HEATAWAY

OPERATION AND MAINTENANCE

FALLING FILM CHILLER - MODEL FR3



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OPERATION CHECKLIST



Note: Water tank additional equipment

PRE-STARTUP INSPECTION

- ☑ Ensure the inlet water temperature and flow rate are within the design specifications (as per the sales agreement).
- ☑ Verify that the water quality meets the required standards.
- ☑ Confirm evaporator plates are clean and free of dirt or scale.
- ☑ Ensure that the water distribution holes in the upper tray are not clogged.
- ☑ Make sure the machine covers are securely closed.

DURING OPERATION

- ☑ Monitor that the inlet and outlet water temperatures and flow rates conform to the design.
- ☑ Check that the water level in the upper tray is within normal range.
- ☑ Verify water is flowing through all distribution holes in the upper tray.
- ☑ Ensure evaporator plates are free of ice.
- ☑ Inspect the lower basin to ensure it is free of sediment or contaminants.
- ☑ Confirm proper operation of water level controls, pumps, valves, and float balls.
- ☑ Ensure the cooling system is functioning normally.

MAINTENANCE PROCEDURES

EVAPORATOR PLATES

Evaporator plates are essential for transferring heat from the flowing water to produce chilled water. Accumulation of dirt, scale, or corrosion reduces efficiency and increases energy consumption just 0.5 mm of scale can increase compressor energy usage by approximately 18%.



Normal plates



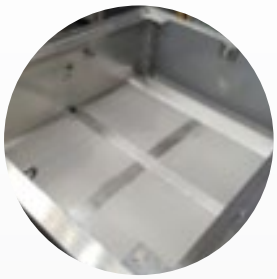
Defective plates

WATER TRAY MAINTENANCE

Regular cleaning of the upper tray and lower basin is crucial. Blockages in the upper tray can result in poor performance and ice formation on the plates, potentially leading to damage or leaks.



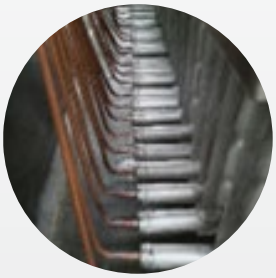
Normal upper tray

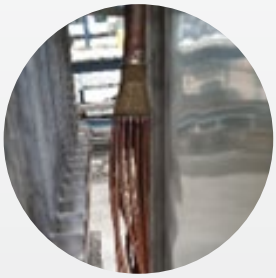


Defective upper tray

LIQUID DISTRIBUTION PIPES

Only available on DX models, these pipes should be cleaned regularly. Avoid alkaline or corrosive detergents. Refer to the “Prohibited/recommended disinfectants” section for guidance. Use soft or food-grade quality water to reduce chemical use. Avoid hot water cleaning due to the refrigerant system. Use non-metallic brushes and, where necessary, high-pressure water jets.





Important: Residual chlorine levels in water must not exceed 2–3 ppm (at pH 6.5–8, 25°C) to prevent corrosion of stainless steel 304, including crevice, pitting, and stress corrosion cracking.

MACHINE INSPECTION AND MAINTENANCE LIST

TASK	PERIOD OF INSPECTION AND MAINTENANCE				
	BEFORE STARTUP	MONTHLY	BI-YEARLY	YEARLY	SHUTDOWN
Clean all cooling parts	✓	✓	✓	✓	✓
Check upper tray water level	✓	✓			
Inspect drain pipes	✓			✓	
Check water inlet/outlet valves	✓		✓		
Confirm inlet water temperature	✓				
Ensure all machine covers are closed	✓				✓

Note: Inlet water temperature must match the agreed design. Deviations may affect outlet temperature.

INSTRUCTIONS FOR WASHING MACHINES.

Cleaning should be done frequently, as it reduces the accumulation of dirt and germs that can contaminate the cold water. Use water of the same quality as that used in food production, or use soft water, as it helps reduce the amount of cleaning agents needed. If the water hardness is higher, it will reduce the efficiency of disinfection. Do not use hot water to wash because the machine contains refrigerant in the system, which may be damaged by heat. Use a brush that will not harm the surface of the stainless steel, and do not use a brush made of metal wire. A high-pressure water sprayer can also be used (High-pressure water pumps) to help in washing machines in areas that are difficult to scrub with hands.

RECOMMENDED DISINFECTANTS

CHEMICAL NAME	MOLECULAR FORMULAS	CONCENTRATION % MASS	TEMP. °C
Hydrogen peroxide	H_2O_2	5	20
		10	23
		10	40
		15	22
		15	30 – 40
		30	27
Ethyl alcohol	C_2H_5OH	Con. All	20 – 40
Chloroxylenol	$C_8H_9C_{10}$	Con. All	20 – 40

PROHIBITED DISINFECTANTS

CHEMICAL NAME	MOLECULAR FORMULAS	CONCENTRATION % MASS	TEMP. °C
Sodium hypochlorite	NaOCl	5	20
Sodium chlorite	NaCl	Con. All	20 – BP
Povidoneiodine	Prohibited in all cases.		
Iodine in iodophor	Prohibited in all cases.		

Bp = Boiling solution.
It is recommended to consult with the manufacturer of the disinfectant or cleaning agent.

Be careful!! The level of residual chlorine in the water must not exceed 2-3 ppm for grade 304 stainless steel at pH 6.5 - 8, temperature 25 °C because if the amount of residual chlorine exceeds the specified limit, it can cause local corrosion such as crevice & pitting corrosion or stress corrosion cracking (SCC).

CLEANING INSTRUCTION

1. Remove machine cover and drain all water.



2. Rinse dirt from the structure using water spray on the upper tray and lower basin.





3. Wash with an appropriate cleaning solution based on the type of dirt. Use compatible tools.

TABLE OF WATER VOLUME IN THE BASIN FOR CALCULATING THE AMOUNT OF SOLUTION ADDED.

MODEL	WATER QUANTITY (L)
WT-1	200
WT-2	350
WT-3	490
WT-4	640
WT-5	810

4. Rinse thoroughly to remove cleaning agents.

5. Sanitize with an approved disinfectant.

6. Conduct a final rinse with clean water. Verify no residue remains by checking for color, odor, and pH.

WATER QUALITY STANDARDS

Water is a critical factor in machine performance. Poor water quality can cause scaling, corrosion, and system failure.

PHYSICAL PROPERTIES (MAXIMUM ALLOWABLE)

PROPERTIES	THE HIGHEST CRITERIA
Color	≤ 20 Hazen units
Odor	None (chlorine odor excluded)
Turbidity	≤ 5 Silica scale units
pH	6.5 - 8.5

CHEMICAL PROPERTIES

PROPERTIES	THE HIGHEST CRITERIA (MG/L)
MERCURY (HG)	<0.002
NITRATE (NO3-N)	<4
PHENOLS	<0.001
SELENIUM (SE)	<0.01
SILVER (AG)	<0.05
ZINC (ZN)	<3
FLUORIDE (F)	<1.5
ALUMINUM (AL)	<0.2
ABS (ALKYLBENZENE SULFONATE)	<0.2
CYANIDE (CN)	<0.1
TDS (TOTAL DISSOLVED SOLIDS)	<500
HARDNESS (AS CACO3)	<100
ARSENIC (AS)	<0.05
BARIUM (BA)	<0.1
CADMIUM (CD)1	<0.01
CHLORIDE (CL)	<250
CHROMIUM (CR)	<0.05
COPPER (CU)	<1.0
IRON (FE)	<0.3
LEAD (PB)	<0.1
MANGANESE (MN)	0.05

TROUBLESHOOTING GUIDE

SYMPTOM	POSSIBLE CAUSE	RECOMMENDED ACTION
OUTLET WATER TEMPERATURE NOT AS SPECIFIED	Inlet water temperature not within design range	Adjust inlet water temperature
	Cooling system malfunction	Check cooling system
	Ice formation on evaporator plate	Defrost evaporator plate
OUTLET WATER VOLUME NOT AS SPECIFIED	Inlet water volume too low	Adjust inlet flow to match design
	Clogged water tray holes	Clean upper tray
	Valve malfunction	Repair or replace valve
ICE FORMATION ON PLATE	Low inlet water temperature or clogged tray	Adjust temperature / Clean tray
WATER NOT POURING ON PLATE	Clogged water tray holes	Clean upper tray
LOW OR INSUFFICIENT WATER LEVEL IN THE UPPER TRAY	Inlet water flow rate is not within design specification	Adjust water flow to match design specification
	Solenoid valve malfunction or component damage	Check operation of solenoid valve, refill valve; repair or replace faulty parts
WATER OVERFLOWING FROM TRAY	Clogged outlet / tray holes	Clean upper tray and outlet
ABNORMAL SCALE FORMATION OR MINERAL BUILDUP ON THE EVAPORATOR PLATE	Poor water quality (not within standard)	Adjust water quality to meet recommended specifications in the manual
	Insufficient cleaning frequency	Increase cleaning frequency or improve cleaning procedure

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WORLD CLASS QUALITY

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FOR FALLING FILM CHILLER - MODEL FR3

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