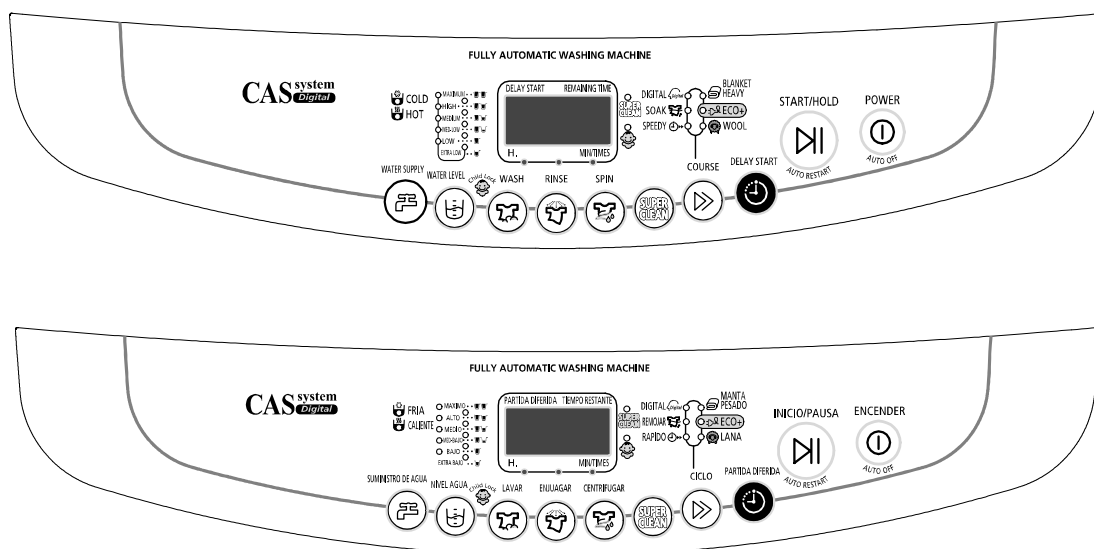


2. TECHNICAL POINTS

2-1. Control Panel



2-2 FUNCTION OF CONTROL KEYS

1. COURSE

- (1) Before the initial start key is entered or during the pause mode, each pressing of this key shows the selectable courses as in the order below.

► DIGITAL → BLANKET/HEAVY → SOAK → ECO+ → SPEEDY → WOOL

- (2) Each time you press the key whilst in valid operation, it gives a beep sound for each key-in but it does not perform any corresponding action.
- (3) When you press HOLD key and change the course while the selected course is valid and in normal operation, the course selected at last resets the current settings as its default initial values even if you changed the course (wash, rinse, spin) by using the Manual key.
- (4) When the selected course is valid and in normal operation, pressing any key is valid except for the Course Selection key.

(5) Function Table for Courses

	DIVISION	DIGITAL	BLANKET/HEAVY	SOAK	ECO+	SPEEDY	WOOL
WASH TIME	MANUAL SET	6~30min.	6~30min.	6~30min.	6~30min.	1~15min.	1~15min.
	MAXIMUM	20 min.	15 min.	20 min.	10 min.	5min.	5 min.
	HIGH	20 min.	15 min.	20 min.	10 min.	5 min.	5 min.
	MEDIUM	20 min.	15 min.	20 min.	10 min.	5 min.	5 min.
	MED-LOW	15 min.	15 min.	20 min.	10 min.	3 min.	5 min.
	LOW	15 min.	15 min.	20 min.	10 min.	3 min.	5 min.
RINSE	MANUAL SET	1~5 Times	1~5 Times	1~5 Times	1~5 Times	1~5 Times	1~5 Times
	INITIAL VALUE	2 Times	2 Times	2 Times	1 Times	1 Times	2 Times
SPIN TIME	MANUAL SET	1~9 min.	1~9 min.	1~9 min.	1~9 min.	1~9 min.	1~9 min.
	INITIAL VALUE	5 min.	5 min.	5 min.	3 min.	Max,High,Med : 3min., Med-low Low : 1min.	1 min.
INITIAL WATER SUPPLY		Cold Water	Cold Water	Cold Water	Cold Water	Cold Water	Cold Water
WEIGHT SENSING W/L		Low~ Maximum	Low~ Maximum	Low~ Maximum	Low~ Maximum	Low~ Maximum	Low~ Maximum

2.MANUAL KEY(WASH, RINSE, SPIN KEY)

(1) Input of this KEY is always effective, except for the cases that the intermittent spin, spin, or hold function is being performed.

- If you select the silver-sterilizing course/tub-washing course, this KEY is not available selected.

(2) The function of this KEY is as follows.

- ① At the initial stage of the POWER ON (i.e., when every course was selected already), if you input this MANUAL key before pressing START key, it performs a manual function of that course.
- ② If you input this MANUAL key while one of the courses is in progress(motion), it performs the ADD function of that course.
 - ㊦ Input of WASH KEY while one of the courses is in progress will perform to select the time of washing (before the end of washing).
 - ㊧ Input of RINSE KEY while one of the courses is in progress will perform to select the time of rinse (before the end of rinse).
 - ㊨ Input of SPIN KEY while one of the courses is in progress will perform to select the time of SPIN (before the end of dehydration).
 - ㊩ The time of washing and the number of rinse can be ADDED in a WASH+RINSE cycle of each course.
 - ㊪ The number of rinse and the time of spin can be ADDED in a RINSE+SPIN cycle of each course.

(3) Spin-Only Function (for spin at each course)

- ① If you touch this KEY before pressing START KEY at initial stage (under digital condition), the SPIN-ONLY function will be selected and be performed with START KEY.. Every time of touching this KEY while the spin function is in progress will show the following display.

▶ 5 MIN → 4 MIN → 3 MIN → 2 MIN → 1 MIN → 9 MIN → 8 MIN → 7 MIN → 6 MIN

- ② In case touching this KEY after the HOLD during the spin cycle, it will perform the ADD function as same with the procedure ① since it has already entered the spin cycle.
- ③ If some other keys (water level or course key) are pressed during the spin-only functioned cycle, it will make only a sound of pressing a key.
- ④ If the COURSE key is pressed after the HOLD during the spin-only cycle, it will perform to cancel the MANUAL function and to convert to AUTOMATIC COURSE function.
- ⑤ Reset of the spin time at the procedure ① will discard the passed time of spin, and newly perform spin for the time reset finally.
- ⑥ During the operation or after the HOLD, input of this key is only possible until the time before entering the spin.
- ⑦ The display for selection at the initial stage of spin is as follows.
 - "SPIN" : ON/OFF for 1 sec
 - Only the actual time of spin will be displayed on the 8 SEGMENTS.
--> "5MIN" at early time
- ⑧ The display for input of START key is as follows(3 seconds after).
 - "SPIN" : ON/OFF for 1 sec
 - The remaining time will be displayed on the 8 SEGMENTS.
--> "10MIN" at early time

(4) Selection of WASH-ONLY function (for washing at each course)

- ① If this key is pressed before pressing START key at the initial stage, it will select the WASH-ONLY function. Input of START key at this time will perform the WASH-ONLY function, and every touch of this key before or after the START will change the display as follows.

20MIN→22MIN→24 MIN→26 MIN→30 MIN→26 MIN→8 MIN→10 MIN→12 MIN→14 MIN→16 MIN→18 MIN
 ↑ (standard)

For wool, saving mode

5 MIN →7 MIN → 9 MIN → 11 MIN →13 MIN →15 MIN →1 MIN →3 MIN (saving low water level)
 ↑

- ② If the SELECT COURSE key is pressed after the HOLD during the WASH-ONLY function cycle, it will cancel the function of MANUAL selection and convert to the AUTOMATIC function.
- ③ Reset of the washing time at the procedure ① will discard the passed time of washing, and newly perform washing for the time reset finally.
- ④ During the operation or after the HOLD, input of this key is only possible until the time before entering the DRAIN cycle.
- ⑤ The display during the washing cycle is as follows.
 - "WASH" : ON/OFF for 1 sec
 - The remaining time will be displayed on the 8SEGMENTS.
--> "20 MIN" at early time
- ⑥ The display during the washing cycle is as follows (3 seconds after).
 - "WASH" : ON/OFF for 1 sec
 - The remaining time will be displayed on the 8SEGMENTS.
--> "25MIN" at early time (based on HIGH WATER LEVEL)

(5) RINSE-ONLY function

- ① If this key is pressed before pressing START key at the initial stage, it will select the RINSE-ONLY function. Input of START key at this time will perform the RINSE-ONLY function, and every touch of this KEY will change the number of rinse as follows.

2 times → 3times → 4times → 5times → 1time(For small dirt, lower than MEDIUM/LOW WATER LEVEL)



- ② The display during the RINSE CYCLE is as follows.

- “RINSE” : ON/OFF for 1 sec
- The remaining time will be displayed on the 8SEGMENTS.

(6) WASH+RINSE ONLY function (availably selectable at each course)

- ① Before input of the START key, touching the WASH key and the RINSE key will select the WASH+RINSE ONLY function. After input of the START key, each key has the same function with the WASH-ONLY key and the RINSE-ONLY key to control the time of washing and the number of RINSE, respectively. (The time of washing and the number of rinse can be changed before pressing the START key.)
- ② The lamp of that cycle in progress is lighted ON/OFF for 1 second.

(7) RINSE+SPIN ONLY function (availably selectable at each course)

- ① Before input of the START key, touching the RINSE key and the WASH key will select the RINSE+SPIN ONLY function. After input of the START key, each key has the same function with the RINSE-ONLY key and SPIN-ONLY key to control the number of RINSE and the time of spin, respectively. (The number of rinse and the time of spin can be changed before pressing the START key.)

- ② The lamp of that cycle in progress is lighted ON/OFF for 1 second

※ The WASH, RINSE, SPIN KEYS are always effective before the end of that cycle, except for the operations such as the intermittent spin, the spin, and the HOLD.

EX) The WASH key is effective before the end of washing function.

※ During the MANUAL operation, input of other manual keys will make a sound of pressing a key without performing any function.

3.WATER SUPPLY

(1) This key is valid except for error cases.

(2) This key-in changed the mode as follows.

► Cold Water → Hot/Cold Water → Hot Water ◀

(3) If you select a water supply by using the water supply key, the selected water supply setting remains valid even if you changed a course after. If you switch to the wool course, cold water is automatically selected, but the previous setting is restored if you switch to the other course.

(4) Error cases as follows in above item (1).

- Water supply error
- Drain error
- Water sensing error
- Door error

(5) While water is being supplied the corresponding water supply lamp flashes on/off by 1 sec. interval.

4.START/HOLD

(1) This key-in toggles between start and pause as follows.

► Start → Hold ◀

(2) Pause displays the remaining 1 sec. on/off.

(3) This key performs error clear function.

- Water supply error
- Drain error

(4) Delay time to re-start after pause mode is as follows.

START MODE	DRIVING PART	START FUNCTION	HOLD FUNCTION	START FUNCTION	REMARK
WATER SUPPLY	Water Supply Valve Rinse Valve				Delay times is 10 sec. dispersing 1 after UNB is detected.
WASH	Motor MR.ML				
DRAIN/HOLD	Drain Motor				
SPIN (including intermittent spin)	Drain Motor				
	Motor (ML)				

5.WATER LEVEL

(1) The Water Level key is always valid except for Error cases.

* Error: Water Level Sensor, Water Supply Error, Drain Error, Door Error, Unbalance Error

(2) Pressing the Water Level key shows the options in the order as below.

Midium → High → Maximum → High → Medium → Med-Low → Low → Extra Low

↑ ————— High → Medium ————— ↓

- (3) If Water Level is changed by pressing the Water Level key before Motor starts rotating, the water supplying time also is changed according to the selected water level so the remaining time is recalculated.
- (4) In the Digital course wash time can be changed only before motor starts rotating by using water level Wash course performs its working by the previous set wash time regardless of water level after motor starts rotating. (It proceeds to start wash course after supplying water up to the changed water level)
- (5) Changing the wash times by using wash key calculates the selected time as the remaining times regardless of the water level.

6.DELAY START

- (1) Reserve key-in is available only before entering start-key under the condition of pressing any course.
- (2) Default value of the key as the repeated key is 3 hours.
- (3) Each key-in can update 1 hour by pressing the key and max value of reserve times is 19 hours.
- (4) After touching the key pressing the start key 3 hours is automatically reserved. Reserve time can be changed only after pressing the start key in 10 min. Otherwise key-in is canceled.
- (5) Manual wash time, rinse time and spin time can be adjusted only after pressing the start key in 10 min. If total working time is over 3 hours automatic reserve process is canceled and return to the early condition.

2-3. MAIN FUNCTIONS

2-3-1 WASH PROCESS

1. WATER SUPPLY

- (1) The water supply function of each process opens the corresponding water valve ON until the selected water level is fulfilled.
- (2) Water supply valve for the water supply function of each process.

Selected Water	Wash	Rinse	Rinse2	Water plus	Intermittent spin
Cold Water	Cold Water	Cold Water	Cold Water	Cold Water	Cold Water
Hot/Cold Water	Hot/Cold Water	Hot/Cold Water	Cold Water	Cold Water	Cold Water
Hot Water	Hot Water	Hot/Cold Water	Cold Water	Cold Water	Cold Water

- (3) Corresponding lamp flashes ON/OFF for 1 sec when water supply process is in operation and or OFF when water supply process is not in operation.
- (4) If the water supply is not completed yet after the standard time allocated for water supplying has passed, the remaining time does not count down any more.
- (5) If the water supply is already completed before the standard time allocated for water supplying has passed, the remaining time counts down as much as the standard time and then proceed to next step.
- (6) If the water supply is not completed even after 60 minutes has passed, Water Supply Error function is performed.
- (7) If a Water Level key is entered again after the water supply is all finished, and if the newly set level is higher than the current level, then the water supply process is performed again, and the Motor is turned OFF and the remaining time does not count down during water supply.
- (8) Water supply times table for each water level.

Water level	MAXIMUM	HIGH	MEDIUM	MED-LOW	LOW EXTRA LOW
Supply Time	5 min	4min, 30 sec	4 min	2min.30sec.	2min.

- (9) If the water level comes down under the reset during in operation the process continues after the water is supplied up to the selected water level.

2. SOAK COURSE

- (1) The soak course is performed only when it is selected by using manual key.
- (2) If the water is supplied up to the selected water level, soaking is repeatedly performed by 5 min.interval for total 30 min. (Motor rotates for 1 min. and stops for 4 min.)
- (3) If the water level is changed to a higher level while soaking is in operation, it stops soaking and starts water supply, and then resume the soaking process(for all course and water level).
- (4) Once the soaking is stopped and resumed again for any reason such as changed water level or Pause and Re-start, the ongoing settings are still valid starting the soaking process from the breakpoint.

3.WASH FUNCTION

- (1) Water Plus is performed if the current water falls short of the selected water level by sensing the water level setting, washing for 2 min and 9 min, turning the Motor OFF for 3 sec., then reading the water level frequency, and the washing process goes on after proper water supply. The time for Water Plus does not exceed Max. 30 seconds (for all course and water level).

* In case of rinse, economy wash and wool course, water plus is performed 1 min. later.

- (2) Though the washing time is changed during in washing operation after performing the water plus function, it does not perform the function anymore. Water plus is not performed when the water plus setting time has passed.

2-3-2 RINSE PROCESS

1. DRAIN FUNCTION

- (1) Drain function maintains the drain valve open ON.
If the water level at initial operation is higher than Reset, the drain function is performed for 50 seconds after detecting Reset. If the water level at initial operation is lower than Reset, the drain function is performed for 20 seconds after detecting Reset.
- (2) After starting the drain function, the remaining time starts counting down until the standard drain time elapses, and stops counting down thereafter. If the drain function is completed, it is regarded as the standard drain time is finished.

Water Level	MAXIMUM	HIGH	MEDIUM	MED-LOW	LOW	Remark
Drain Time	2 min.10 sec	2 min.	1 min.50 sec	1 min.40 sec	1 min.30 sec	50 sec DELAY excluded

- (3) If the water level is still higher than Reset when 5 min has passed after drain function is started, it performs Drain Error function. Buzzer beeps 5 times and then enters the Pause mode.
- (4) If the Start key is pressed in the above item (3), the Error status is cleared and Time Out is reset to 15min again and then drain function resumes.

2.INTERMITTENT SPINNING

- 1) Opening the door while the Intermittent Spin is in operation stops spinning and generates Door Open Alarm (Door Open Melody 5 times).
- 2) If the door is closed while the Door Open Alarm is ongoing, the alarm status is terminated and proceeds to the next step in as identical order as in Start/HOLD key-in.
- 3) If the Satefy S/W is sensed as Unbalance during the Intermittent Spinning cycle, it performs Unbalance Clear function.

1. Unbalance Sensing Function

- S/W Sensing Time

UNBALANCE : 20~449mS, Door Open : 450mS or more.

If the Door is closed while the Door Open Alarm is undergoing, the alarm status becomes invalid and the drain valve turns ON min. 10 seconds after OFF, and MOTOR resumes 10 seconds after the drain valve turns ON.

2. Unbalance Clear Function

- It is the unbalance clear function which happens in spin process after finishing wash process.
It is the same working as adding spin course one more time.
After detecting the unbalance in rinse process and supplying the selected water it proceeds the next rinse function.
When unbalance happens in the last spin process it gives the unbalance sound after preforming the twice unbalance function.
- At the initial operation of this function (standard time of water supply + 1 min.) is added to the remaining time of the corresponding process.
Release function performs discharging water after supplying water for 1 min.
- 'UE' turns ON/OFF for 1 sec. when unbalance error happens and gives flash melody 5 times.
- Release function performs its working when unbalance error happens during in spin only function and it gives error sound when unbalance error happens twice times.

3.SPIN FUNCTION

- (1) The Spin function allows the Washing Motor to rotate to the left and to maintain the Drain Valve opened for the whole spinning time.
- (2) Other functions are as identical as Intermittent Spin function.
- (3) Spin time for rinse course is 2 min. and 30 sec. for wool course.
- (4) Spin time for spin course performs its working during the selected time.

4.PAUSE FUNCTION

- (1) The Pause function turns ML OFF for 1 min. and 30 seconds and turns the Drain Valve ON continuously.
- (2) If the Door is opened while the Pause function is in operation during the Rinse cycle, it gives Door Open Error and resumes processing after Door is closed.
- (3) If the door is opened while the Pause function is in operation during the Spin cycle, it exits the Spin function.

5.WATER SUPPLY FUNCTION

- (1) Identical as the Water Supply function of Wash process

6.RINSE FUNCTION

- (1) If a selected water level is fulfilled, the Rinse function is performed.
- (2) Rinse time is 2 min 30 sec permeal regardless of time. (2 min. for wool course, 1 min. 30 sec. for econo course)

2-3-3 SPIN PROCESS

- (1) Identical as the Intermittent Spin and Spin functions of Rinse process
- (2) Spin function for 1 min. performs as identical as wool course.

2-3-4 EXIT PROCESS

- (1) After all the selected process is completed, it performs Exit process.
- (2) While the exit function is in operation it gives End melody and turns off all the driving compartment.
The display shows "END"
- (3) If the Exit function is finished, it automatically turns Power Relay OFF.

2-4 SPECIAL FUNCTIONS

2-4-1 ERROR FUNCTION

1.WATER LEVEL SENSOR ERROR

- (1) When the Water Level Sensor detects a frequency less than 15KHz or more than 30KHz for more than 5 seconds
- (2) Generates ERROR MELODY 5 times.
- (3) DISPLAY : '1E'
- (4) How to Clear : Press the start to check again.

2.WATER SUPPLY ERROR

- (1) When the Water Supply does not reach for the selected water level after 60 min has passed since starting to supply water.
- (2) Generates ERROR MELODY 5 times.
- (3) Display "E" 0.5 sec ON/OFF
- (4) How to Clear : Press Start Key to clear the Error status and to resume Water Supply.

3.DRAIN ERROR

- (1) When the water level does not fall under Reset level after 15 min. has passed since starting to drain.
- (2) Generates ERROR MELODY 5 times.
- (3) DISPLAY : 'dE' 0.5 sec. ON/OFF
- (4) How to Clear : Press Start Key to clear the Error status and to resume Water Drain.

4. DOOR OPEN ERROR

- (1) When the Door is opened during the Intermittent Spin and Spin.
- (2) Generates ERROR MELODY 5 times.
- (3) DISPLAY : 'UE' 0.5 sec. ON/OFF
- (4) How to Clear : Close the Door.

5.DEFECTIVE MOTOR ERROR

- (1) When a trouble is detected with ML, MR, Weight sensing circuit after weight sensing
- (2) Give error melody 5 times
- (3) Display : '3E'
- (4) How to clear : press the start key to proceed wash course in the high level.

2-4-2DELAY START FUNCTION

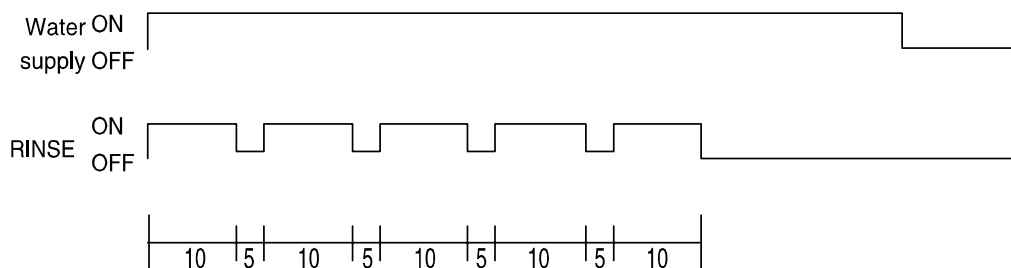
- (1) Initial value of reserved function is 3 hours (base value) and each key-in updates reserved time by 1 hour.
- (2) All key-in is valid when real wash course giving key melody sound performs.
- (3) Reserve setting is valid for all courses.
- (4) All key in is not valid except for water supply and start key after pressing the start key with the elapse of 10 min.
- (5) It is in the mode of reserve function when water level is selected by using start key after performing the first weight sensing. After that the initial water supply function proceeds.

2-4-3 AUTO POWER OFF FUNCTION

- (1) Auto Power OFF function automatically turns Power Relay OFF after all the selected process is finished and End Melody is generated.

2-4-4 RINSE SOLUTION INPUT FUNCTION

- (1) The function opens the Rinse Input Valve as below.



- (2) The function adds rinse solution at the last stage of Rinse, and it turns OFF the Rinse Solution Valve and performs Water Supply if the number of Rinse times is increased while adding the rinse solution is in operation.
- (3) If the number of rinse times is increased while adding the solution is in operation, stop adding and resume adding for the remaining time.
- (4) If HOLD key is pressed while it is adding the rinse solution and then Start key is pressed, it stops adding the rinse solution and then resume adding for the remaining time later at the last stage of rinsing.

2-5 TEST PROGRAM MODE

2-5-1 TEST MODE FUNCTION (Drive and other test)

- 1) How to enter: (Water level + Power s/w)
- 2) MODEL change: you may change mode by pressing COURSE key in test mode.
- 3) Mode discription

MODE NO.	DISPLAY	TEST CONTENT	REMARKS
1	"01"	AGING TEST FOR DRIVING Drive and Display turn ON/OFF as follows. SPIN LAMP (DRAIN/MOTOR) Cold water. Hot water SPIN LAMP (RINSE) "r" 7-SEG (MOTOR RIGHT) "L"	Open and close door, and you may run spin after UNB.
2	"02"	SPIN AGING MODE After detecting reset in 50 sec. it proceeds starting intermittent spin in 3rd times and then continues spin course in the order of 5 min. ON and 3 min. OFF. If the initial water level is under reset it starts intermittent spin after 20 sec. - Door error or unbalance error will be detected and displayed as follows. Door error : "dE" UNBALANCE ERROR : "UE"	
3	"03"	It is selected under the condition of high water level set (Hot water/Cold water) and motor starts rotating repeatedly after supplying high water level.	
4	"04"	Water level sensor is marked by HEX-DECIMAL VALUE in water level frequency.	
5	"05"	Weight sensor is marked by HEX-DECIMAL VALUE as med. low, extra low when pressing the water level key.	
6	"06"	Weight sensing test/value indicate mode Start key-in performs weight sensing and total pulse number displays after selecting water level. It is marked on the 7-SEGMENT under 100, SPIN LAMP turns ON over 100 and RINSE AND SPIN LAMP turn ON over 200.	
7	"07"	TEST MODE OF WATER SUPPLY VALUE cold water for RINSE VALUE turns ON/OFF by 2 sec. REPEATED MODE	
8	"08" "OE"	Med. low, extra low A/D PORT OPEN/SHORT PIN NO DISPLAY OVER FLOW ERROR FUNCTION It performs the release function during in operation which drains overflow water level to selected water level by 2 times and performs overflow error function in 3rd times when over error happens keeping motor going on until power OFF	