



DEFENDER SERIES

UNDERCOUNTER DISHWASHER

High Temperature
Installation & Operation Manual

MODEL

B-21



▲ **WARNING** — Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death. Read the installation, operating and maintenance instructions thoroughly before installing or servicing this equipment.



READ AND KEEP THESE INSTRUCTIONS

This manual covers installation, daily operation and routine maintenance of the Jet-Tech Defender Series B-21 high-temperature undercounter dishwasher. Keep it with the machine for the life of the equipment. Indoor use only.

DANGER

Do not connect this machine to a hot-water supply that exceeds **140 °F (60 °C)**. Final rinse water leaves the machine at 180–194 °F (82–90 °C) and will scald. Never open the door during a cycle.

ALWAYS

- Maintain incoming water hardness between **1.5 and 4.3 gpg (25–75 mg/L)**.
- Scrape and pre-wash tableware thoroughly before racking.
- Use only detergents and rinse aids recommended by a professional chemical supplier.
- Clean, rinse and dry the machine at the end of every working day, and leave the door open.
- Remove limescale on the schedule set by your chemical supplier.
- Use only cleaning products declared safe for stainless steel.

NEVER

- Run the machine on water below 25 mg/L — soft water foams and attacks stainless steel.
- Use household dishwashing detergent.
- Use additives containing chlorine, acid or metal to clean the machine.
- Clean tableware or machine surfaces with steel wool or metal brushes.
- Exceed the chemical maker's stated concentrations for detergent, sanitizer, rinse aid or descaler.
- Allow foreign objects — metal in particular — to enter the machine.
- Hose down or pressure-wash the exterior of the machine.

SIGNAL WORDS USED IN THIS MANUAL

DANGER	A hazard which, if not avoided, will result in death or serious injury.
WARNING	A hazard which, if not avoided, could result in death or serious injury.
CAUTION	A hazard which, if not avoided, could result in minor or moderate injury.
NOTICE	Practice that protects the equipment, the wash result or your warranty.

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BEFORE YOU INSTALL

Sections 3.3 to 3.5 must be carried out by qualified technicians. Commissioning and operator training may only be performed by technicians who have received professional training on this equipment. Commission the machine using the record at the back of this manual and leave it with the operator.

01

OVERVIEW

The Defender Series B-21 is a high-temperature undercounter dishwasher for continuous commercial service. It washes and sanitizes a 20 × 20 in rack in 120 seconds on its shortest cycle — up to 24 racks per hour — from a footprint that fits beneath a standard counter.

1.1 HOW THE MACHINE WORKS

Every wash completes in two stages.

Wash

The rack stands still while the pump circulates hot water from the wash tank through the upper and lower wash arms, which rotate. Water sprayed from the arms lifts the soil off the ware.

Final rinse

Rinse water carries no detergent. The upper and lower rinse arms spray fresh high-temperature water at **180–194 °F (82–90 °C)** simultaneously.

Rinse water from one cycle becomes the wash water for the next, so the tank is continuously refreshed rather than run to exhaustion.

WATER QUALITY DRIVES THE RESULT

Wash performance is tied closely to water quality. Where the mineral content is high, it appears as point-like or stripe-like deposits on glassware as it dries. This is a water treatment problem, not a machine fault.



FIG 1 GENERAL ARRANGEMENT – THE MACHINE STANDS ON ADJUSTABLE LEVELING FEET

CAPACITY	RACK SIZE	MAX WASH HEIGHT
24 racks / hour	20 × 20 in	12.6 in
WATER PER RACK	FINAL RINSE	CONNECTED LOAD
0.66 gal	180–194 °F	2.95 kW · 1 phase

1.2 TECHNICAL SPECIFICATIONS

DEFENDER SERIES B-21 · HIGH-TEMPERATURE UNDERCOUNTER DISHWASHER

Overall dimensions (W × D × H)	23.6 × 25 × 31.5 in (600 × 635 × 800 mm)
Depth, door fully open	38.1 in (967 mm)
Cabinet depth	24.4 in (620 mm)
Loading height to chamber floor	15.1 in (384 mm)
Chamber cavity height	12.6 in (320 mm)
Capacity	24 racks per hour
Rack size	20 × 20 in (500 × 500 mm)
Maximum wash height	12.6 in (320 mm)
Power supply	208–240 V / 60 Hz / 1 phase, 2-pole 3-wire
Total connected load	2.95 kW
Rinse booster heater	2.5 kW
Wash tank heater	1.7 kW
Wash pump	0.45 kW
Incoming water temperature	122–140 °F (50–60 °C)
Incoming water pressure	22–73 psi (0.15–0.50 MPa)
Water hardness	1.5–4.3 gpg (25–75 mg/L)
Water consumption per rack	0.66 gal (2.5 L)
Wash tank capacity	4.9 gal (18.5 L)
Wash temperature	131–140 °F (55–60 °C)
Final rinse temperature	180–194 °F (82–90 °C)
Drain terminal height	1.6–4 in (40–100 mm)
Installation	Indoor use only, undercounter

The wash tank heater and rinse booster do not draw simultaneously; the 2.95 kW connected load reflects that interlock rather than the sum of the two elements. Measured load varies with supply voltage — see the electrical data table in section 3.5. Specifications are subject to change without notice; always verify against the dataplate fitted to the machine.

NOTICE

Wash and final rinse temperatures shown above are the factory settings. Where local health authority or NSF requirements specify higher minimum temperatures for high-temperature machines, the stricter requirement applies. Confirm the setting with your authority having jurisdiction at commissioning.

02

DIMENSIONS & SERVICE POINTS

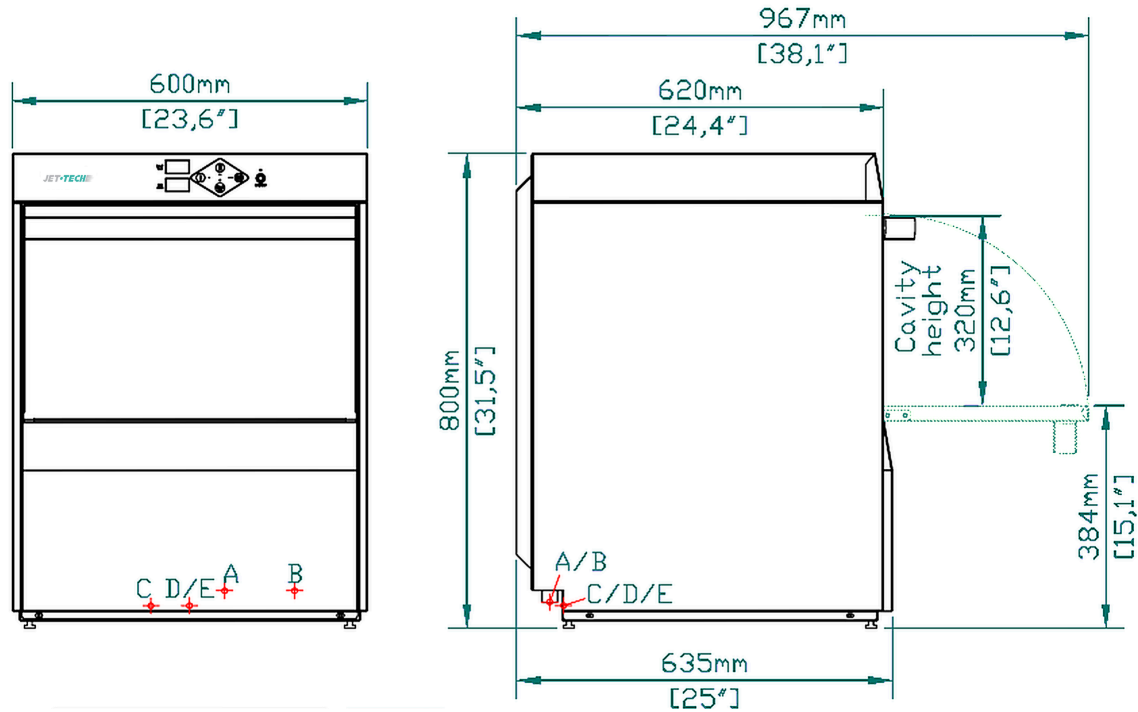


FIG 2 FRONT AND SIDE ELEVATIONS, DOOR SHOWN OPEN · DIMENSIONS IN MM [INCHES]

KEY DIMENSIONS

Overall width	600 mm / 23.6 in
Overall depth	635 mm / 25 in
Cabinet depth	620 mm / 24.4 in
Overall height	800 mm / 31.5 in
Depth, door open	967 mm / 38.1 in
Loading height	384 mm / 15.1 in
Cavity height	320 mm / 12.6 in

ROUGH-IN SUMMARY

Water supply	22–73 psi, tempered to 122–140 °F
Drain terminal	40–100 mm / 1.6–4 in above floor
Electrical	208–240 V, 1 ph, 60 Hz, 2-pole 3-wire
Dispensers	Detergent and rinse aid, 7–15 psi

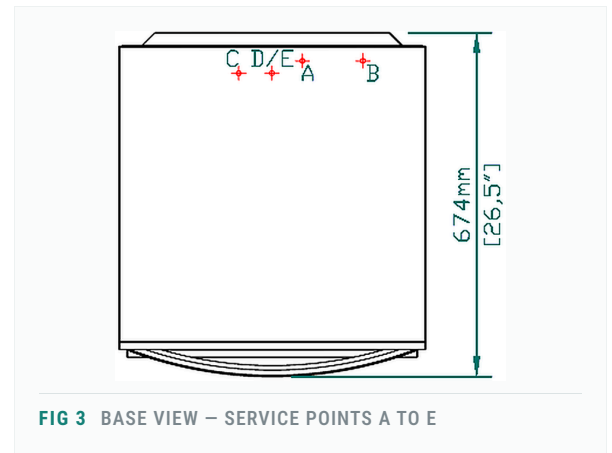


FIG 3 BASE VIEW – SERVICE POINTS A TO E

NOTICE

Points **A** to **E** carry the incoming water supply, the drain and the dispenser take-offs. Confirm each designation against the dataplate and the factory connection drawing before roughing in services — do not assume the arrangement from a previous installation.

03

INSTALLATION

The dishwasher must be installed in accordance with local codes or, in their absence, with the applicable requirements of the National Electrical Code NFPA 70, the Canadian Electrical Code CSA C22.1 Part I, and the Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations, NFPA 96.

3.1 RECEIVING AND INSPECTION

- 1 Before installation, check the dataplate on the right side of the machine and confirm that the supply voltage and frequency match your site.
- 2 Open the packaging and inspect immediately for transit damage. Do not sign clean for a damaged shipment.
- 3 If damage is found, keep all packaging materials and notify the supplier **within 15 days of receipt**. Claims made after this period cannot be supported.

3.2 SITING AND LEVELING

Install the machine under a counter, away from heat sources and out of direct sunlight. The sides or back of the cabinet may stand against adjacent units or walls. Inlet and outlet pipes can be run to the right or the left to suit the installation, and the machine should sit close to the water supply and the drain.

- Set the machine on a stable, level platform.
- Keep the drain pipe terminal between **40 and 100 mm (1.6–4 in)** above floor level.
- Turn the adjustable leveling feet until the cabinet is level and stable in both axes. The machine will not fill, drain or spray correctly if it is out of level.
- Check that the door closes and seals evenly once the machine is level.

CAUTION

Use appropriate lifting equipment and at least two people to position the machine. Do not lift the cabinet by the door or the door handle.

FIRST HEAT-UP

On first use the machine may give off a faint odor as residues from manufacture burn off the heating elements. This is normal. Run one complete cycle with the tank filled and no tableware loaded before putting the machine into service.

3.3 WATER SUPPLY AND DRAIN

SUPPLY PRESSURE

Before installing the machine, check with a pressure gauge that the supply pressure falls between **0.15 and 0.50 MPa (22–73 psi)**. Outside that range the machine cannot be installed normally and water pressure treatment is required — a booster pump below the range, a pressure-reducing valve above it. Both are supplied by others.

WATER INLET

- 1 Connect the water valve connector that matches the inlet pipe to the tap water pipe and confirm it is secure.
- 2 Open the water valve and confirm there is no leakage at the connection.

DANGER

Maximum inlet water temperature is **140 °F (60 °C)**. Do not connect the machine to a hot-water supply that exceeds it.

DRAIN

Fit the drain hose to the drain pipe, or hang it over the sink.

- The terminal height of the pipe must be between **40 and 100 mm (1.6–4 in)**.
- The end of the drain pipe must sit **higher than any point between it and the drain outlet**, so that waste water cannot be trapped in the line.
- The drain pipe must **not** be submerged in the water inside the sewer pipe — a submerged outlet allows waste water to flow back into the machine.
- Check that the drain pipe is not dented, kinked or bent anywhere along its run.

WARNING

Plumbing connections must comply with all relevant hygiene, safety and plumbing regulations. The type and concentration of cleaning agents used must comply with local regulations.

CHEMICAL DISPENSERS

Dispenser supply pressure must not exceed **0.05 to 0.10 MPa (7–15 psi)**. Use a non-foaming alkaline detergent (pH > 7) and a non-foaming acidic rinse aid (pH < 7).

3.4 ELECTRICAL CONNECTION

DANGER

Electrical connection must be made by authorized technicians only. Before any repair work, disconnect the supply and hang a clear sign at the power switch so that others know the circuit is being worked on.

SUPPLY REQUIREMENTS

- Install **independent circuit breakers** sized and located to suit the position of the dishwasher, and ensure a good ground connection.
- An **independent all-pole disconnecting device**, such as an air switch, must be installed in the supply circuit to this machine. See the circuit data sheet for electrical parameters.
- Size the power cord for the rated current of the machine. **Use copper conductors only.**
- The appliance must be grounded through the grounding connection of the electrical wiring board.
- Check that the supply voltage and frequency match the dataplate, then connect the supply and carry out a trial run.

Refer to the markings on the power cord, to the wiring diagram, to the dataplate and to the electrical schematic inside the machine panel to connect the colored conductors correctly.

WARNING

The circuit and grounding connections must comply with the applicable provisions of the National Electrical Code and all other local electrical codes.

When testing the machine for the first time after installation, check that the wash pump motor rotates in the indicated direction. A reversed wash pump will not clean correctly, and even a brief period of reversed running will damage the pump.

TERMINAL MARKINGS



Equipotential Bonding

Marks the terminal that brings every part of the equipment or system to the same potential once interconnected. This is not necessarily ground potential. The equipotential bonding point is located below the equipment.



Protective Grounding symbol

Protective Grounding

Marks the terminal connected to the external protective conductor, which prevents electric shock in the event of a fault, or the terminal connected to the protective grounding electrode.

3.5 ELECTRICAL DATA

B-21 · 208–240 V, 60 HZ, 1 PHASE, 2-POLE 3-WIRE

SUPPLY VOLTAGE	LOAD CURRENT	TOTAL POWER	WASH PUMP CURRENT	WASH PUMP POWER	RINSE HEAT CURRENT	RINSE HEAT POWER
208 V	13.0 A	2.72 kW	2.7 A	0.56 kW	10.4 A	2.16 kW
240 V	14.5 A	3.50 kW	2.6 A	0.62 kW	12.0 A	2.88 kW

Size the supply and the protective device for the voltage actually present at site. The 2.95 kW figure quoted in the specification table is the nameplate rating.

COMMISSIONING

Check and commission the machine before it is put into use. Commissioning and operator training may only be carried out by qualified technicians who have received professional training on this equipment. Operators may use the machine only after that training.

- 1 Confirm that all installation tools and any other items left inside the machine have been removed.
- 2 Check for water leakage and for leakage of cleaning agents at every connection.
- 3 Verify that the safety system and the door switch function correctly.
- 4 Check that all screws are tight.
- 5 Verify wash pump rotation against the direction indicated.
- 6 Run a complete cycle and confirm the wash and final rinse temperatures reach their set values.

NOTICE

Record the commissioning results on page 19 and leave this manual with the operator. A completed record is the fastest route to a supported warranty claim.

04

OPERATION

4.1 CONTROL PANEL



FIG 4 CONTROL PANEL LAYOUT AND INDICATORS

NO.	CONTROL	FUNCTION
1	Wash temperature display	Shows the real-time temperature of the wash water during operation, and fault codes.
2	Rinse temperature display	Shows the real-time temperature of the rinse water during operation, and fault codes.
3	Cycle selection I / II	Selects the 120-second or 180-second wash cycle.
4	Cycle selection III / IV · Start or Drain	Press for the 240-second cycle. Press and hold 3 seconds for cycle IV, the 600-second low-temperature disinfection mode. Press any cycle button after the wash completes to exit that mode.
5	Power	Switches the machine on and off. Pressing it to stop the machine leaves the unit powered — isolate at the main switch to remove power.

READY TO RUN

After filling, the machine heats automatically — this can take more than ten minutes. The machine is ready when the wash tank reaches **131 °F (55 °C)** and the rinse temperature exceeds **180 °F (82 °C)**.

4.2 DAILY START-UP AND LOADING

⚠ WARNING

Operation is restricted to trained personnel. If the door is opened during a cycle, wash water may spray out and cause injury — wait for the program to finish before opening the door.

START-UP

- 1 Check that the wash arms, the rinse spray arms and the filter screen are correctly positioned.
- 2 Open the inlet valve and turn on the main switch, or connect the plug.
- 3 Check that the quantity of detergent and rinse aid is sufficient for the shift.
- 4 Close the door and press the power switch on the control panel. The machine opens the solenoid valve and fills automatically.
- 5 When filling is complete the machine heats — this can take more than ten minutes. The machine is ready when the wash tank reaches 131 °F and the rinse temperature exceeds 180 °F.

PREPARING TABLEWARE

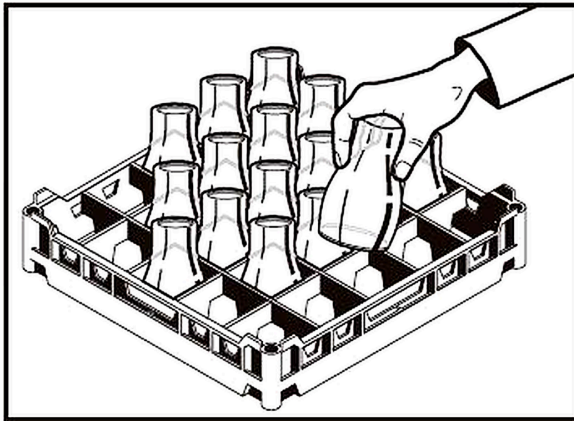


FIG 5 PLACE WASHING UTENSILS FACE DOWN ON THE RACK

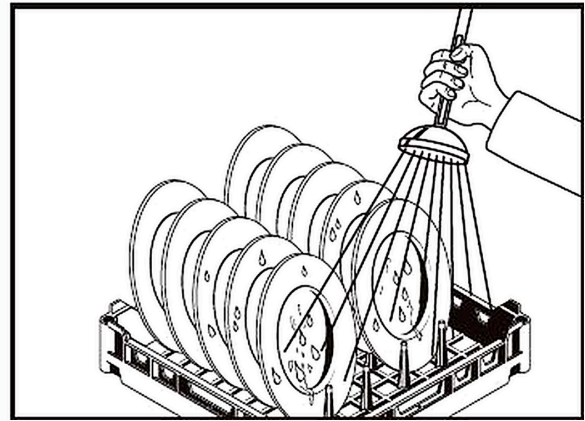


FIG 6 REMOVE FOOD RESIDUES BEFORE RACKING

- Place cups, glasses and bowls **face down** on the rack.
- Remove food residues before loading.
- Stand plates upright and evenly spaced so that water reaches both faces.
- Do not exceed a wash height of **12.6 in (320 mm)**.

NOTICE

Most wash complaints trace back to racking, not to the machine. Ware that touches, overlaps or lies flat will come out soiled however long the cycle runs.

4.3 RUNNING A WASH CYCLE

CHOOSING A CYCLE

CYCLE	TOTAL TIME	SELECT FOR
I	120 s	Lightly soiled tableware and glassware
II	180 s	Normally soiled tableware
III	240 s	Heavily soiled tableware
IV	600 s	Low-temperature disinfection mode — press and hold the III button for 3 seconds

Rated capacity of 24 racks per hour is based on cycle I. After a disinfection cycle, press any cycle button to leave the mode.

CYCLE SEQUENCE

Slide the rack into the machine and close the door.



Press the on/off button. The power indicator lights and the machine enters automatic preparation mode.



The machine fills, heats to the set temperature, then holds, waiting for the cycle to be executed.



The selected cycle runs automatically. A buzzer sounds at the end of the wash.



Open the door, take out the rack and let the ware stand to dry.

4.4 SHUTTING DOWN

Press the power switch to stop the machine. **The machine remains powered at this point.** To remove power:

- Turn off the main power switch.
- Unplug the machine.
- Close the inlet valve on site.

CAUTION

Tableware coming out of the machine is very hot. Allow it to stand and cool before handling it without gloves.

DRYING

Let the ware sit for a period after the cycle to allow sufficient drying time. Ware pulled straight from the rack and stacked wet will spot, whatever the rinse aid dose.

05

CLEANING & MAINTENANCE

⚠ DANGER

Before starting any repair work, disconnect the power supply and hang a visible sign at the power switch so that others know the circuit is being worked on.

5.1 DAILY CLEANING

- 1 Open the machine door.
- 2 Remove the filter and clean it. Make sure food residues do not enter the pump suction port.
- 3 Rinse the fine filter screen under running water.
- 4 Clean the inside of the machine.
- 5 Replace the filter screen.
- 6 Leave the door half open for ventilation.

⚠ WARNING

Improper use of chemicals causes corrosion. Do not use any additive containing chlorine, acid or metal to clean the machine, and do not use metal brushes.

5.2 WEEKLY CLEANING

- 1 Unscrew the screws on the rinse spray arm and remove the rinse spray arm and the wash spray arm.
- 2 Clean both arms, clearing any blocked nozzle with a needle and flushing with water.
- 3 Reinstall the wash and rinse arms.

⚠ CAUTION

When removing the drainage pipe, take care not to come into contact with high-temperature water. After draining, the electric heating pipe retains a high residual temperature — allow it to cool before cleaning around it.

TWICE A DAY

Empty the wash tank and rinse the filter **at least twice a day**, or after every 40 to 50 wash cycles, whichever comes first.

5.3 MONTHLY SERVICE SCHEDULE

Carried out by a qualified service technician. Record each visit in the service log at the back of this manual.

ITEM	CHECK
Wash pump	Pump tightness, seal ring, running noise and direction of rotation.
	Pump suction.
	Position and condition of the filter screen.
Wash system	Water level in the wash tank.
	Tightness of the wash line.
	Wash system complete, spraying correctly, wash arm turning freely.
Rinse system	Water pressure and tightness.
	Rinse system complete, nozzles clear, spraying correctly.
Cabinet and components	Wash tank, door, door seal and equipment surfaces.
	Hoses, clamps, plastics and seals.
	Door switch and safety system operation.
Water inlet	Water level switch, solenoid valve; clean the inlet filter screen.
	Tightness of all connections; supply pressure within 22–73 psi.
	Water hardness; water softener condition, total or partial failure where fitted.
Drain	Tightness; drain pipe free of dents and kinks.
	Drain pump operation; terminal height still 40–100 mm.
Electrical	All fuses; tighten all relevant screws.
	Wash and rinse heater wiring, thermostat and overheat protection switch.
Chemical dispensers	Concentration; adjust if necessary. Supply pressure 7–15 psi.
Descaling	Descale the boiler and heating elements on the schedule set by your chemical supplier, then flush thoroughly with clean water.

NOTICE

Scale build-up is not a warranty defect. The machine has no demineralizing device fitted — where the supply falls outside 25–75 mg/L, external water treatment is required.

06

SANITATION STANDARDS

- Operators must strictly comply with all sanitation requirements when handling clean tableware.
- Do not touch clean tableware with dirty or oily hands. Wear gloves or keep hands clean to prevent contamination. **Tableware coming out of the machine is very hot.**
- Dry tableware thoroughly with a clean, disinfected cloth. Do not use unsterilized kitchen towels or cloths.
- Wait for the machine to reach its working wash temperature before running ware through it, so that disinfection and cleaning are effective. For best results, clean tableware only once the machine is ready.
- Empty the wash tank and rinse the filter at least twice a day, or after 40 to 50 wash cycles.
- Dose detergent and rinse aid correctly, following the supplier's recommended amount. At the start of the workday, check that the quantity in the storage tank will meet the day's demand.
- Keep the dishwasher absolutely clean and maintain it regularly.

07

LONG-TERM SHUTDOWN

If the machine will stand unused for a long period — holidays, temporary closure — follow this procedure before leaving it.

- 1 Empty the machine completely, **including the boiler**.
- 2 Clean the machine thoroughly.
- 3 Leave the machine door open.
- 4 Close the inlet valve.
- 5 Cut off the main power supply.

WARNING

Where there is any risk of freezing temperatures, consult technical service personnel on how to protect the machine from freezing. Water left in the boiler or the pump will split the casing if it freezes, and that damage is not covered by warranty.

08

TROUBLESHOOTING

Work through the possible causes below before calling for service. If the problem persists, contact your local service agent or authorized dealer.

SYMPTOM	POSSIBLE CAUSE	CHECK OR REPLACE
Machine does not take in water	No water source; clogged filter; water level switch malfunction; solenoid valve failure; safety switch malfunction	Reconnect the water supply; clean the filter; replace faulty parts
Rinse arm is not spraying water	No water source; clogged filter; solenoid valve malfunction; rinse pump cannot draw water; rinse system needs descaling	Reconnect the water supply; clean the filter; replace faulty parts; descale
Streaks or stains on tableware	Rinse water mineral content too high; rinse temperature below 180 °F; rinse water volume reduced; unsuitable rinse aid, or incorrect dose	Soften the water; adjust the temperature; clean the filter and the rinse arms; change the rinse aid or adjust the dose
Reduced rinse water volume	Filter or rinse arm fouled at the rinse solenoid valve	Clean the filter and the rinse arm ahead of the rinse solenoid valve
Wash water below 104 °F	Wash temperature setting incorrect; thermal protection device tripped; circuit breaker tripped	Check the wash temperature setting and the thermal protection device. If the thermal device has tripped, reset it manually and check for faults. If the breaker has tripped, inspect the wiring before resetting.
Excessive foam in the wash tank	Unsuitable detergent or rinse aid; overdose; water too soft; heavy protein or starch load	Change the chemical or adjust the dose; check water hardness against 25–75 mg/L; empty the tank and clean the filters more frequently

NOTICE

Repair by unauthorized personnel, non-original spare parts and unauthorized technical modification all void the manufacturer's warranty and product liability.

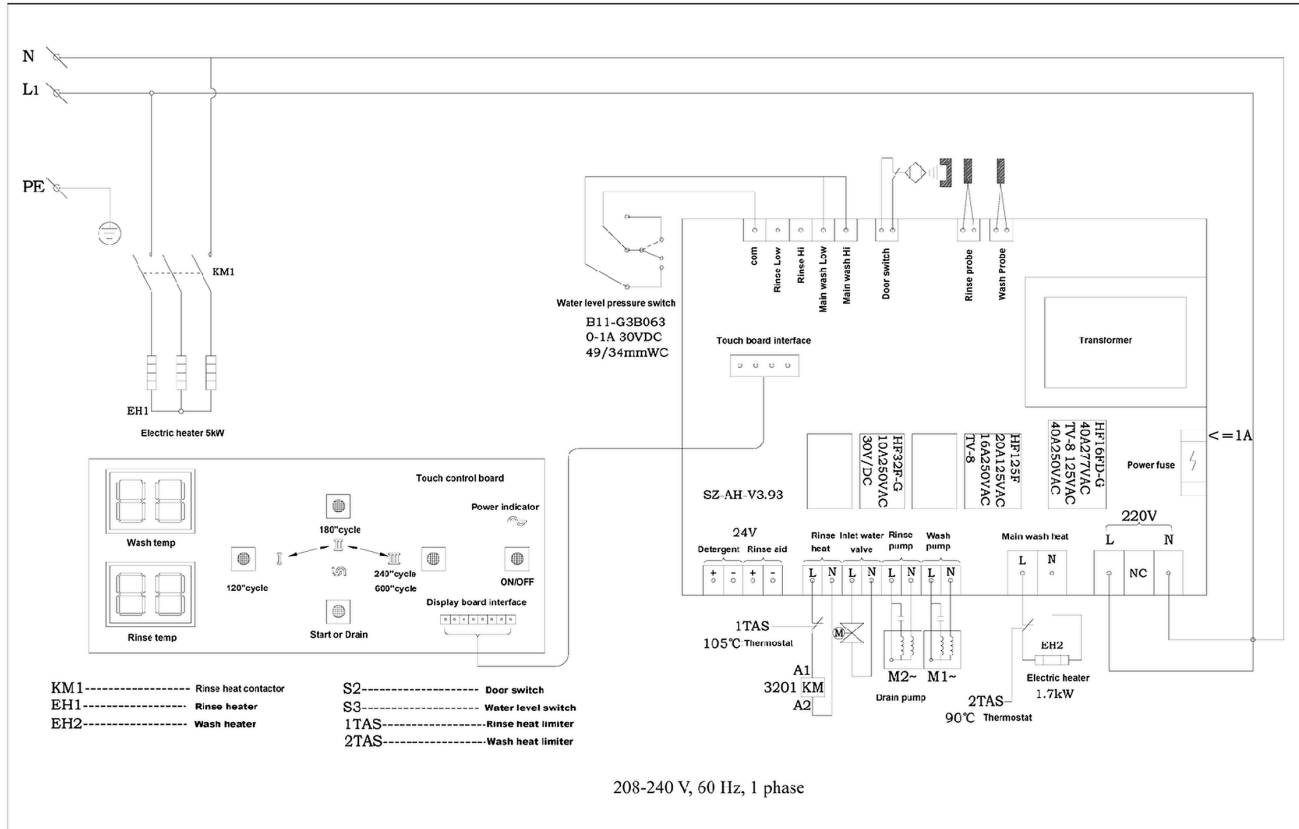
BEFORE CALLING FOR SERVICE

- **Model and serial number** — dataplate, right side of the machine
- **Supply voltage** — measured at the machine, not the nominal site voltage
- **Displayed temperatures** — wash and rinse at the time of the fault, plus any code shown
- **Water hardness** — most recent test result, in gpg or mg/L
- **Chemicals in use** — detergent and rinse aid brand, type and dose rate

09

WIRING SCHEMATIC

B-21 · 208-240 V / 60 HZ / 1 PHASE



10

COMMISSIONING RECORD

Complete at installation and leave this manual with the operator.

INSTALLATION DETAILS		
Model	Defender Series B-21	
Serial number		
Site / location		
Date commissioned		
Installed by		

COMMISSIONING CHECKS		
Supply voltage measured		
Chamber cleared; no leakage; screws tight		
Door switch, safety system and pump rotation verified		
Leveled; drain terminal 40–100 mm; inlet pressure / hardness		
Wash / final rinse temperature achieved		
Chemical dose set; operator training completed		

SERVICE LOG		
Date	Work carried out	Technician



SERVICE & SUPPORT

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BEFORE YOU CALL

Have the model and serial number from the dataplate on the right side of the machine, the supply voltage measured at the machine, the wash and rinse temperatures displayed at the time of the fault, and any code shown on either display.

KEEP THIS MANUAL

This manual must remain with the machine for the life of the equipment. Replacement copies are available from your dealer.

WARRANTY

Installation or repair by unauthorized personnel, non-original spare parts and unauthorized technical modification void the manufacturer's warranty and product liability.

QUICK REFERENCE

WASH TEMPERATURE

131–140 °F

FINAL RINSE

180–194 °F

RACK SIZE

20 × 20 in

WATER HARDNESS

1.5–4.3 gpg

