valve operation sound is heard, but water supply is not carried out, check for blockage of the inlet valve, fill hoses, hoses to detergent compartment, and hoses from detergent compartment to the drum.	.9 K~1.2k Ω -Connector loosened/ not inserted -Electric wire short -Sound and defect in water supply due to foreign substances in bellows	-Short in solenoid -Connection defect -Electric wire short -Structural defect in water inlet valve	-Replace inlet valve -Try reconnection, repairing, or replacing connection defect. -Try reconnection, repairing, or replacing connection defect. -Replace water inlet valve.
	Pressure Sensor	1) Check for 'E9 ' in display window.	-E9	-Loose wire on pressure sensor terminal or electric wire short -Defect in pressure sensor	-Connect terminal of pressure sensor -Connect terminal of PCB. -Replace pressure sensor
Unit won't fill	PCB	1. Check PCB pin connector is inserted properly. 2. Power is supplied to inlet valve terminal, but unit won't fill.	Electric wire loose on connector PCB water supply circuit open, damaged (water supply relay operation not carried out)	Pin connector housing not inserted enough Defect in water supply circuit	Completely insert connector housing. Replace PCB.
Unit fills continuously	PCB	1. Immediate fill when power is turned on	PCB water supply circuit or relay short (continuous power supply to valve)	Water supply relay short	Replace PCB.
	Water inlet valve	1. Check if unit is continuously filling even if power is not on.	Water supply bellows blocked/ deformed	Defect in water supply valve	Replace water supply valve.
	Drain pump (valve housing)	1. Check for normal operation of water supply valve/ water supply status. 2. Check if water is drained through drain hose. 3. Check for foreign substances inside drain pump housing. 4. Check for foreign substances in drain pump impeller. 5. Forcefully restore SUS wire.	-Not closed due to foreign substances inside drain pump housing -Impeller caught by foreign substances inside drain pump -Forced restoration not possible	-Foreign substances in drain pump housing -Foreign substances -Defect in drain pump	-Remove foreign substances. -Remove foreign substance. -Replace drain pump.

2. Water Level Sensor

1) Spec. of Water Level Sensor

Overflow: Forced draining is necessary as water level is high. When this level is reached, the inlet valve will be stopped and drain pump will run to remove the excess water.

RESET :

1. The spin cycle begins 30sec after drain level reset is reached.
2. Heater operation level

Low: Small load of laundry, therefore considered to be water level of 'low'

Medium: Large load of laundry

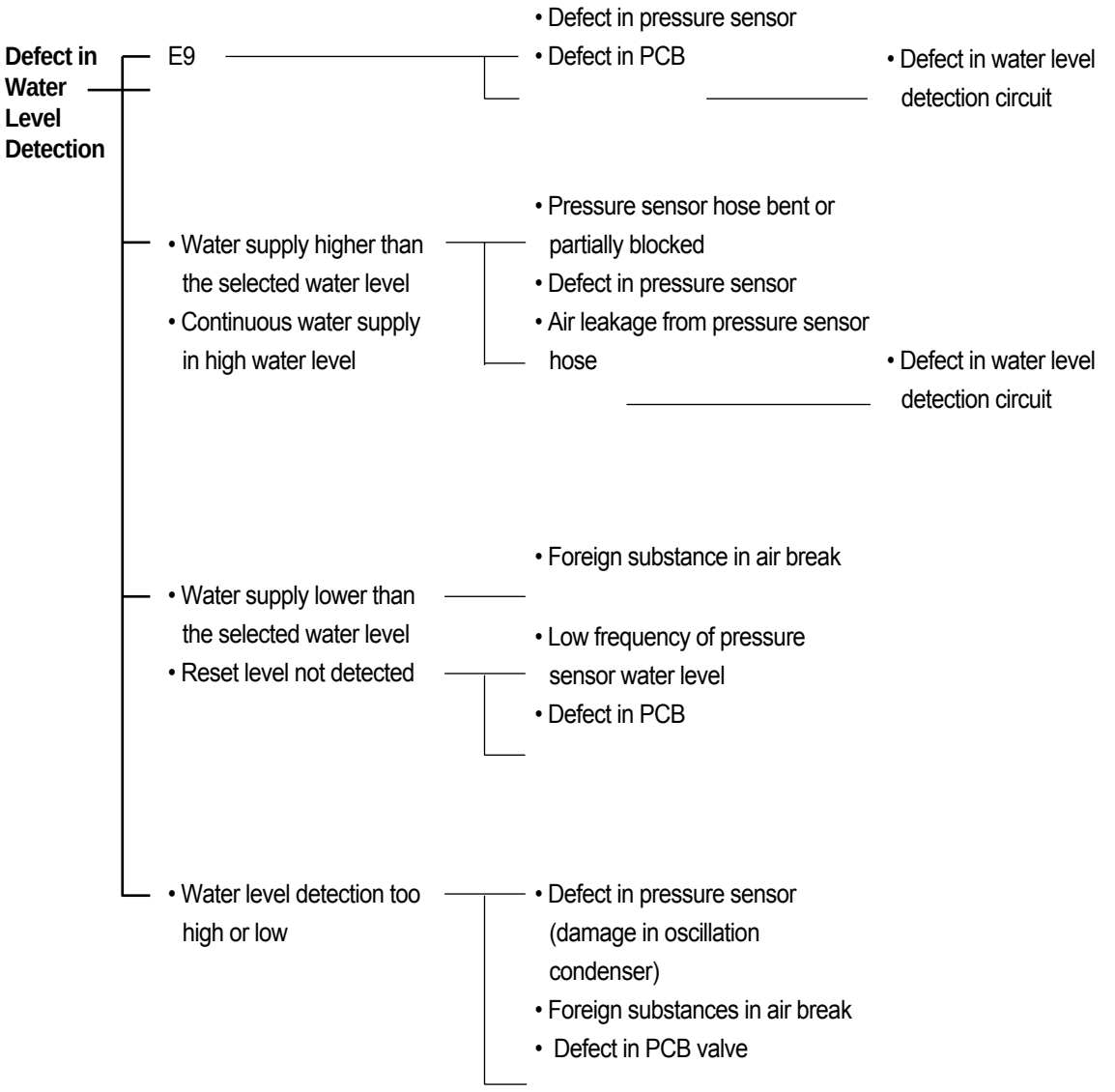
Medium High: Water level for rinsing

Safety: Door open possible
Door opened only when water level is below safety level

Model	Code	Classification	O/F	Medium High	Medium	Low	Safety	Reset	Initial(Defect)	Inlet Angle
13K	3614825220 DN-DD03, DL-DW03	Frequency	22.60㎑	23.10㎑	23.20㎑	24.00㎑	24.40㎑	24.70㎑	25.80㎑	90°
		Water level (mm)	260± 15	225± 15	220± 7	170± 15	140± 15	120± 20	0	

2) Breakdown Analysis

Symptoms	Detailed Symptoms	Cause	Diagnosis	Solution	PCB Error Mode
Continuous water fill	Water valve normal	Defect in pressure sensor hose	Check for holes.	Replace hose.	"E2"
		Blockage in pressure sensor hose	Visual checking	Remove foreign substances.	"E2"
"E9"	Occurrence in water level sensor 30kHz or higher	Connector loosened	Visually check connector connection status.	Make sure connector is plugged in firmly.	"E9"
		Wiring short	Wiring short ->	Repair short	"E9"


Defect in Water Level Detection
E9
• Defect in pressure sensor
• Defect in PCB
• Defect in water level detection circuit
• Water supply higher than the selected water level
• Continuous water supply in high water level
• Pressure sensor hose bent or partially blocked
• Defect in pressure sensor
• Air leakage from pressure sensor hose
• Defect in water level detection circuit
• Water supply lower than the selected water level
• Reset level not detected
• Foreign substance in air break
• Low frequency of pressure sensor water level
• Defect in PCB
• Water level detection too high or low
• Defect in pressure sensor (damage in oscillation condenser)
• Foreign substances in air break
• Defect in PCB valve

3. POWER CORD

Classification	Rated	Cord Thickness	Color	Code	Type	Length	Remarks
DEC	250V/15A	1.5sq	Gray	3611340430	LP-31 SJT	2.3m	-

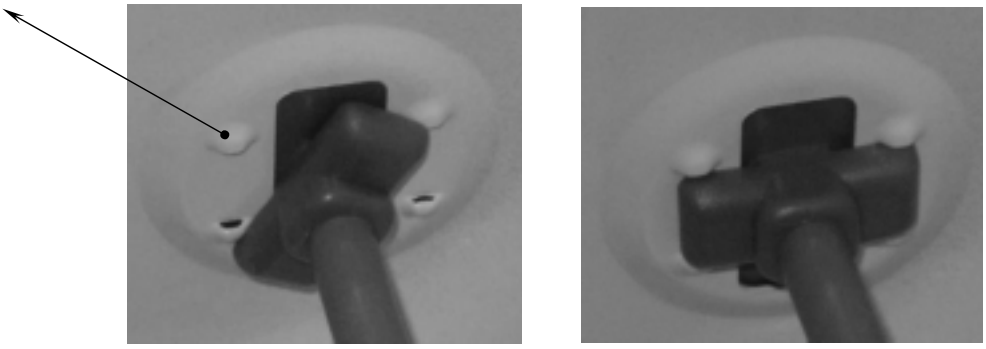
1) Assembly

4 embossed parts in cabinet

-> To prevent loosening after assembly

-> SS: 2 special screws

-> LG: Forced indentation



[Before] **[After]**

. CONNECTOR

-> #1806 Housing 3P Used: Using both ends only and not the hole in the middle (materials highly resistant to flame)

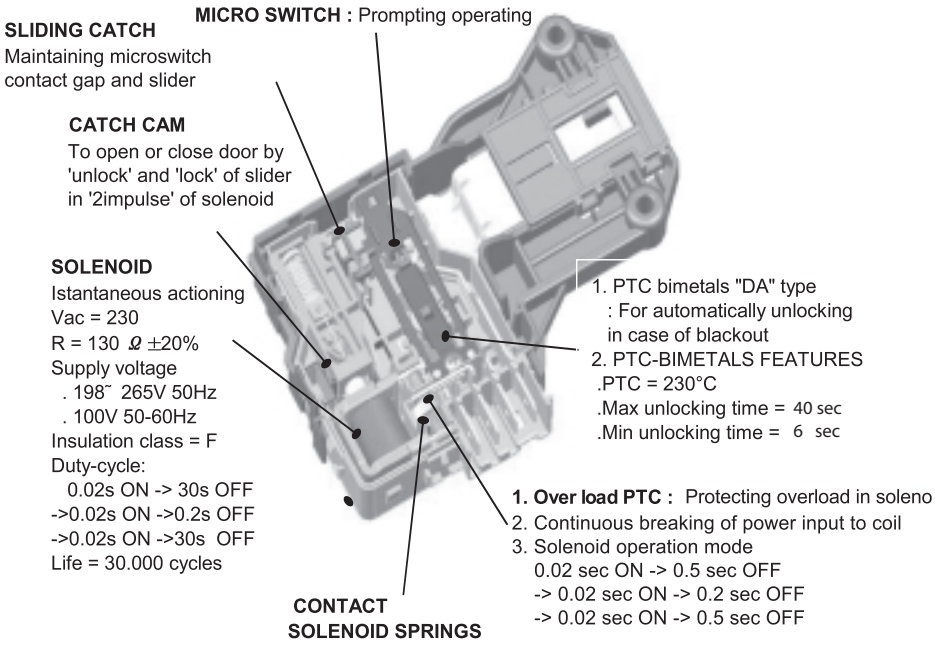
-> To prevent fire caused by high current

4. DOOR DCK S/W

1) Comparison of Door Lock S/W Spec.

TYPE	CODE	MODEL	RATED	LOCK ON PRINCIPLE	LOCK 'ON'/'OFF' TIME	LOCK OFF TYPE	EXTERNAL APPEARANCE
DF F01 007	3619046410	13K	125V 16A	Bimetal operation by PTC heating	-ON : Min. of 6sec -OFF after Cooling in Air: 40sec ~ 5min -Forced OFF: Immediate OFF (door opening) bimetal	1. Forced OFF by solenoid 2. Natural OFF by cool down of	

2) Structure and Spec. of Door Lock S/W: DF SERIES

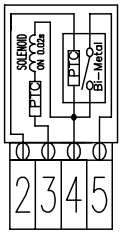


*** How to Replace Door Lock Switch**

1) Open door and dismantle clamp spring for gasket.
2) Dismantle gasket.
3) Loosen 2 screws for door lock S/W.
4) Remove door lock S/W.
5) Administer assembly in reverse order.

*** Checking Solenoid Wiring of Door Lock Switch**

PIN Arrangement



2 3 4 5
(1 does not exist.)

Terminal 3 and 4:
94 Ω

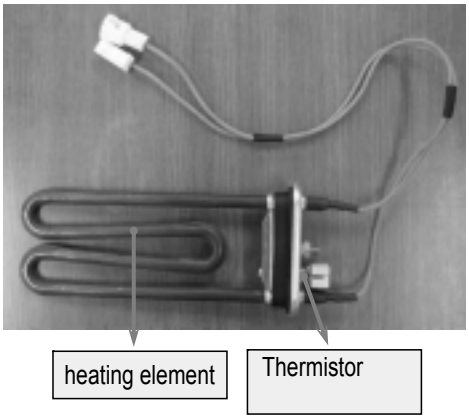
4) Diagnosis of Defect

Symptoms	Detailed Symptoms	Cause	Diagnosis of Defect	Solution	Error Mode
Clicking noise	Click' during initial operation and 'click, click' when the unit is pauused 'DF' type only	Normal noise	Normal sound generated during solenoid operation when the door lock mechanism locks/ unlocks to close or open door.		–
LE fault code in the display	The door lock won't stop making clicking noice. LE or DF fault code in the display	Connector loose	Visually check harness connection	Insert connector.	"LE"
		Terminal loosened from connector	Referring to door lock switch dismantling and checking methods below	Insert connector. switch 4 or 5 terminal	"LE"
		Door not completed closed	-	Completely close door.	"LE"
		Abnormality in lock hook on door	-	Replace door hook assembly.	"LE"
		Defect in door lock mechanism	Occurrence of continuous clicking noise unlike normal sound	Replace door lock mechanism.	"LE"
	LE fault code without clicking noise in 'DF' type	Connector loosened	Visually checking harness connection	Insert connector.	"LE"
		Terminal loosened from connector	Refer to wire location on previous page.	Insert terminal switch 2 or 3 terminal	"LE"
		Breaking of solenoid coil	Referring to picture on previous page.	Replace door switch.	"LE"
Door does not open.	Power failure, turning power off during operation	PCB MICOM' cannot open door in case of power failure or turning power off during operation. Door will be unlcked during the maximum time of 5 minutes.			
	No power failure and power on	Water in drum	Checking if water level is higher than safety level	Door opens after draining.	–
		Inside the drum is hot	The door will remain locked until the load cools to prevent burns.		
	Others	Door does not open normally in case of loosening of connector/ terminal and breaking of solenoid coil during operation. Administer measures after test according to the following method.			

5. HEATING ELEMENT

1) Spec of Washing Machine heating element

Classification	Wahing
Maker	IRCA
Rated	120V
Consumption Power	1000W± 5%
Resistance	11.8Ω
Current Density	8.9
Temp. Fuse	363°F (184°C)
Thermister	Heater built-in
MaterialSUS430	
Max. Temp.	Limited by control
Part Code	3612801740



Temp. Fuse of Washing Heater 363°F (184° C CUTOFF TYPE)
: Located inside heater to prevent fire, etc. caused by heating without water due to breakdown of water level sensor, etc.

: Washing heater must be used under water.

2) Breakdown Diagnosis

Breakdown Symptoms	Cause	Diagnosis	Solution	PCB Error Mode
Unit not heating	Wiring short	Check for short	Replace shorted harness.	"H6"
	Heating element or temp. fuse short	Check for short: ohm between both terminals on the heating element 10.5 ~ 12Ω	Replace heating element.	"H6"
	Connector/ terminal loosening	Check for loose connections	Insert terminal.	"H6"
	Defect in thermistor	Measuring resistance between both terminals of sensor 14 ~ 15.5Ω	Replace thermistor	"H2"
Unit is overheating	Defect in thermistor	Measuring resistance between both terminals of sensor 14 ~ 15.5Ω	Replace thermistor	"H2" or "H4"

Heater Replacement

*** How to Replace Washing Heater and Temp. Sensor**

1. Unplug Connector

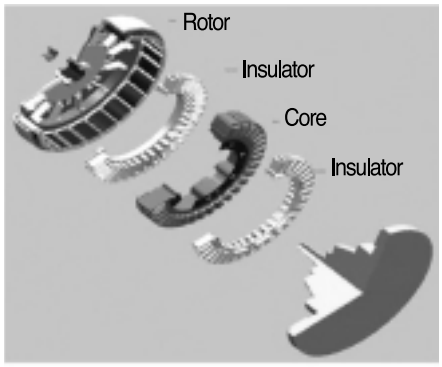
2. Remove the nut for the ground and heating element

3. Replacing Heater and Thermistor

4. Assemble in reverse order and make sure to fasten heater nut first before the grround nut.

6. BLDC Motor

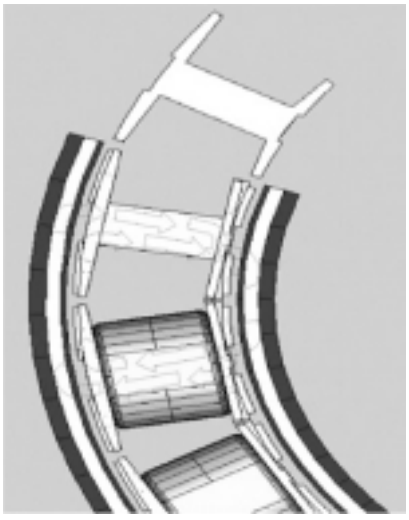
6-1. Structure of BLDC Motor



BLDC MOTOR

6-2. Power Transmission System of BLDC Motor

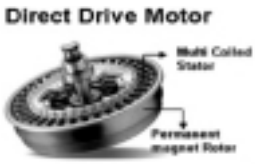
Magnetic density flow of BLDC Motor

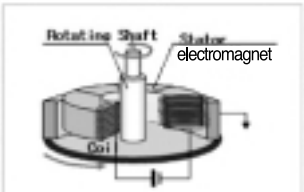


Sequence diagram of BLDC MOTOR

Drum

Motor



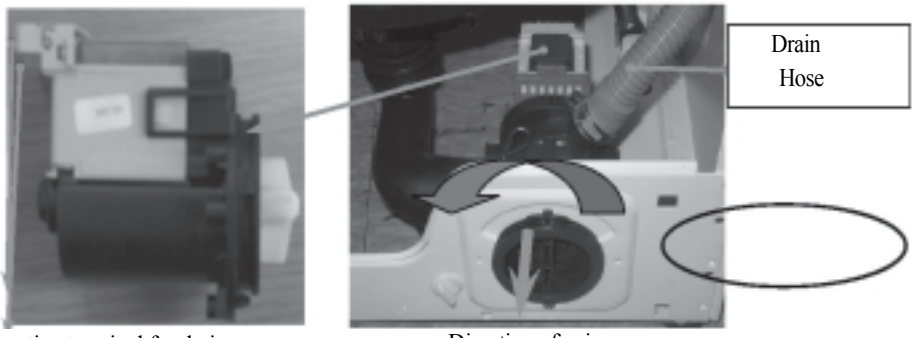


generating high power by rotator
(a permanent magnet) and stator
(multiple coils)

6-3. Specification

Classification	Item	BLDC : Direct Drive Motor
1. General	Rated Voltage	Vm = 310 [Vdc], Hall IC Voltage 5 [Vdc]
	Insulating Structure	Type B, insulator method
	External Appearance	Shaft connection and stator connection structure, Air-gap : 1mm
	No. of Poles	24 poles, Core: 36 slots, Layer: [30mm]
2. Performance	Consumption Power	390[W]±10[%], during washing (picked value)
	RPM	During Washing: 45RPM, During Spin-drying:1300RPM
	Output Characteristics	Torque: 300Kgf.cm (washing: 45rpm) Current: 1.5A (washing: 45rpm), 2.5A (spin-drying: 800rpm) AC Input Terminal - Washing: 250Wo, Spin-drying: 380Wo
3. Structure	Stator Resistance	ø265x30H
		Motor resistance at ambient temperature of 32 ~ 95°F (0 ~ 35°C) 7.04 ~ 8.1 Ω
	Rotor	Magnet : 24 segments, bracket, serration
	Hall IC	2-sensor Control Type, Top Central Angle: 7.5 degrees Signal Error Angle (phase difference): 90±5 degrees (based on electric angle)

7. Drain pump system

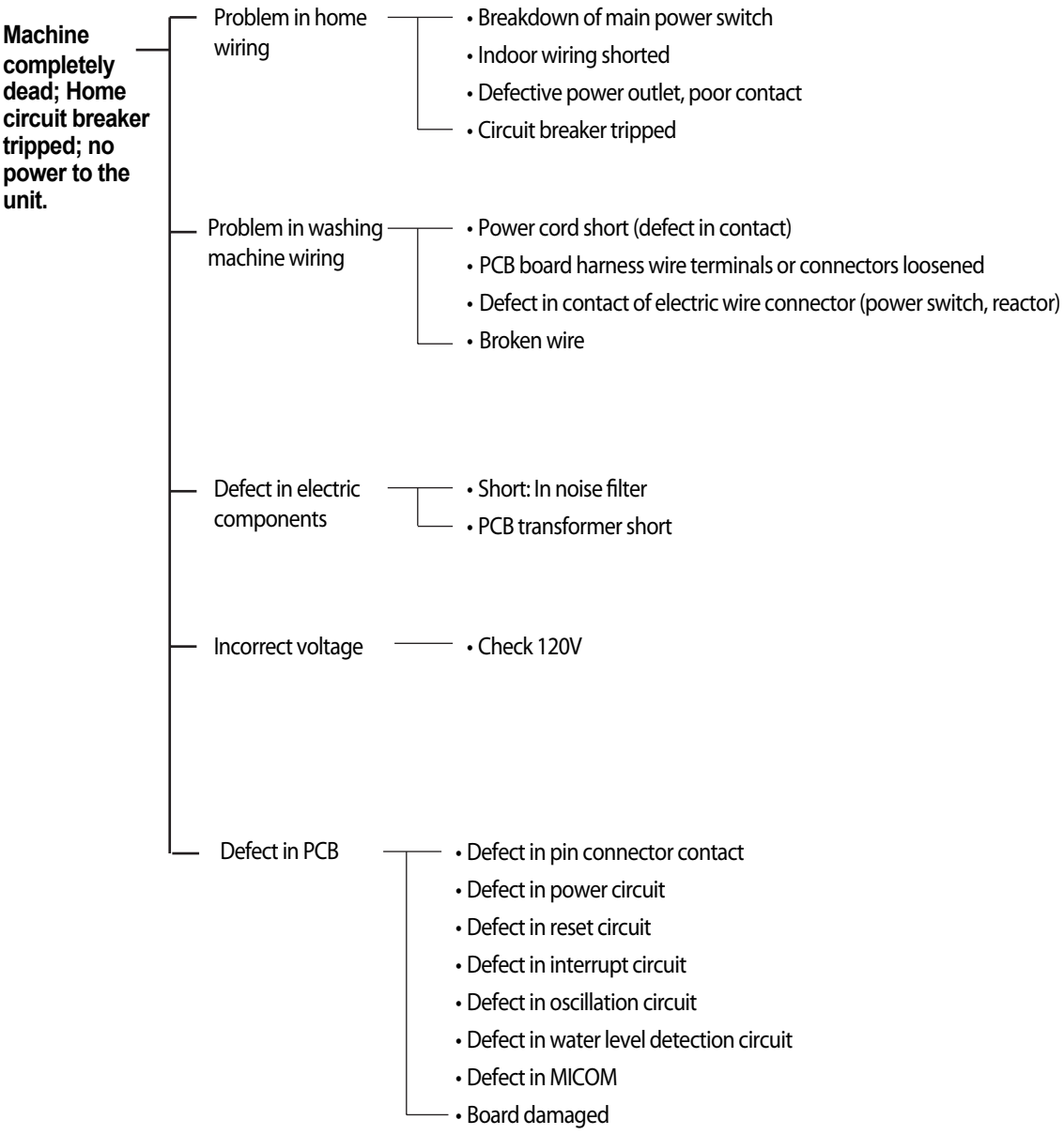


Wire connection terminal for drain pump

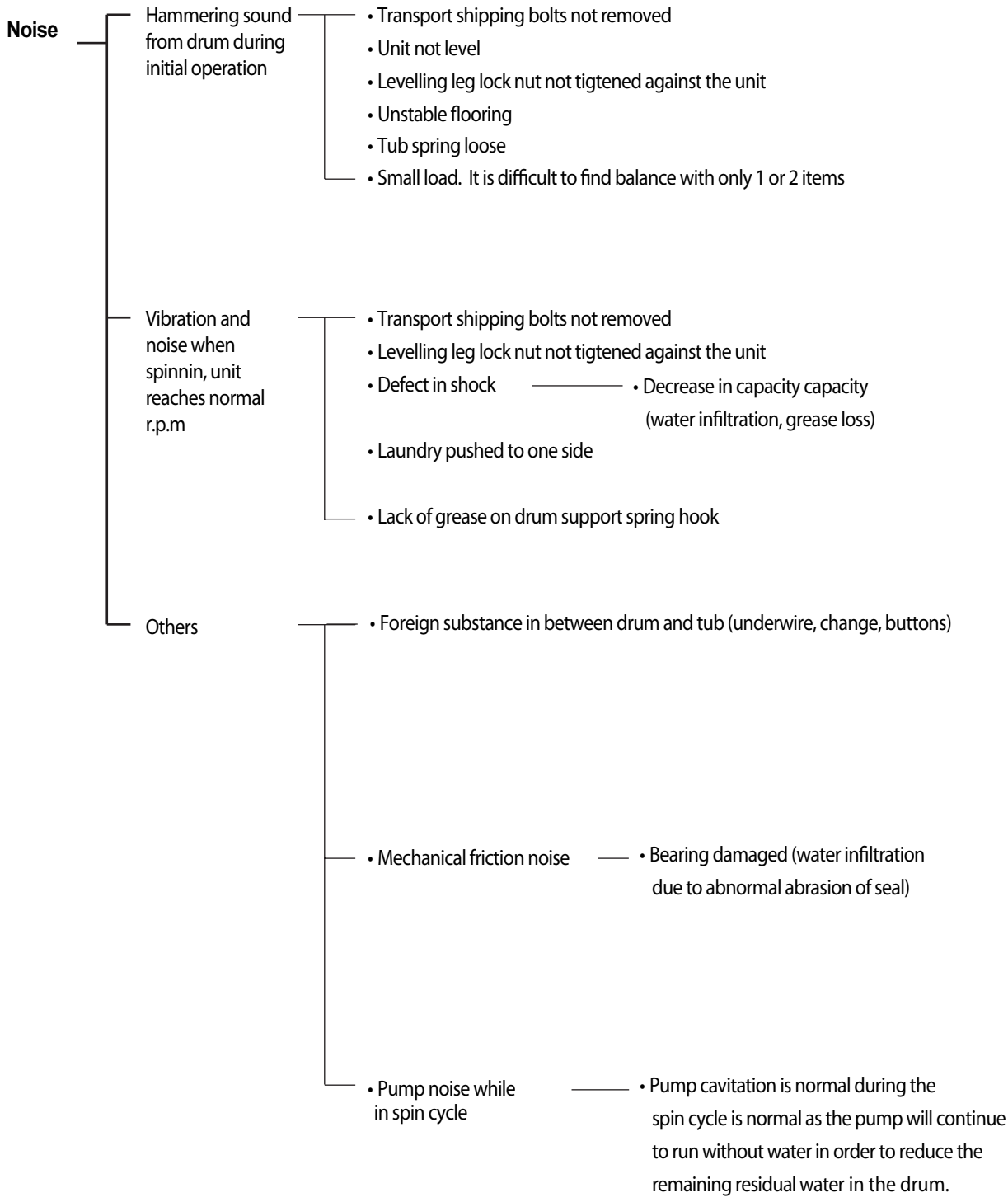
Direction of coin trap opening

Machine won't drain

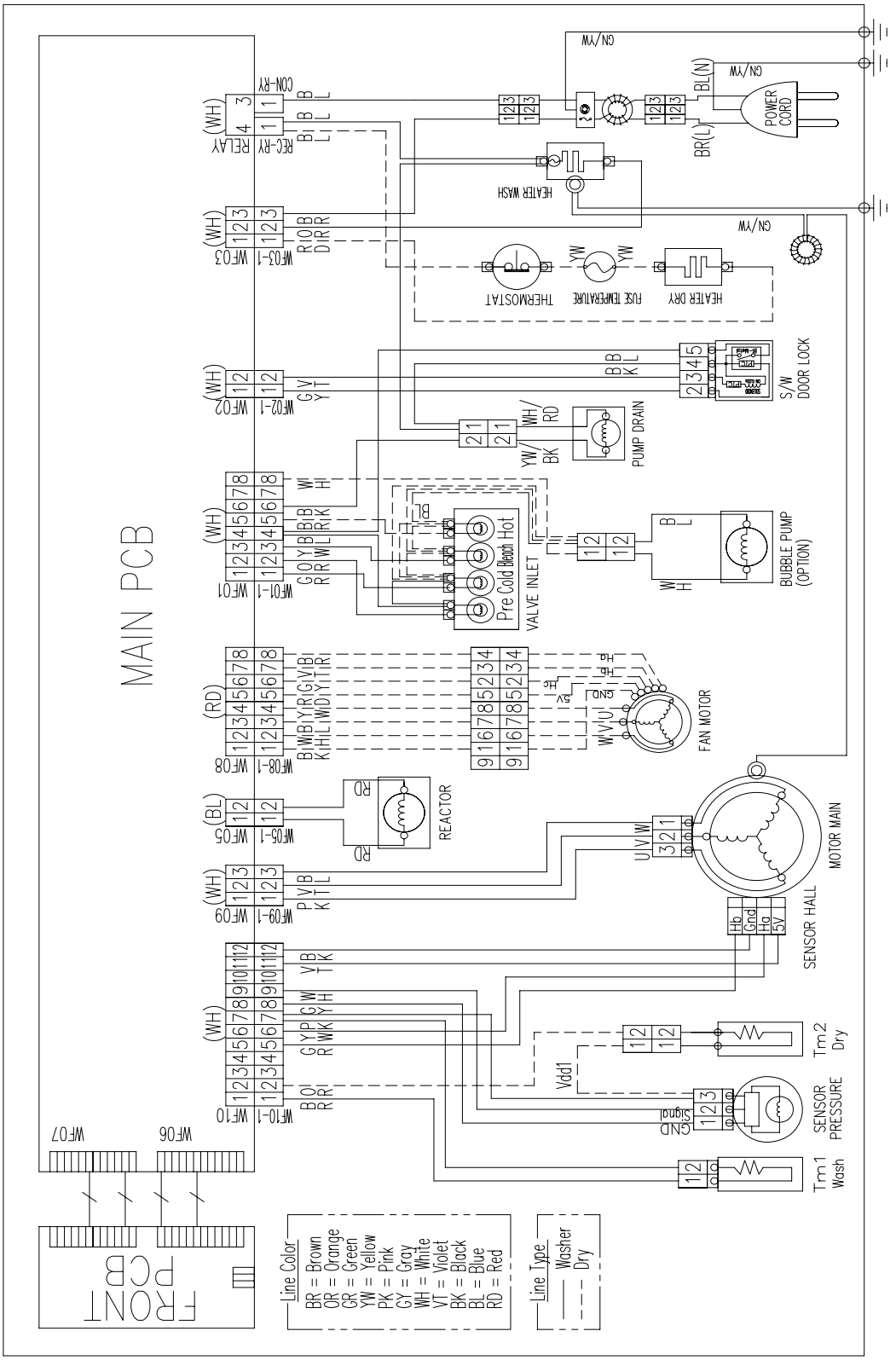
- Machine did not drain OE error in the display
  - Pump case blocked (coin, button, pins)
  - Pump case frozen
  - Defect in pump motor
  - Drainage hose kinked or installed too high
  - Ends of drainage hose blocked
  - Drain wires disconnected, poor connection
  - Defect in PCB
    - Defect in drain relay drive circuit
    - Drain relay short
- Machine did drain, but OE error in the display
  - Defect in pressure sensor (oscillation frequency low)
  - Defect in controller
    - Defect in oscillation circuit (high oscillation frequency)


Machine completely dead; Home circuit breaker tripped; no power to the unit.
Problem in home wiring
• Breakdown of main power switch
• Indoor wiring shorted
• Defective power outlet, poor contact
• Circuit breaker tripped
Problem in washing machine wiring
• Power cord short (defect in contact)
• PCB board harness wire terminals or connectors loosened
• Defect in contact of electric wire connector (power switch, reactor)
• Broken wire
Defect in electric components
• Short: In noise filter
• PCB transformer short
Incorrect voltage
• Check 120V
Defect in PCB
• Defect in pin connector contact
• Defect in power circuit
• Defect in reset circuit
• Defect in interrupt circuit
• Defect in oscillation circuit
• Defect in water level detection circuit
• Defect in MICOM
• Board damaged

8. Noise Defect

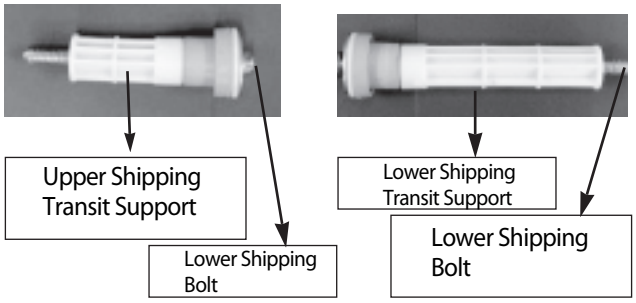
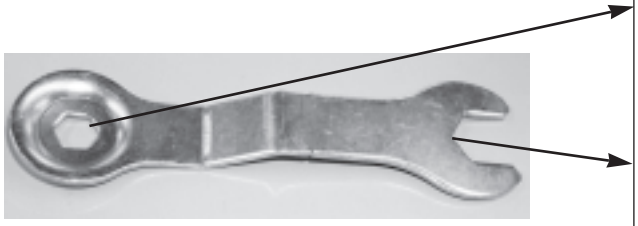
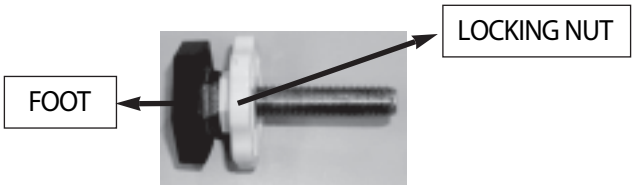


▣ Wiring Diagram



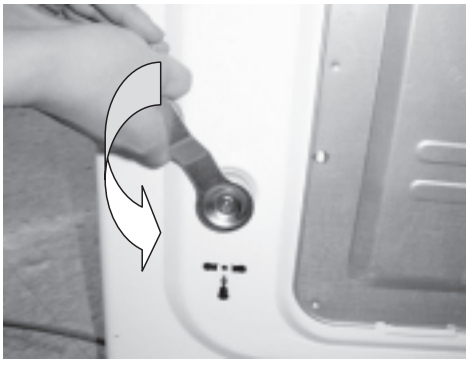
▣ Installation

1) Related Parts and Configuration

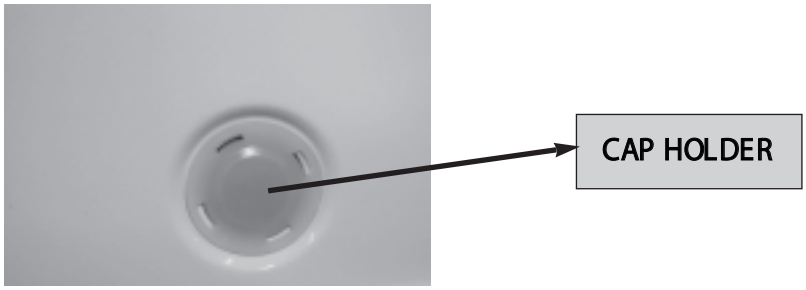
Item	Configuration	Remarks
Shipping transit bolts, upper and lower		Shipping bolt upper : L= 109mm Shipping bolt lower :L=160mm
UNIT SERVICE WRENCH		① Shipping Bolt Removal tool ② Leg Adjuster
LEVELLING LEG ASSEMBLY		

2) Installation Procedures

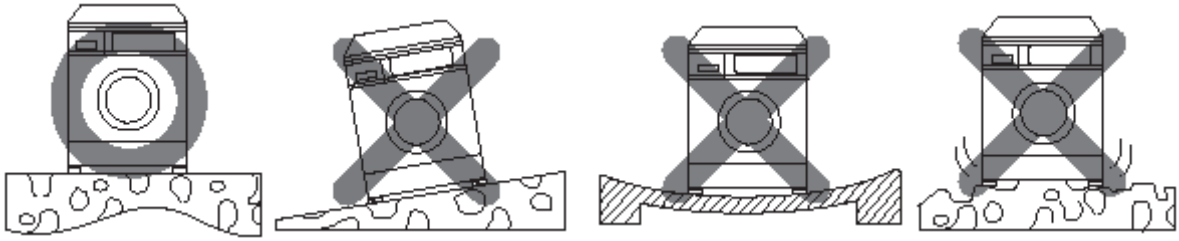
① Remove shipping bolts.

Removal	Remarks
	☞ Unscrew shipping bolt by turning it counterclockwise. ☞ Store shipping bolts for use later on. ☞ To install shipping bolts, screw them in by turning them clockwise.

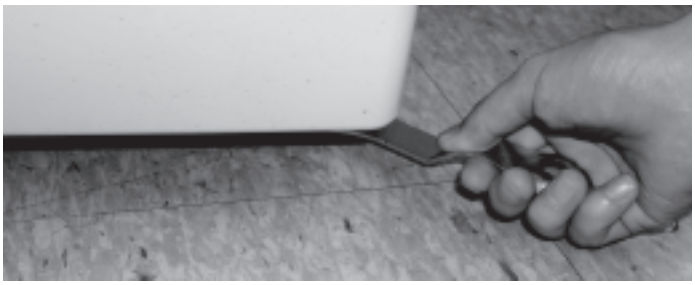
② Insert cap holder (4) into holes created after removing the shipping bolts as shown in the picture.



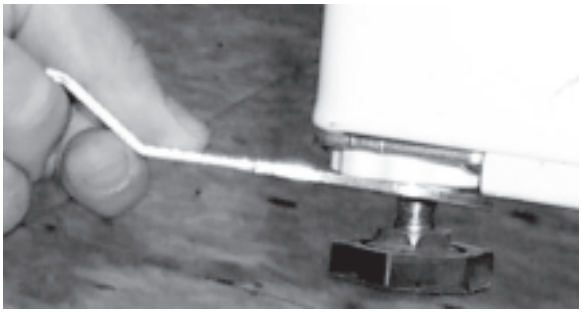
③ The washing machine must be installed on flat and solid ground.



④ Adjust leveling with the leveling legs.

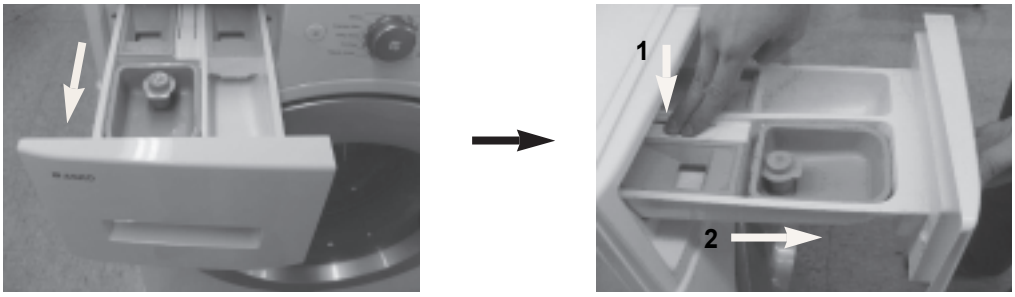
Adjustment	Remarks
	☞ The washing machine is raised by rotating the leveling leg clockwise. ☞ The washing machine is lowered by rotating the leveling leg counter clockwise.

⑤ Once the unit is level, thighten the locking nut firmly against the bottom of the washing machine.

Adjustment	Remarks
	☞ Washing machine vibration can be minimized by tightening the locking nut to lock the leveling leg in place.

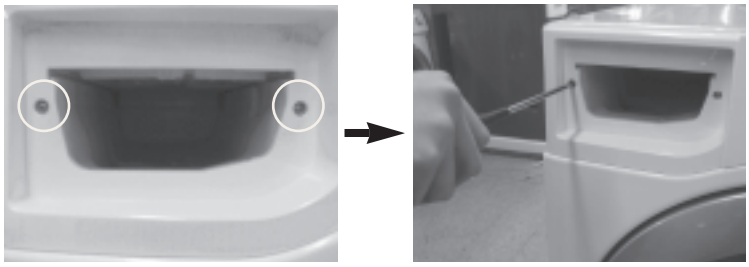
▣DISMANTLING METHOD FOR WASHING MACHIEN

DETERGENT COMPARTMENT ASSEMBLY



FRONT PANEL ASSEMBLY

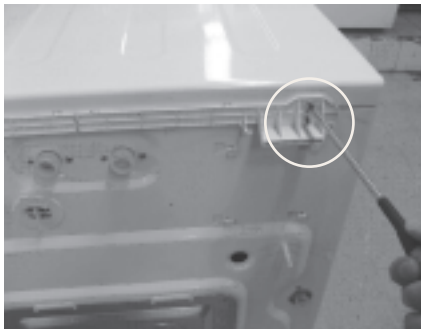
1. Remove 2 screws.
2. Remove control panel by lifting the panel straight up.
3. Unplug both wiring harnesses.
4. Be careful not to damage control panel tabs.



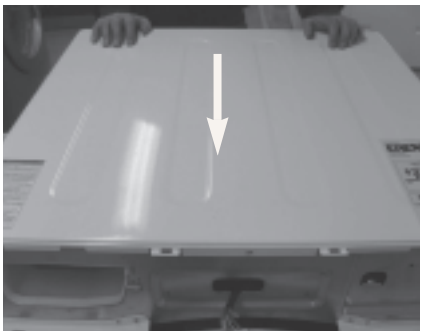
TOP PLATE ASSEMBLY

1. Remove 3 screws.

2. Remove 4 screws.

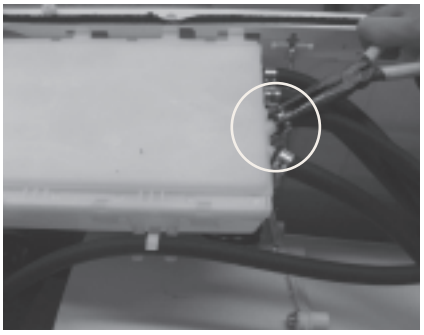


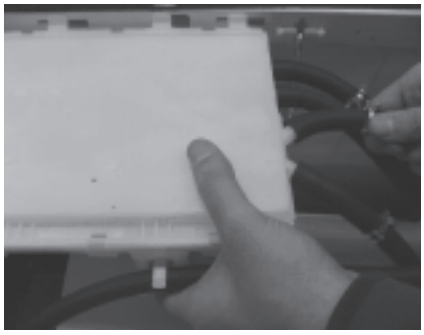
3. Slide the top towards the front of the machine.



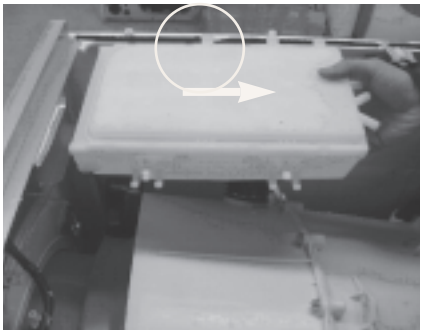
WATER INLET BOX ASSEMBLY

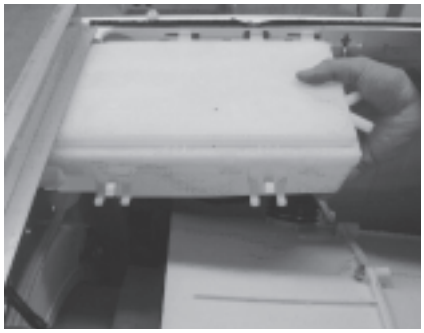
1. Remove 4 hose clamps.



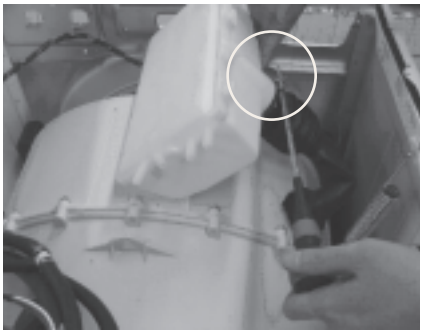


2. Remove 1 screw.



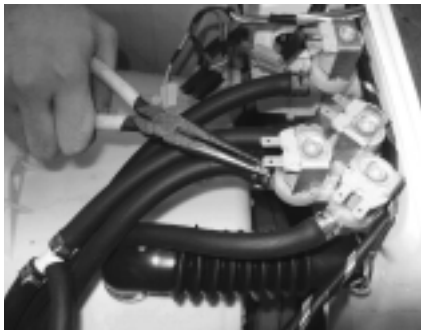


3. Remove and separate inlet bellows hose.

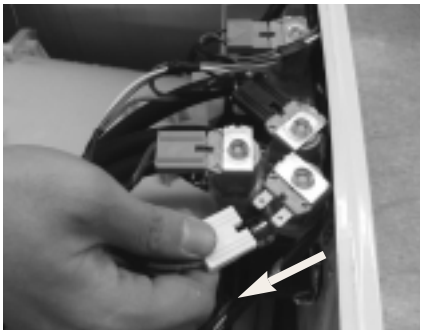


COLD 3 WAY VALVE-HOT VALVE

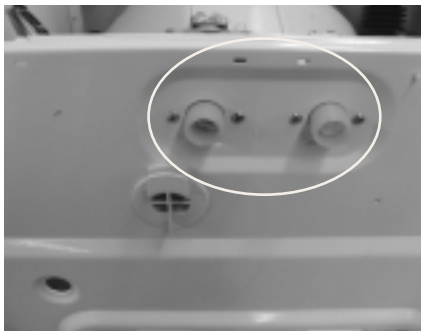
1. Separate 4 hose clamps.

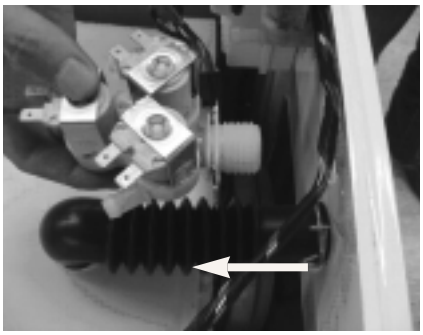


2. Separate 4 connectors.



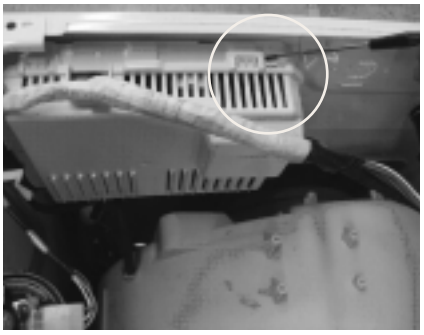
3. Remove 4 screws.





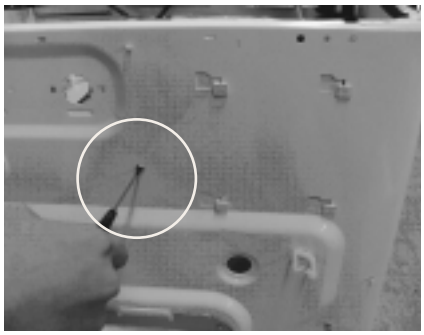
MAIN PCB ASSEMBLY

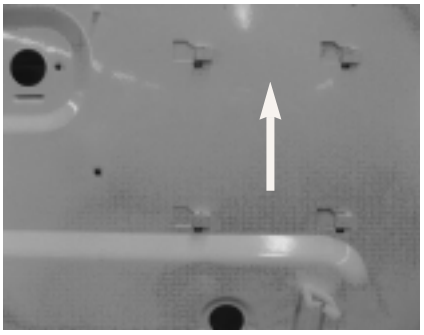
1. Separate harness and separate PCB cover.

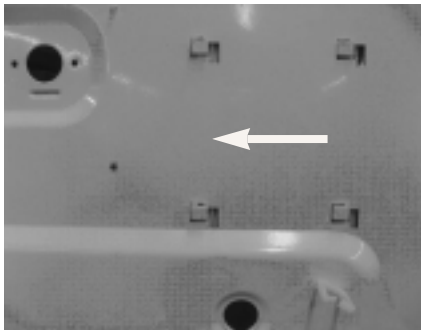


2. Separate connectors.

3. Remove 1 screw.





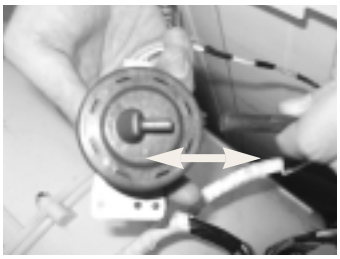


WATER LEVEL SENSOR

1. Remove 1 screw.

2. Separate connector.

3. Separate pressure sensor hose.



BACK COVER

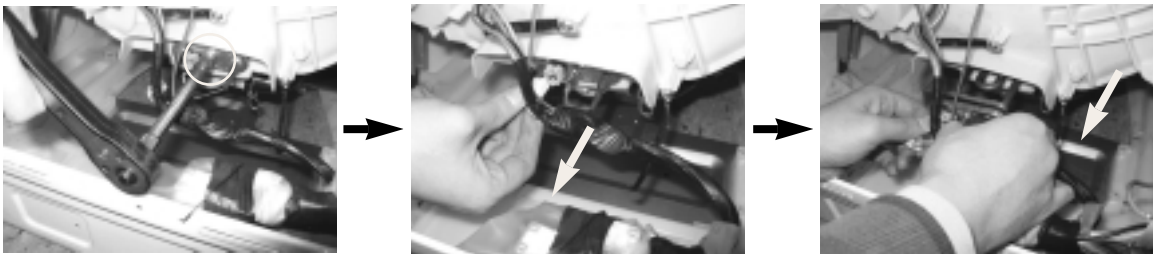
1. Remove 4 screws.

HEATING ELEMENT

1. Remove nut.

2. Remove connector.

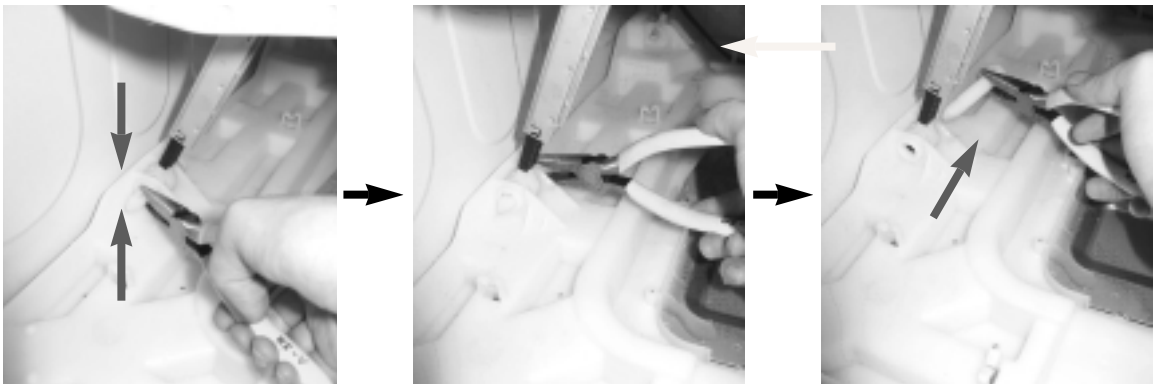
3. Remove element in the direction of arrow.



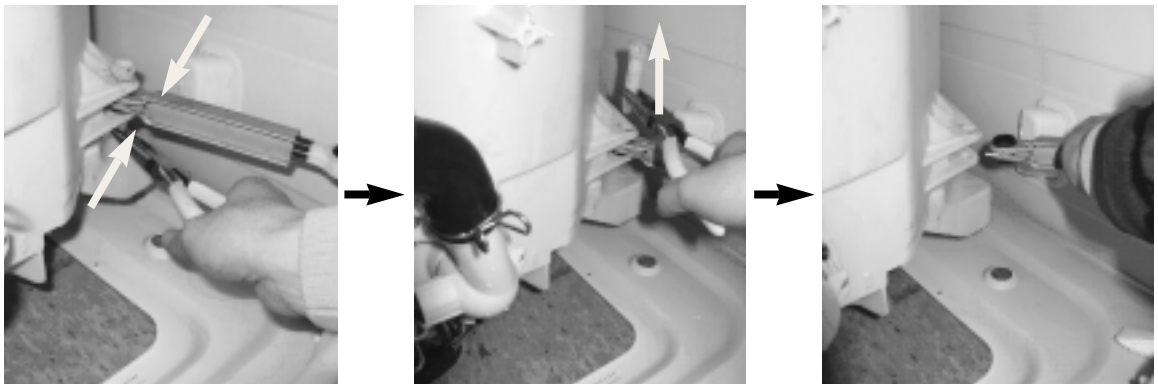
SHOCK ASSEMBLY

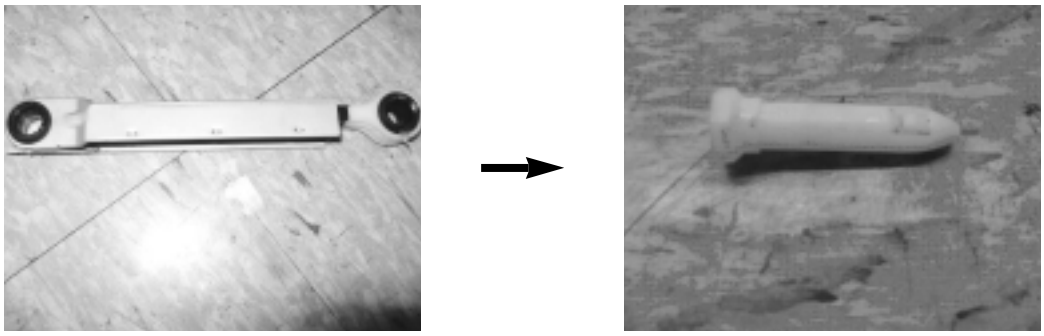
1. Press in the tab on the pin.

2. Remove shock pin.



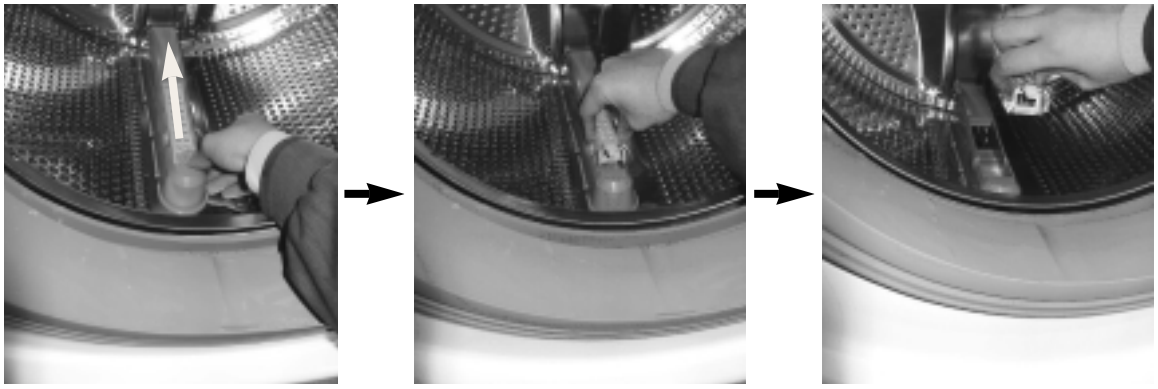
3. Remove shock pin on tub side in the same way and remove the shock.





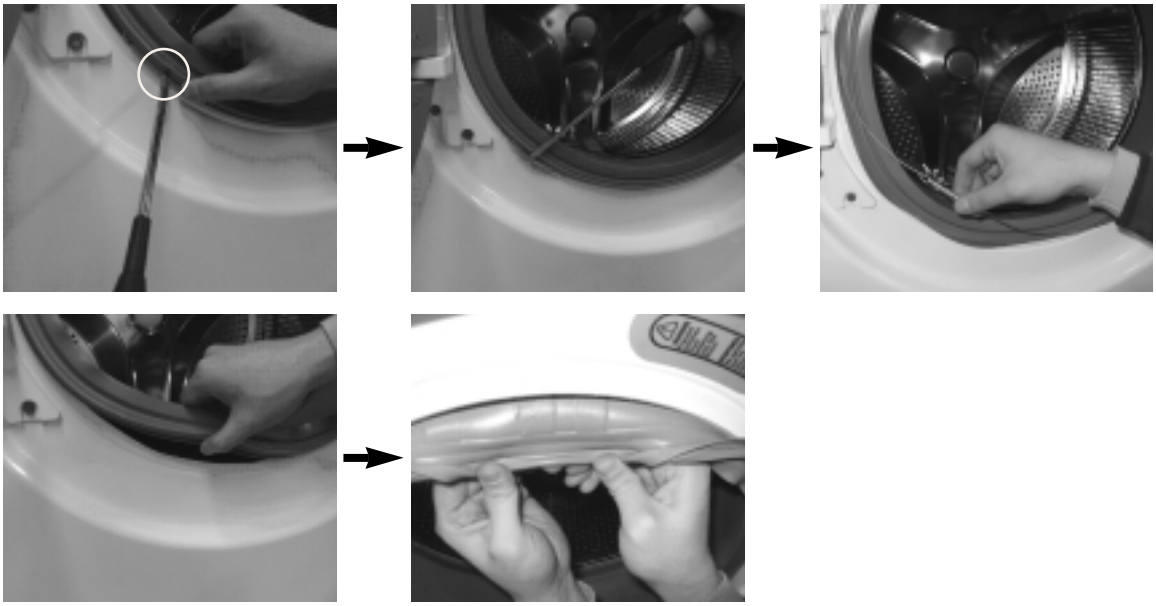
REMOVING THE PADDLE FILTER

1. Push filter in the direction of arrow and pull it out by lifting it in upward direction.



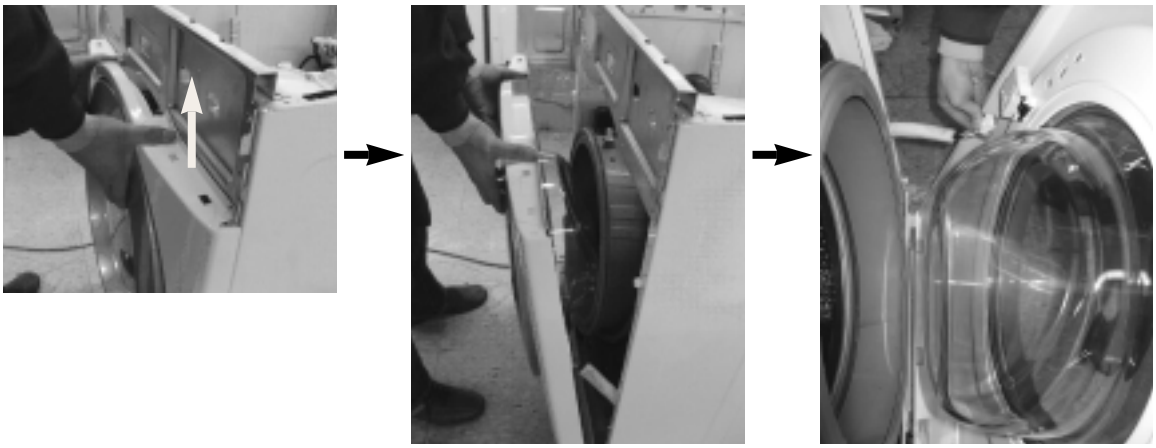
FRONT CABIET ASSEMBLY

1. Remove door seal spring clamp.



2. Remove 4 screws.

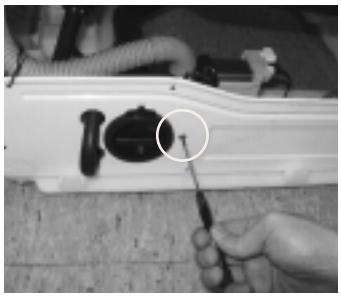
3. Lift front in the direction of arrow to open it in forward direction.
4. Separate door switch harness.



DRAIN PUMP ASSEMBLY

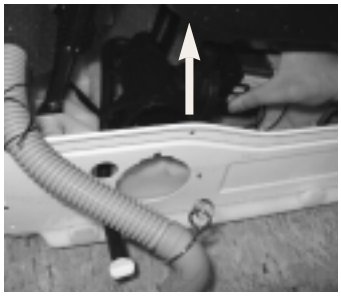
1. Remove drain hose clamp.

2. Remove 2 screws.



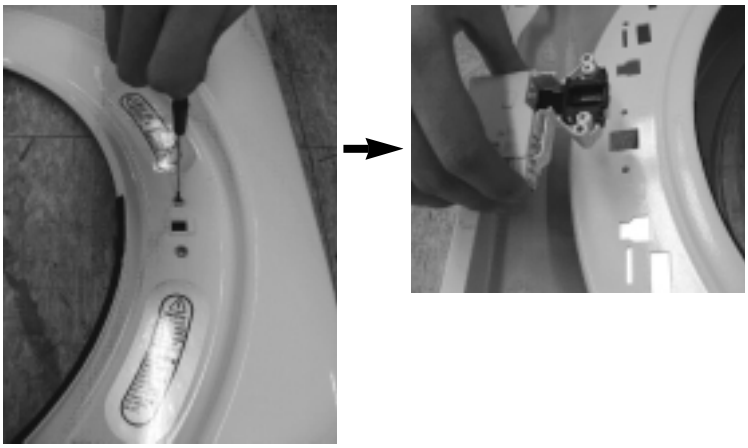
3. Separate harness.

4. Remove pump in the direction of arrow.



DOOR LOCK SWITCH

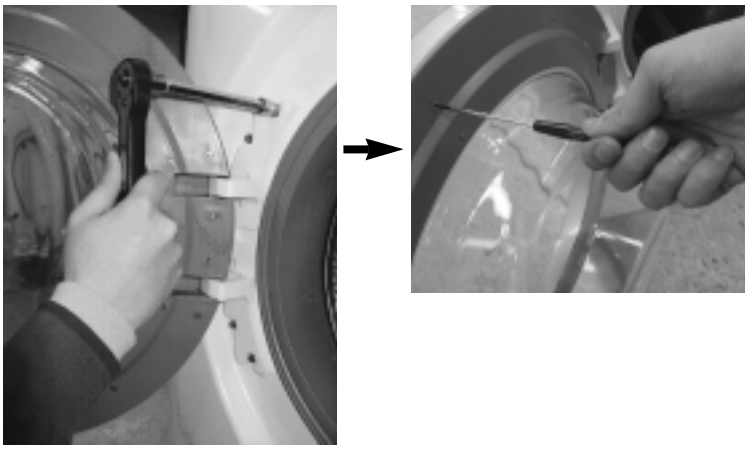
1. Remove 2 screws and separate door lock switch.



DOOR ASSEMBLY

1. Remove 4 bolts.

2. Remove 16 screws to separate inner and outer door ring.



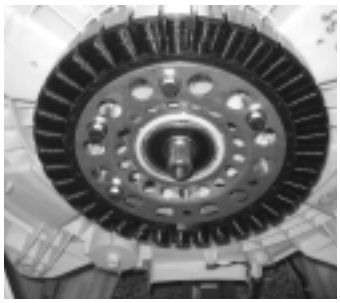
TUB ASSEMBLY

1. Separate counter balance weights after removing 8 screws.

2. Remove inner boot clamp.

3. Remove 1 bolt that attaches the stator.

4. Remove motor by separating 6 bolts that attach the rotor. (Caution: Don't damage guide pin)



5. Separate tub assembly.

6. Separate tub front after removing 16 screws and suspension springs.