Training Material (SD & BL Series)

DATE: April 12, 2017

1. Difference between VD and SD/BL

1) Chamber: Seamless Chamber (High Durability, Long Lifetime)
2) External Steam Generator (There is nothing inside chamber)

   -> Prevent recontamination and enhancing sterilization
3) During dry process, dry heater and steam generator (Hot Air) shall be operated and

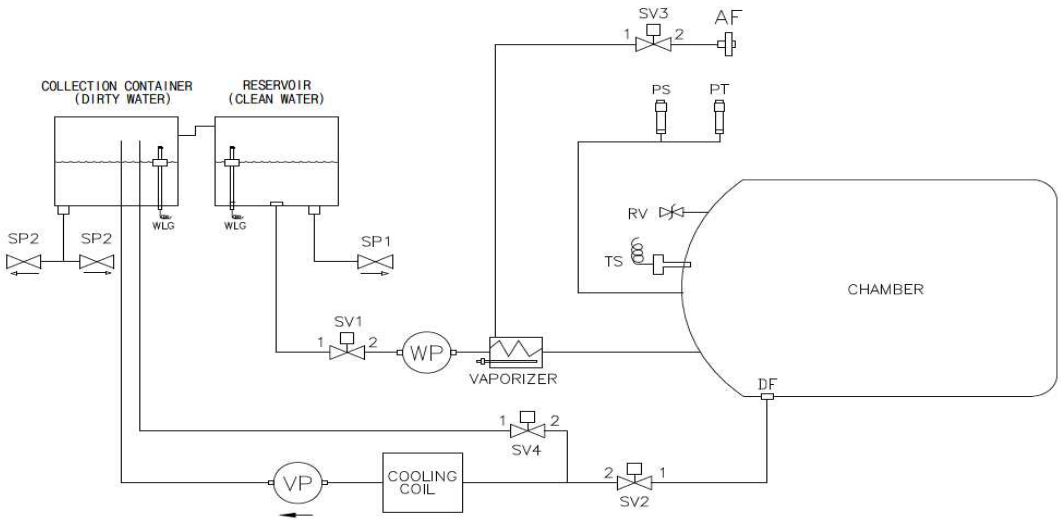
   it makes dry performance improvement
4) Separation of reservoir tank: Prevent recontamination
5) Owing to simply open & reading an operating history, can be checked to find a defective point and also to repair the problem easily.

2. SD(S-Class): HS-1607SD, HS-2321SD, HS-2522SD, HS-3035SD, HS-3041SD

BL(B-Class): HS-1607BL, HS-2321BL, HS-2522BL, HS-3035BL, HS-3041BL

Vertical Type Steam Sterilizer: HS-60SL, HS-85SL

3. Component:



- Heater (**Steam Generator**) Below 40 Liters: 2100W

  Above 40 Liters: 2600W

- Dry Heater / **Band Heater**: Operate during Pre-Heat (up to 35℃) & Dry

- S/V (**Filling, Air-In**): 1/8”

- S/V (**Release the Air in V.P**): 1/4”

- S/V (**Vacuum & Vent**): 1/4”

  Total: Four (4) S/V (Note: BL Series: S/V (N.O) Type shall be installed)

- **Water Pump** (48W) from S/V to Steam Generator

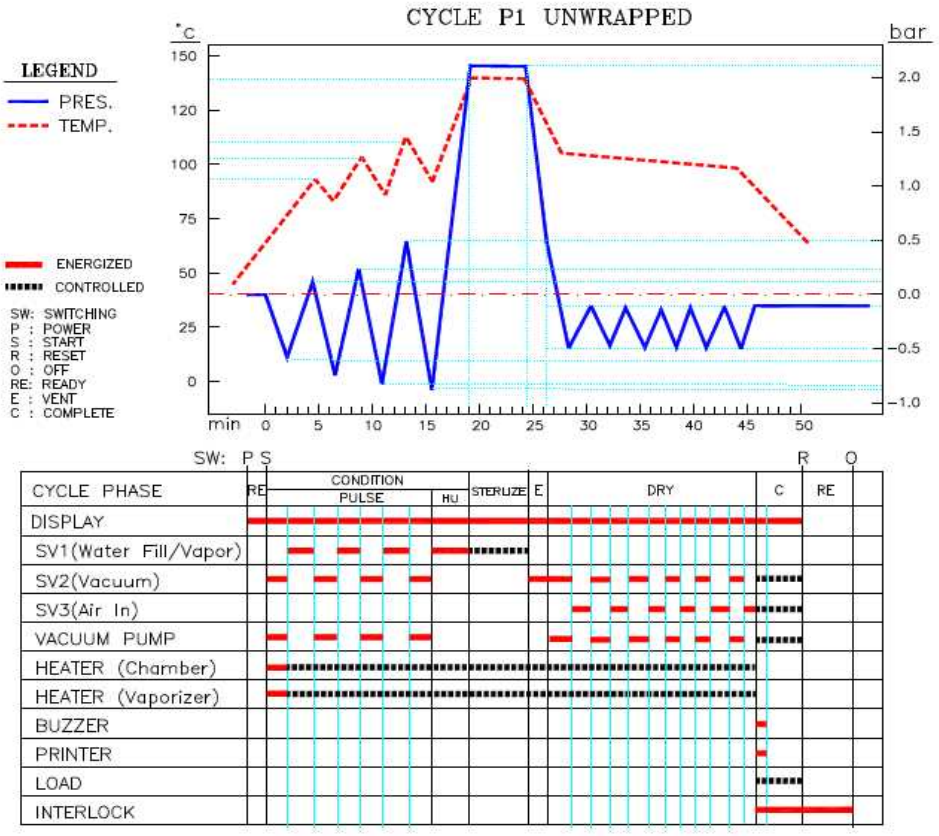
- **Vacuum Pump** : Diaphragm Type

- **Water Level Sensor**: one (1) Reservoir tank & one (1) collection tank

4. Principle: Ready→Condition→Sterilization→Vent→Dry→Complete

1) Turn on the unit and filling the water into reservoir tank.

(Note: Please use distilled water & Reverse Osmosis Water only)



2) **Condition**: After click the "Start" button, the steam generator is working about 150~185 Celsius then the S/V1 (Filling), Water Pump is working together. After that, water is going to steam generator and it makes the steam going to inside chamber. (SD: 0 bar~0.5bar) After pulse process (BL: +0.5 bar~0.90 bar, three (3) times), the temperature is going to setting temperature.

3) **Sterilization**: Sterilization process is going with setting sterilization time. (Steam Generator, Water Pump, and S/V1 are working and stable the sterilization temperature ±1.1 Celsius)

4) **Vent**: In initial vent (up to 0.70 bar), S/V 2 is working as on and off at the intervals of 3 seconds.

5) **Dry**: In 12 minutes (Initial), Vacuum Pump (V.P) shall make vacuum inside chamber then S/V 3(Air-In), Steam Generator, Dry Heater shall make the hot air then send to inside chamber.

6) **Complete**: After complete the cycle, alarm shall show up in 30 seconds.

5. Password Function

A. [1.2.3.4]

★ Change Sterilization Temperature and Time

★ Change the Date and Time

★ Change the Wrapped or Unwrapped on the cycle

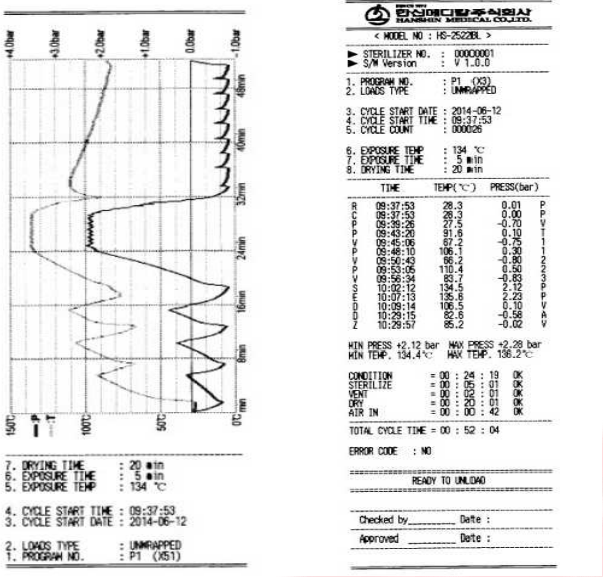
B. [0.1.5.9]

★ Adjust the temperature (Fine Control) / Do not adjust too much temperature

★ Choose the language (Korean Or English)

★ Change the password (Original Password: 1234)

★ Change the printer function:



- Nr: Print result
- Gr: Print graph
- Tr: Print text
- NN: Not use printer function

C. [0.3.5.7]

★ Parameter Setting: User or Customer does not need to use it.

(Without confirmation from manufacturer, parameter shall never be changed)

D. [0.2.5.8]

★ Maintenance Mode

★ Print the previous cycle (Counter & Date)

★ Setting the USB (Unlock: 50 / 84 / 32 / 1)

★ Setting the Network (Unlock: 50 / 80 / 82 / 9)

E. [0.4.5.6]

★ – For Only BL Model (Or Push ▶ + ◀ Cursor)

★ Verify the operation of Heater, S/V, W.P, and V.P

★ Start & Stop function shall be available after return to initial condition.

6. Other Hidden Function

1) ▶ + ▲ Cursor: Check the temperature of steam generator

2) ▶ + ▼ Cursor: Check the temperature and pressure (SD Models)

3) ▶ + ◀ Cursor: Verify the operation of each part (Only BL Models)

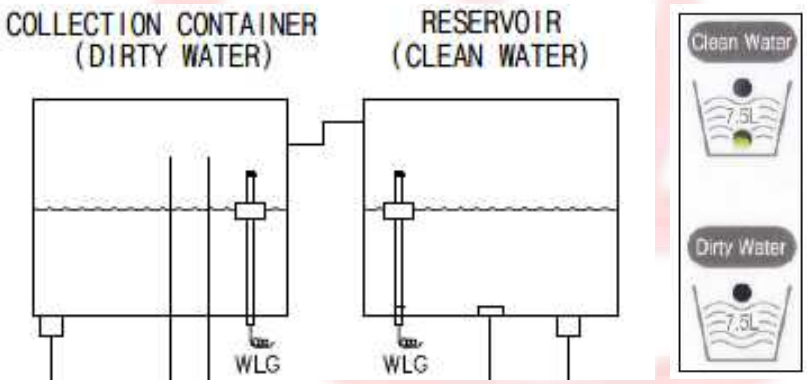
4) When put the password [0.1.5.9] then change the value -90.0 Celsius on T2, print the steam generator temperature graph.

7. Self-Diagnosis (Error 1~13)

● **Error #1: Low Water**

① Check the amount of water about 2 Liters (Below 2 Liter)

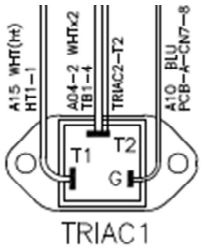
② Check the water level sensor in reservoir tank



● **Error #2: Overheat of Steam Generator**

① Check the overheat sensor (240 Celsius)

② Check the PCB and TRIAC (Steam Generator)

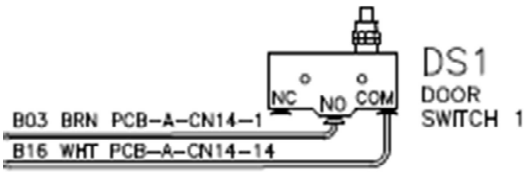


③ Check the operation of Water Pump and S/V1

● **Error #3: Unlock Door**

① Check the Door Switch and wire connection

② Check the Door Switch Post



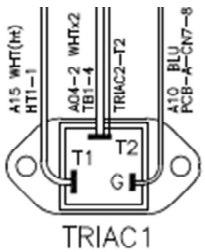
● **Error #4: Sterilization Temperature Deviation (+3℃ / -0℃) during Sterilization Phase**

① Check the chamber temperature sensor

② Check the operation of steam generator

③ Check the operation of S/V (Filling), W.P

④ Check PCB and TRIAC (Steam Generator)



⑤ Check the program version

a) Latest Version BL: V1.2.0
SD: V3.1.8

⑥ Change the Parameter

a) Error #4 (Over 137.0℃) : Increase value of PA11

b) Error #4 (Below 134.0℃) : Decrease value of PA06 OR PA07

● **Error #5: Full of Collection Reservoir Tank**

① Drain the collection reservoir tank

② Check water level sensor located in collection reservoir tank

● **Error #6: Excess Heating Time During Condition**

① Check the steam generator

② Check S/V1 and W.P

③ Check the temperature sensor

④ Check the version of program such as Error #4 - ⑤

⑤ Change the Parameter (PA10: 0808->1008) when Error #6 occur at 121℃ Cycle

● **Error #7: Malfunction of the Chamber Temperature Sensor**

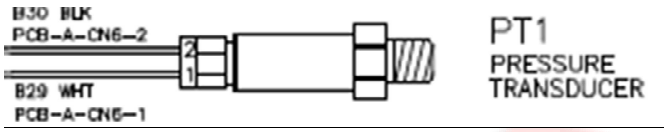
① Unstable temperature change: Check the temperature sensor

② Check the connection of temperature sensor
(Note: Please check the temperature sensor with cold condition)

● **Error #8: Malfunction of the pressure sensor**

① Unstable Pressure: Check the pressure sensor

② Check the Connection of pressure sensor



● **Error #9: Malfunction of the steam generator temperature sensor**

① Push the ▶ + ▲ Cursor together then check the temperature of steam generator.

② Check the connection of temperature sensor

③ Check the Lot Number of temperature sensor **(Lot No. 160519)**

● **Error #10: Failure of the vacuum leak test**

① Check the leakage point of door, hose, and S/V when temperature increase (Usually, the vacuum leak fail from the lid of steam generator)

● **Error #11: Excess of the venting time**

① Check the S/V (Vent) and pressure sensor

● **Error #12: Unused distilled water**

① Stop an audible alarm by pressing the <Start/Stop> button.

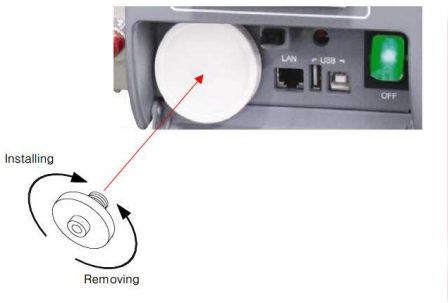
② Remove the water from the reservoir tank

③ Fill the distilled water in the reservoir.

● **Error #13: Replace Air Filter (Cycle : 1000 Times)**

① Change the Air Filter

② Holding ▼ cursor and turn on the machine

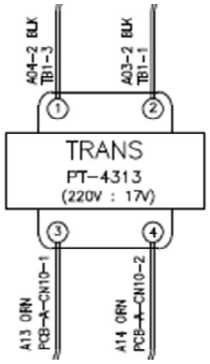


Hidden Function

1. Hold ▲ + Power On = Reset the cycle program (Factory Reset)
2. Hold <Select> + Power On = Parameter Reset (Factory Reset)
   (Note: Please remember the original parameter before reset the parameter)
3. Hold ▶ + Power On = Operate the clean cycle

Others

1. The unit can not start if there is Above Positive pressure (±0.04) inside chamber.
2. Check the transformer (AC17V) if the display and LCD display is not working



3. Check the amount of water inside chamber if the V.P has noise and severe vibration

4. Check the air filter and S/V (Air-In) if the dryness is not good.

5. Check the fan & radiator if the vacuum is not good

6. Printer: Use the suitable printer for these models

   Print the history and check the condition of unit if the unit has the problem

7. Check the monitoring system by password [0.4.5.6] in case of BL has the problem.

8. Use distilled water & Reverse Osmosis Water only

Table 2-2. Contaminants of Condensate and Feed Water

ITEM	Condensate	Feed Water
Evaporate residue	≤ 1.0 mg/kg	≤ 10 mg/ℓ
Silicium oxide : SiO_2	≤ 0.1 mg/kg	≤ 1 mg/ℓ
Iron	≤ 0.1 mg/kg	≤ 0.2 mg/ℓ
Cadmium	≤ 0.005 mg/kg	≤ 0.005 mg/ℓ
Lead	≤ 0.05 mg/kg	≤ 0.05 mg/ℓ
Residue of heavy metals excluding iron, cadmium, lead	≤ 0.1 mg/kg	≤ 0.1 mg/ℓ
Chloride	≤ 0.1 mg/kg	≤ 2 mg/ℓ
Phosphate	≤ 0.1 mg/kg	≤ 0.5 mg/ℓ
Conductivity (at 20℃)	≤ 3 μs/cm	≤ 15 μs/cm
pH value	5 to 7	5 to 7.5
Appearance	colourless, clean, without sediment	colourless, clean, without sediment
Hardness	≤ 0.02 mmol/ℓ	≤ 0.02 mmol/ℓ
NOTE 1: Using of the water included contaminants of exceeding over those given level in Table 2-2 for steam generation may shorten the working life of sterilizer and invalidate the manufacturer's guarantee. NOTE 2: The condensate is produced from the steam in the empty chamber of the sterilizer.		
REFERENCE: EN 13060:2014, Annex C (informative)		

9. When there is positive pressure inside chamber, V.P is working automatically.

★ Daily & Weekly & Periodic Check Point ★

Daily Maintenance	Weekly Maintenance	Periodic Maintenance
Exterior Inspection	Chamber Cleaning	Reservoir Tank Cleaning (Every 1 month)
Control Panel Inspection	Chamber Drain Filter Cleaning	Safety Valve Inspection (Every 3 months)
Door Operation Inspection		
Door Gasket Inspection		

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