Go To Table Of Contents

UltraClave® Automatic Sterilizers

Model Numbers:

M9 -020 thru -022

M9D -020 & -022

M11 -020 thru -022

M11D -020 & -022

Serial Number Prefixes:

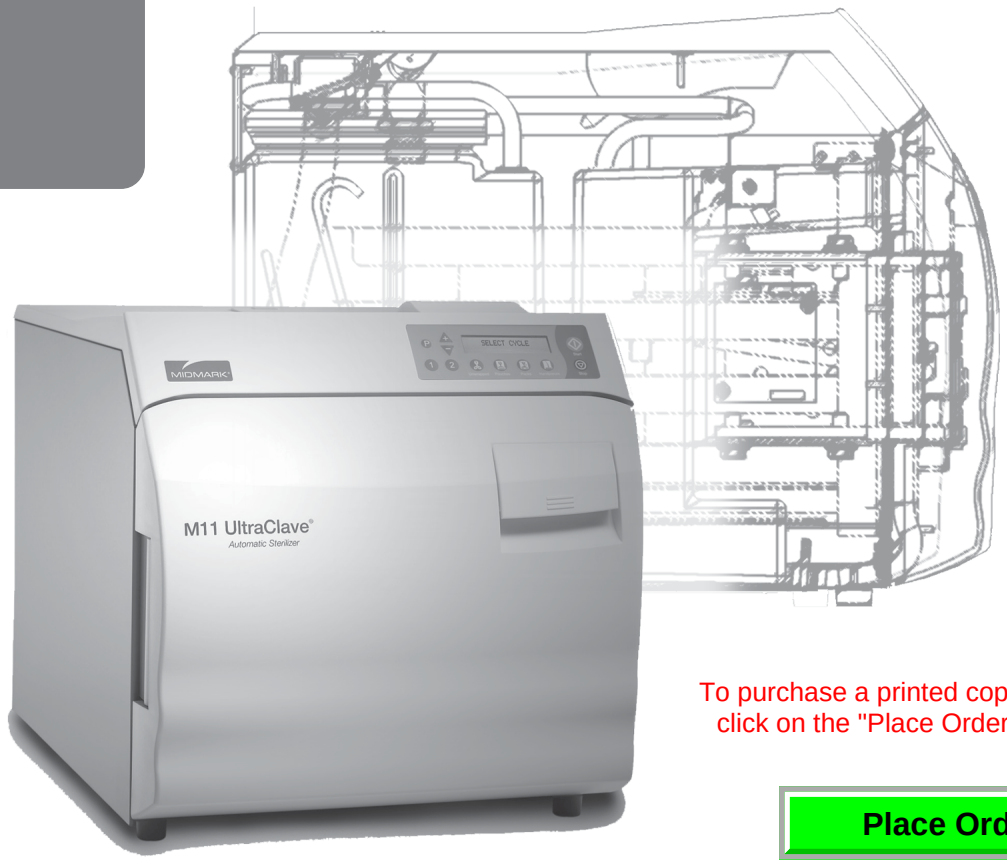
RN, RP, RR, V

RW, RX, V

RS, RT, RV, V

RY, RZ, V

Service and Parts Manual



To search for a specific error code, click on the button below then type in error code. [ex. Cxxx]

Find Error Code

To purchase a printed copy of this manual, click on the "Place Order" button below.

Place Order

FOR USE BY MIDMARK TRAINED TECHNICIANS ONLY

SF-1854

Part No. 004-0453-00 Rev. E (4/25/12)

Style B

Table Of Contents

Symbols

Caution
Indicates a potentially hazardous situation which could result in injury if not avoided.

Equipment Alert
Indicates a potentially hazardous situation which could result in equipment damage if not avoided.

Note
Amplifies a procedure, practice, or condition.

Indicates that the component the check mark appears beside should be tested before replacing it.
In Section A, test the components in the order indicated.
(ex. ***1st*** ✓ then, ***2nd*** ✓)

Refer to Section B for component testing procedures.

These symbols are used throughout this manual to represent the operational status of functions and components.

Indicates the function / component is working properly. No action required.

Indicates the function / component is working, but a problem exists.

Indicates the function / component is not working at all.

Ordering Parts

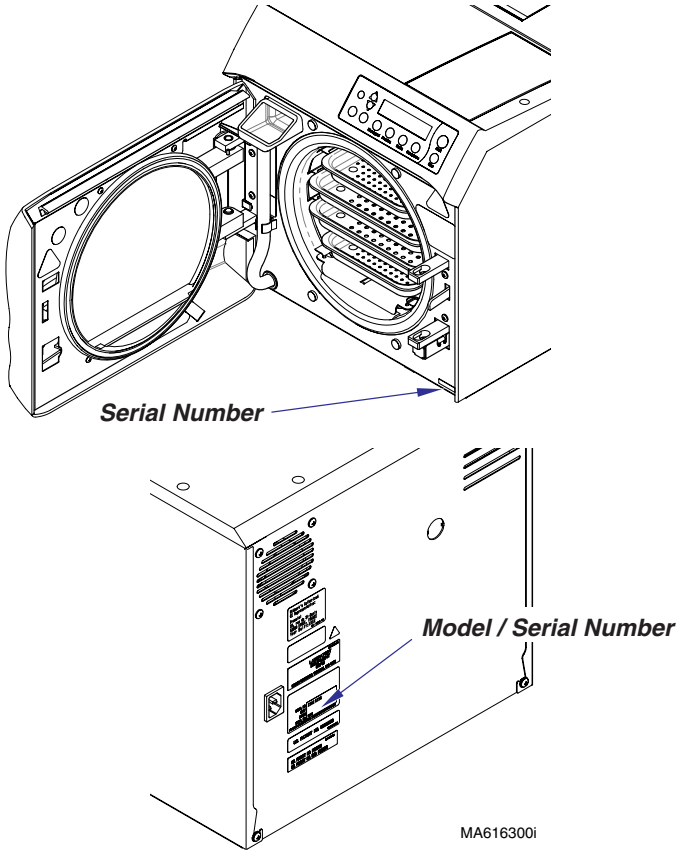
The following information is required when ordering parts:

- Serial number & model number
- Part number for desired part.
  [Refer to Section E: Exploded Views / Parts Lists]

<u>Non-warranty</u> parts orders may be faxed to Midmark using the Fax Order Form in the back of this manual.

For warranty parts orders, call Midmark's Technical Service Department with the required information.
Hours: 8:00 am until 5:00 pm EST [Monday - Friday]
Phone: 1-(800)-Midmark

Model / Serial Number Location



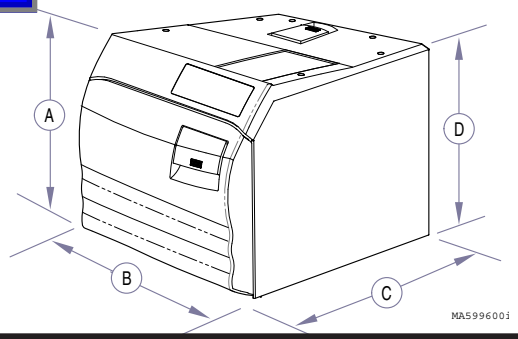
Go To Table Of Contents

General Information

Weights, Dimensions, Electrical Specifications

ATTENTION

A seperate (dedicated) electrical circuit is recommended for all models (M9/D & M11/D). Do not connect to a circuit with other devices, unless the circuit is rated for the additional load.



M9 / M9D Model Information

Dimensions *[Refer to illustration]:*
- Front Height *(A)* ..... 15.8 in. (40.1 cm)
- Width *(B)* ..... 15.3 in. (38.9 cm)
- Depth w/plug *(C)* ..... 20.1 in. (51 cm)
- Back Height *(D)* ..... 15.3 in. (38.9 cm)

Standard Tray Dimensions
- M9 / M9D (Large) ..... 7 5/16 in. x 12 in. x 7/8 in. (18.6 cm x 30.5 cm x 2.2 cm)
- M9 / M9D (Small) ..... 5 5/8 in. x 12 in. x 7/8 in. (14.3 cm x 30.5 cm x 2.2 cm)

Chamber Size: ..... Diameter: 9 in. (22.9 cm)
Depth: 15 in. (38.1 cm)

Shipping Carton:
- *(Length x Width x Height)* ..... 24.2 in. x 20.5 in. x 21 in. (61.4 cm x 52 cm x 53.3 cm)

Weight:
- Shipping Weight ..... 81 lbs (36.7 kg)
- w/reservoir empty ..... 73 lbs (33.1 kg)
- w/reservoir full ..... 82 lbs (37 kg)

Reservoir Capacity: ..... Approx. 1.1 gallon (4.1 liters) at FULL mark

Pressure Relief Valve:
opens at approximately: ..... 40 psi (275kPa)

Electrical Requirements: ..... *[See Model Identification / Compliance Chart]*

Fuses *(on main PC board)*:

115 VAC model
- *F1* ..... 0.250 amp, 250 V, Slo-Blo, 1/4" x 1-1/4"
- *F2* ..... 15 amp, 250 V, Fast-Acting, 1/4" x 1-1/4"

230 VAC models:
- *F1* ..... 0.125 amp, 250 V, Slo-Blo, 5mm x 20mm
- *F2* ..... 8 amp, 250 V, Fast-Acting, 5mm x 20mm

Power Consumption:
- *115 VAC models* ..... 1425 watts, 12 amps @ 120 VAC
- *230 VAC models* ..... 1500 watts, 7 amps @ 240 VAC

Heat Emission:
- *M9 / M9D* ..... 5000 BTU/Hr during operation

M11 / M11D Model Information

Dimensions *[Refer to illustration]:*
- Front Height *(A)* ..... 17.8 in. (45.2 cm)
- Width *(B)* ..... 17.75 in. (45.2 cm)
- Depth w/plug *(C)* ..... 22.75 in. (57.8 cm)
- Back Height *(D)* ..... 17.0 in. (44.2 cm)

Standard Tray Dimensions
- M11 / M11D (Large) ..... 9 in. x 15 in. x 1 1/8 in. (22.9 cm x 38 cm x 2.9 cm)
- M11 / M11D (Small) ..... 6 5/8 in. x 15 in. x 1 1/8 in. (14.3 cm x 38 cm x 2.9 cm)

Chamber Size: ..... Diameter: 11 in. (27.9 cm)
Depth: 18 in. (45.7 cm)

Shipping Carton:
- *(Length x Width x Height)* ..... 26.2 in. x 21.5 in. x 21 in. (66 cm x 54.6 cm x 53.3 cm)

Weight:
- Shipping Weight ..... 131 lbs (59.4 kg)
- w/reservoir empty ..... 99 lbs (44.9 kg)
- w/reservoir full ..... 111 lbs (50.4 kg)

Reservoir Capacity: ..... Approx. 1.4 gallon (5.3 liters) at FULL mark

Pressure Relief Valve:
opens at approximately: ..... 40 psi (275kPa)

Electrical Requirements: ..... *[See Model Identification / Compliance Chart]*

Fuses *(on main PC board)*:

115 VAC models
- *F1* ..... 0.250 amp, 250 V, Slo-Blo, 1/4" x 1-1/4"
- *F2* ..... 15 amp, 250 V, Fast-Acting, 1/4" x 1-1/4"

230 VAC models:
- *F1* ..... 0.125 amp, 250 V, Slo-Blo, 5mm x 20mm
- *F2* ..... 8 amp, 250 V, Fast-Acting, 5mm x 20mm

Power Consumption:
- *115 VAC models* ..... 1425 watts, 12 amps @ 120 VAC
- *230 VAC models* ..... 1500 watts, 7 amps @ 240 VAC

Heat Emission:
- *M11 / M11D* ..... 5000 BTU/Hr during operation

General Information

Model Identification / Compliance Chart - M9/D & M11/D

Model	Description	Serial Number Prefixes	Complies To:					Electrical Ratings:		
			UL 61010A-1	UL 61010-2-041	CAN/CSA C22.2, #1010	CAN/CSA C22.2, #1010.2-041-96	ASME Boiler & Pressure Vessel Code	VAC +/- 10%	Amps	Cycles (Hz)
M9-020	**Midmark M9 Ultraclave** *(115 VAC)*	**RN** & **V**	**X**	**X**	**X**	**X**	**X**	115	12	50/60
M9-021	**Midmark M9 Ultraclave** *(230 VAC)*	**RP** & **V**	**X**	**X**	**X**	**X**	**X**	230	6.4	50/60
M9-022	**Ritter M9 Ultraclave** *(115 VAC)*	**RR** & **V**	**X**	**X**	**X**	**X**	**X**	115	12	50/60
M9D-020	**Midmark M9D Ultraclave** *(115 VAC)*	**RW** & **V**	**X**	**X**	**X**	**X**	**X**	115	12	50/60
M9D-022	**Ritter M9D Ultraclave** *(115 VAC)*	**RX** & **V**	**X**	**X**	**X**	**X**	**X**	230	12	50/60
M11-020	**Midmark M11 Ultraclave** *(115 VAC)*	**RS** & **V**	**X**	**X**	**X**	**X**	**X**	115	12	50/60
M11-021	**Midmark M11 Ultraclave** *(230 VAC)*	**RT** & **V**	**X**	**X**	**X**	**X**	**X**	230	6.4	50/60
M11-022	**Ritter M11 Ultraclave** *(115 VAC)*	**RV** & **V**	**X**	**X**	**X**	**X**	**X**	115	12	50/60
M11D-020	**Midmark M11D Ultraclave** *(115 VAC)*	**RY** & **V**	**X**	**X**	**X**	**X**	**X**	115	12	50/60
M11D-022	**Ritter M11D Ultraclave** *(115 VAC)*	**RZ** & **V**	**X**	**X**	**X**	**X**	**X**	230	12	50/60

UL61010A-1 C UL US LISTED LABORATORY EQUIPMENT 59FM

General Information

Cycle Parameters

This table shows the temperature / pressure / time parameters for the pre-set cycles.

Cycle	Chamber Temperature *(minimum)*	Chamber Pressure *(minimum)*	Sterilization Mode Time	Dry Mode Time*
 **Unwrapped**	270°F (132°C)	27.1 psi (186 kPa)	3 minutes	30 minutes*
 **Pouches**	270°F (132°C)	27.1 psi (186 kPa)	5 minutes	30 minutes*
 **Packs**	250°F (121°C)	15 psi (104 kPa)	30 minutes	30 minutes*
 **Handpieces**	270°F (132°C)	27.1 psi (186 kPa)	6 minutes	30 minutes*

* *Dry Mode Time can be adjusted from 0 to 60 minutes*

Special Tools

This table lists all special tools needed to diagnose and repair the sterilizer.

Special Tool	Manfacturer	Part Number	Purpose of Tool
Digital Multimeter	Commercially available	any type	To perform continuity / voltage checks
Digital Thermometer	Commercially available	any type	To verify chamber temperature
Pressure Gauge Test Harness	Midmark Corporation	002-0372-00	To check chamber pressure during cycle

Warranty Information

SCOPE OF WARRANTY

Midmark Corporation (“Midmark”) warrants to the original purchaser its new Alternate Care products and components (except for components not warranted under “Exclusions”) manufactured by Midmark to be free from defects in material and workmanship under normal use and service. Midmark’s obligation under this warranty is limited to the repair or replacement, at Midmark’s option, of the parts or the products the defects of which are reported to Midmark within the applicable warranty period and which, upon examination by Midmark, prove to be defective.

APPLICABLE WARRANTY PERIOD

The applicable warranty period, measured from the date of delivery to the original user, shall be one (1) year for all warranted products and components.

EXCLUSIONS

This warranty does not cover and Midmark shall not be liable for the following: (1) repairs and replacements because of misuse, abuse, negligence, alteration, accident, freight damage, or tampering; (2) products which are not installed, used, and properly cleaned as required in the Midmark “Installation” and or “Installation / Operation Manual for this applicable product. (3) products considered to be of a consumable nature; (4) accessories or parts not manufactured by Midmark; (5) charges by anyone for adjustments, repairs, replacement parts, installation, or other work performed upon or in connection with such products which is not expressly authorized in writing in advance by Midmark.

EXCLUSIVE REMEDY

Midmark’s only obligation under this warranty is the repair or replacement of defective parts. Midmark shall not be liable for any direct, special, indirect, incidental, exemplary, or consequen tial damages or delay, including, but not limited to, damages for loss of profits or loss of use.

NO AUTHORIZATION

No person or firm is authorized to create for Midmark any other obligation or liability in connection with the products.

THIS WARRANTY IS MIDMARK’S ONLY WARRANTY AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED. MIDMARK MAKES NO IMPLIED WARRANTIES OF ANY KIND INCLUDING ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. THIS WARRANTY IS LIMITED TO THE REPAIR OR REPLACE MENT OF DEFECTIVE PARTS.

SF-1487 REV. A1

Additional Information

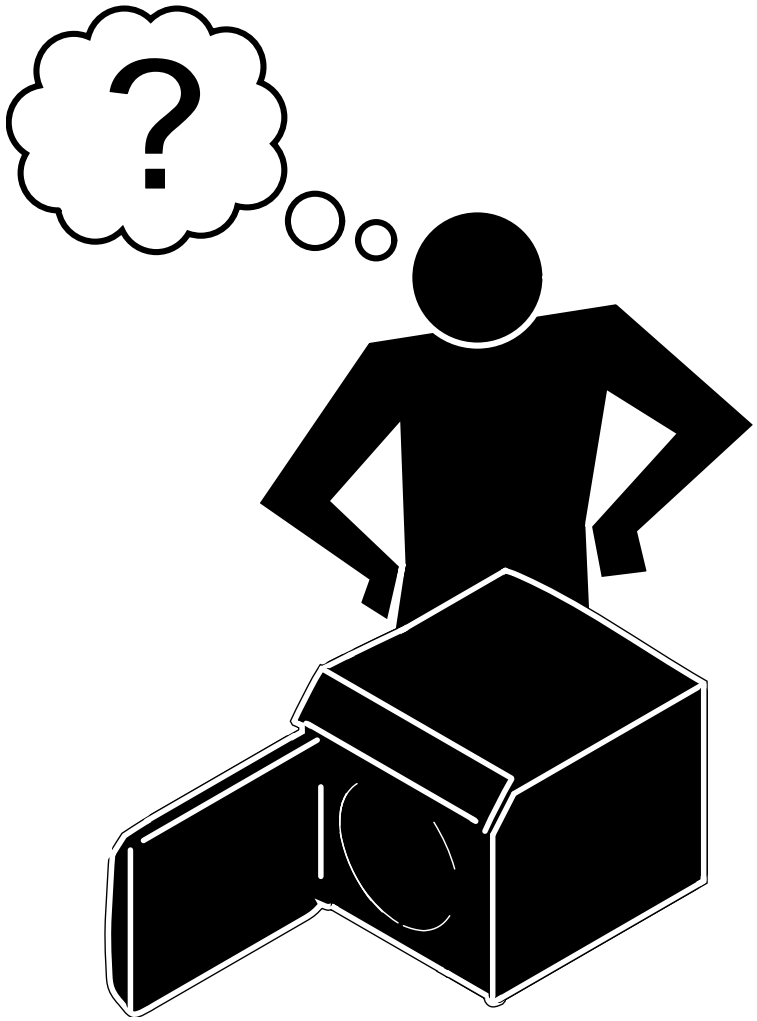
Failure to follow the guidelines listed below will void the warranty and/or render the sterilizer unsafe for use.

- If a malfunction is detected, do not use the sterilizer until necessary repairs are made.
- Do not attempt to disassemble sterilizer, replace components, or perform adjustments unless you are a Midmark authorized service technician.
- Do not use another manufacturer's parts to replace malfunctioning components. Use only Midmark replacement parts

Go To Table Of Contents

Section A

Operation & Troubleshooting



To search for a specific error code, click on the button below then type in error code.
[ex. Cxxx]

Find Error Code

Operation & Troubleshooting

Error Codes

If an electronic malfunction is detected during a cycle, a numeric error code will appear on the display panel. Each digit in the error code provides information about the problem that occurred.

Example:

First Digit = Where?
The first digit indicates the component or system where the problem occurred.
*(example: **3** = Door Switch)*

Second Digit = What?
The second digit indicates what problem or symptom was detected.
*(example: **8** = Open)*

Third Digit = When?
The third digit indicates when the problem was detected.
*(example: **2** = Fill Mode)*

The table below cross-references the numeric error code with the Component, Problem, and Mode.

First Digit (Component)	***Second Digit (Problem)***	***Third Digit (Mode)***
0= General System	**0** (not used)	**0**= Power-Up Mode
1= Stop Button	**1**= Power Loss	**1**= Select Cycle
2= Water Level Sensor	**2**= Closed	**2**= Fill Mode
3= Door Switch	**3**= Low	**3**= Heat-Up Mode
4 (not used)	**4**= High	**4**= Sterilizing Mode
5= Temperature Sensor	**5**= (not used)	**5**= Vent
6= Pressure Sensor	**6**= Hardware	**6**= *"Door To Open"*
7 (not used)	**7**= Over Limit	**7**= Dry
8 (not used)	**8**=Open	**8** (not used)
9= High Limit Thermostat	**9** (not used)	**9** (not used)

Troubleshooting
[Error Codes]

Go To Page:

To search for a specific error code, click on the button below then type in error code.
[ex. Cxxx]

Find Error Code

Operation & Troubleshooting

Error Codes: C010 / C060

Problem: Power interruption

C010

- Press stop to restart.

1st ✓ Check power cord connections at wall outlet and on back of sterilizer..

2nd ✓ Check if sterilizer is plugged into a dedicated 15 amp circuit.

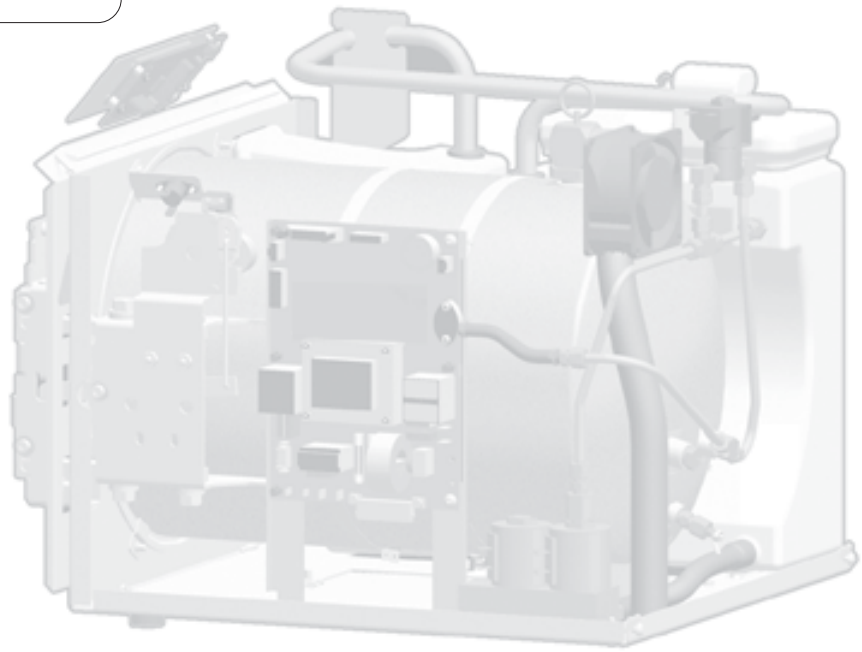
C060

- Unplug and re-plug unit.

(Unplug sterilizer for a full 60 seconds.)

1st ✓ Check power cord connections at wall outlet and on back of sterilizer.

2nd ✓ Check if sterilizer is plugged into a dedicated 15 amp circuit.



Refer To: **Go To Page:**

Models:	ALL			
Serial Numbers:				

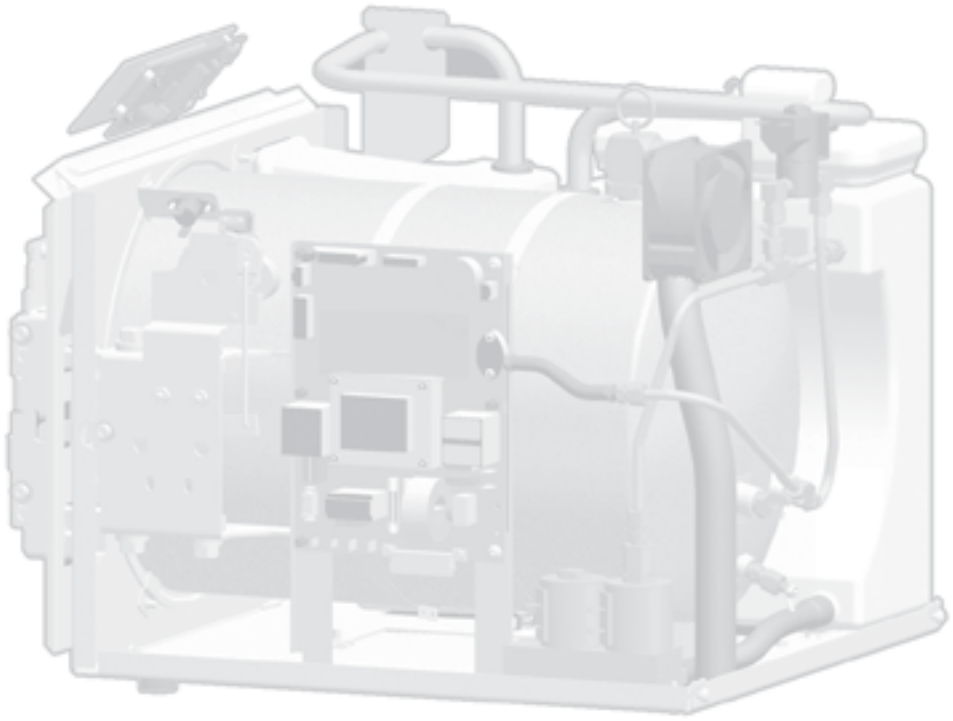
Error Codes

Operation & Troubleshooting

Error Code: C099

Problem: None. *[This code was generated during testing at the factory]*

Ignore this error code.
(Push STOP to restart)

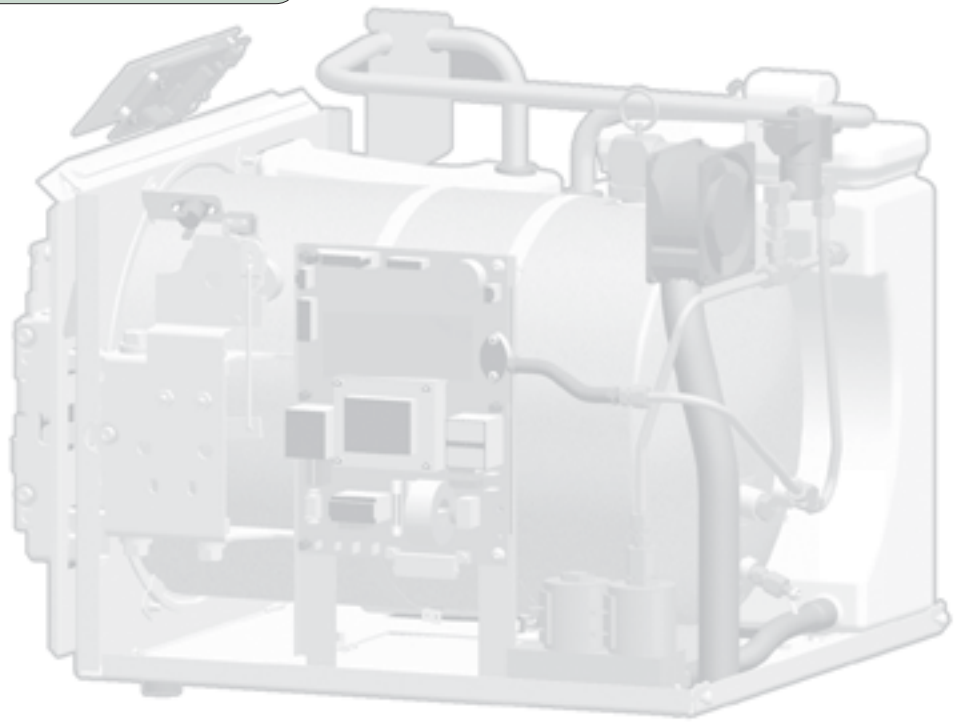


Operation & Troubleshooting

Error Codes: C100 Series (all)

Problem: *STOP button was pressed during a cycle.*

Explain proper operation to users. *1st* ✓
(Push STOP button to restart)



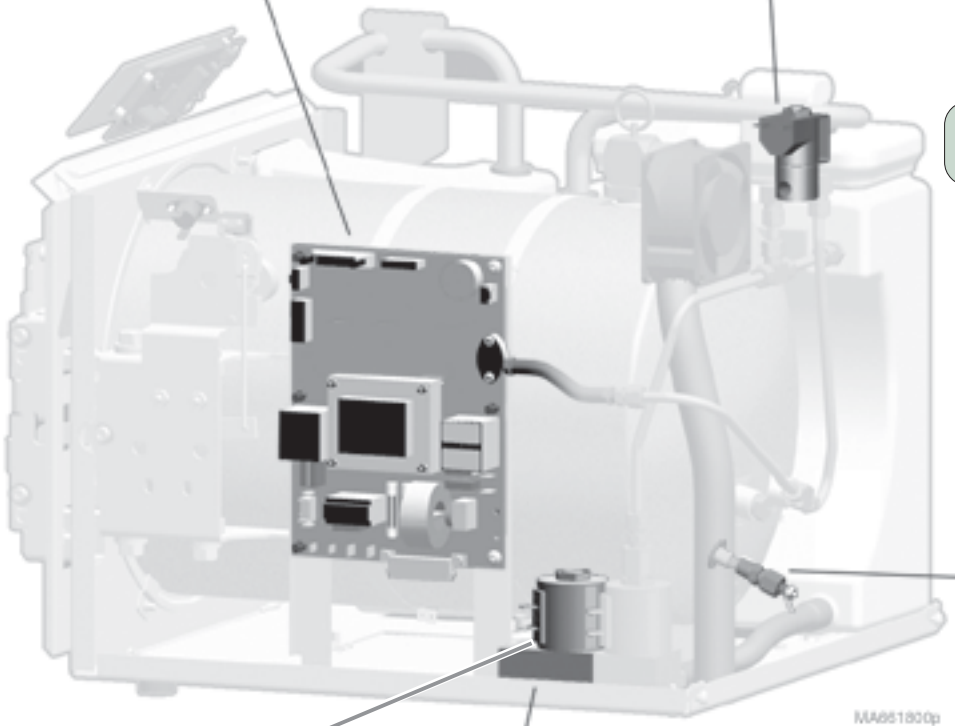
Models: ALL
Serial Numbers:

Error Codes

Operation & Troubleshooting

Error Codes: C200 Series (all)

Problem: *Water level sensor did not detect a full chamber within 5 minutes of starting the cycle.*



Main PC Board — 6th ✓

Air Valve — 5th ✓

Low water in reservoir? — 1st ✓
(Add water if necessary)

Water Level Sensor — 3rd ✓

Chamber Filter — 2nd ✓
Remove filter & clean using SpeedClean and a brush.

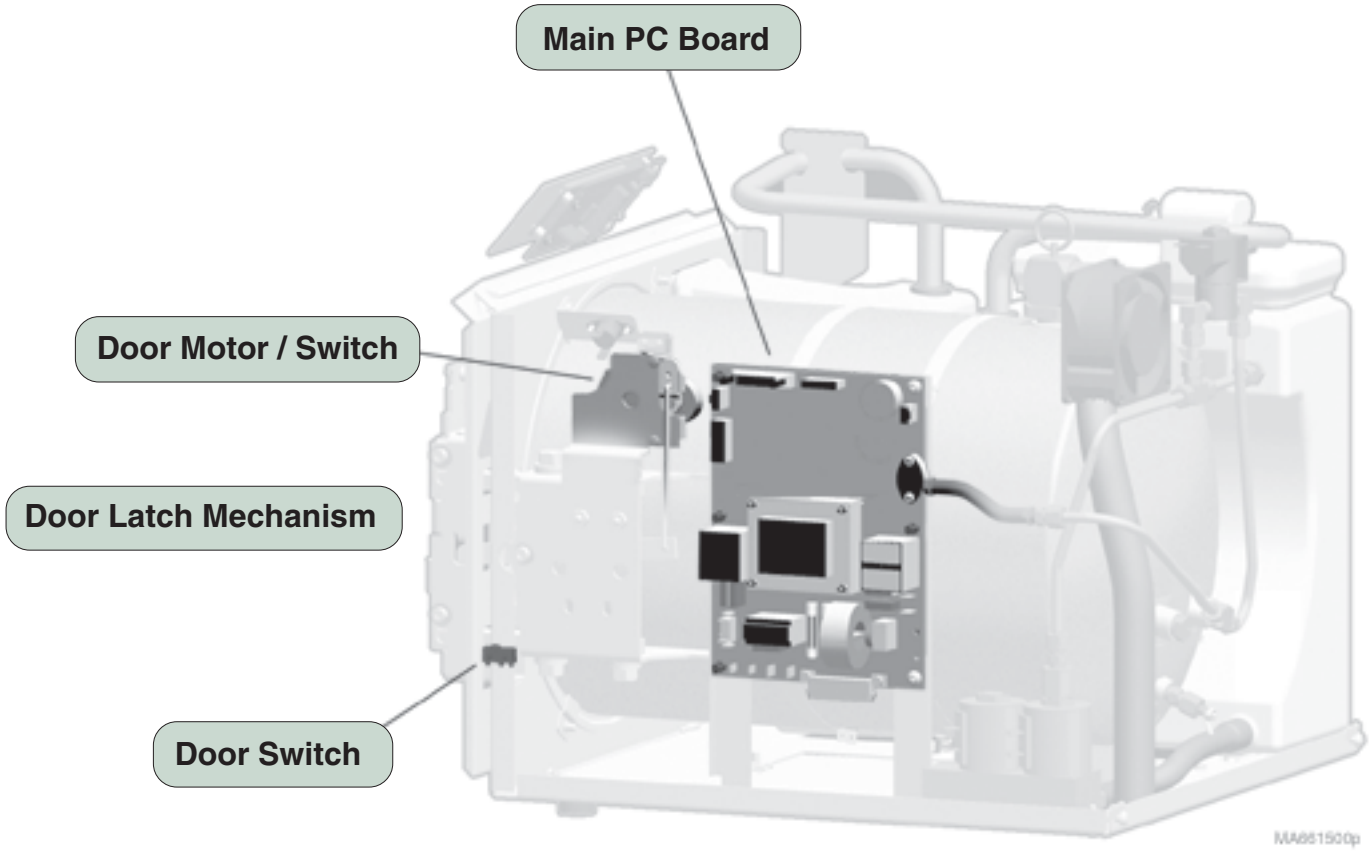
Fill Valve — 4th ✓
Check all wire connections. Test the valve if necessary.

Operation & Troubleshooting

Error Codes: C300 Series (all)

Problem: *PC board detected open door switch contacts during a cycle.* ***-or-***
Door switch contacts remained closed after door motor shut off.

Refer To: **Go To Page:**



C326

- *If door is open...*
  - *1st ✓ Door Switch*
  - *2nd ✓ Main PC Board*
- ***If door is closed...***
  - *1st ✓ Door Latch Mechanism*
  - *2nd ✓ Door Motor / Switch*

C382 / C383 / C384

- *If door is open...*
  - *1st ✓ Improper operation.*
    (Do not open door during cycle)
- *If door is closed...*
  - *1st ✓ Door Switch*

Models: / ***Serial Numbers:***	ALL			

Error Codes

Operation & Troubleshooting

Error Codes: C500 Series (all)

Problem: Chamber temperature reading was not within the acceptable range for the current cycle.

Attention:

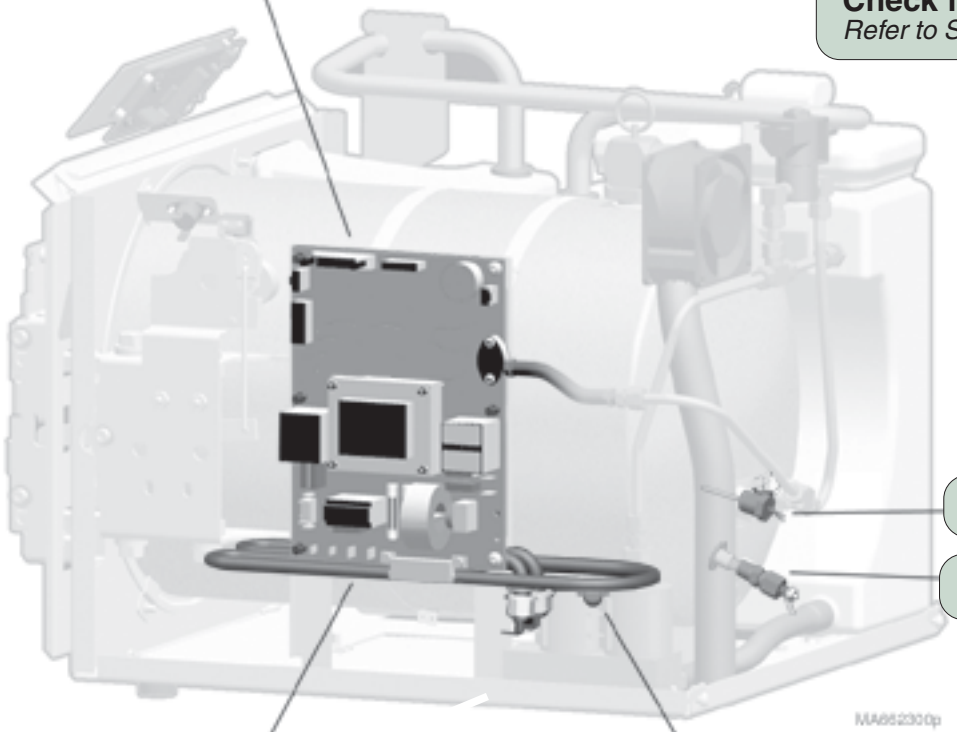
C560 & C570 *indicate a power interruption occurred after an error code was displayed.*

When these errors appear, always check the five previous error codes.
[Refer to Section B: Service Diagnostics]

Is sterilizer level? 1st ✓
Adjust leveling feet as necessary.

Main PC Board 7th ✓

Check for pressure leaks. 2nd ✓
Refer to Section B for checkpoints.



Temperature Sensor 4th ✓

Water Level Sensor 5th ✓

Heating Element 6th ✓

Chamber Filter 3rd ✓
Remove filter & clean using SpeedClean and a brush.

Error Codes

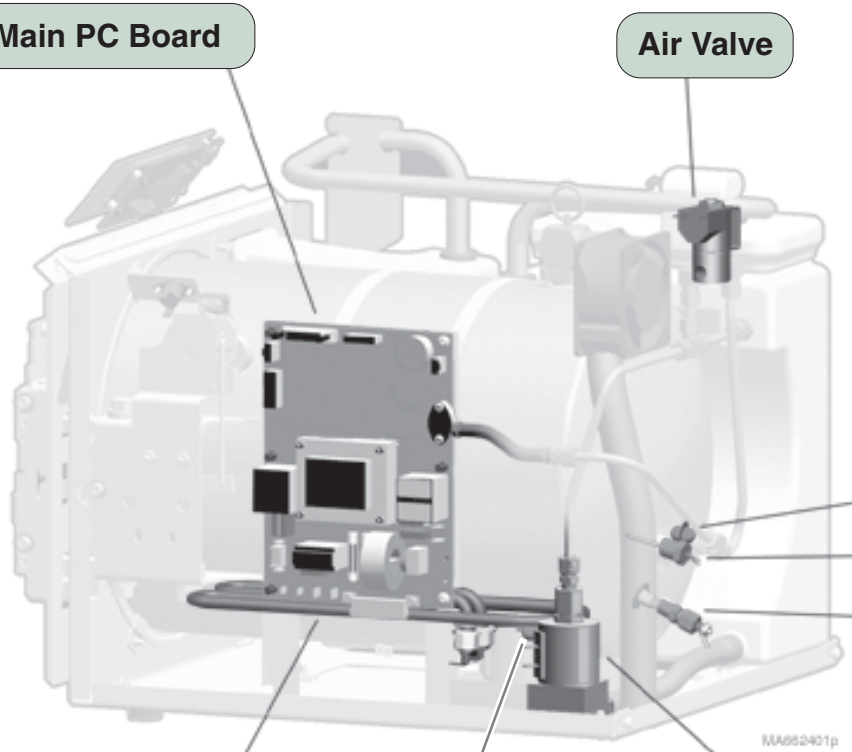
Models: ALL
Serial Numbers:

Operation & Troubleshooting

Error Codes: C600 Series (all)

Problem: *Chamber pressure reading was not within the acceptable range for the current cycle.*

Check for pressure leaks.
Refer to Section B for checkpoints.



Low Pressure Error
(C633)

1st ✓ Pressure Leaks
2nd ✓ Water Level Sensor
3rd ✓ Heating Element
4th ✓ Main PC Board

High Pressure Errors
(C645 / C647 / C671 / C675 / C677)

1st ✓ Vent Valve
2nd ✓ Chamber Filters
3rd ✓ Main PC Board

(C672 / C673 / C674)

1st ✓ Air Valve
2nd ✓ Main PC Board

Hardware Errors
(C661 / C662 / C663 / C664 / C665 / C667)

1st ✓ Main PC Board

Attention:
C660 & C670 *indicate a power interruption occurred after an error code was displayed.*

When these errors appear, always check the five previous error codes.
[Refer to Section B: Service Diagnostics]

Models:	***ALL***			
Serial Numbers:				

Error Codes

Operation & Troubleshooting

Error Codes: C900 Series (all)

Problem: *High-limit thermostat contacts opened during cycle.*

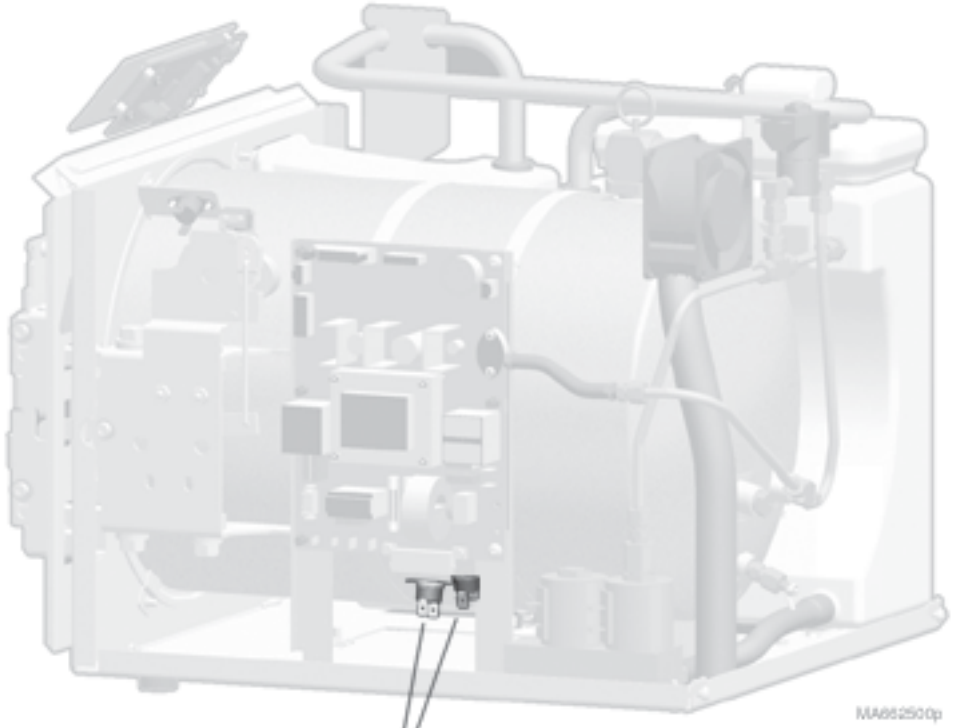
Attention:

C980 *indicates a power interruption occurred after an error code was displayed.*

When this error appears, always check the five previous error codes.
[Refer to Section B: Service Diagnostics]

Is the sterlizer overloaded? *1st* ✓
Reduce load size.

Check for pressure leaks. *4th* ✓
Refer to Section B for checkpoints.



Check if unit skips Fill Cycle . *2nd* ✓
Dry and test water level sensor.

Is sterilizer level? *3rd* ✓
Adjust leveling feet as necessary.

High-Limit Thermostats *5th* ✓

Error Codes

Models: ***ALL***
Serial Numbers:

Operation & Troubleshooting

Power-Up Mode

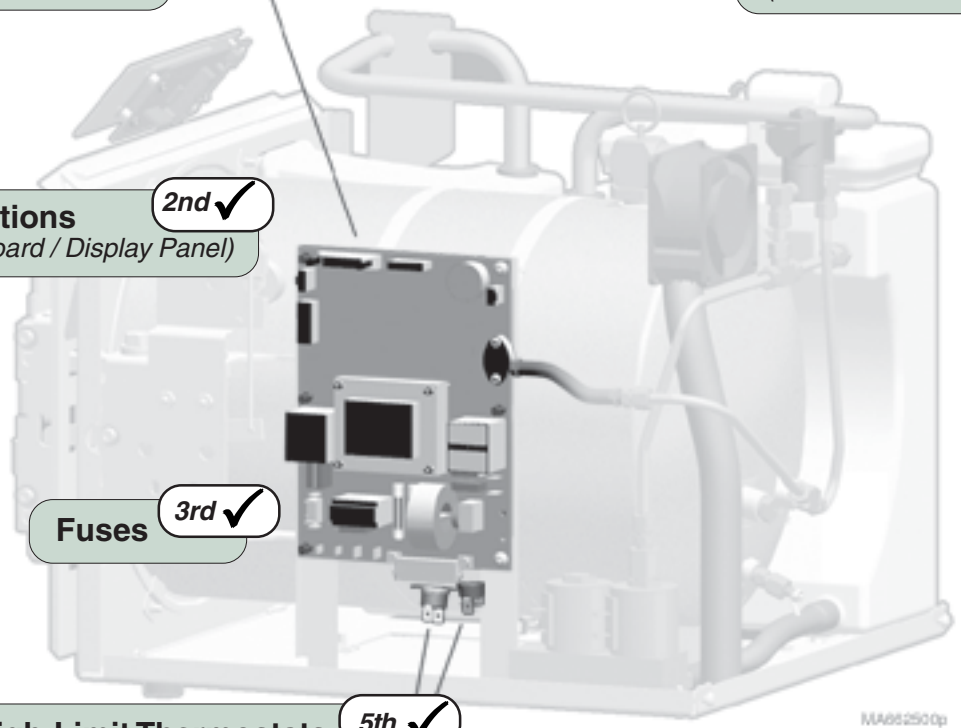
Problem: *Display panel is blank.*
Touch pad does not work.

Main PC Board — 6th ✓

Display Panel — 4th ✓

Check supply voltage. — 1st ✓
(Power cord connection, facility circuit breaker, etc.)

Loose / Damaged Wire Connections — 2nd ✓
(Ribbon connector between Main PC Board / Display Panel)



Fuses — 3rd ✓

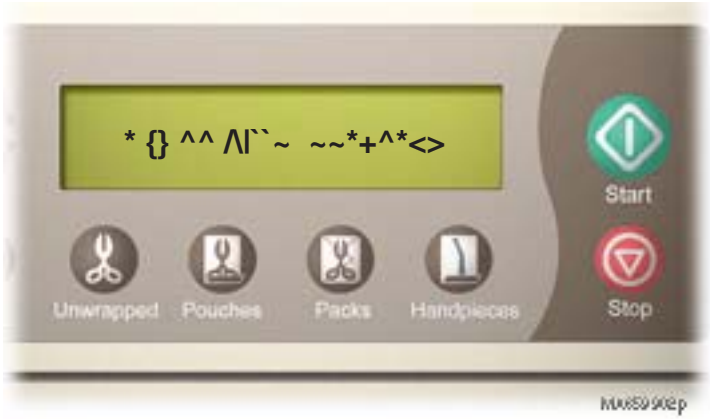
High-Limit Thermostats — 5th ✓

Models:	ALL			
Serial Numbers:				

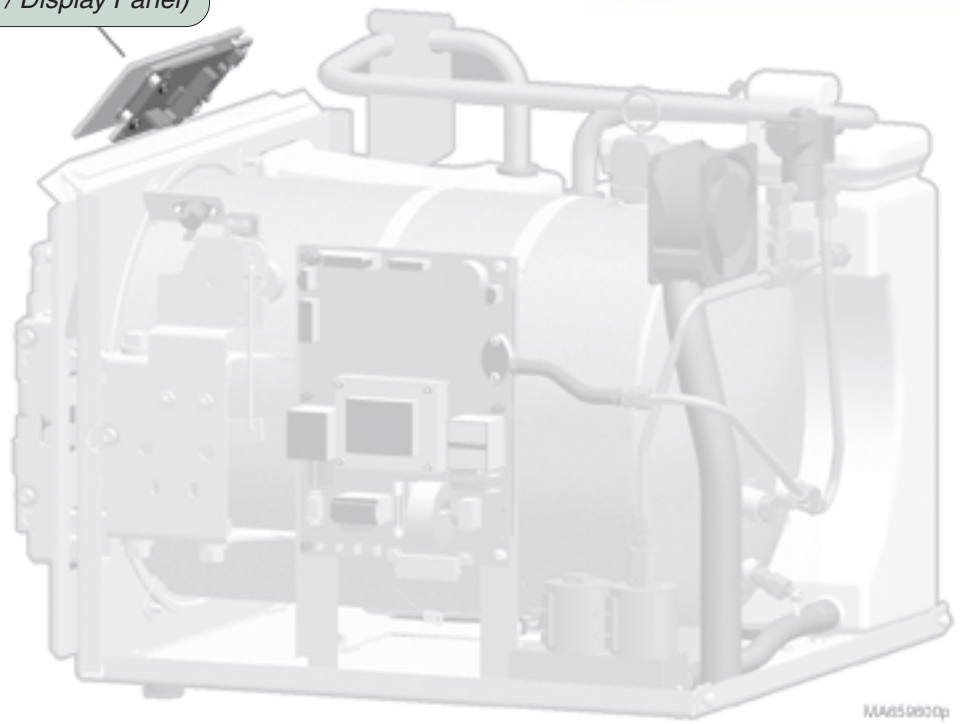
Operation & Troubleshooting

Power-Up Mode

Problem: *"Foreign" characters appear on the display panel. Touch pad works properly. ["Beeps" continuously]*



Loose / Damaged Wire Connections — *1st ✓*
(Ribbon connector between Display PC Board / Display Panel)



Operation & Troubleshooting

Sterilization Mode

Problem: *Biological test strips indicate items are not sterile.*
[No error code appears on display]

Type / condition of indicator strips — 1st ✓

This unit requires test strips rated for:
Gravity Displacement Steam Sterilizers

Test strips must be stored in a cool, dry location.
Failure to do so will result in faulty readings.

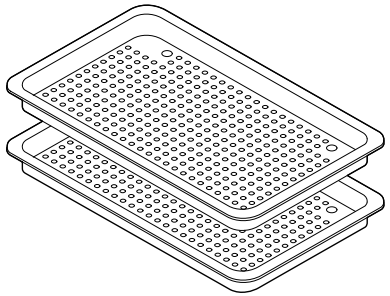
(Follow all instructions provided with test strips)

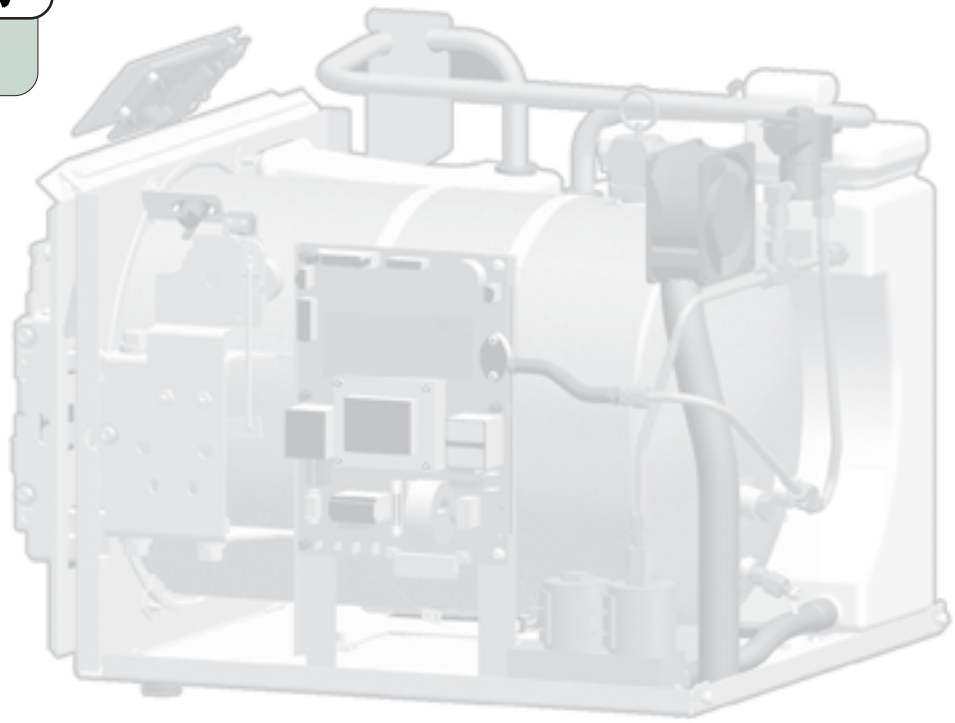
Is the sterlizer overloaded? — 2nd ✓

Large loads or heavy linen packs may prevent strips from changing.

Are the correct trays being used? — 3rd ✓

Some trays may prevent proper air flow.
Be sure trays are designed for this sterilizer.





Models: ALL
Serial Numbers:

Troubleshooting

Operation & Troubleshooting

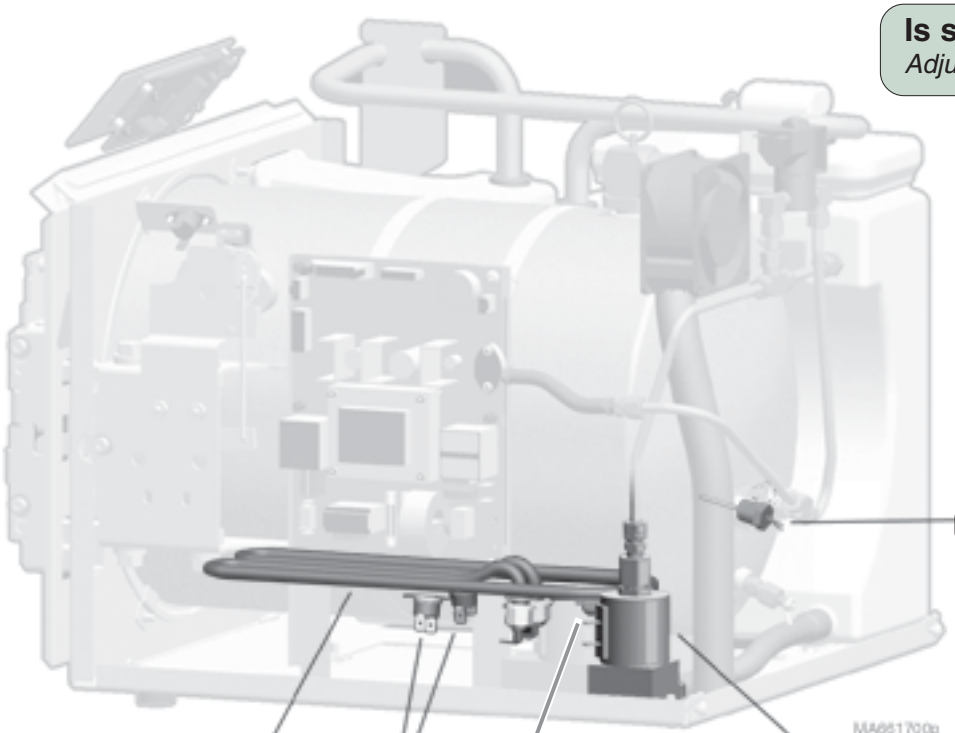
Drying Mode

Problem: *Instruments are still wet after Drying Mode.* ***-or-***
Packs are burning during Dry Mode.

Improper Operation — 1st ✓
Sterilizer may be overloaded.
Door must remain partially open during Dry Mode.
(If door is closed, or fully opened, items may not dry properly)

Is sterilizer level? — 2nd ✓
Adjust leveling feet as necessary.

Adjust Drying Time — 4th ✓
Refer to Section B: Adjusting the Dry Time



Temperature Probe — 8th ✓

Heating Element — 7th ✓

High-Limit Thermostat(s) — 6th ✓

Vent Valve — 5th ✓

Chamber Filter — 3rd ✓
Remove filter & clean using SpeedClean and a brush.

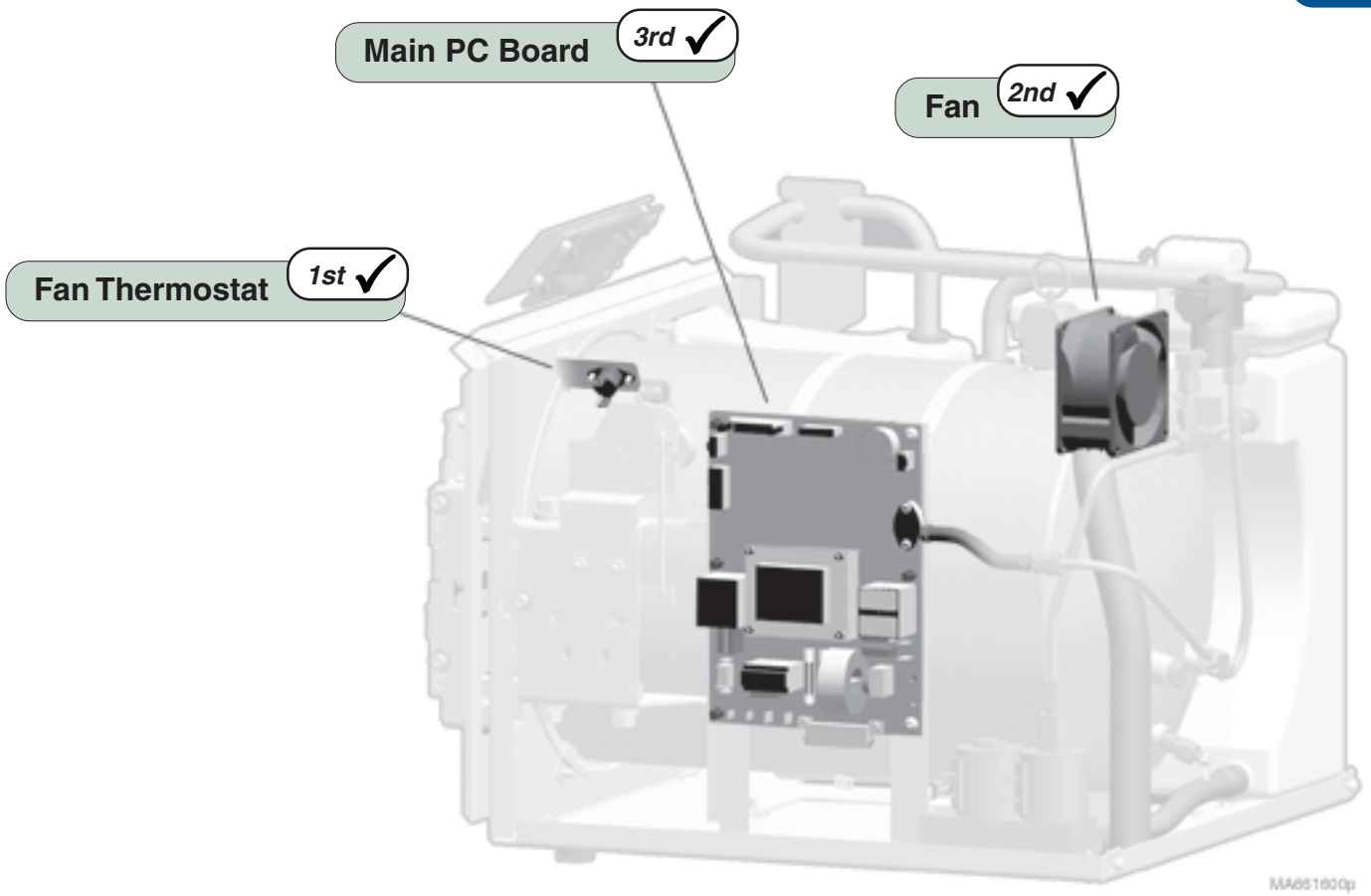
Troubleshooting

Models: ALL
Serial Numbers:

Operation & Troubleshooting

Fan System

Problem: *Fan does not run when temperature exceeds 130°F.* ***-or-***
Fan continues to run after temperature drops below 100°F.



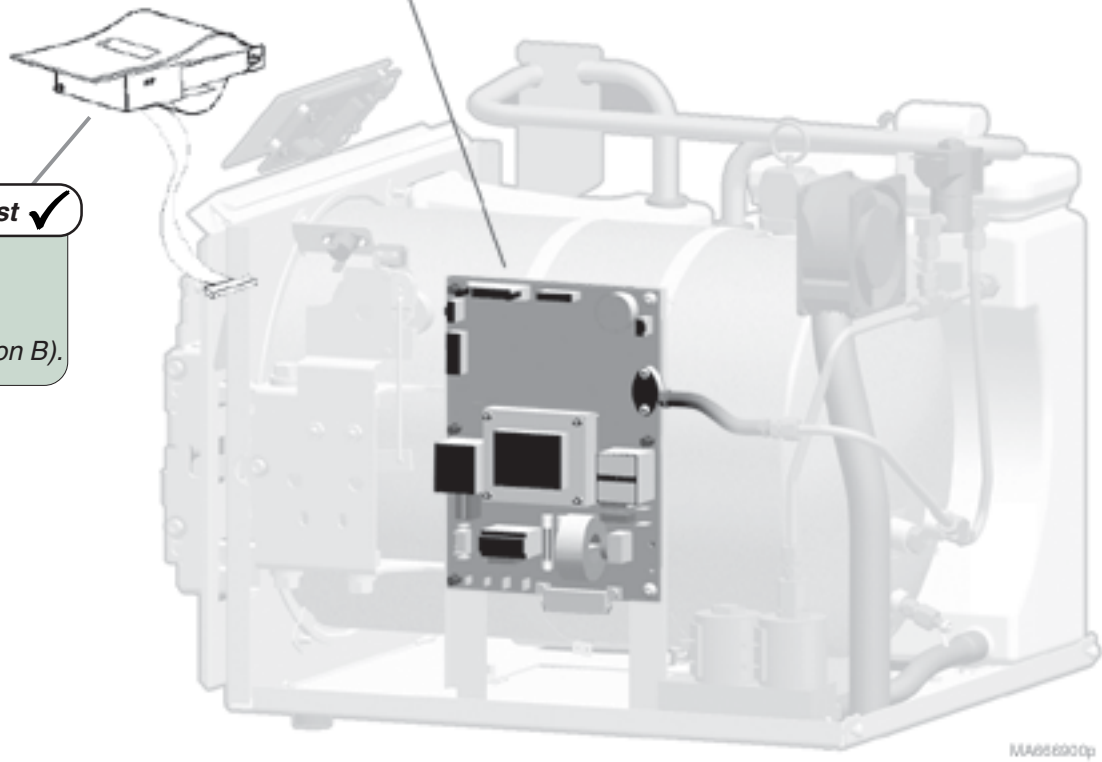
Operation & Troubleshooting

Printer (optional)

Problem: *Printer does not generate a print-out.*

Refer To: **Go To Page:**

Main PC Board *2nd* ✓



Printer *1st* ✓

Check the following:

- *Printer paper*
- *Ink cartridge*
- *Ribbon harness connections*

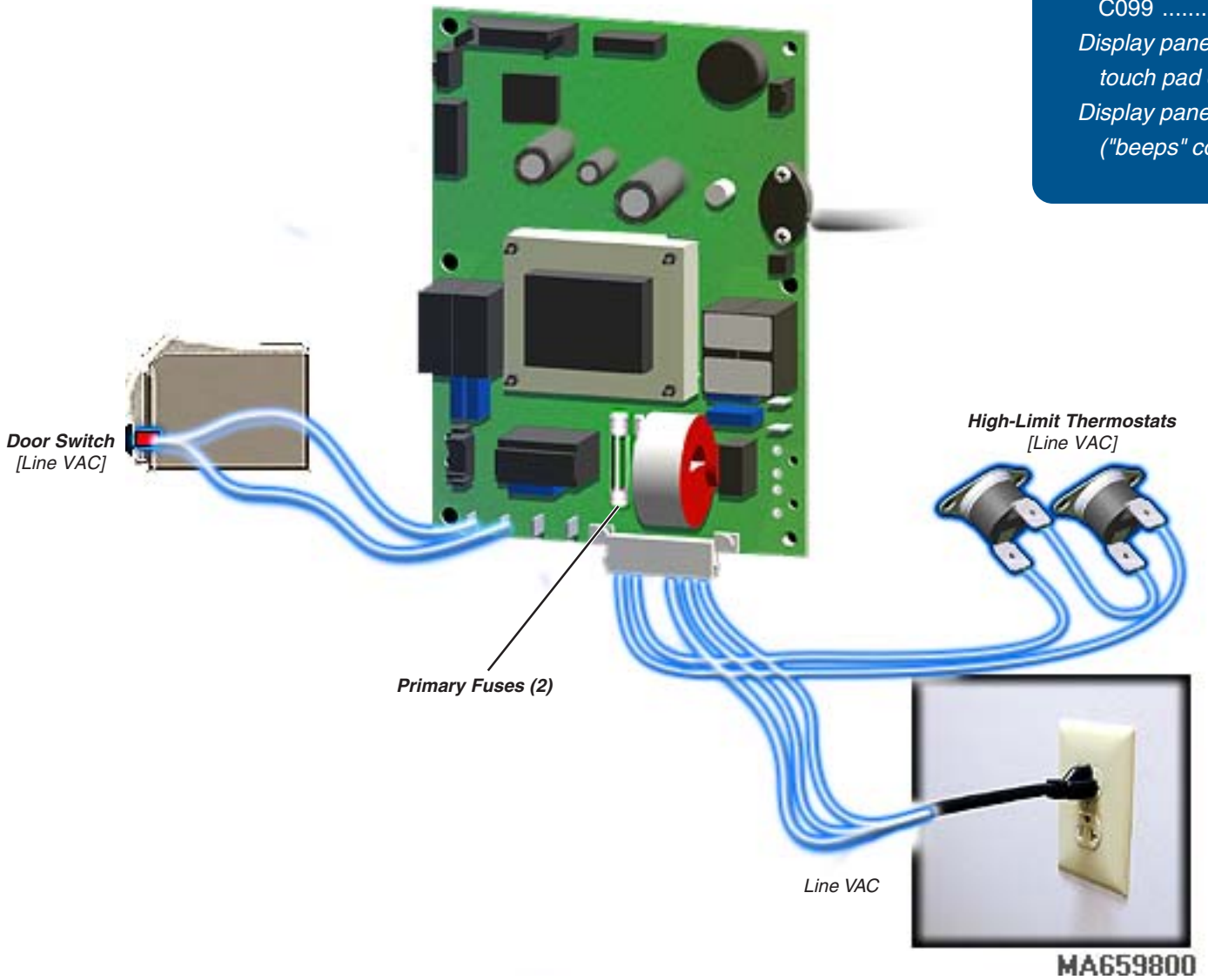
If necessary, perform Printer Test (Section B).

This page intentionally left blank

Operation & Troubleshooting

Power-Up Mode

This illustration shows the components that affect, or are monitored during all cycle modes. Refer to the following page for a detailed description of the Power-Up Mode.



Troubleshooting
[Power-Up Mode]

Problem:	**Go To Page:**
Error Codes:	
C010	A-3
C060	A-3
C099	A-4
Display panel is blank, & touch pad does not work	A-11
Display panel shows foreign characters ("beeps" continuously)	A-12

Power-Up Mode

Primary Fuses
With the sterilizer's power cord properly connected, facility supply voltage is supplied to the Main PC Board thru the two primary fuses.

If either fuse is faulty, the sterilizer will have no power.

High-Limit Thermostats
When power is supplied to the Main PC Board, current continuously flows thru the two *(normally closed)* High-Limit Thermostats. This circuit powers all line voltage components *(except Fan System)*.

If either thermostat opens for any reason *(overheat or malfunction),* the sterilizer will shut down until unit cools, or thermostat is replaced.

Door Switch
Once a cycle is initiated, the Main PC Board continuously monitors the status of the Door Switch.

If an open door is detected, the cycle will not start. If the door switch opens during a cycle, the cycle will be terminated and the corresponding error code will appear in the display.

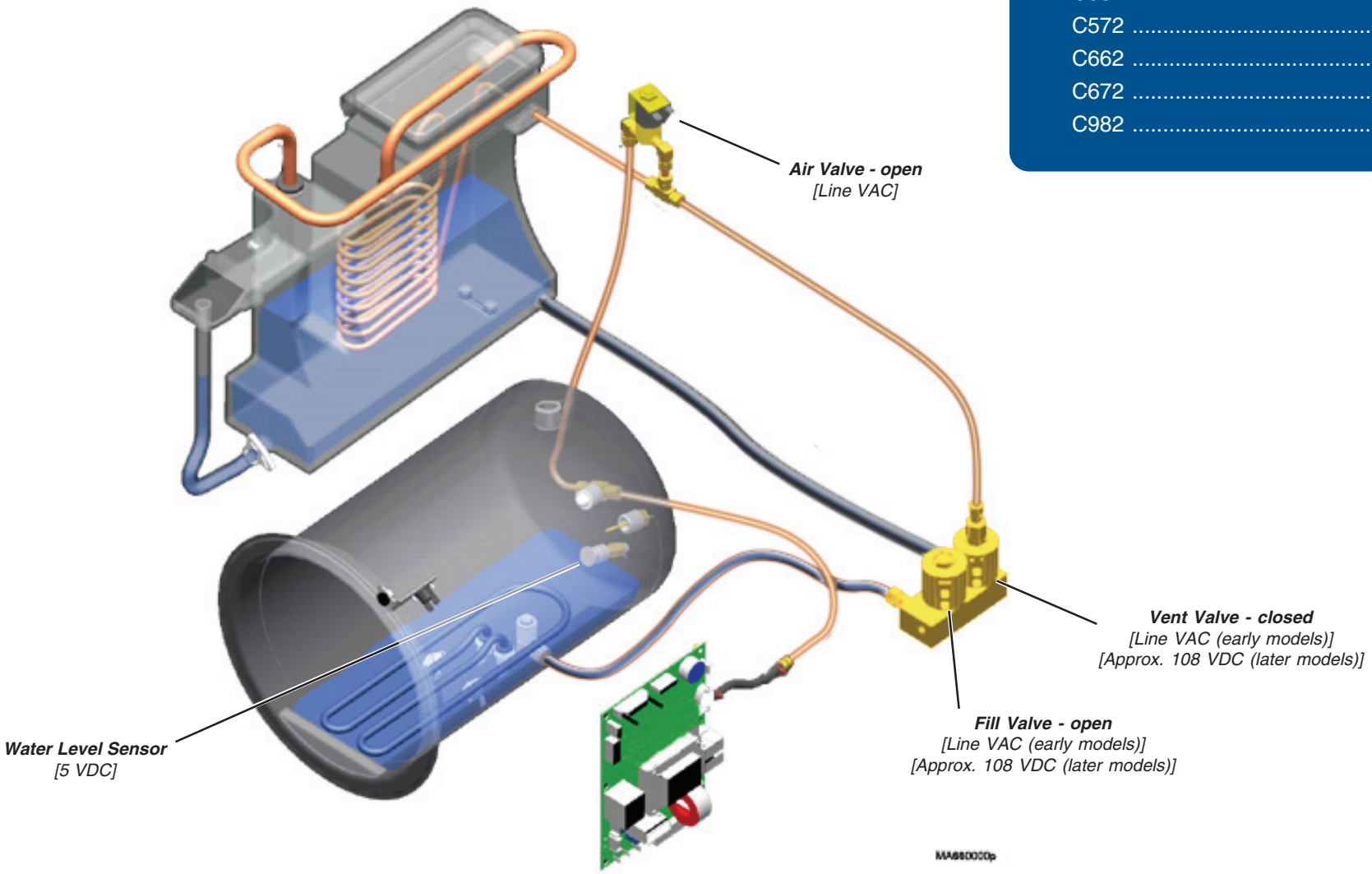
Each time power is reconnected, the display panel will show:

Operation & Troubleshooting

Fill Mode

This illustration calls out the components that are energized / monitored during the Fill Mode. Refer to the following page for a detailed description of the Fill Mode.

*[Refer to to **Main Power System** for components that are continually monitored during all modes]*



Troubleshooting
[Fill Mode]

Error Codes — **Go To Page:**

Fill Mode

During the Fill Mode, water flows from the reservoir, thru the fill valve into the chamber.

*[All electrical current is supplied thru the two high-limit thermostats (on bottom of chamber). Refer to '**Power-Up Mode**', for further detail].*

Air Valve
Throughout the Fill Mode, line voltage is supplied to the *(normally closed)* air valve. When energized, the air valve opens. *[This allows air to pass thru the valve so that water can flow from the reservoir].*

Vent Valve
Throughout the Fill Mode, voltage is supplied to the *(normally open)* vent valve. When energized, the vent valve closes. *[This prevents water from flowing back into the reservoir thru the vent valve].*

Fill Valve
During the Fill Mode, voltage is supplied to the *(normally closed)* fill valve. When energized, the fill valve opens allowing water to flow into the chamber.

When the water level in the chamber reaches the water level sensor, the PC Board stops the current flow to the fill valve. This allows the valve to close, stopping the flow of water into the chamber.

During the Fill Mode, the display panel will show:

Water Level Sensor
Throughout the Fill Mode, 5 VDC is supplied to the water level sensor. When the water level in the chamber reaches the sensor, a circuit is completed and current flows back to the PC Board.

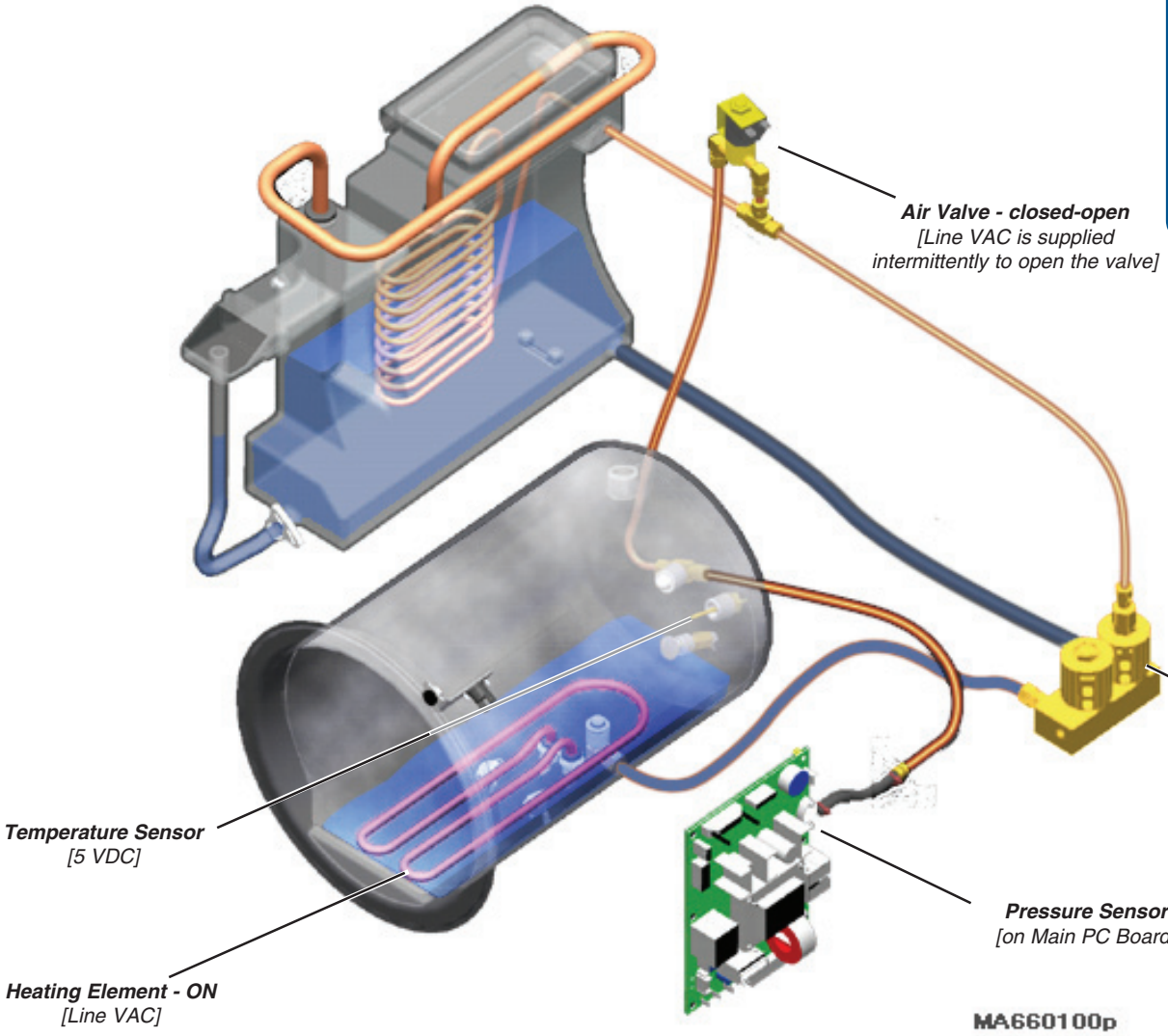
When the 5 VDC from the water level sensor is detected, the PC Board stops the current flow to the fill valve.

Operation & Troubleshooting

Heat-Up Mode

This illustration calls out the components that are energized / monitored during the Heat-Up Mode. Refer to the following page for a detailed description of the Heat-Up Mode.

*[Refer to to **Main Power System** for components that are continually monitored during all modes]*



Troubleshooting
[Heat-Up Mode]

Error Codes	Go To Page:
C103	A-5
C383	A-7
C533	A-8
C563	A-8
C573	A-8
C633	A-9
C663	A-9
C673	A-9
C983	A-10

Heat-Up Mode

Models: ALL
Serial Numbers:

Heat-Up Mode

During the Heat-Up Mode, the water in the chamber is heated to achieve the proper temperature for sterilization.

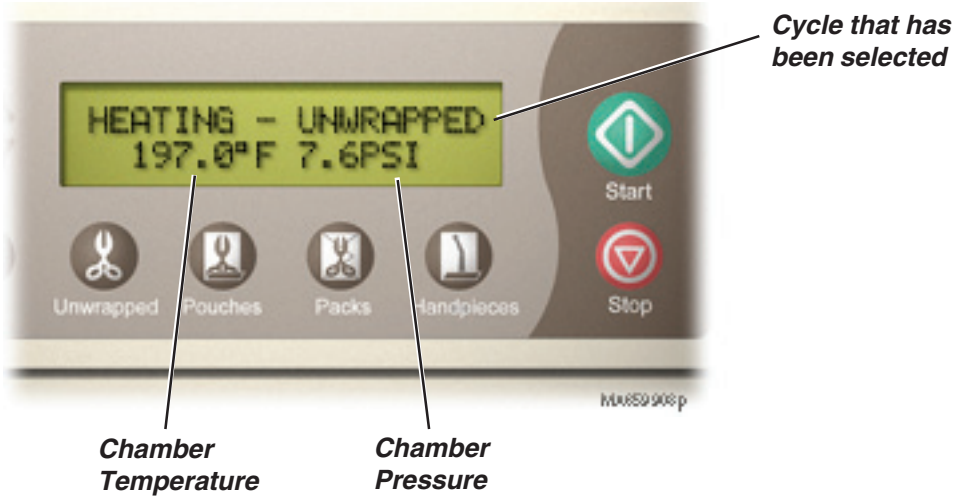
*[All electrical current is supplied thru the two high-limit thermostats (on bottom of chamber). Refer to '**Power-Up Mode**', for further detail].*

Heating Element
Throughout the Heat-Up Mode, line voltage is continually supplied to the heating element. The heating element heats the water in the chamber until sterilzation temperature is achieved.

Vent Valve
Throughout the Heat-Up Mode, voltage is supplied to the *(normally open)* vent valve. When energized, the vent valve closes. *[This prevents water from flowing back into the reservoir thru the vent valve].*

Air Valve
Periodically during the Heat-Up Mode, line voltage is supplied to the *(normally closed)* air valve. When energized, the air valve opens. *[This occurs three times during this mode to expel air from the chamber.]*

During the Heat-Up Mode, the display panel will show:



Temperature Sensor & Pressure Sensor
The temperature sensor *(inside chamber)* & pressure sensor *(on Main PC Board)* monitor the temperature & pressure conditions inside the chamber.

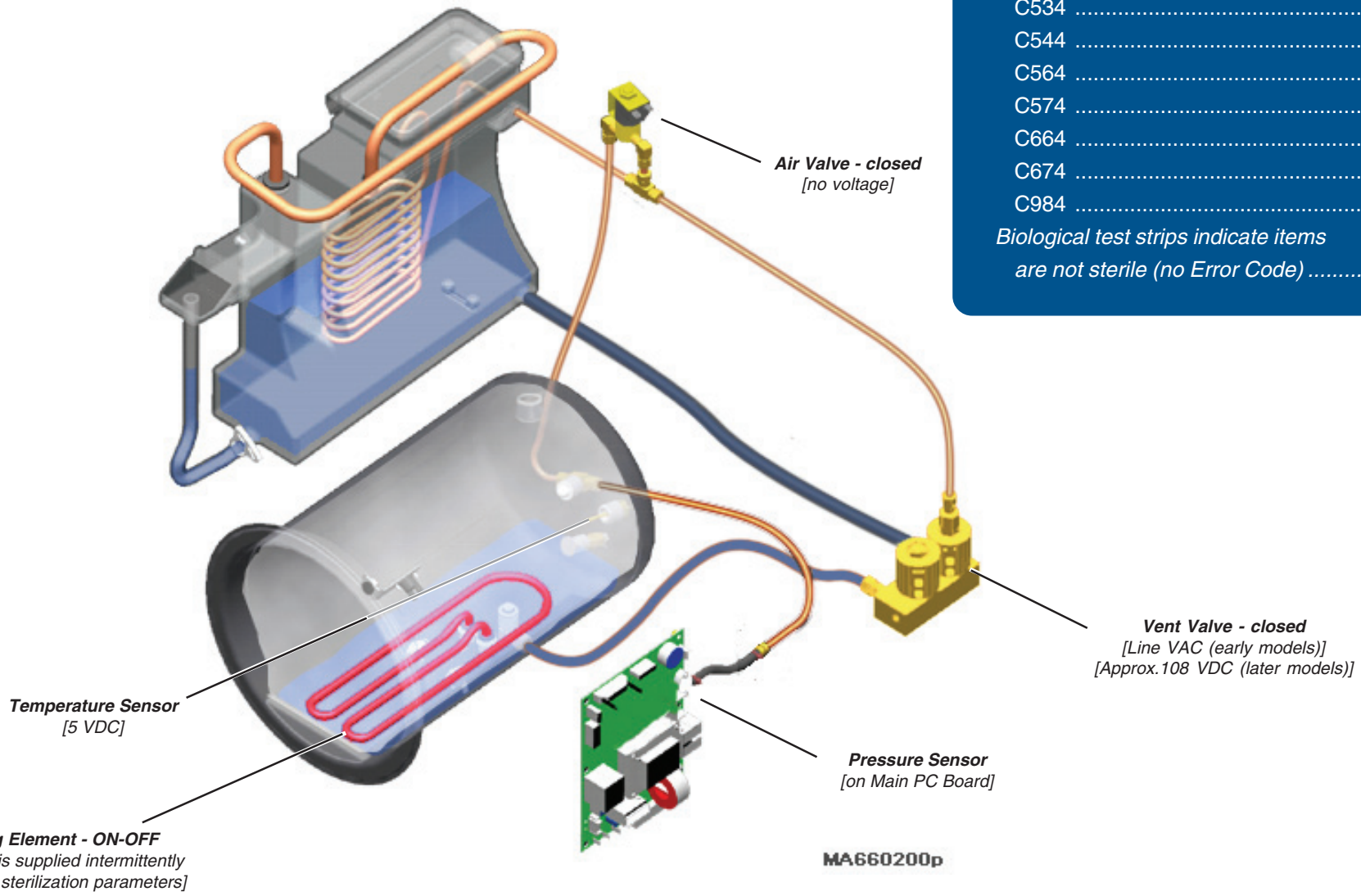
When the pre-set sterilization conditions are met, the Heat-Up Mode is complete & the unit goes into the Sterilization Mode.

Operation & Troubleshooting

Sterilization Mode

This illustration calls out the components that affect the Sterilization Mode.
Refer to the following page for a detailed description of the Sterilization Mode.

*[Refer to to **Power-Up Mode** for components that are continually monitored during all modes]*



Troubleshooting
[Sterilization Mode]

Problem: **Go To Page:**

Error Codes:

Biological test strips indicate items are not sterile (no Error Code) A-13

Sterilization Mode

During the Sterilization Mode, the temperature and pressure parameters for the selected cycle are maintained for the required time.

*[All electrical current is supplied thru the two high-limit thermostats (on bottom of chamber). Refer to '**Power-Up Mode**', for further detail].*

Temperature Sensor & Pressure Sensor
The temperature sensor *(inside chamber)* & pressure sensor *(on Main PC Board)* monitor the temperature & pressure conditions inside the chamber throughout the Sterilization Mode.

Heating Element
Based on readings from the temperature sensor & pressure sensor, the heating element is cycled ON / OFF to maintain the required temperature and pressure for the selected cycle.

Vent Valve
Throughout the Sterilization Mode, voltage is supplied to the *(normally open)* vent valve. When energized, the vent valve closes.
[This prevents water from flowing back into the reservoir thru the vent valve].

Air Valve
The air valve is closed *(no voltage)* throughout the entire Sterilization Mode.
[This prevents pressure from escaping the chamber].

During the Sterilization Mode, the display panel will show:

Sterilization time counts down

Chamber Temperature

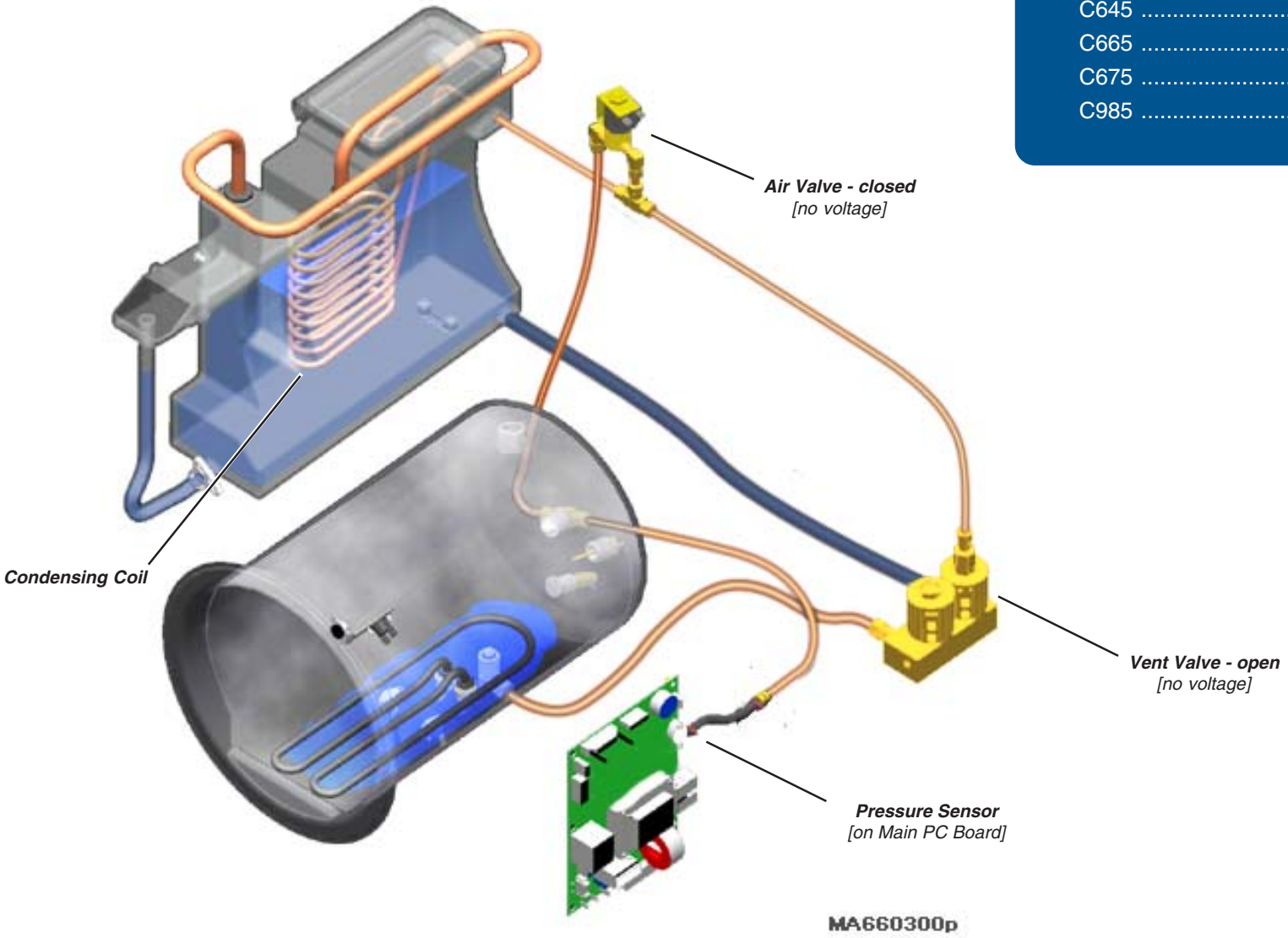
Chamber Pressure

Operation & Troubleshooting

Vent Mode

This illustration calls out the components that affect the Vent Mode.
Refer to the following page for a detailed description of the Vent Mode.

*[Refer to to **Power-Up Mode** for components that are continually monitored during all modes]*



Troubleshooting
[Vent Mode]

Error Codes — *Go To Page:*

Vent Mode

During the Vent Mode, pressure is released from the chamber. The steam cools as it passes thru the condensing coil and the water is returned to the reservoir.

*[All electrical current is supplied thru the two high-limit thermostats (on bottom of chamber). Refer to '**Power-Up Mode**', for further detail].*

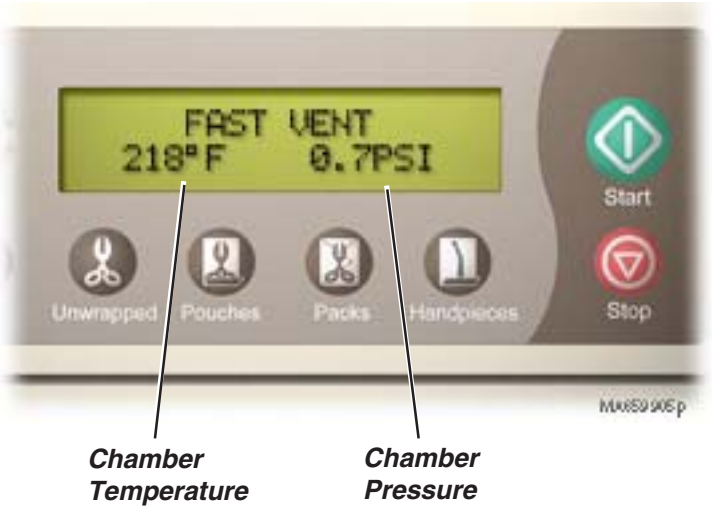
Vent Valve
During the Vent Mode, the PC Board stops the current flow to the *(normally open)* vent valve. This allow the valve to open, and the pressure *(steam)* is released from the chamber.

Condensing Coil
When the steam is released from the chamber, it passes thru the condensing coil. The coil cools the steam and returns the water back to the reservoir.

Air Valve
The air valve is closed *(no voltage)* throughout the entire Vent Mode.

Pressure Sensor
The pressure sensor *(on Main PC Board)* monitors the chamber pressure as it is released. When the pressure reaches 0.7 psi (5kPa), you will hear several *"beeps"*. This indicates the door will open in approximately 5 seconds.

During the Vent Mode, the display panel will show:



Operation & Troubleshooting

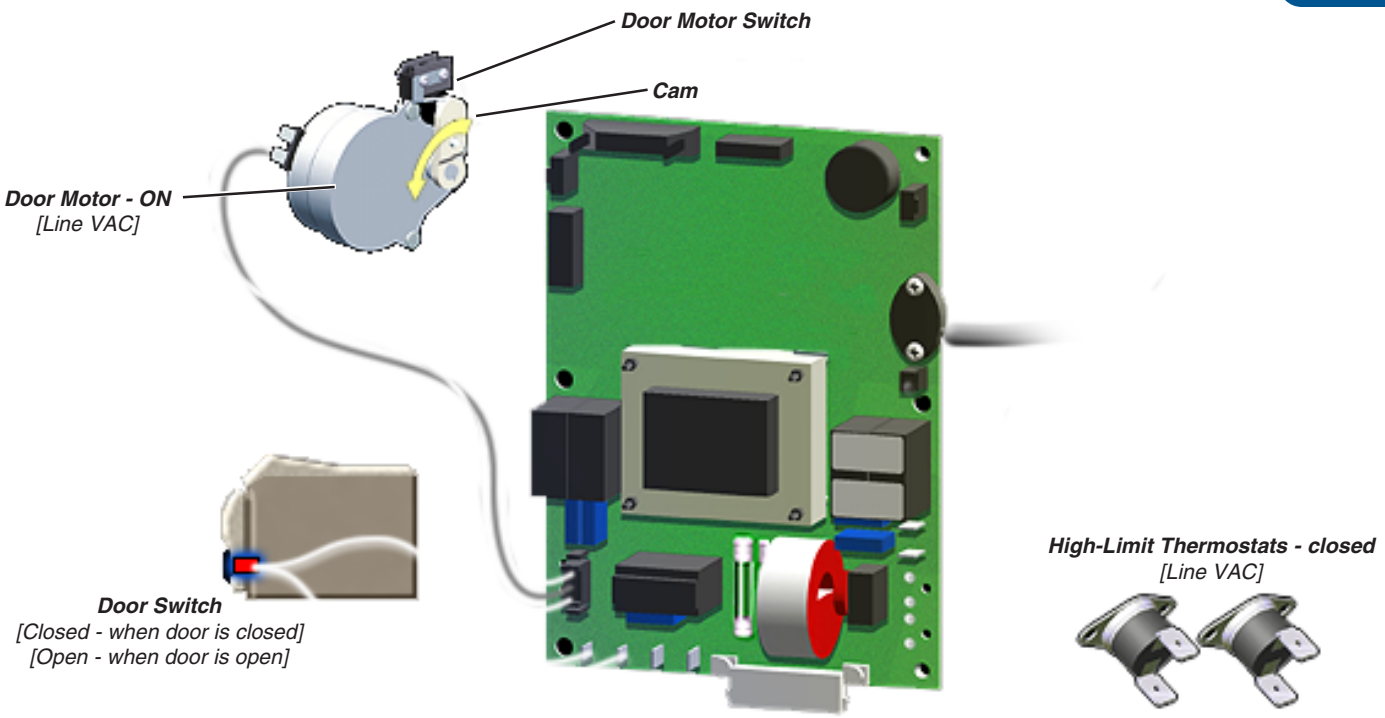
Door Motor System

This illustration shows only the components that affect the Door Motor System.
Refer to the following page for a detailed description of the Door Motor System.

Troubleshooting
[Door Motor System]

Error Codes — ***Go To Page:***

C106 ..... A-5
C326 ..... A-7



Door Motor System

Th Door Motor System automatically opens the sterilizer door when the Vent Mode is complete.

*[All electrical current is supplied thru the two high-limit thermostats (on bottom of chamber). Refer to '**Power-Up Mode**', for further detail].*

When the Door Motor System is activated, the display panel will show:

Door Motor / Door Motor Switch

For the first 15 seconds, line voltage is supplied directly to the door motor. This causes the motor to run, rotating the cam and linkage downward.

As the cam mechanism rotates, the motor switch closes. After 15 seconds, the current to the door motor flows thru the closed door switch. The cam continues to rotate, causing the linkage to lift the door latch mechanism and open the door.

When the cam reaches the bottom of its travel, the door motor reverses direction. When the mechanism reaches its original position, the motor switch is opened. This stops current flow to the motor, and the motor stops.

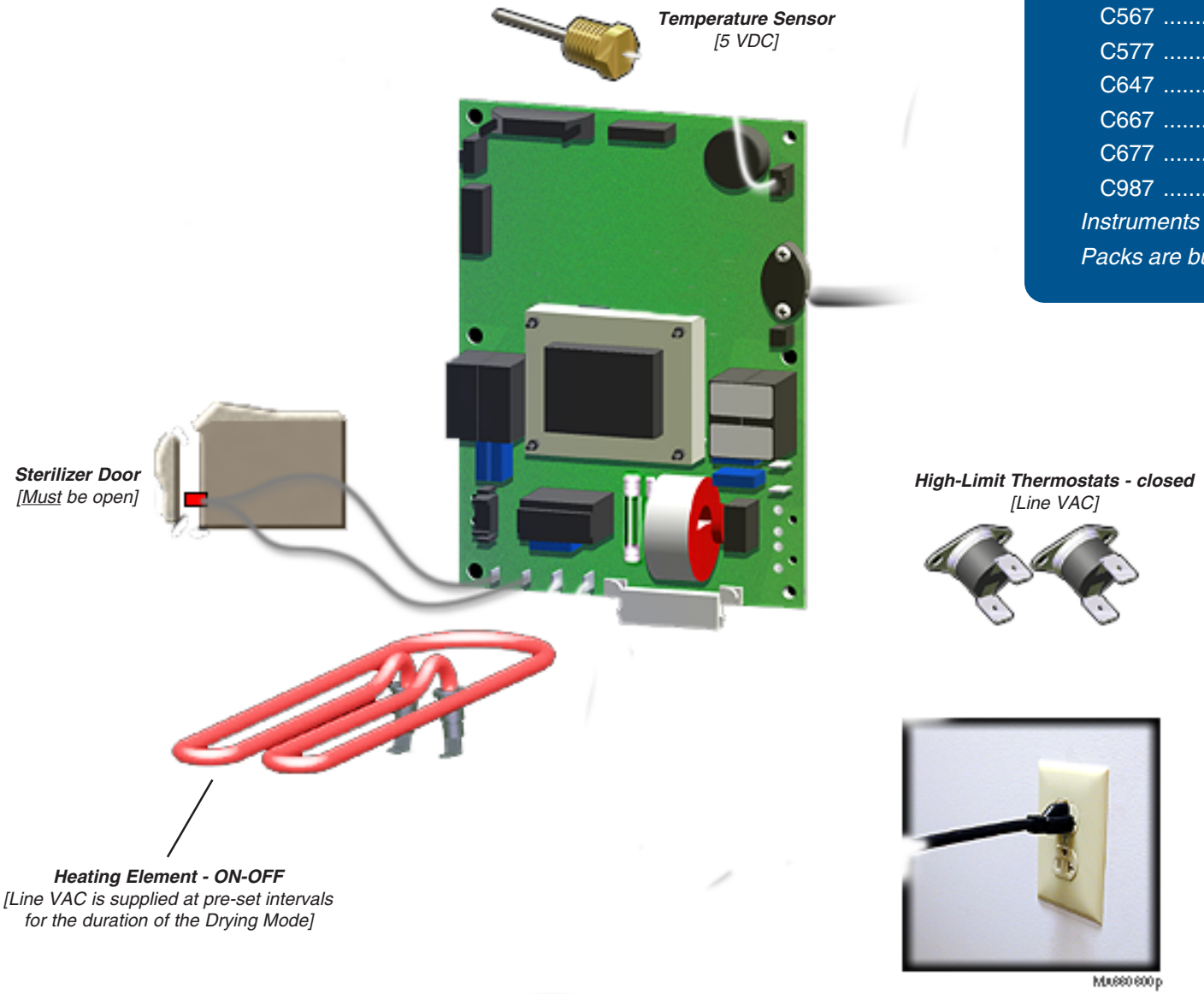
Door Switch

The status of the *(normally open)* door switch reflects the position of the door. *(ex. Door open= switch open)*

Operation & Troubleshooting

Drying Mode

This illustration shows only the components that affect the Drying Mode.
Refer to the following page for a detailed description of the Drying Mode.



Troubleshooting
[Drying Mode]

Problem: — **Go To Page:**

Error Codes:
C567 ..... A-8
C577 ..... A-8
C647 ..... A-9
C667 ..... A-9
C677 ..... A-9
C987 ..... A-10
Instruments still wet after Dry Mode..... A-14
Packs are burning during Dry Mode A-14

Drying Mode

During the Drying Mode, the heating element is energized to dry the instruments in the chamber.

*[All electrical current is supplied thru the two high-limit thermostats (on bottom of chamber). Refer to '**Power-Up Mode**', for further detail].*

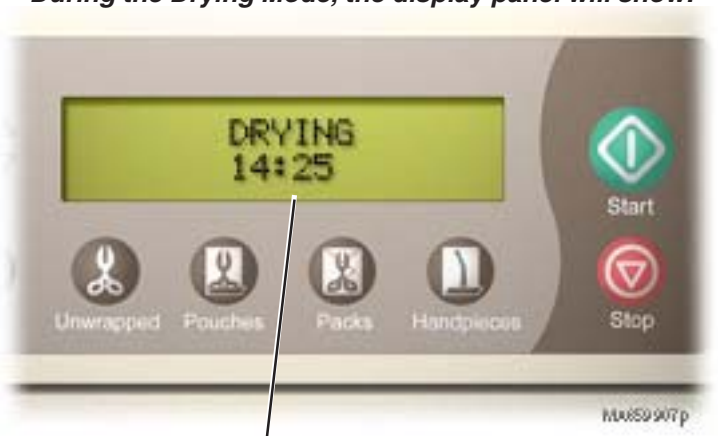
Heating Element
During the Drying Mode, line voltage is supplied to the heating element at pre-set intervals to turn it ON / OFF. This continues for the duration of the Drying Mode.

When the drying time expires, voltage is removed from the high-limit thermostats and the heating element.

Temperature Sensor
The temperature sensor *(inside chamber)* monitors the temperature throughout the Drying Mode. If the temperature exceeds 240°F *(115°C),* the PC board stops the current flow to the heating element until the temperature drops.

Sterilizer Door
The sterilizer door must remain open throughout the Drying Mode. If the door is closed, pressure may build up in the chamber resulting in an error code.

During the Drying Mode, the display panel will show:

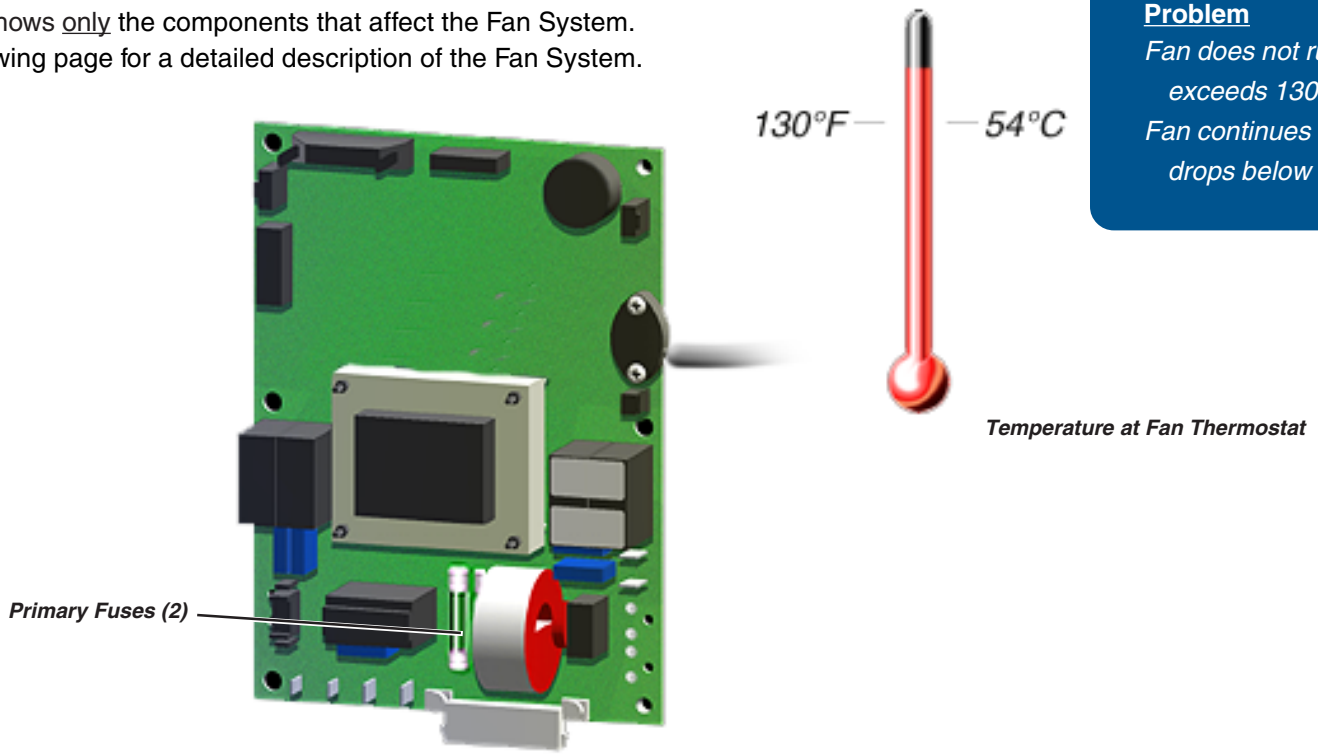


Drying time counts down

Operation & Troubleshooting

Fan System

This illustration shows only the components that affect the Fan System.
Refer to the following page for a detailed description of the Fan System.



Troubleshooting
[Fan System]

Problem — **Go To Page:**

Fan System

The Fan System reduces heat inside the enclosure by circulating air between the chamber and the covers.

[The electrical current to the fan system does not pass thru the high-limit thermostats (on bottom of chamber)].

Primary Fuses
With the table's power cord properly connected, facility supply voltage is supplied to the Main PC Board thru the two primary fuses.

If either fuse is faulty, the sterilizer will have no power.

Fan Thermostat
When power is supplied to the Main PC Board, current continuously flows to the fan thermostat.

The fan thermostat controls the ON/OFF function of the fan. When the temperature *(at the thermostat)* is less than 130°, the fan thermostat contacts are open *(no current to the fan)*. When the temperature reaches 130°, the fan thermostat contacts close *(current flow to the fan)*.

When the temperature drops to approx. 100°, the contacts of the fan thermostat open and the fan stops running.

ATTENTION
The fan may run continuously when running consecutive cycles.

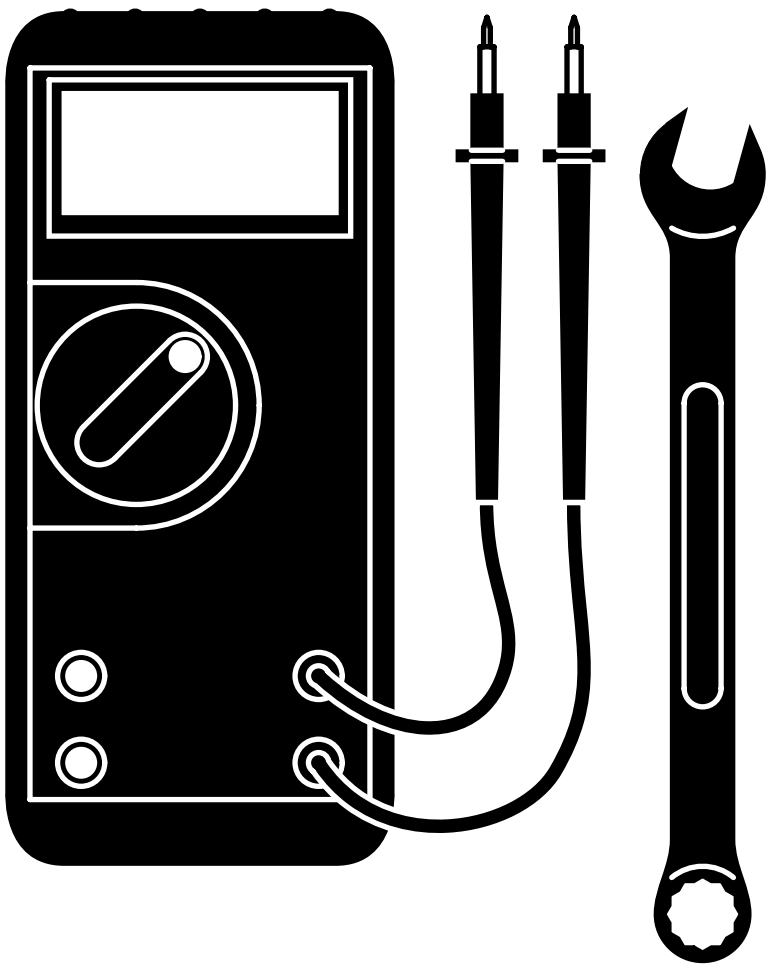
Fan
When the contacts of the fan thermostat are closed, line voltage is applied to the fan causing the fan to run. When the contacts of the thermostat open, current is removed, and the fan stops.

Go To Table Of Contents

This page intentionally left blank

Section B

Testing & Repair



Component Testing & Repair

Checking for Pressure Leaks

This illustration shows the areas to check for pressure leaks.

WARNING

Do not attempt to adjust, modify, or alter in any manner, any part of the pressure vessel. Serious injury and/or damage to the unit could result.

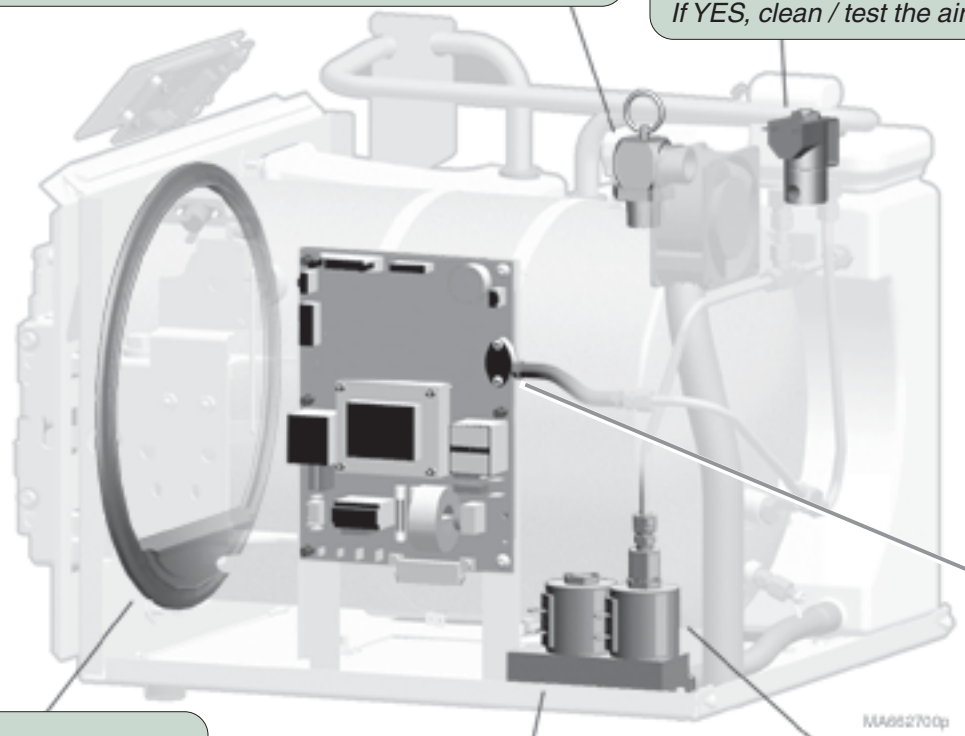
All Fittings
Tighten / replace fittings if necessary.

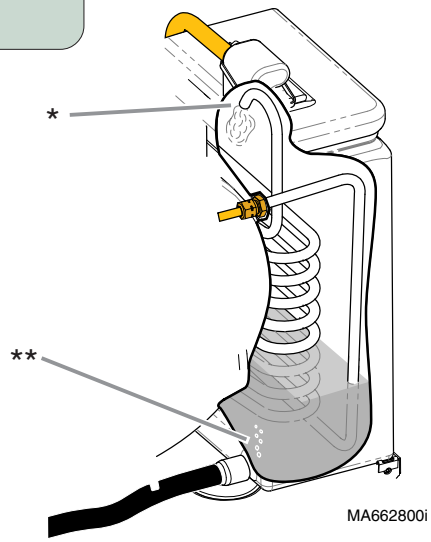
Pressure Relief Valve
Is there water or steam leakage under back of sterilizer?

If YES, test the pressure relief valve.

Air Valve
Is there steam exhausting from condensing coil during the Sterilization Mode?*

If YES, clean / test the air valve.





Pressure Sensor Hose
Is there steam leaking from hose/PC board connection?

If YES, secure with hi-temp. cable tie.

Door Gaskets
Is there water leaking around door?

If YES, replace gasket(s).

Fill Valve
*Are there bubbles coming from the bottom of the reservoir**?*

If YES, clean / test the fill valve.

Vent Valve
Is there water leaking from the condensing coil?*

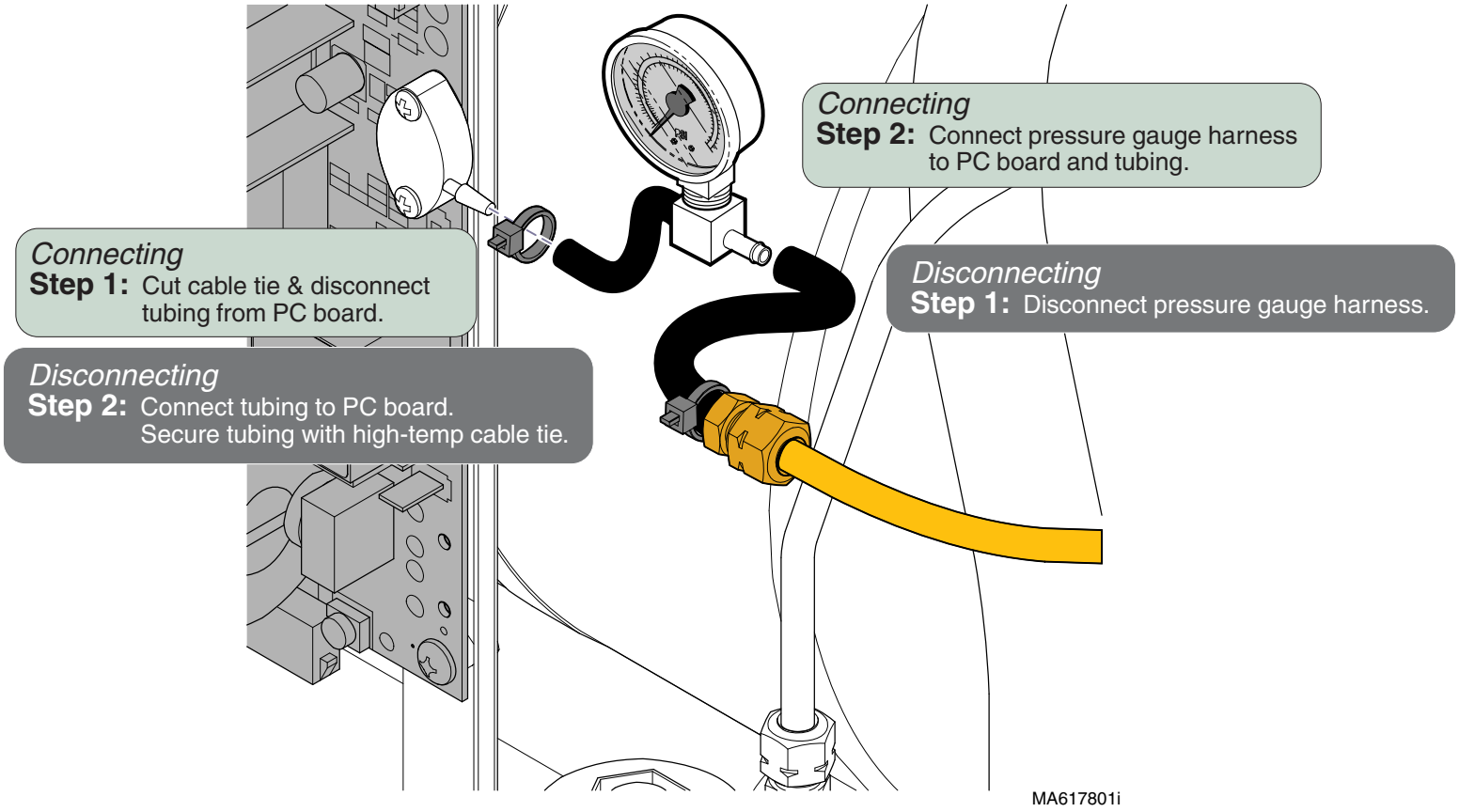
If YES, clean / test the vent valve.

Component Testing & Repair

Using a Pressure Gauge

> ***Note***
> To test chamber pressure, a Pressure Gauge Harness is available *(002-0372-00)*.

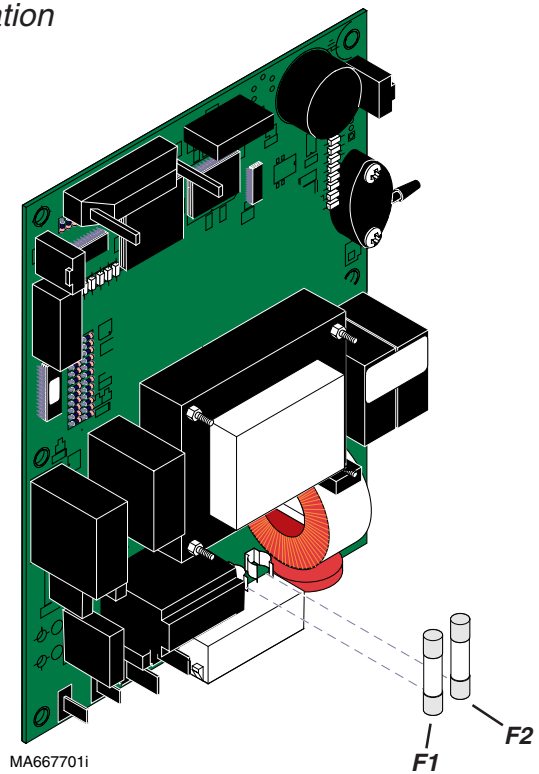
Refer To: **Go To Page:**
Cover Removal C-2



Component Testing & Repair

Fuses

Location



Fuse Ratings:

115 VAC models:
- *F1* ..... 0.250 amp, 250 V, Slo-Blo, 1/4" x 1-1/4"
- *F2* ..... 15 amp, 250 V, Fast-Acting, 1/4" x 1-1/4"

230 VAC models:
- *F1* ..... 0.125 amp, 250 V, Slo-Blo, 5mm x 20mm
- *F2* ..... 8 amp, 250 V, Fast-Acting, 5mm x 20mm

Fuse Test

Fuse Test
Step 1: Set meter to **200 Ω.**

Fuse Test
Step 2: Place meter probes on each end of fuse.

Meter Reading	*Status*	*Required Action*
OL		Replace **both** fuses.
less than 5 Ω		Fuse - OK

Fuses

Models: ALL
Serial Numbers:

Component Testing & Repair

Service Diagnostics

The Service Diagnostics feature allows you to view recent error codes and test the sterilizer's major components without running a complete cycle. The Service Diagnostics tests should always be done before replacing any major component.

CAUTION
This operation requires power to be connected to the unit with the panels removed. Use caution when performing this procedure.

Activating Service Diagnostics

Service Diagnostics
Step 1: Disconnect power cord.

Service Diagnostics
Step 2: Remove right side panel.

Service Diagnostics
Step 3: Move switch #1 on the SW1 block to ON.

Service Diagnostics
Step 4: Reconnect power cord.

Service Diagnostics
Step 5: Press START button.
*[Then, go to **Test Selection Screen** page].*

Attention
To return to normal operating mode...
A. Disconnect power cord.
B. Move #1 switch (SW1 block) to OFF.
C. Reconnect power cord.

Component Testing & Repair

Service Diagnostics

Test Selection Screen

Service Diagnostics Go To Page:
Test Selection:
I/O Test B-7
Recall Errors B-10
Keytest B-11

Press the **START** button to initiate the *I/O Test*. This test allows you to energize the air valve, vent valve, fill valve, door motor, and heating element independently without running a cycle.

This test also displays the temperature & pressure inside the chamber, and the status of the high-limit thermostats, door switch, and the water level sensor

Press the **STOP** button to show the last five error codes displayed on the unit

Press the **HANDPIECES** button to initiate the Keytest. This test allows you to check the functionality of the buttons on the touch pad.

Service Diagnostics

Refer to: **Go To Page:**
Air Valve B-12
Vent Valve B-15
Fill Valve B-15
Main PC Board B-46

I/O Test

I/O Test
Press the START button.
This energizes the Air Valve, causing it to open.
Pressing the START button again, closes the valve.

[You should hear a "click" when the valve opens / closes.
This indicates the PC Board and valve are functioning properly].

Press the STOP button for the next test.

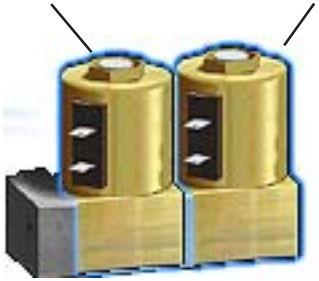
Air Valve

I/O Test
Press the START button.
This energizes the Vent Valve, causing it to close.
Pressing the START button again, opens the valve.

[You should hear a "click" when the valve opens / closes.
This indicates the PC Board and valve are functioning properly].

Press the STOP button for the next test.

Fill Valve ***Vent Valve***



Attention
The door switch must be tripped when testing the Fill Valve. Close the door or manually trip the switch.
The water level sensor does not function during this test. The chamber will overflow if the valve is left open too long.

I/O Test
Press the START button.
This energizes the Fill Valve, causing it to open.
Pressing the START button again, closes the valve.

[Water will flow into the chamber when the valve opens.
This indicates the PC Board and valve are functioning properly].

Press the STOP button for the next test.

Component Testing & Repair

Service Diagnostics

I/O Test - continued

Refer to: **Go To Page:**
Door Motor System B-39
Heating Element B-20
Main PC Board B-46

Attention
This test should be done with the door closed.

I/O Test
Press the START button.
This energizes the Door Motor System.

[The door should open after approx. 15 seconds. This indicates the PC Board and door motor are functioning properly].

Press the STOP button for the next test.

Door Motor System

Attention
Do not run this test more than twice without allowing the unit to cool.
Doing so may cause the sterilizer to overheat.

I/O Test
Press the START button.
This energizes the Heating Element.

[The heating element should heat up for approx. 15 seconds, then shut off. This indicates the PC Board and heating element are functioning properly].

Press the STOP button for the next test.

Heating Element

Service Diagnostics

I/O Test - continued

Refer to: **Go To Page:**
High-Limit Thermostats B-31
Door Switch B-34
Water Level Sensor B-27

High-Limit Thermostats
Status should always be: *CLOSED*. *OPEN*, indicates malfunctioning thermostat(s), or that the unit has overheated.

Door Switch
Status should correctly reflect the position of the door. (*OPEN* or *CLOSED*)

Water Level Sensor
Status should reflect the amount of water in the chamber. If water is contacting the sensor, status should be: *FULL*. If not: *EMPTY*

I/O Test
The display shows the status of the High-Limit Thermostats, the Door Switch, and the Water Level Sensor.

[If the display reading shows a malfunction, test the corresponding component].

Press the STOP button for the next test.

I/O Test
The display shows the chamber temperature & pressure.

Press the STOP button to return to the Test Selection Screen.

Chamber Temperature
[verify w/ thermometer]

Chamber Pressure
With the door open, display should show: *0.0 PSI (0.0 kPa)*

Component Testing & Repair

Service Diagnostics

Recall Errors

Refer to: Error Codes A-2
Go To Page:

Recall Errors
The display shows the last five error codes displayed on the unit.
*[**NOTE**: 1: is the most recent error code, 5: is the oldest]*

Recall Errors
To erase all five error codes from memory...
Press the START button.

To retain the error codes...
Press the STOP button.

Service Diagnostics

Keytest

Refer to: Go To Page:
Touch Pad / Display Panel B-37

Keytest
Press the START button.

[When the designated button is pressed, you will hear single "beep", and the test will advance to the next button. This indicates the button is functioning properly].

Keytest
Press the STOP button.

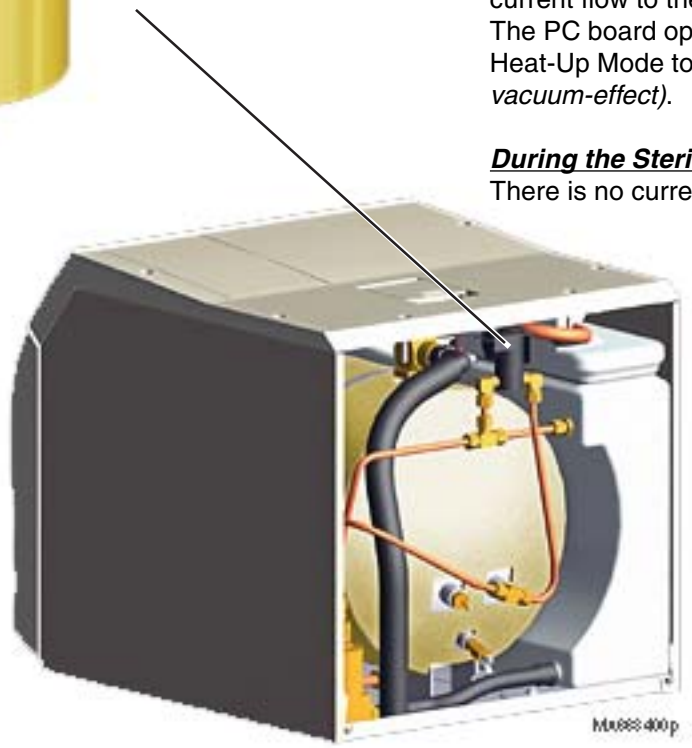
Keytest
Press the HANDPIECES button.

[Continue for all remaining buttons].

Component Testing & Repair

Air Valve

Location & Function



During the Fill Mode...
Line voltage is supplied to the air valve. This causes the valve to open so that water can flow into the chamber.

During the Heat-Up Mode...
When the Heat-Up Mode begins, the PC board stops the current flow to the air valve. This allows the valve to close. The PC board opens the air valve three times during the Heat-Up Mode to release air from the chamber *(this prevents vacuum-effect)*.

During the Sterilization, Vent, & Drying Modes...
There is no current flow to the air valve - the valve is closed.

Component Testing & Repair

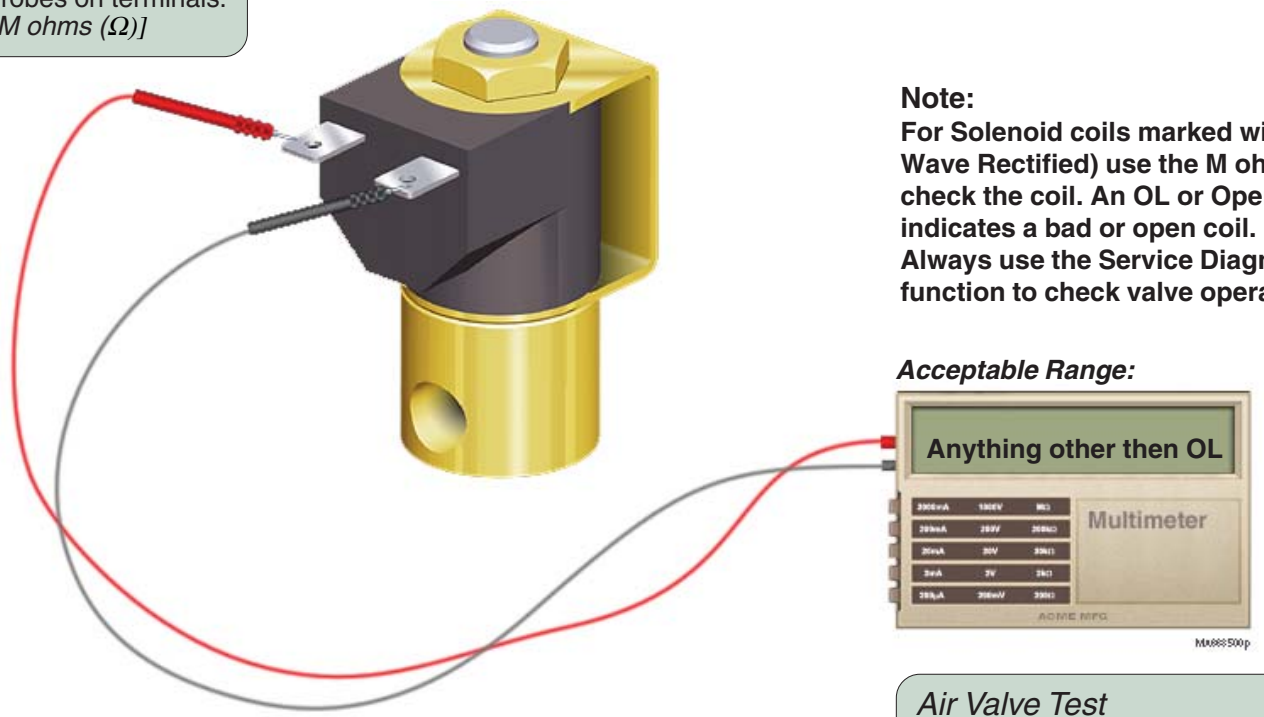
Air Valve

Electrical Testing

Refer to: *Go To Page:*
PC Board Relay Test B-48
Cover Removal C-2

Air Valve Test
Step 1: Disconnect wires from air valve.

Air Valve Test
Step 2: Place meter probes on terminals.
[Set meter to M ohms (Ω)]



Note:
For Solenoid coils marked with FWR (Full Wave Rectified) use the M ohms Scale to check the coil. An OL or Open reading indicates a bad or open coil.
Always use the Service Diagnostic function to check valve operation.

Acceptable Range:

Air Valve Test
If reading is out of acceptable range...
Replace air valve.

If reading is within acceptable range...
Perform *PC Board Relay Test*.

Component Testing & Repair

Air Valve

Replacement / Cleaning

Refer to: Cover Removal ..... C-2 — **Go To Page:**

Removal
Step 2: Remove two elbow fittings from air valve.

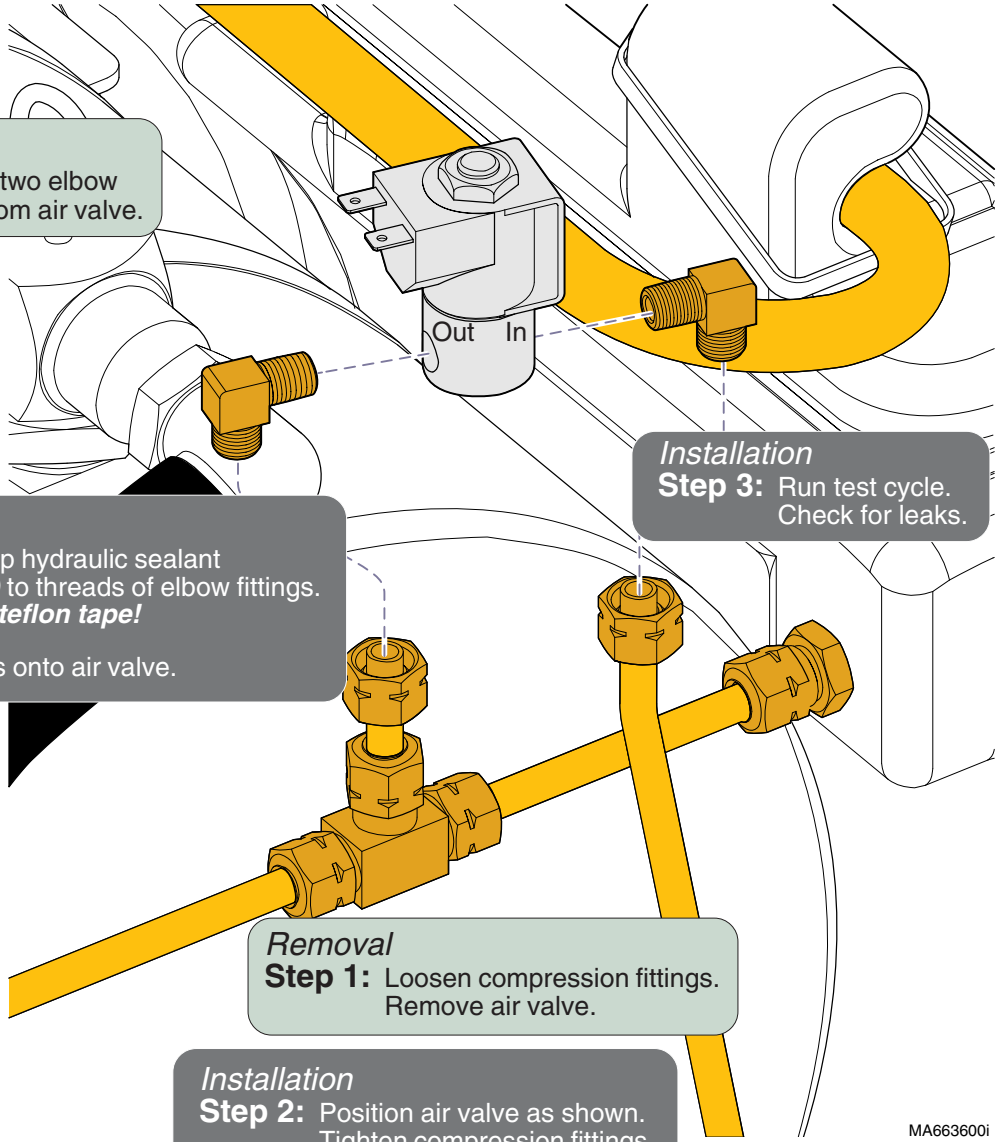
Installation
Step 1: Apply hi-temp hydraulic sealant *(Loctite 565)* to threads of elbow fittings. ***Do not use teflon tape!***

Install fittings onto air valve.

Installation
Step 3: Run test cycle. Check for leaks.

Removal
Step 1: Loosen compression fittings. Remove air valve.

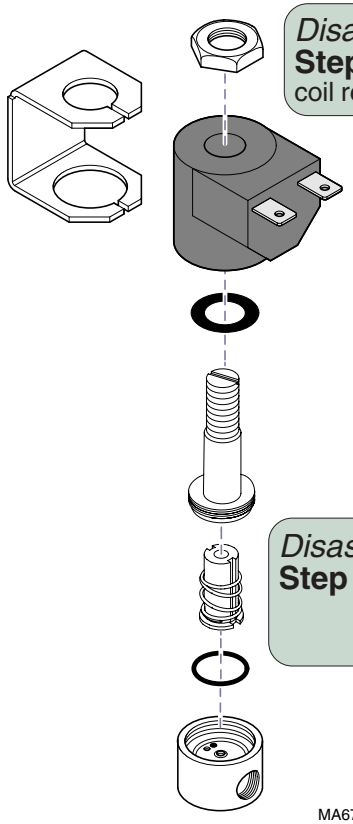
Installation
Step 2: Position air valve as shown. Tighten compression fittings.



MA663600i

Disassembly
Step 1: Remove nut, coil retainer, and coil.

Disassembly
Step 2: Remove Valve Stem and clean ports in valve body.



MA676701i

Assembly
Step 1: If necessary, replace O-ring in body and flat gasket on stem, then assemble valve.

Fill / Vent Valves

Location & Function

Fill Valve

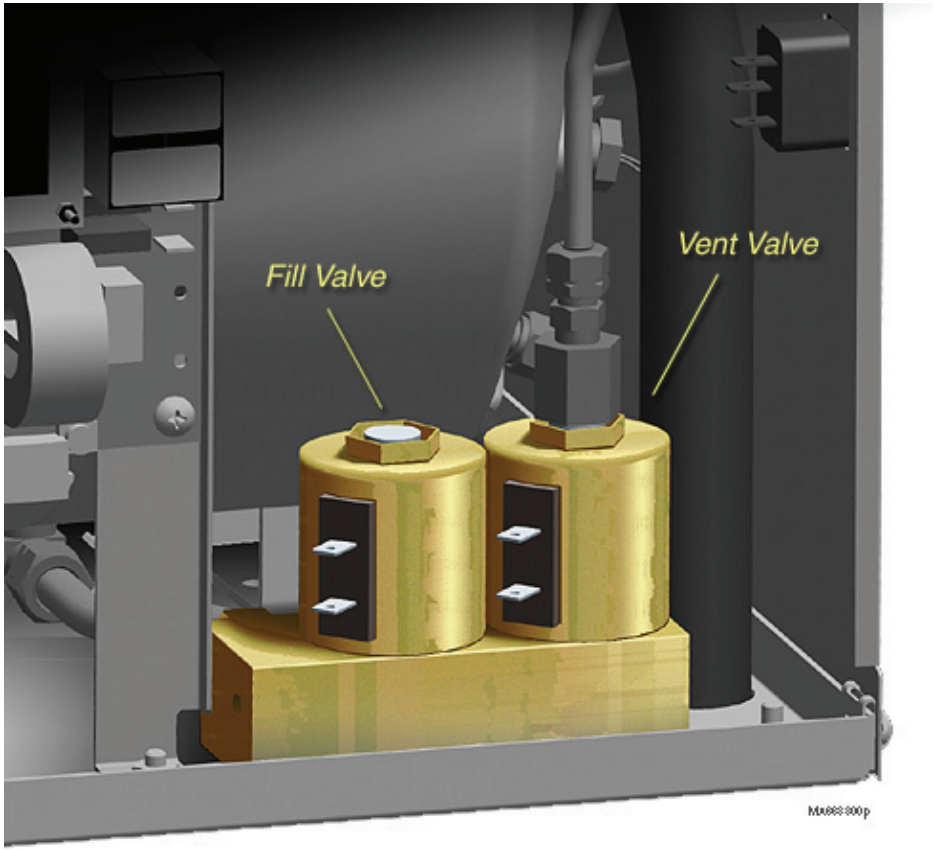
During the Fill Mode...

Voltage is supplied to the fill valve. This causes the valve to open, allowing water to flow into the chamber.

When the water in the chamber reaches the water level sensor, the PC board stops the current flow to the fill valve. This allows the valve to close, stopping the flow of water into the chamber.

During the Heat-Up, Sterilization, Vent, & Drying Modes...

There is no current flow to the fill valve.The valve is closed.



Vent Valve

During the Fill, Heat-Up, & Sterilization Modes...

Voltage is supplied to the vent valve. This causes the valve to close so that pressure can build in the chamber.

During the Vent Mode...

The PC board stops the current flow to the vent valve. This allows the valve to open, releasing pressure from the chamber.

During the Drying Mode...

There is no current flow to the vent valve.The valve is open.

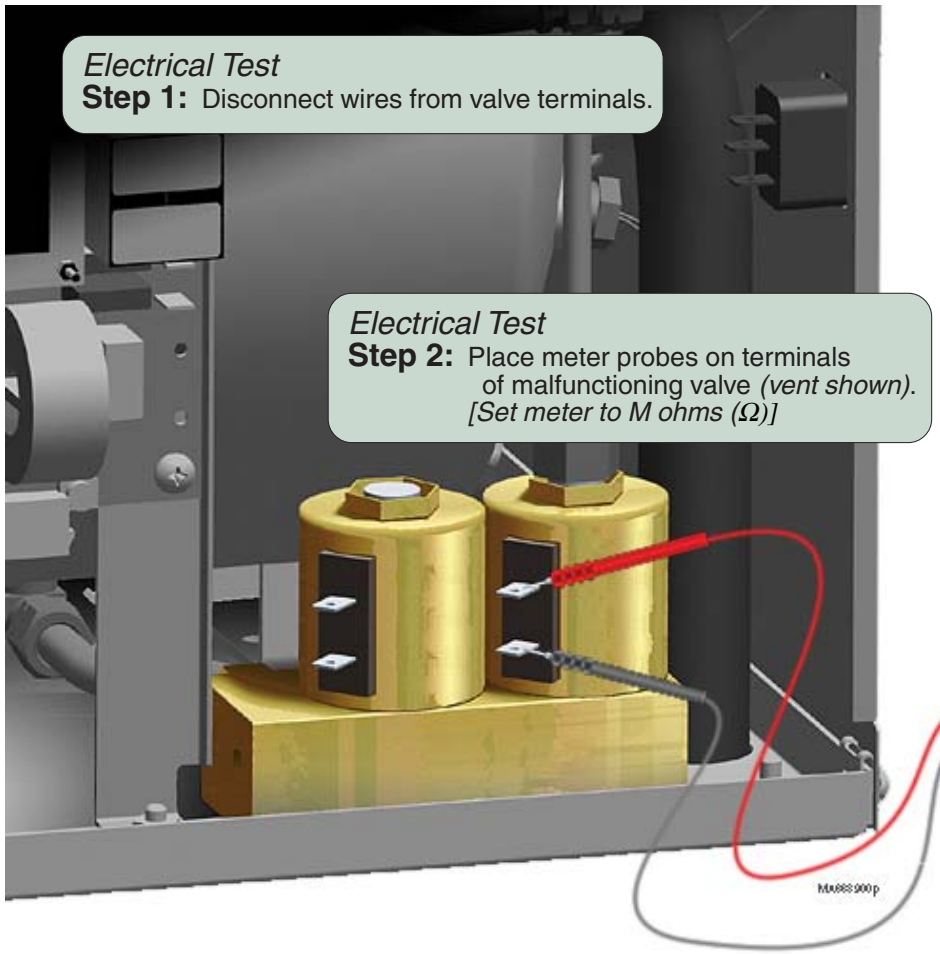
Component Testing & Repair

Fill / Vent Valves

Electrical Testing

[The testing procedure is the same for the fill valve and the vent valve].

Refer To: **Go To Page:**
PC Board Relay Test B-48
Cover Removal C-2



Note:
For Solenoid coils marked with FWR (Full Wave Rectified) use the M ohms Scale to check the coil. An OL or Open reading indicates a bad or open coil.
Always use the Service Diagnostic function to check valve operation.

Acceptable Range (115 VAC Units):

Electrical Test
If reading is displayed OL...
Replace faulty valve.

If reading is within acceptable range...
Perform *PC Board Relay Test.*

Acceptable Range (230 VAC Units):
Fill Valve ..... Any reading other then OL
Vent Valve ..... Any reading other then OL

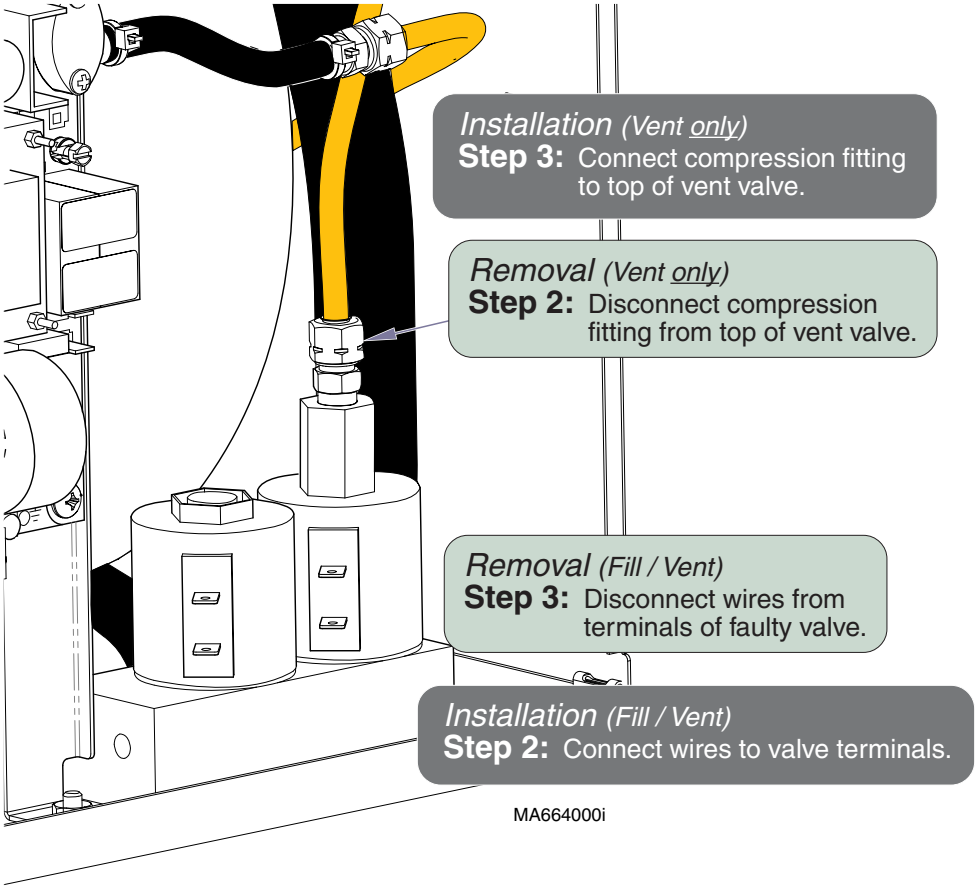
Component Testing & Repair

Fill / Vent Valves

Cleaning / Replacement

Removal (Fill / Vent)
Step 1: Drain water from reservoir.

Installation (Fill / Vent)
Step 4: Refill reservoir.
Run test cycle.
Check for leaks.



Installation (Vent only)
Step 3: Connect compression fitting to top of vent valve.

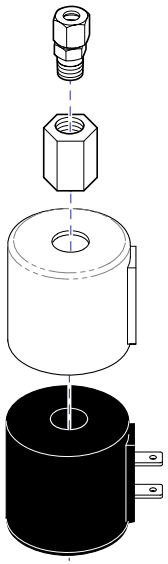
Removal (Vent only)
Step 2: Disconnect compression fitting from top of vent valve.

Removal (Fill / Vent)
Step 3: Disconnect wires from terminals of faulty valve.

Installation (Fill / Vent)
Step 2: Connect wires to valve terminals.

MA664000i

Refer to: **Go To Page:**

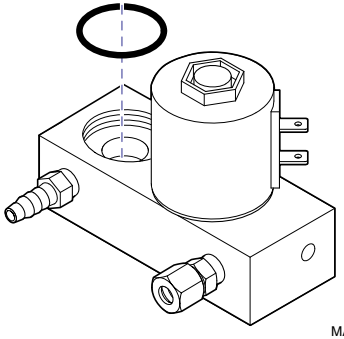


Removal (Fill / Vent)
Step 4: Disassemble valve
(Vent valve shown - Fill valve is similar)
Remove any debris.

Installation (Fill / Vent)
Step 1: Assemble valve.
(Vent valve shown - Fill valve is similar)

O-Ring Slot

Use a 3/4" spanner wrench to remove plunger housing



MA664101i

Models: ALL
Serial Numbers:

Fill / Vent Valve

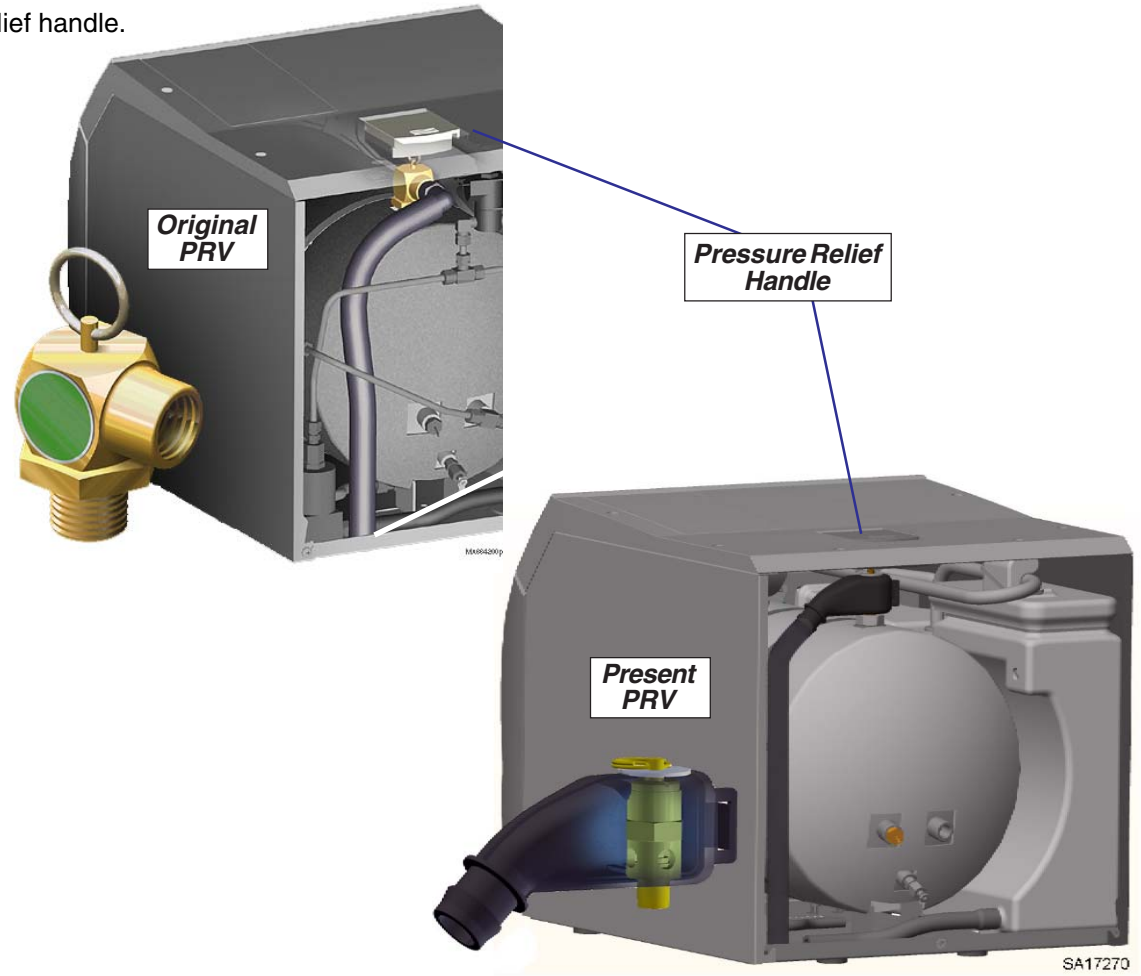
Component Testing & Repair

Pressure Relief Valve

Location & Function

The pressure relief valve opens if the pressure inside the chamber reaches 40 psi (275 kPa). When the valve opens, pressurized steam is released from the bottom of the sterilizer thru the relief valve tubing.

The valve can be opened manually by pulling the pressure relief handle.



Testing

Note: This test should be performed whenever the unit is serviced.

Pressure Relief Valve Test
Step 1: Start an *Unwrapped* cycle.

Pressure Relief Valve Test

Caution
To prevent burns, place a towel around bottom of sterilizer.

Step 2: When chamber pressure reaches 25 psi, pull pressure relief handle briefly, then release.

[Steam should discharge when handle is pulled, and completely stop when handle is released].

Pressure Relief Valve Test
If steam continues to discharge when handle is released...
Pull handle, then quickly release until valve "snaps" closed.

If valve will not close, replace valve.

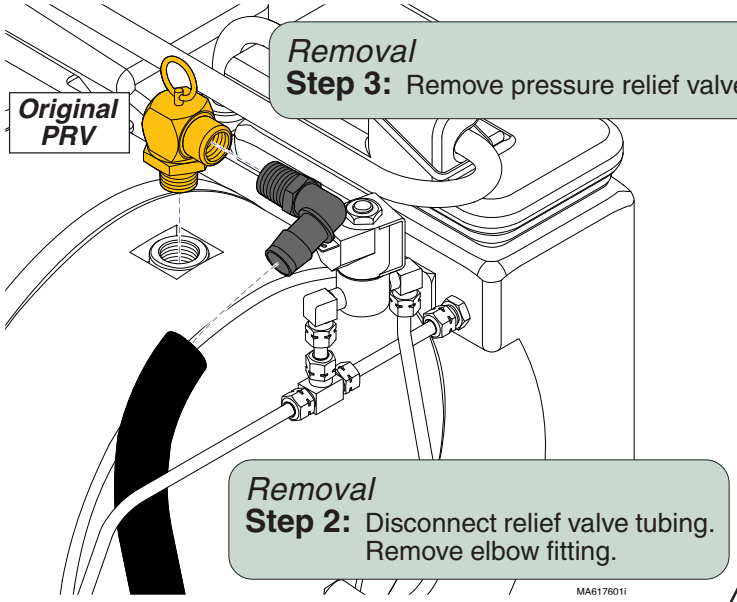
Component Testing & Repair

Pressure Relief Valve

Replacement

Removal
Step 1: Pull pressure relief handle to purge pressure from chamber.

Refer to: Go To Page:
Cover Removal C-2

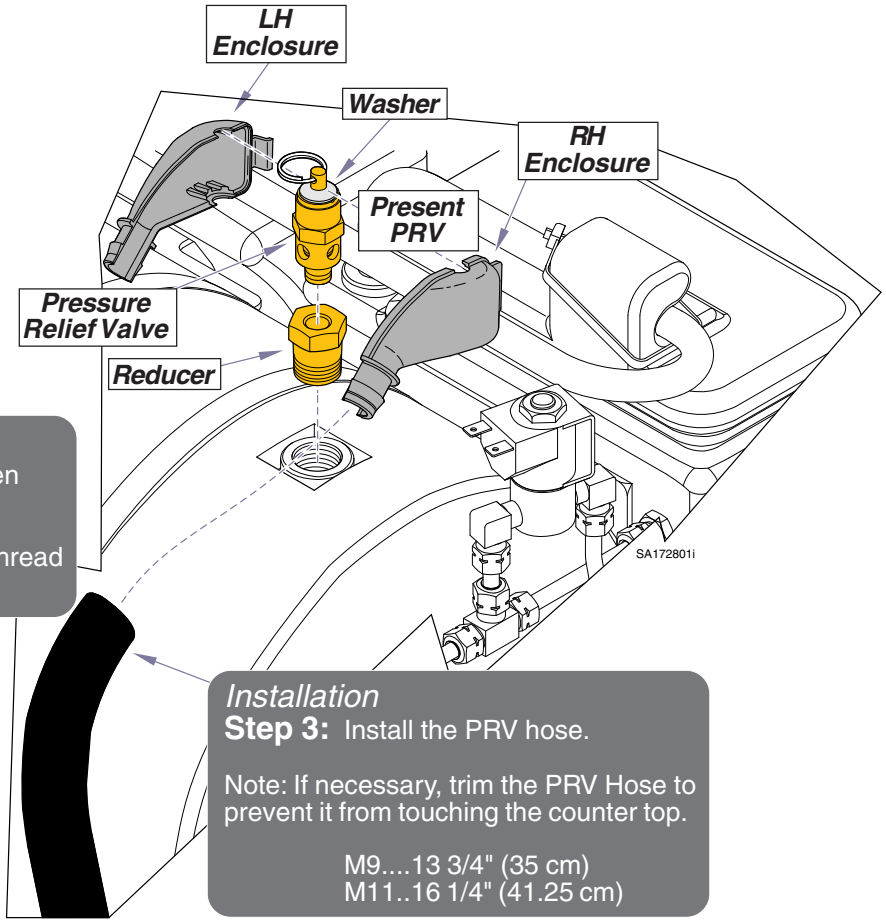


Removal
Step 3: Remove pressure relief valve.

Removal
Step 2: Disconnect relief valve tubing. Remove elbow fitting.

Installation
Step 2: Install the LH & RH Enclosures.

Note: Locate the Washer between the top of the Enclosure and the ring on the PRV.



Installation
Step 1: Install the Reducer and then the Pressure Relief Valve.

Note: The PRV and Reducer have a thread sealant on them to prevent leakage.

Installation
Step 3: Install the PRV hose.

Note: If necessary, trim the PRV Hose to prevent it from touching the counter top.

M9....13 3/4" (35 cm)
M11..16 1/4" (41.25 cm)

Models: / **Serial Numbers:**	ALL			

Component Testing & Repair

Heating Element

Location & Function

During the Fill & Vent Modes...
There is no current flow to the heating element.
Heating element is *OFF*.

During the Heat-Up Mode...
Line voltage is continually supplied to the heating element. The heating element heats the water in the chamber until sterilzation temperature is achieved.

During the Sterilization Mode...
Based on readings from the temperature and pressure sensors, the heating element is cycled *ON* and *OFF* to maintain the required parameters for the selected cycle.

During the Drying Mode...
Line voltage is supplied to the heating element at pre-set intervals to turn it *ON / OFF*. This continues for the duration of the Drying Mode.

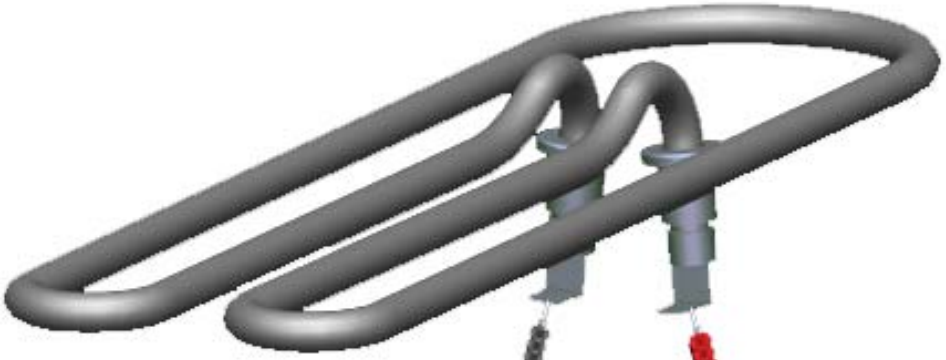
Component Testing & Repair

Heating Element

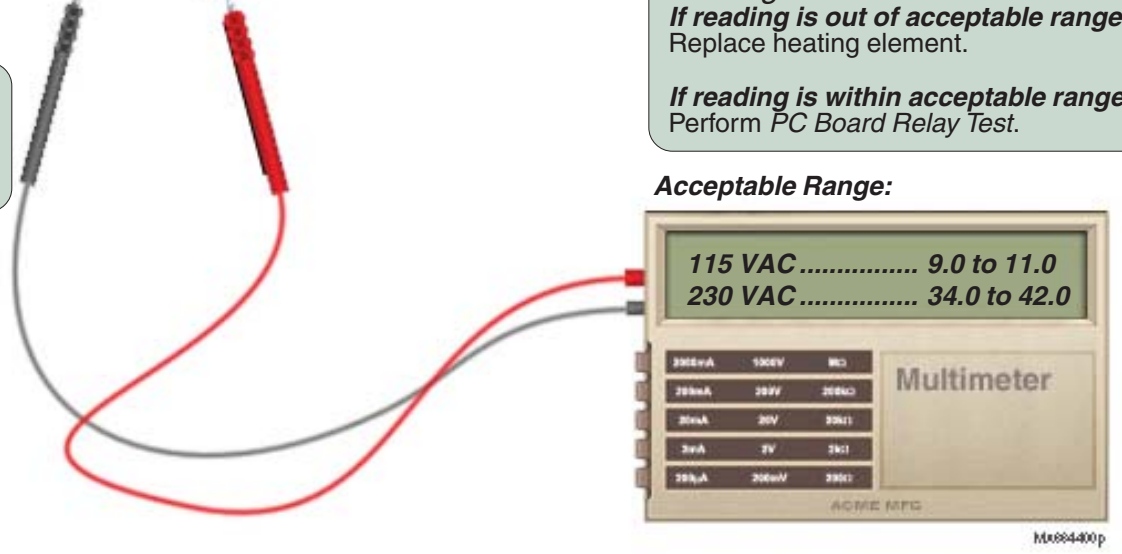
Testing

Refer To: **Go To Page:**
Cover Removal C-2
PC Board Relay Test B-48

Heating Element Test
Step 1: Remove bottom cover.
Disconnect wires from heating element.



Heating Element Test
Step 2: Place meter probes on heating element terminals.
[Set meter to 200 ohms (Ω)]



Heating Element Test
If reading is out of acceptable range...
Replace heating element.

If reading is within acceptable range...
Perform *PC Board Relay Test*.

Acceptable Range:

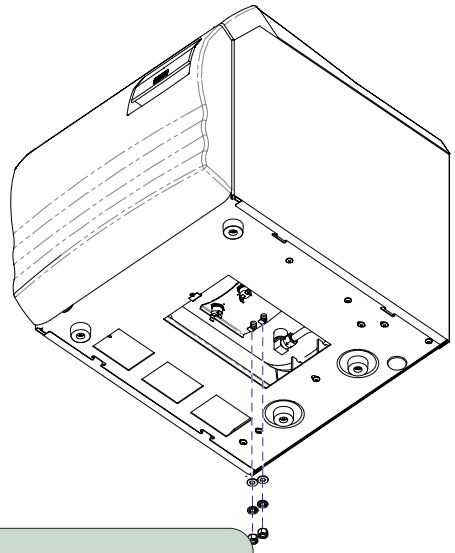
Component Testing & Repair

Heating Element

Replacement

Refer to: **Go To Page:**
Draining the Reservoir C-4
Cover Removal C-2

Removal
Step 1: Drain water from reservoir.



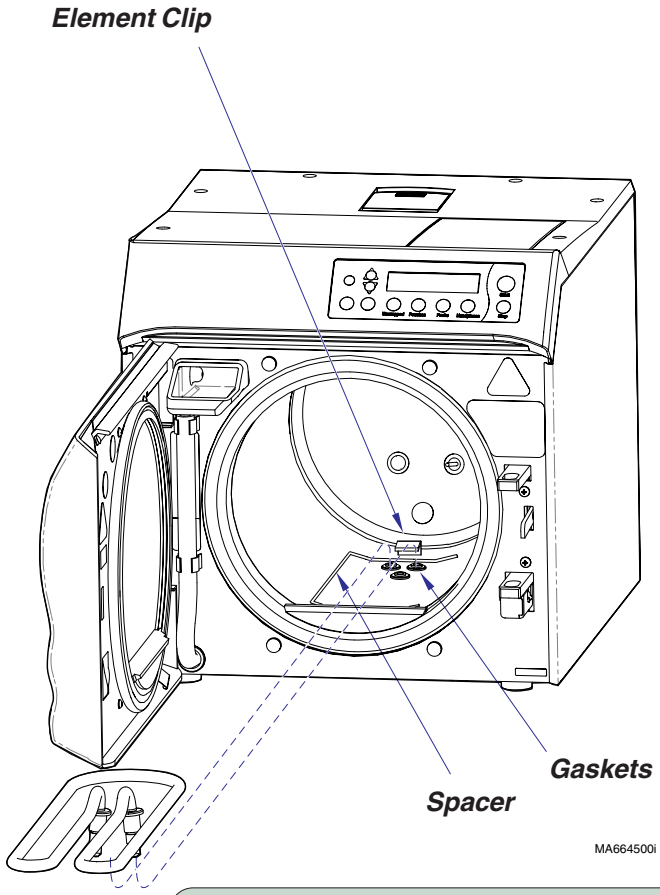
Removal
Step 2: Disconnect wires from heating element.
Remove nuts, lockwashers, & brass washers.

Installation

Equipment Alert

1. Do not overtighten nuts!
Torque must not exceed 25 ft/lbs (34N•M).
2. Make sure when replacing the element in a M11, that the element coil is placed under the element clip.
(see diagram)

Step 2: Install brass washers, lockwashers, & nuts.
Connect wires to heating element.



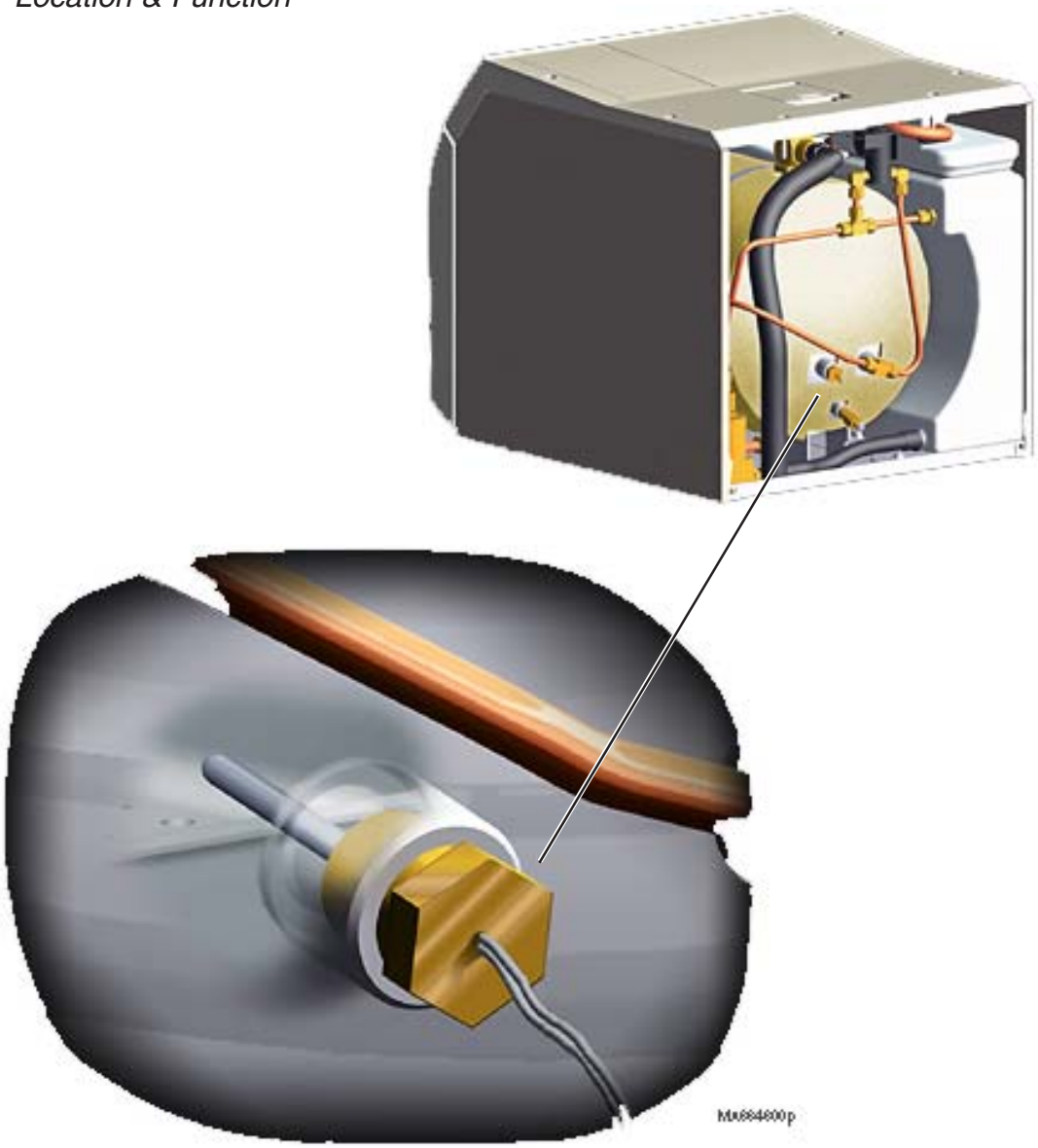
Removal
Step 3: Remove heating element and spacer.

Installation
Step 1: Install gaskets onto heating element.
Install spacer and heating element.

Component Testing & Repair

Temperature Sensor

Location & Function



During the Fill Mode...
The temperature sensor is not monitored.

During the Heat-Up & Sterilization Modes...
The temperature sensor continually monitors the chamber temperature and transmits this information to the PC board.

The PC board turns the heating element ON / OFF based on the readings from the temperature sensor.

During the Vent Mode...
The temperature sensor continually monitors the chamber temperature and transmits this information to the PC board.

During the Drying Mode...
The temperature sensor continually monitors the chamber temperature and transmits this information to the PC board.

If the temperature exceeds 240°F *(115°C),* the PC board stops the current flow to the heating element until the temperature drops.

Component Testing & Repair

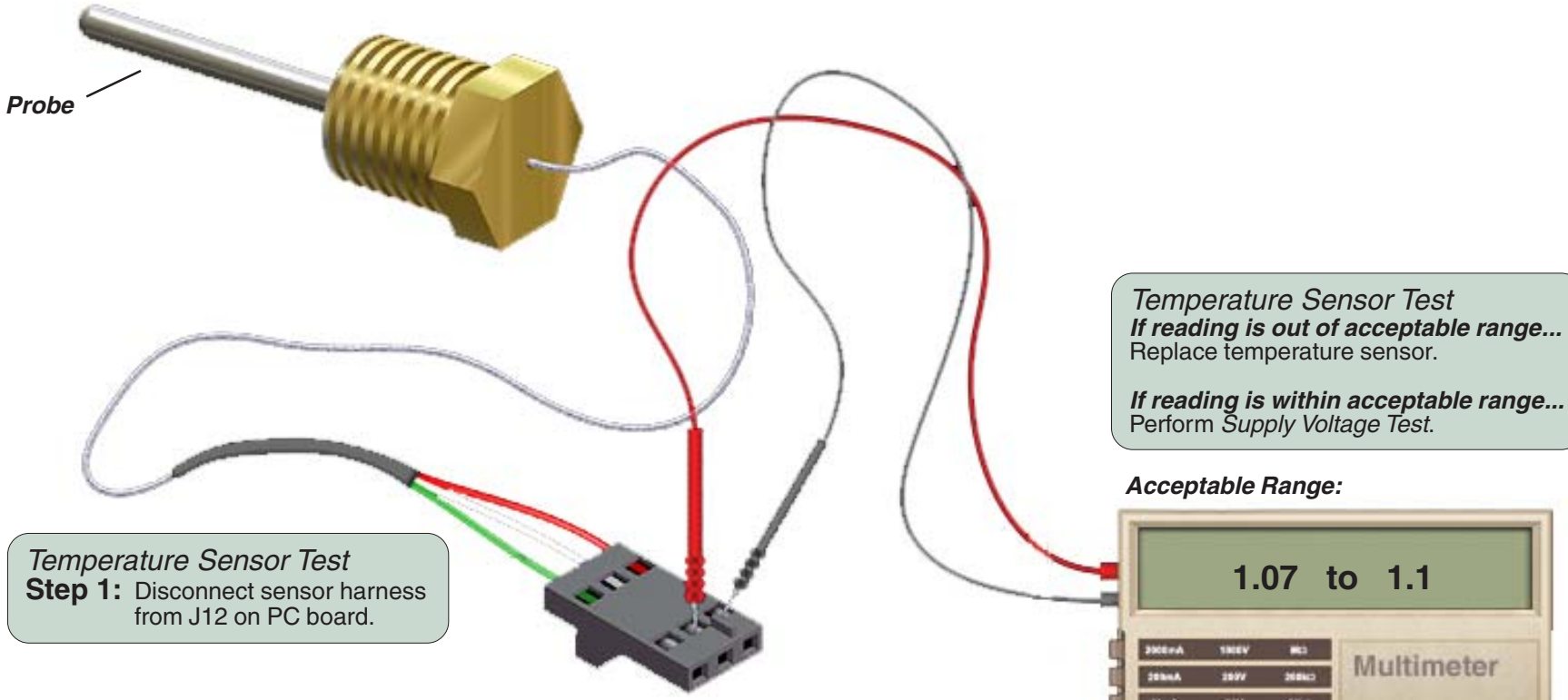
Temperature Sensor

Testing

Refer To: **Go To Page:**
Supply Voltage Test B-25
Cover Removal C-2

Service Tip
Residue can build up on the sensor probe causing inaccurate temperature readings.

Clean the probe with SpeedClean and an abrasive pad.



Temperature Sensor Test
Step 1: Disconnect sensor harness from J12 on PC board.

Temperature Sensor Test
If reading is out of acceptable range...
Replace temperature sensor.

If reading is within acceptable range...
Perform *Supply Voltage Test.*

Acceptable Range:

Temperature Sensor Test
Step 2: Place meter probes on red and white wires.
[Set meter to 2K ohms (Ω)]

Component Testing & Repair

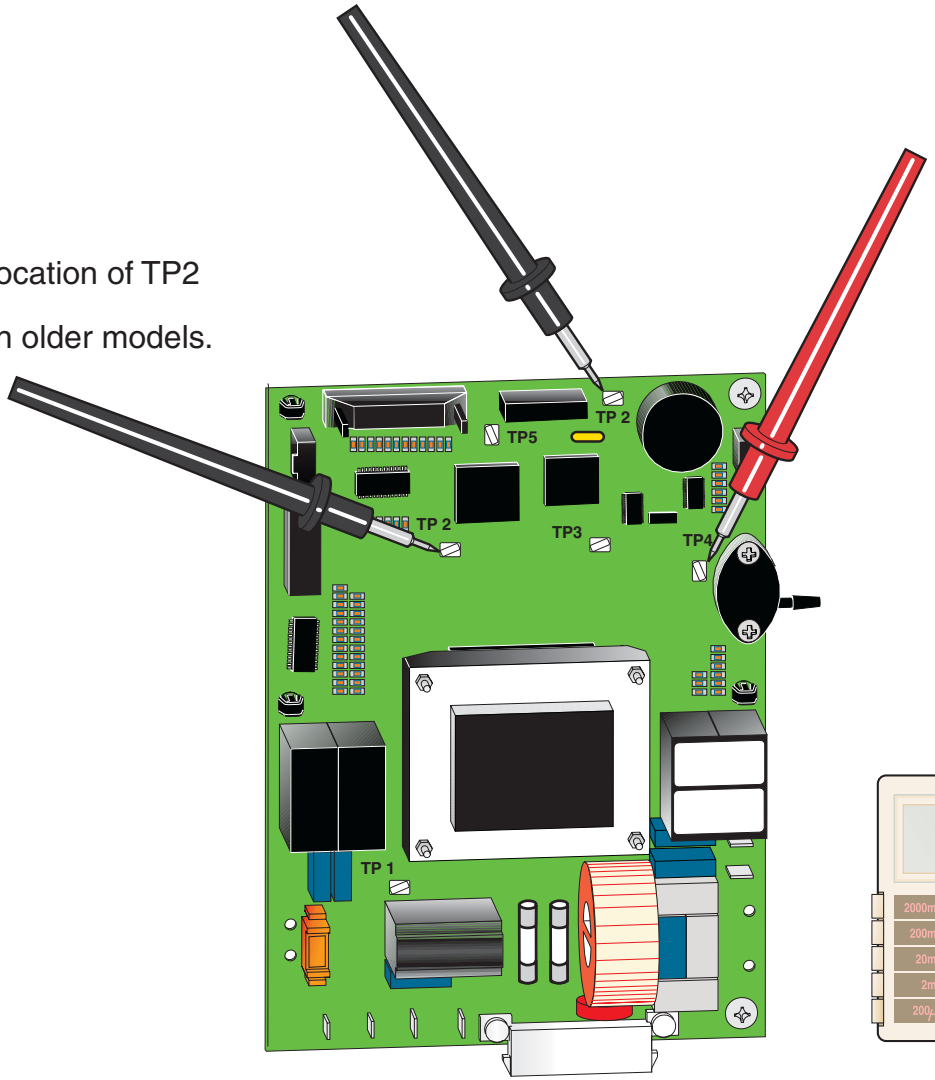
Temperature Sensor

Supply Voltage Test

Refer To: Go To Page:
Cover Removal C-2

Location of TP2

on older models.



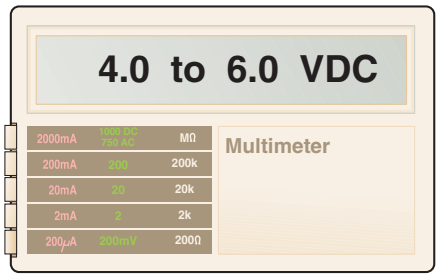
Supply Voltage Test
Step 1: Place meter probes on test points:
Black probe: TP2
Red probe: TP4

[Set meter to 20 VDC]

Supply Voltage Test
If reading is out of acceptable range...
Replace main PC board.

If reading is within acceptable range...
Main PC board is functioning properly

Acceptable Range:



SA110600

Component Testing & Repair

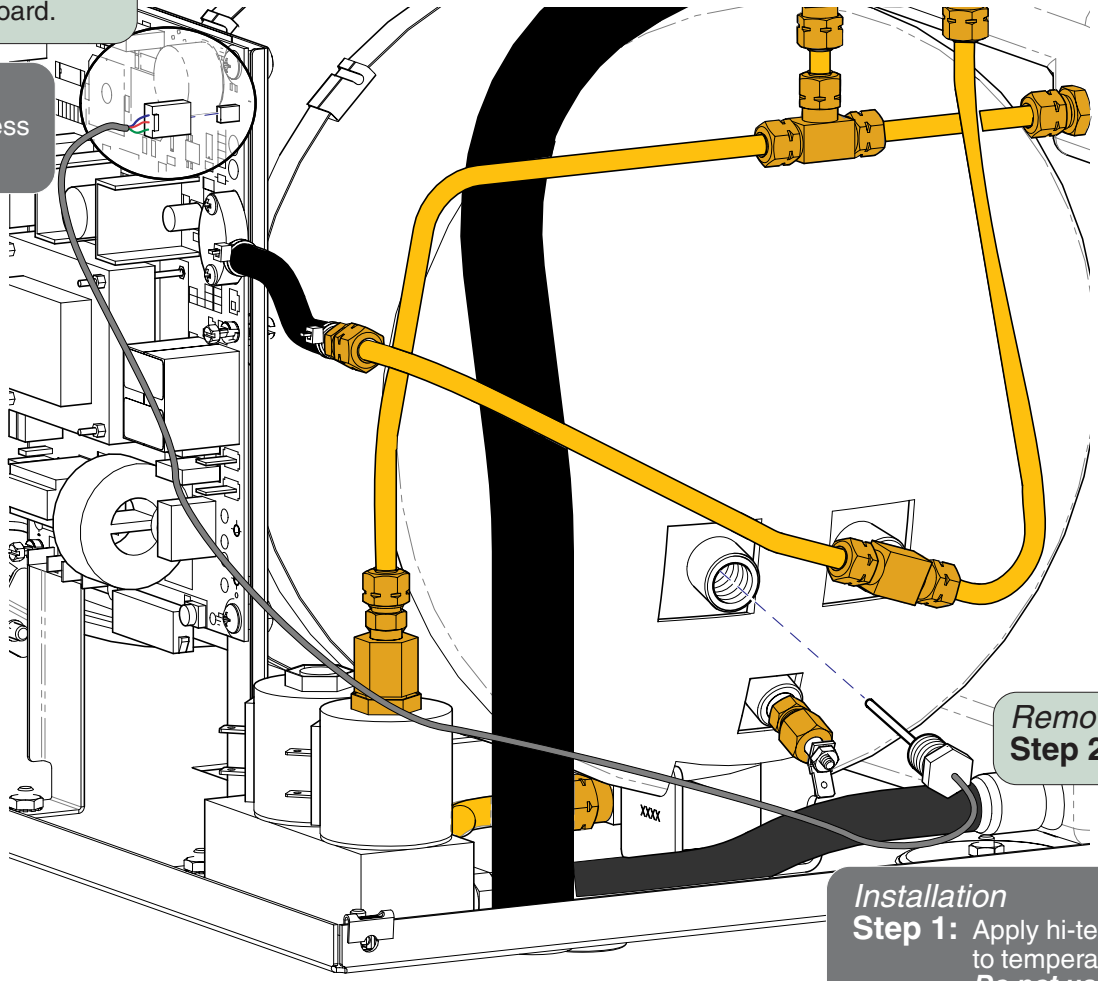
Temperature Sensor

Replacement

Refer To: **Go To Page:**
Cover Removal C-2

Removal
Step 1: Disconnect sensor harness from J12 on PC board.

Installation
Step 2: Connect sensor harness to J12 on PC board.



MA664700i

Removal
Step 2: Remove temperature sensor.

Installation
Step 1: Apply hi-temp hydraulic sealant *(Loctite 565)* to temperature sensor threads.
Do not use teflon tape!

Install temperature sensor.

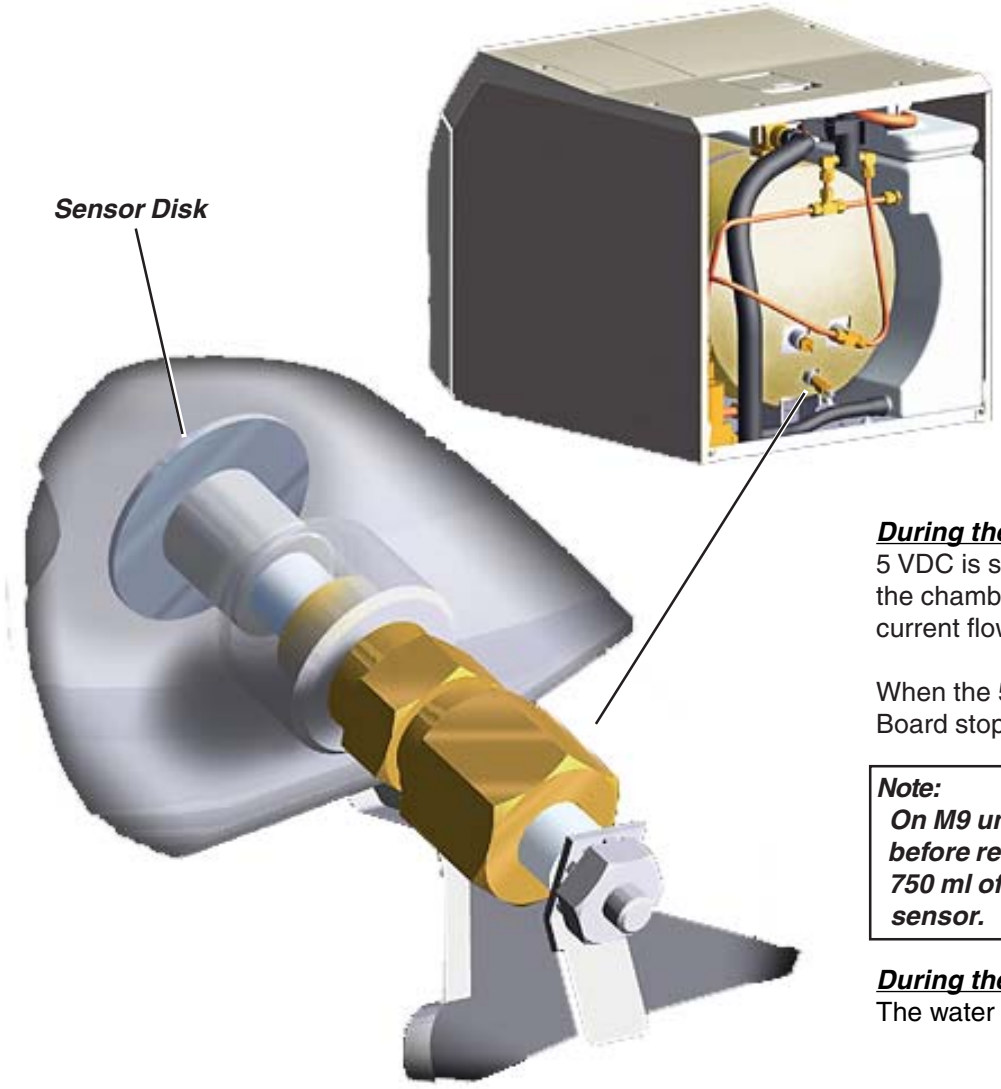
Temperature Sensor

Models:	***ALL***			
Serial Numbers:				

Component Testing & Repair

Water Level Sensor

Location & Function



During the Fill Mode...

5 VDC is supplied to the water level sensor. When the water level in the chamber reaches the sensor disk, a circuit is completed and current flows back to the PC Board.

When the 5 VDC from the water level sensor is detected, the PC Board stops the current flow to the fill valve.

Note:
On M9 units, approximately 650 ml of water will enter chamber before reaching the water sensor. On M11 units, approximately 750 ml of water will enter chamber before reaching the water sensor.

During the Heat-Up, Sterilization, Vent, & Drying Modes...

The water level sensor is not monitored.

Component Testing & Repair

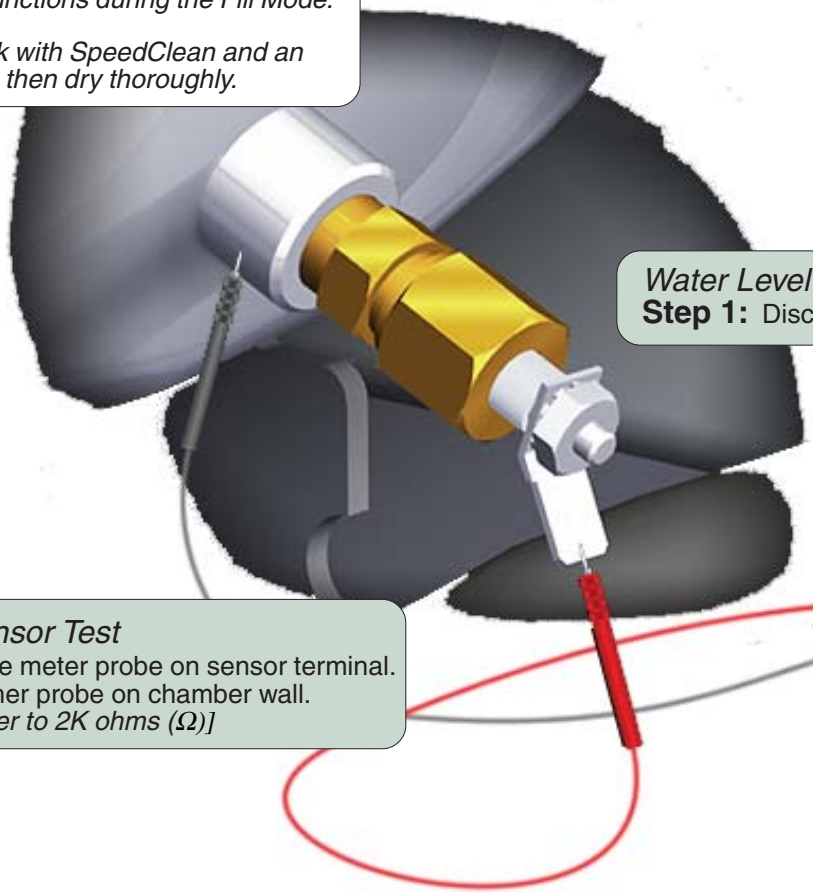
Water Level Sensor

Testing

Refer To: **Go To Page:**
Supply Voltage Test B-29
Cover Removal C-2

Service Tip
Residue can build up on the sensor disk causing malfunctions during the Fill Mode.

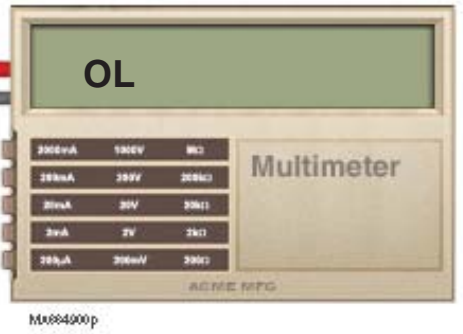
Clean the disk with SpeedClean and an abrasive pad, then dry thoroughly.



Water Level Sensor Test
Step 1: Disconnect wire from sensor terminal.

Water Level Sensor Test
Step 2: Place one meter probe on sensor terminal.
Place other probe on chamber wall.
[Set meter to 2K ohms (Ω)]

Acceptable Reading:



Water Level Sensor Test
If reading is anything other than OL...
Replace water level sensor.

If reading is OL...
Perform *Supply Voltage Test.*

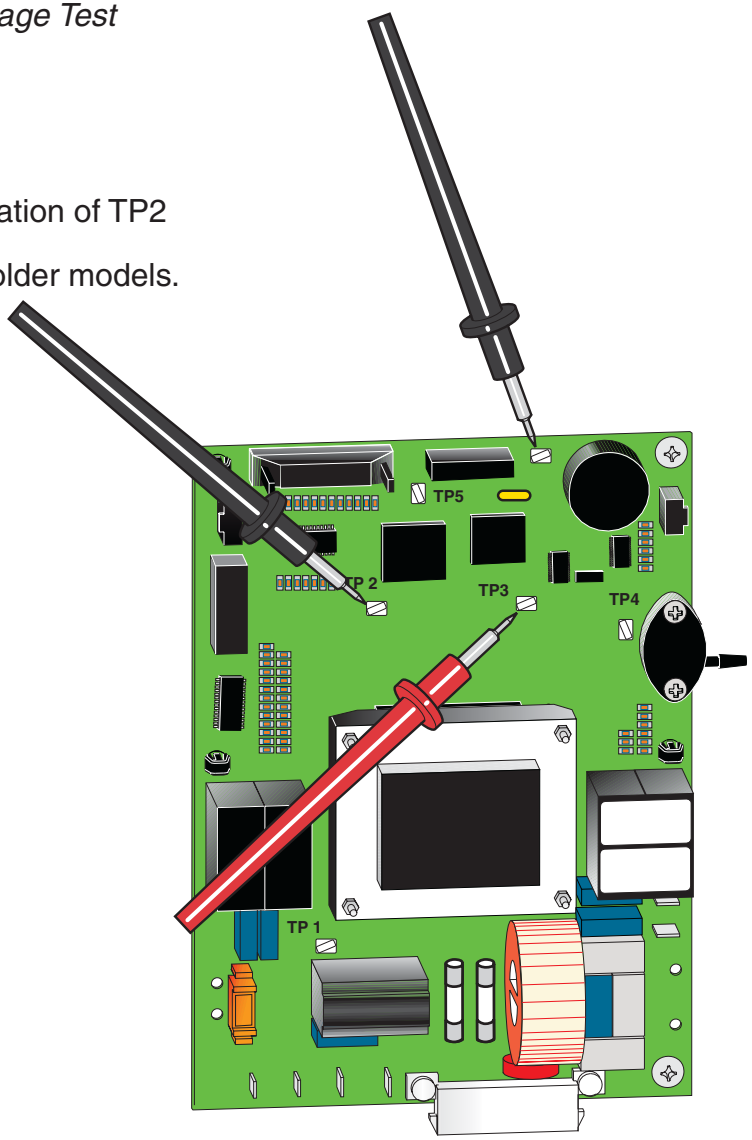
Component Testing & Repair

Water Level Sensor

Supply Voltage Test

Location of TP2

on older models.



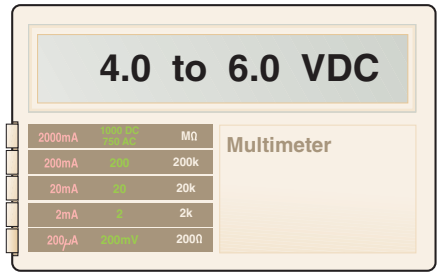
Supply Voltage Test
Step 1: Place meter probes on test points:
Black probe: TP2
Red probe: TP3

[Set meter to 20 VDC]

Supply Voltage Test
If reading is out of acceptable range...
Replace main PC board.

If reading is within acceptable range...
Main PC board is functioning properly

Acceptable Range:



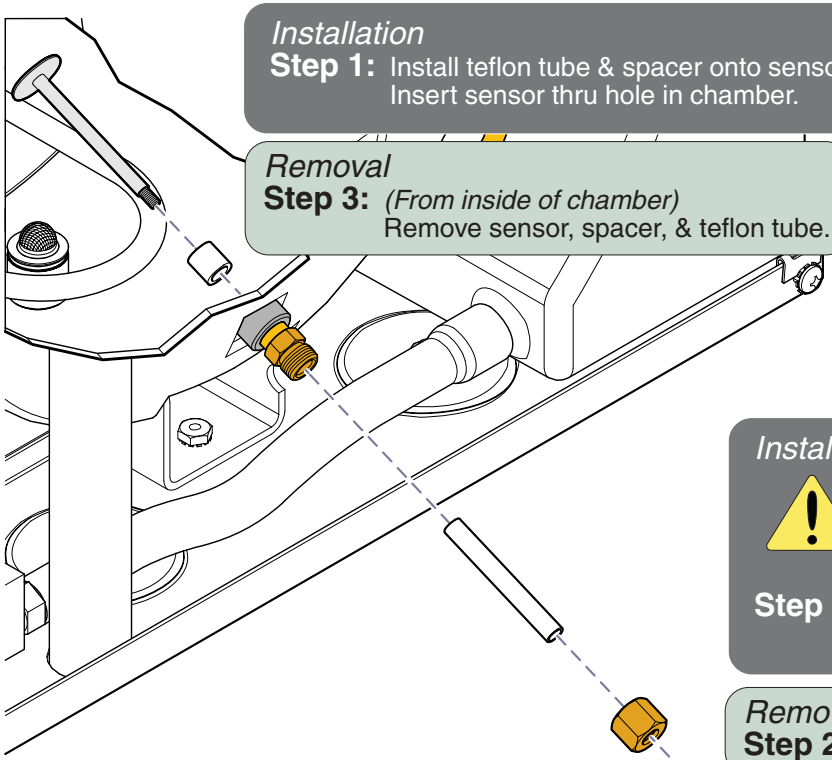
SA110500

Component Testing & Repair

Water Level Sensor

Replacement

Refer To: — **Go To Page:**
Cover Removal C-2



Installation
Step 1: Install teflon tube & spacer onto sensor. Insert sensor thru hole in chamber.

Removal
Step 3: *(From inside of chamber)* Remove sensor, spacer, & teflon tube.

Installation
Equipment Alert
Do not overtighten compression nut!
[Tighten 1-1/4 turns from finger-tight]

Step 2: Install compression nut. Install terminal & nut.

Removal
Step 2: Remove nut, terminal, & compression nut.

Installation
Step 3: Perform test on page B-26 to assure sensor is not grounded.

Removal
Step 1: Disconnect wire from sensor.

Installation
Step 4: Connect sensor wire.

MA665200i

High Limit Thermostats

Location & Function

During all modes...
Line voltage continually flows thru the normally closed contacts of the two high-limit thermostats. This circuit powers all of the line voltage components, except for the Fan System.

If the temperature at either of the thermostats exceeds 450°F (±25°) / 232°C (+14°), the thermostat contacts open. This interrupts power, and terminates the cycle. *[An error code will appear on the display].*

The thermostat contacts reset to the closed position at approximately 325°F / 163°C.

Component Testing & Repair

High Limit Thermostats

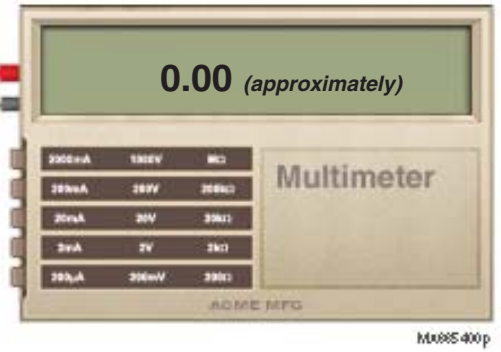
Testing

Note
High-limit thermostats must be tested at room temperature.

High-Limit Thermostat Test
Step 1: Disconnect wires from thermostat.

High-Limit Thermostat Test
Step 2: Place meter probes on thermostat terminals.
[Set meter to 200 ohms (Ω)]

Acceptable Range:



High-Limit Thermostat Test
If reading is (approximately) 0.00 ...
High-limit thermostat is good.

If reading is OL...
Replace high-limit thermostat.

Component Testing & Repair

High Limit Thermostats

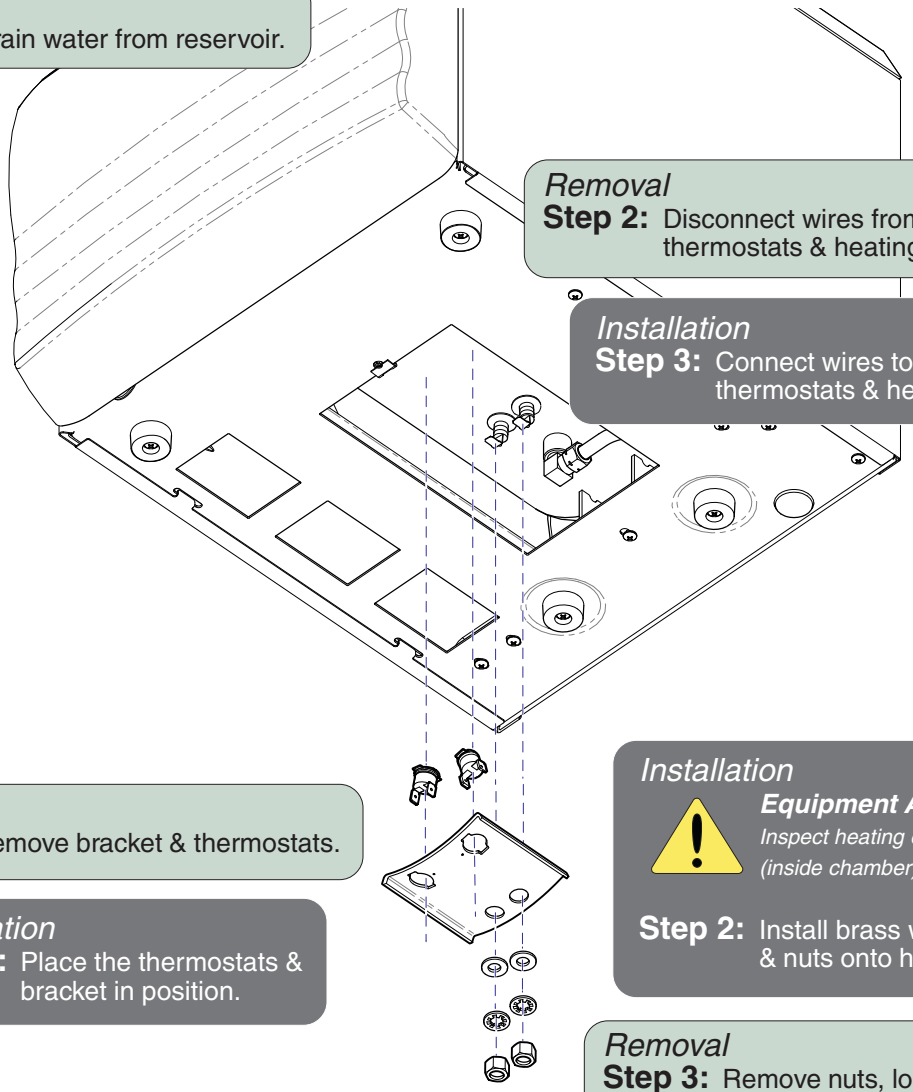
Replacement

Refer to: Go To Page:
Draining the Reservoir C-4
Cover Removal C-2

Removal
Step 1: Drain water from reservoir.

Removal
Step 2: Disconnect wires from both thermostats & heating element.

Installation
Step 3: Connect wires to both thermostats & heating element.



Wire Connections
white jumper wire ..... between thermostats
yellow wire ..... thermostat
red wire ..... thermostat
brown wire ..... heating element
brown/white wire ..... heating element

Removal
Step 4: Remove bracket & thermostats.

Installation
Step 1: Place the thermostats & bracket in position.

Installation

Equipment Alert
Inspect heating element gaskets & wire spacer (inside chamber) before tightening nuts.

Step 2: Install brass washers, lockwashers, & nuts onto heating element.

Removal
Step 3: Remove nuts, lockwashers , & brass washers from heating element.

Models: / ***Serial Numbers:***	***ALL***			

High-Limit Thermostats

Component Testing & Repair

Door Switch

Location & Function

Note
When the door is open, the door switch is untripped / open.
When the door is closed, the door switch is tripped / closed.

During the Fill, Heat-Up, & Sterilization Modes...
When a cycle is initiated, the PC board monitors the status of the door switch.

If an open door is detected, the cycle will not start.
If the door switch opens during a cycle, the cycle will be terminated and the corresponding error code will appear in the display.

During the Vent, & Drying Modes...
The door switch is not monitored.

Component Testing & Repair

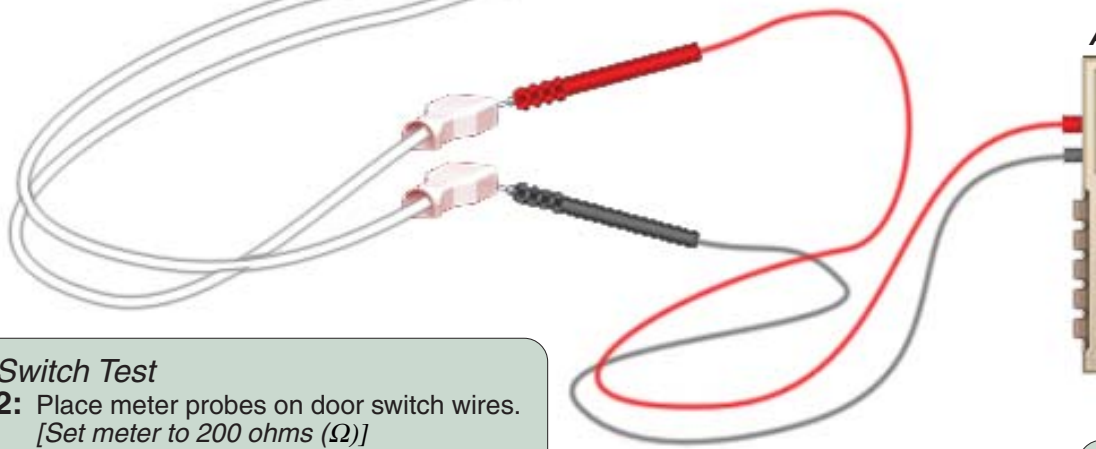
Door Switch

Refer To: Go To Page:
Cover Removal C-2

Testing

> ***Note***
> *The door switch must be tested with the door OPEN and CLOSED.*

Door Switch Test
Step 1: Disconnect two door switch wires from J1 & J2 of main PC board



Acceptable Reading:

Door Switch Test
Step 2: Place meter probes on door switch wires.
[Set meter to 200 ohms (Ω)]
Open and close the door.

Door Switch Test
If reading is out of acceptable range...
Replace door switch.

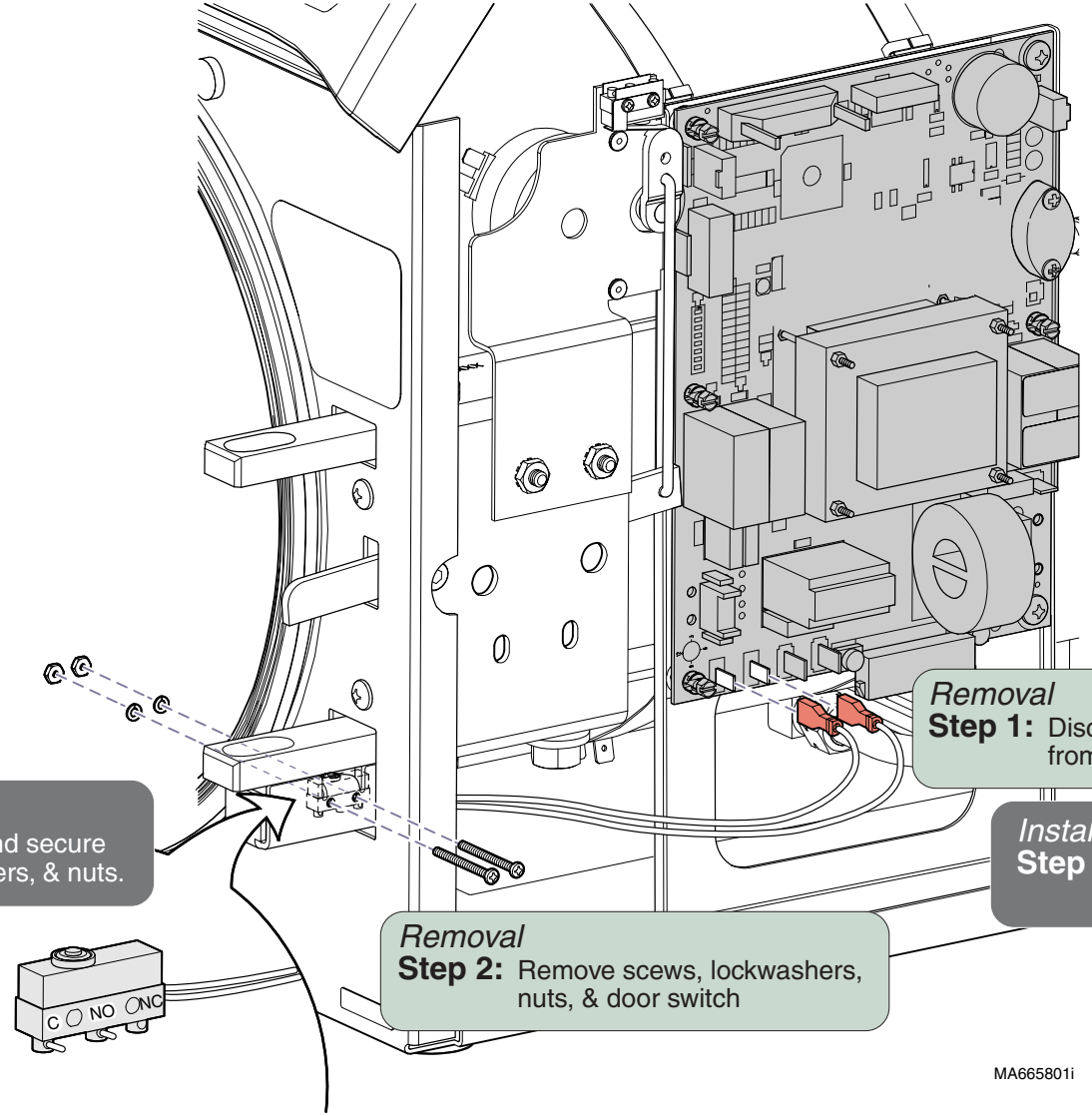
If reading is within acceptable range...
Door Switch is functioning properly.

Component Testing & Repair

Door Switch

Replacement

Refer To: Go To Page:
Cover Removal C-2



Removal
Step 1: Disconnect door switch wires from main PC board *(J1 & J2)*.

Installation
Step 1: Position door switch and secure with screws, lockwashers, & nuts.

Installation
Step 2: Connect door switch wires to main PC board *(J1 & J2)*.

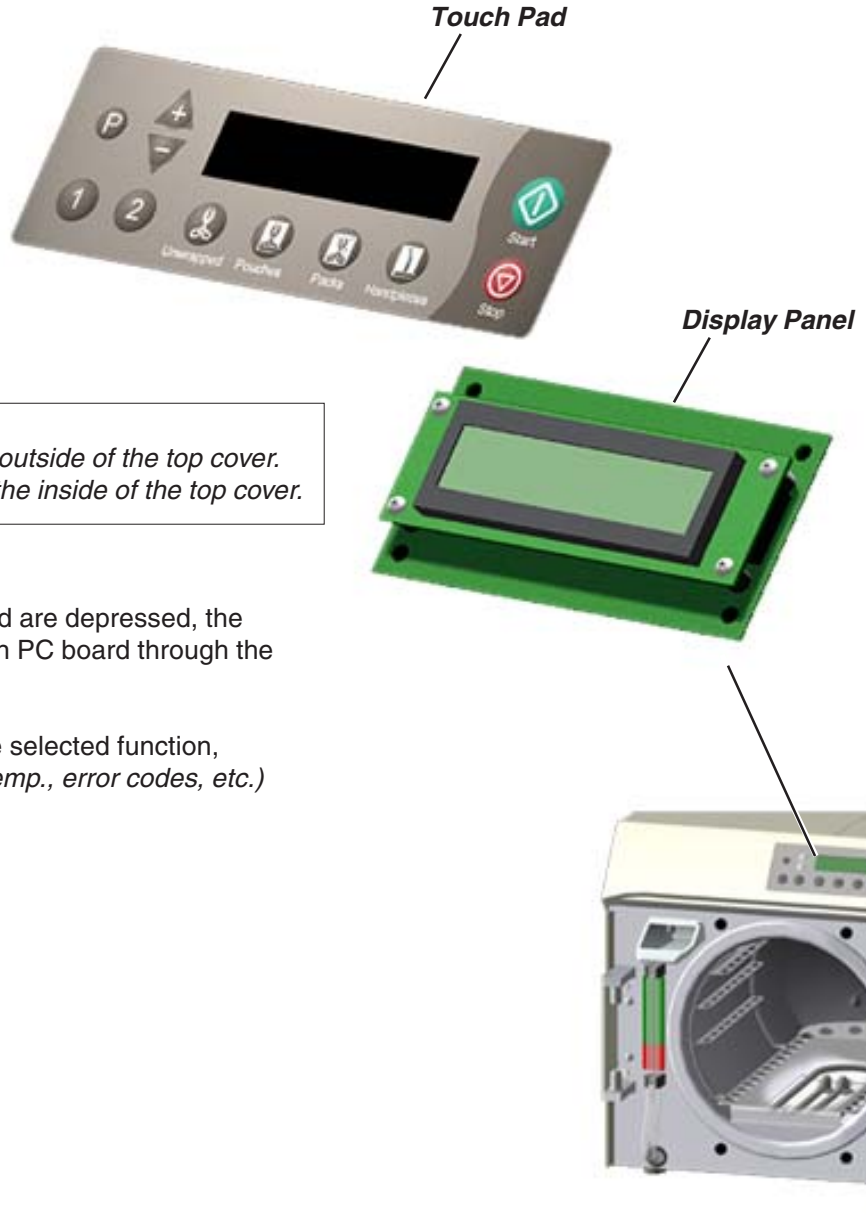
Removal
Step 2: Remove scews, lockwashers, nuts, & door switch

Door Switch

Models: ***ALL***
Serial Numbers:

Touch Pad / Display Panel

Location & Function



> ***Note***
> *The touch pad is attached to the outside of the top cover.*
> *The display panel is attached to the inside of the top cover.*

During all Modes...

When the buttons on the touch pad are depressed, the selection is transmitted to the main PC board through the display panel.

As the main PC board initiates the selected function, informational messages *(time & temp., error codes, etc.)* appear on the display panel.

Component Testing & Repair

Touch Pad / Display Panel

Replacement

Refer To: Go To Page:
Cover Removal C-2

Removal
Step 1: Remove top cover.

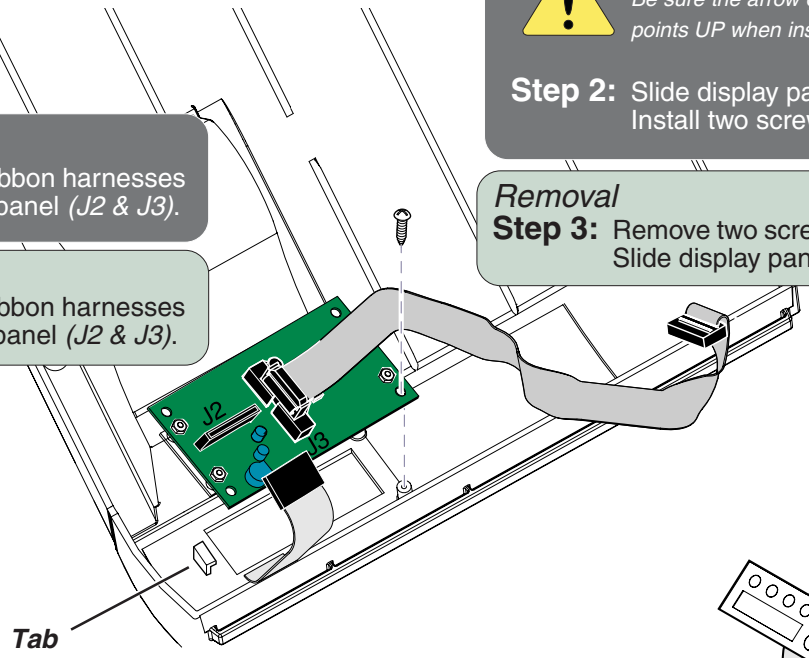
Installation
Equipment Alert
Be sure the arrow on the display panel points UP when installing panel.

Step 2: Slide display panel under tab.
Install two screws

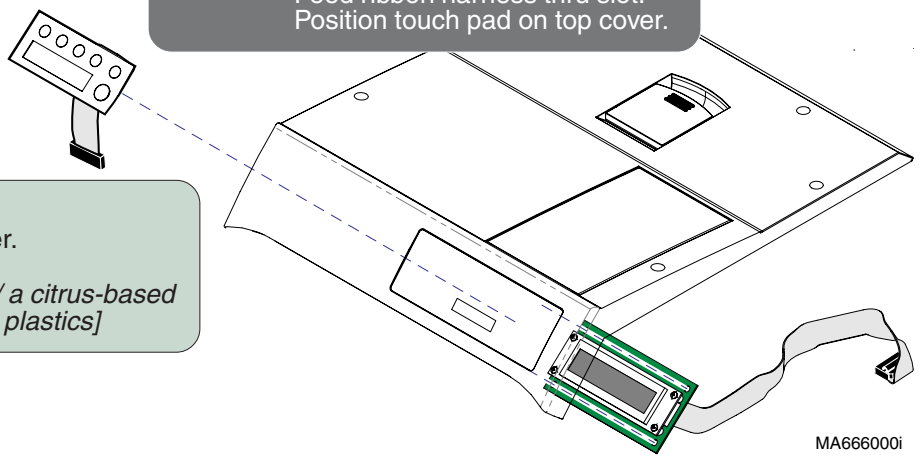
Installation
Step 3: Connect ribbon harnesses to display panel *(J2 & J3)*.

Removal
Step 3: Remove two screws.
Slide display panel out from under tab.

Removal
Step 2: Disconnect ribbon harnesses from display panel *(J2 & J3)*.



Installation
Step 1: Peel backing from touch pad.
Feed ribbon harness thru slot.
Position touch pad on top cover.



Removal
Step 4: Peel touch pad off of top cover.

[Remove adhesive residue w/ a citrus-based solvent that is safe for use on plastics]

MA666000i

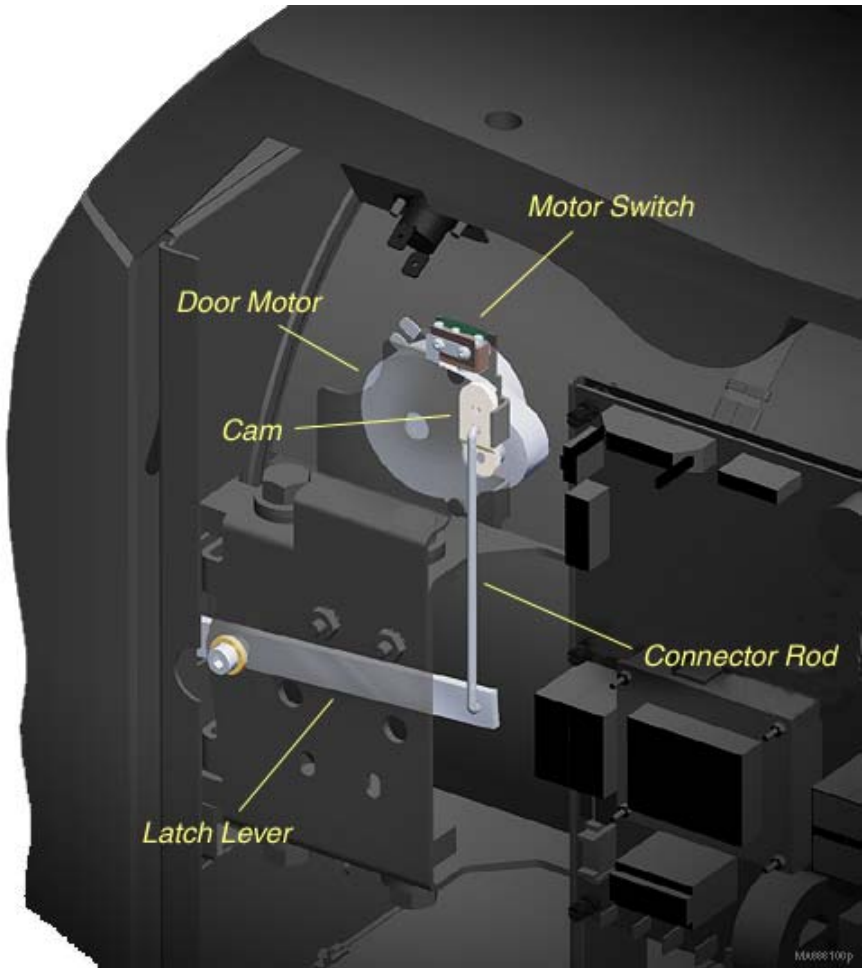
Door Motor System

Location & Function

At the end of the Sterilizing Mode...

When the pressure in the chamber drops to 0.7 psi (5 kPa), the PC board bypasses the motor switch and supplies line voltage to the door motor. The door motor rotates the cam causing the motor switch to close. Now, the current to the door motor flows thru the motor switch. As the cam rotates, the connector rod causes the latch lever to open the door.

When the cam reaches the bottom of its travel, the motor reverses direction. When the cam reaches its starting position, the motor switch opens, stopping the current flow to the door motor.



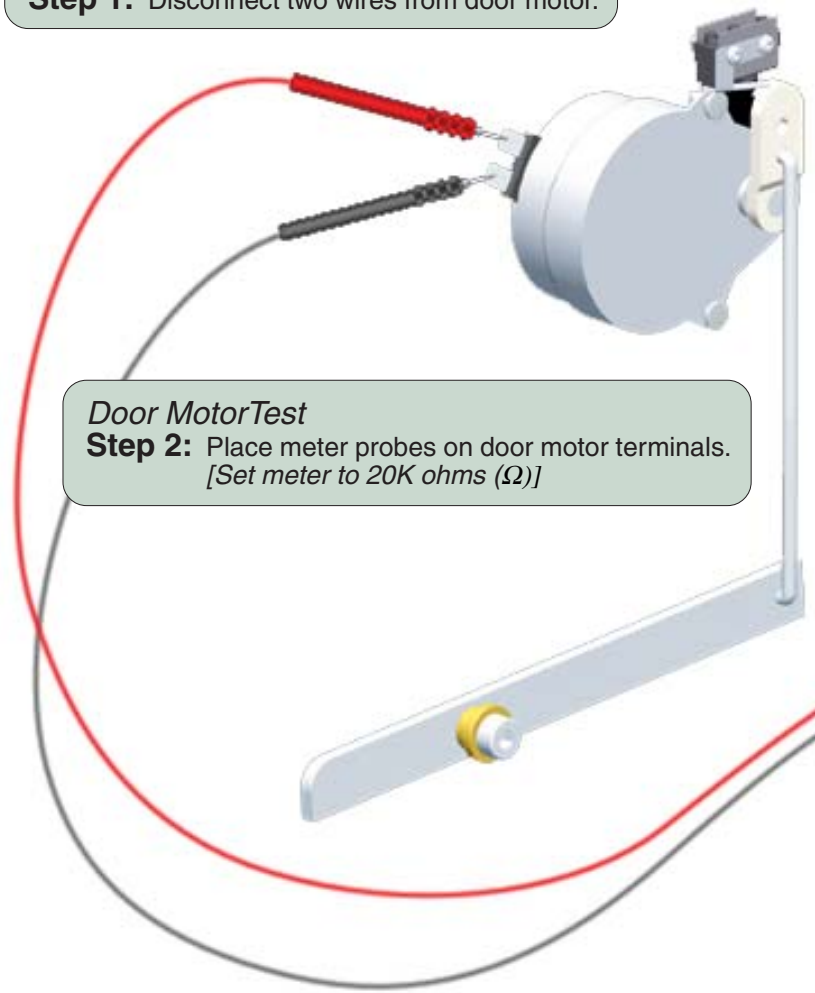
Component Testing & Repair

Door Motor System

Testing

Refer To: **Go To Page:**
Cover Removal C-2
PC Board Relay Test B-48

Door Motor Test
Step 1: Disconnect two wires from door motor.

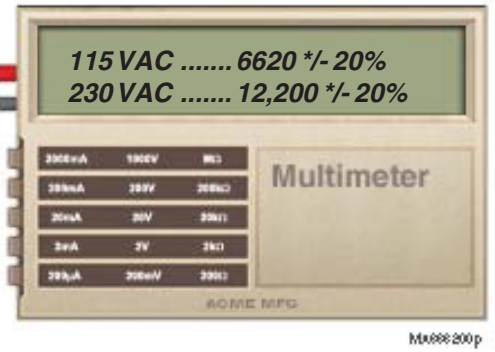


Door MotorTest
Step 2: Place meter probes on door motor terminals.
[Set meter to 20K ohms (Ω)]

Door Motor Test
If reading is out of acceptable range...
Replace door motor.

If reading is within acceptable range...
Perform *PC Board Relay Test*.

Acceptable Reading:



Component Testing & Repair

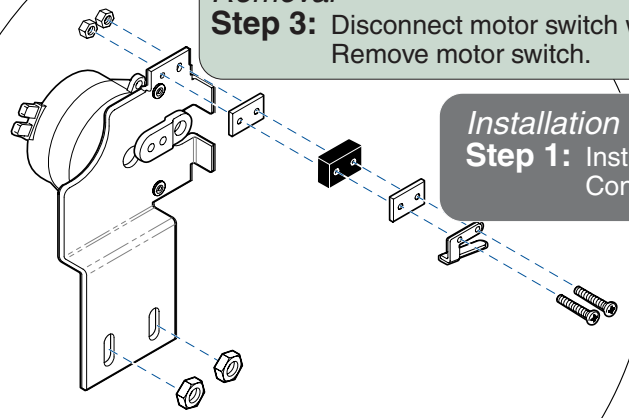
Door Motor System

Replacement

Refer To: **Go To Page:**
Cover Removal C-2

Removal
Step 3: Disconnect motor switch wire harness.
Remove motor switch.

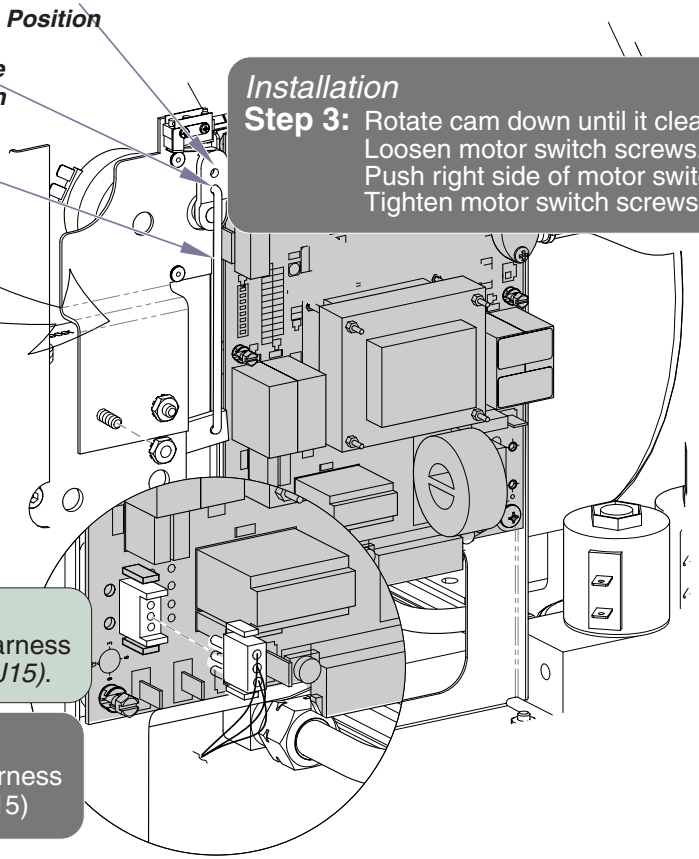
Installation
Step 1: Install motor switch.
Connect motor switch wire harness.



M11 Hole Position

M9 Hole Position

Connector Rod



Installation
Step 3: Rotate cam down until it clears the motor switch.
Loosen motor switch screws.
Push right side of motor switch down.
Tighten motor switch screws.

Removal
Step 2: Remove nuts, connector rod, & motor bracket.

Installation

Equipment Alert
Connector rod must be inserted into proper hole in cam. (See illustration).

Step 2: Insert connector rod into hole in cam.
Insert other end into hole in latch lever.
Install motor bracket.

Removal
Step 1: Disconnect wire harness from PC board *(J15)*.

Installation
Step 4: Connect wire harness to PC board (J15)

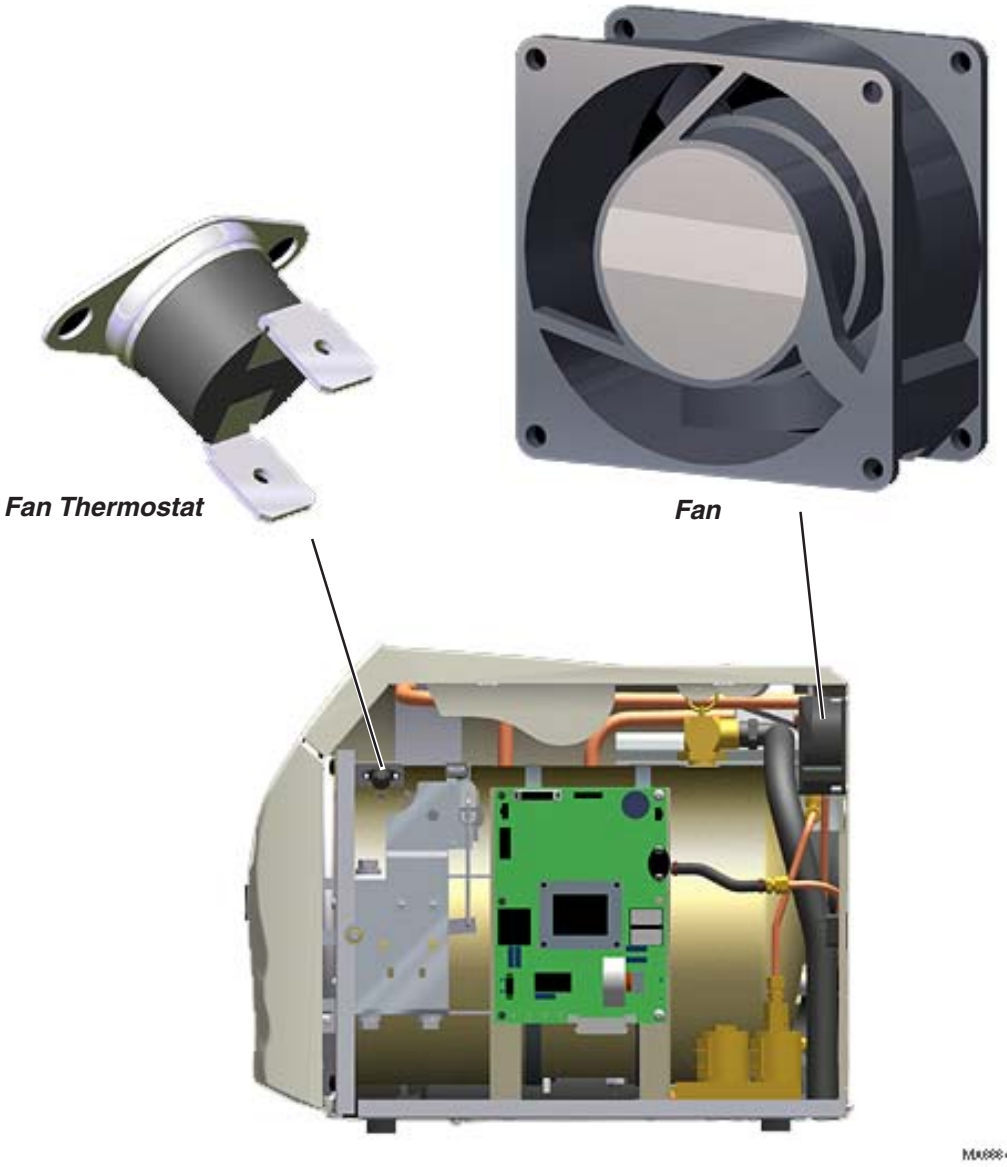
Models: / ***Serial Numbers:***	***M9 (-020 thru -022)*** / ***all***	***M11 (-020 thru -022)*** / ***all***		

Door Motor System

Component Testing & Repair

Fan / Fan Thermostat

Location & Function



Note
The fan may run continuously when running consecutive cycles.

During all Modes...
When power is supplied to the main PC board, line voltage continuously flows to the fan thermostat.

The fan thermostat controls the ON/OFF function of the fan. When the temperature *(at the thermostat)* is below 130°F (54°C), the fan thermostat contacts are open *(no current to the fan - fan is OFF)*. When the temperature reaches 130°F (54°C), the fan thermostat contacts close *(current flows to the fan - fan is ON)*.

When the temperature drops to approx. 100°F (38°C), the contacts of the fan thermostat open and the fan stops running.

Component Testing & Repair

Fan / Fan Thermostat

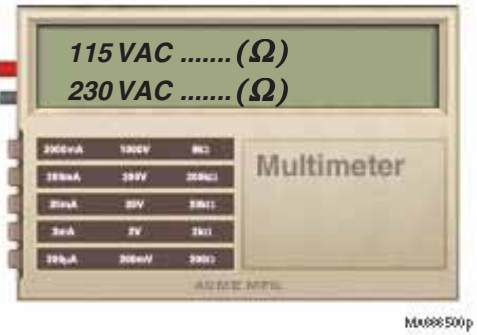
Testing: Fan

Refer To: **Go To Page:**
Cover Removal C-2

Fan Test
Step 1: Disconnect two wires from fan.

FanTest
Step 2: Place meter probes on fan terminals.
*[**115 VAC Models:** Set meter to ohms (Ω)]*
*[**230 VAC Models:** Set meter to ohms (Ω)]*

Acceptable Reading:



Fan Test
If reading show 0 or no reading...
Replace fan.

If reading shows continuity (Ω)..
Fan is functioning properly.

Models: / ***Serial Numbers:***	***ALL***			

Fan / Fan Thermostat

Component Testing & Repair

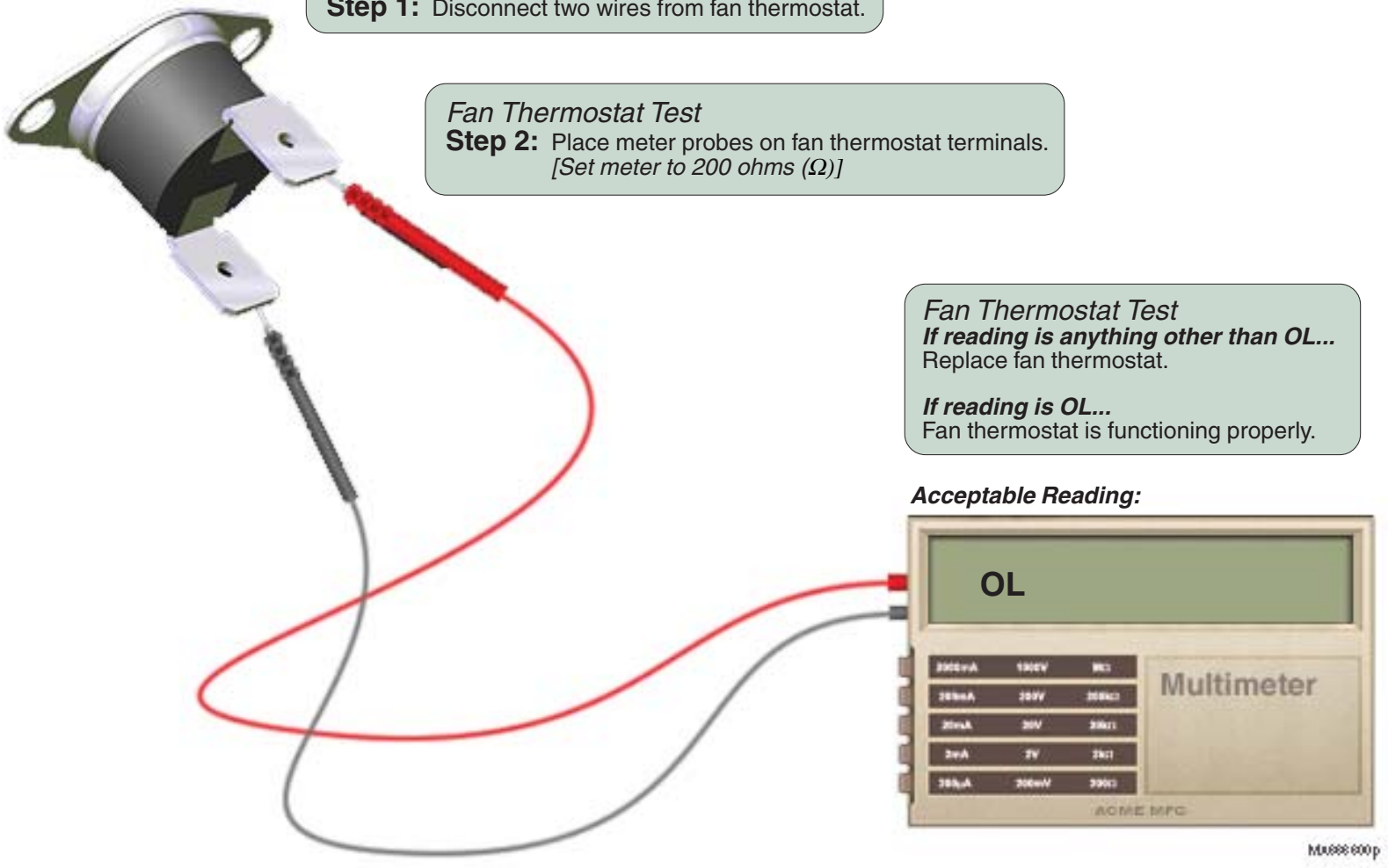
Fan / Fan Thermostat

Testing: Fan Thermostat

Refer To: Go To Page:
Cover Removal C-2

Fan Thermostat Test
Step 1: Disconnect two wires from fan thermostat.

Fan Thermostat Test
Step 2: Place meter probes on fan thermostat terminals.
[Set meter to 200 ohms (Ω)]



Fan Thermostat Test
If reading is anything other than OL...
Replace fan thermostat.

If reading is OL...
Fan thermostat is functioning properly.

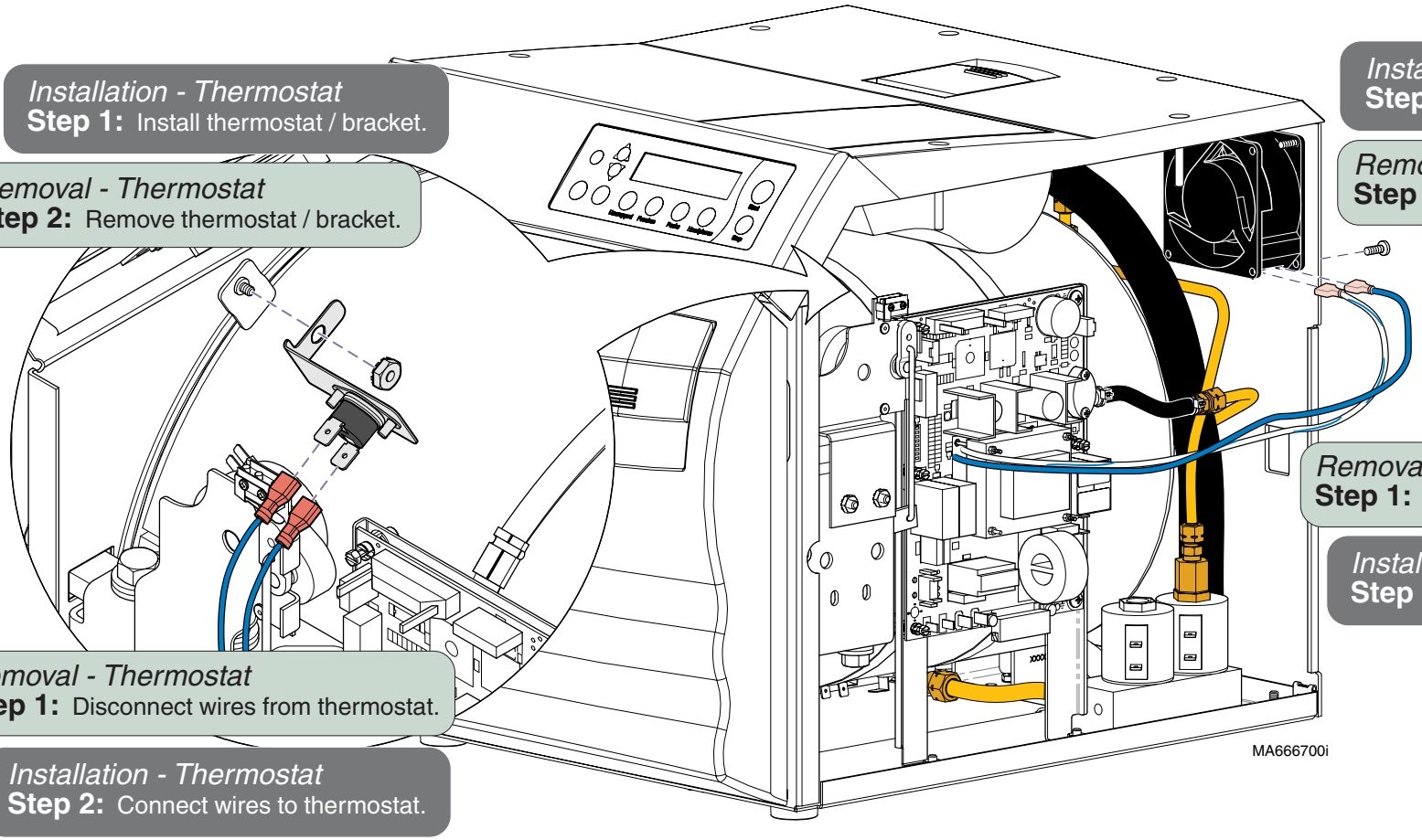
Acceptable Reading:

Component Testing & Repair

Fan / Fan Thermostat

Replacement

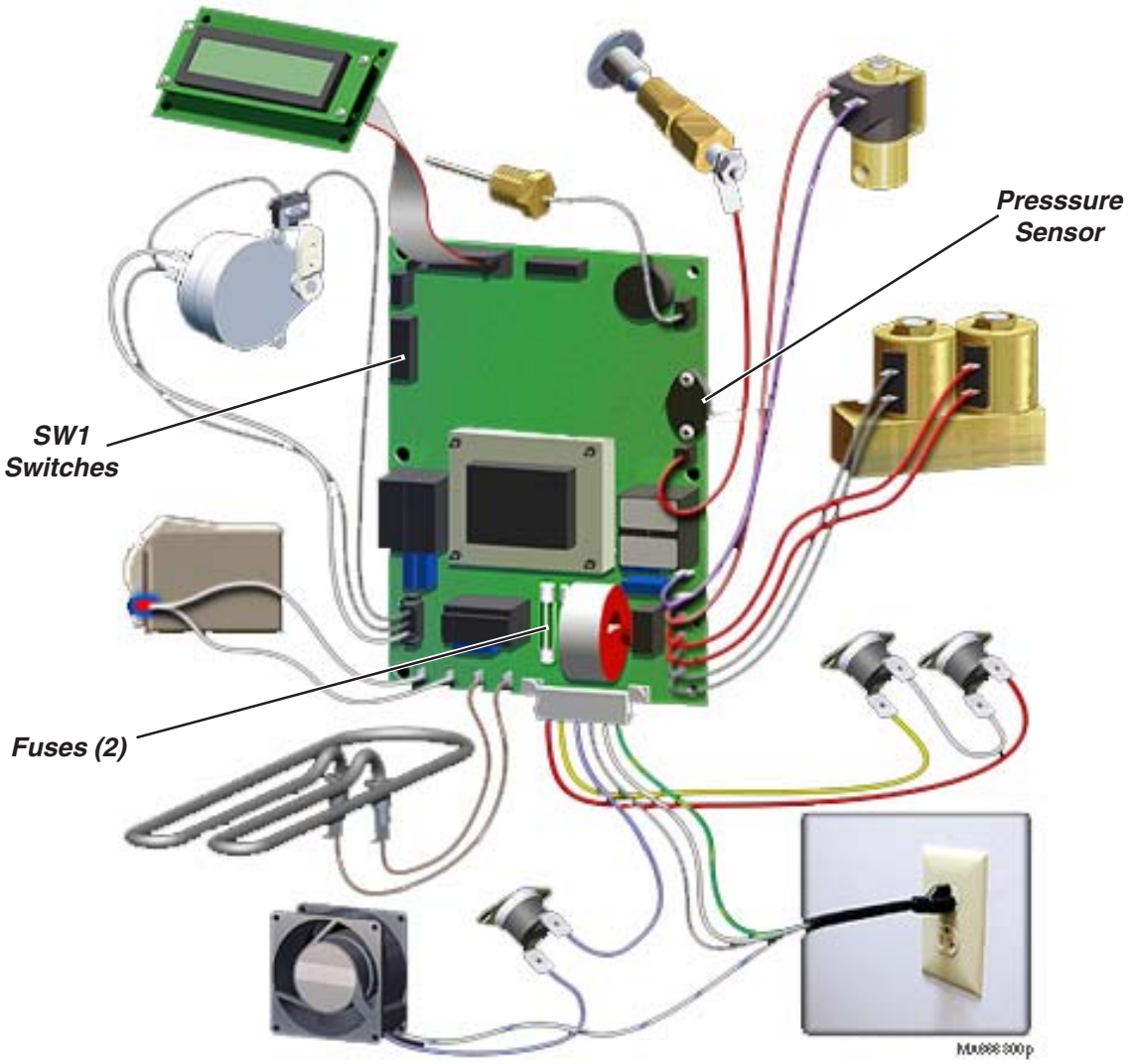
Refer To: Go To Page:
Cover Removal C-2



Component Testing & Repair

Main PC Board

Function



During all Modes...

The Main PC Board controls all of the electronic components of the sterilizer. During operation, the pressure sensor monitors the chamber conditions to maintain the parameters for the selected cycle.

The two fuses (F1 & F2) protect the circuitry from excessive current draw. If either fuse is faulty, the unit will not operate.

The SW1 switches are used for *Service Diagnostics* and to adjust the display to metric units.

Main PC Board

Refer To: Go To Page:
Cover Removal C-2

SW1 Switch Settings

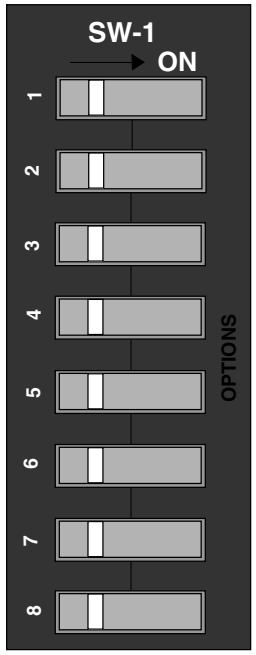
The eight SW1 switches are set to the OFF position when shipped from the factory.
These switches are used when:

- Activating the *Service Diagnostics Mode*.
- Configuring the PC Board *(required when board is replaced)*.
- Changing the display to metric units *(Celcius / kPa)*

To activate the Service Diagnostics Mode...
Move Switch 1 to ON position.
[Note: This switch must be turned OFF to resume normal operation]

To configure the PC Board...
[Note: This procedure changes the software settings for chamber size (ex. M9 - M11) and the door opening function (ex. M9 - M9D)]
Move Switch 2 to ON position.

To change the display to metric units (°C / kPa)...
Move Switch 7 to ON position.



Switch 1	Turn ON for Service Diagnostics Mode
Switch 2	Turn ON to configure PC Board
Switch 3	Not Used, leave OFF
Switch 4	Not Used, leave OFF
Switch 5	Not Used, leave OFF
Switch 6	Not Used, leave OFF
Switch 7	OFF - English Units ON - Metric Units
Switch 8	Not Used, leave OFF

Switch Positions

ISA102401i

Component Testing & Repair

Main PC Board

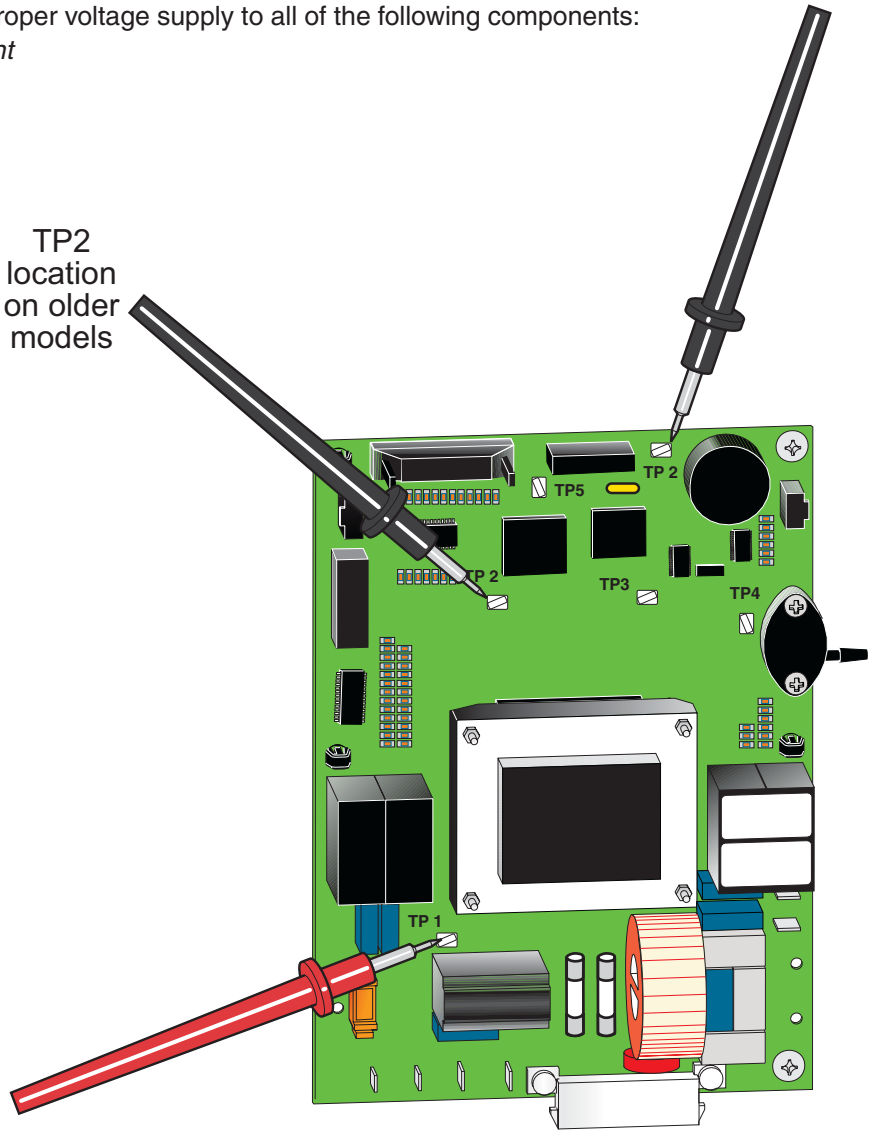
PC Board Relay Test

Refer To: Go To Page:
Cover Removal C-2

This test checks for proper voltage supply to all of the following components:

- *Heating Element*
- *Door Motor*
- *Fill Valve*
- *Vent Valve*
- *Air Valve*

TP2 location on older models



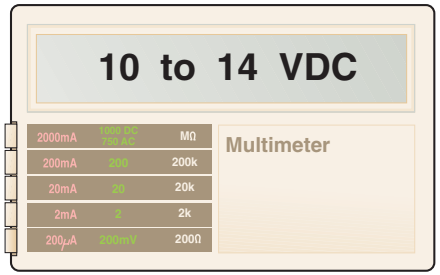
PC Board Relay Test
Step 1: Place meter probes on test points:
Black probe: TP2
Red probe: TP1

[Set meter to 20 VDC]

PC Board Relay Test
If reading is out of acceptable range...
Replace main PC board.

If reading is within acceptable range...
Main PC board is functioning properly

Acceptable Range:



SA110301

Main PC Board

Models: ALL
Serial Numbers:

Component Testing & Repair

Main PC Board

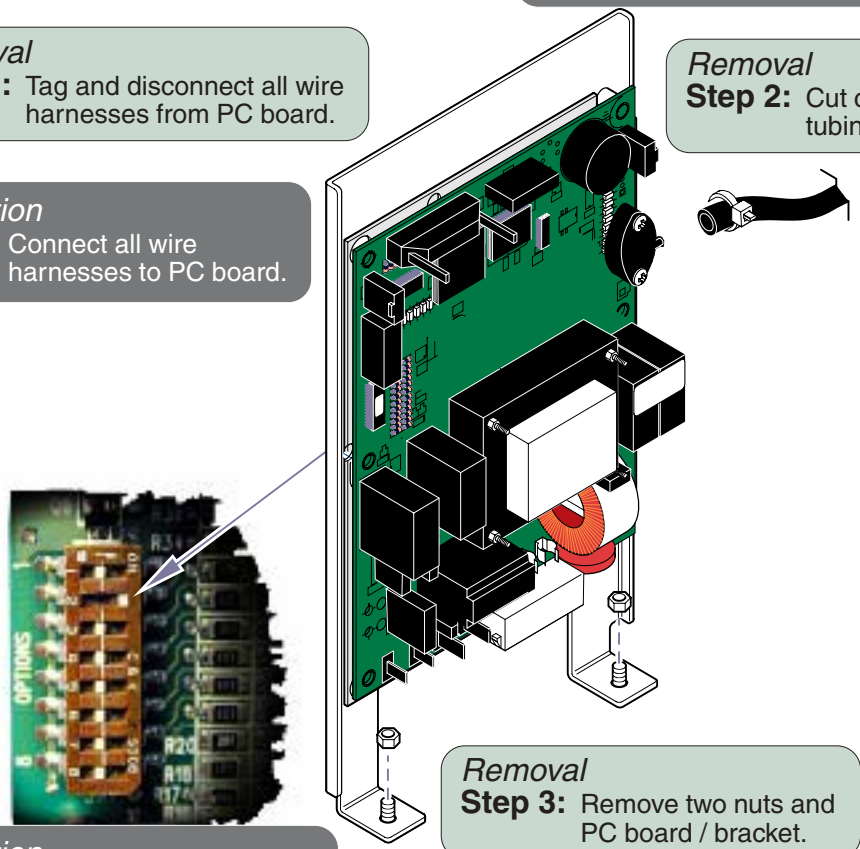
Replacement

Refer To: Go To Page:
Cover Removal C-2

Removal
Step 1: Tag and disconnect all wire harnesses from PC board.

Removal
Step 2: Cut cable tie, then disconnect tubing from pressure sensor.

Removal
Step 3: Remove two nuts and PC board / bracket.



Installation
Step 2: Connect tubing to pressure sensor. Secure with a high temp. cable tie.

Installation
Step 3: Connect all wire harnesses to PC board.

Installation
Step 4: Unplug power cord. Move switch #2 to ON. Reconnect power cord.

Installation
Step 1: Install PC board / bracket. Secure with two nuts

Installation
Step 6: Unplug power cord. Move switch #2 to OFF. Reconnect power cord.

Installation
Step 5: Adjust the PC Board configuration by following the prompts on the display panel.

Use the <**+**> <**-**> buttons to adjust settings. Press the <**P**> button when finished.

CHAMBER SIZE:
M9/M9D ..... 9 INCH
M11/M11D 11INCH

FEATURE SET:
M9/M11 ..... FULLY FEATURED
M9D/M11D ..... DEFEATURED

MA617006i

Models: / **Serial Numbers:**	ALL			

Component Testing & Repair

Printer (optional)

Paper Roll / Ink Cartridge Replacement

Replacement - Ink Cartridge
Step 4: Install printer cover.
Place printer into position.

Replacement - Ink Cartridge
Step 3: Turn knob on cartridge clockwise until ribbon is tight.

Replacement - Ink Cartridge
Step 1: Remove printer cover.
Press down on side of cartridge marked ***Eject***.

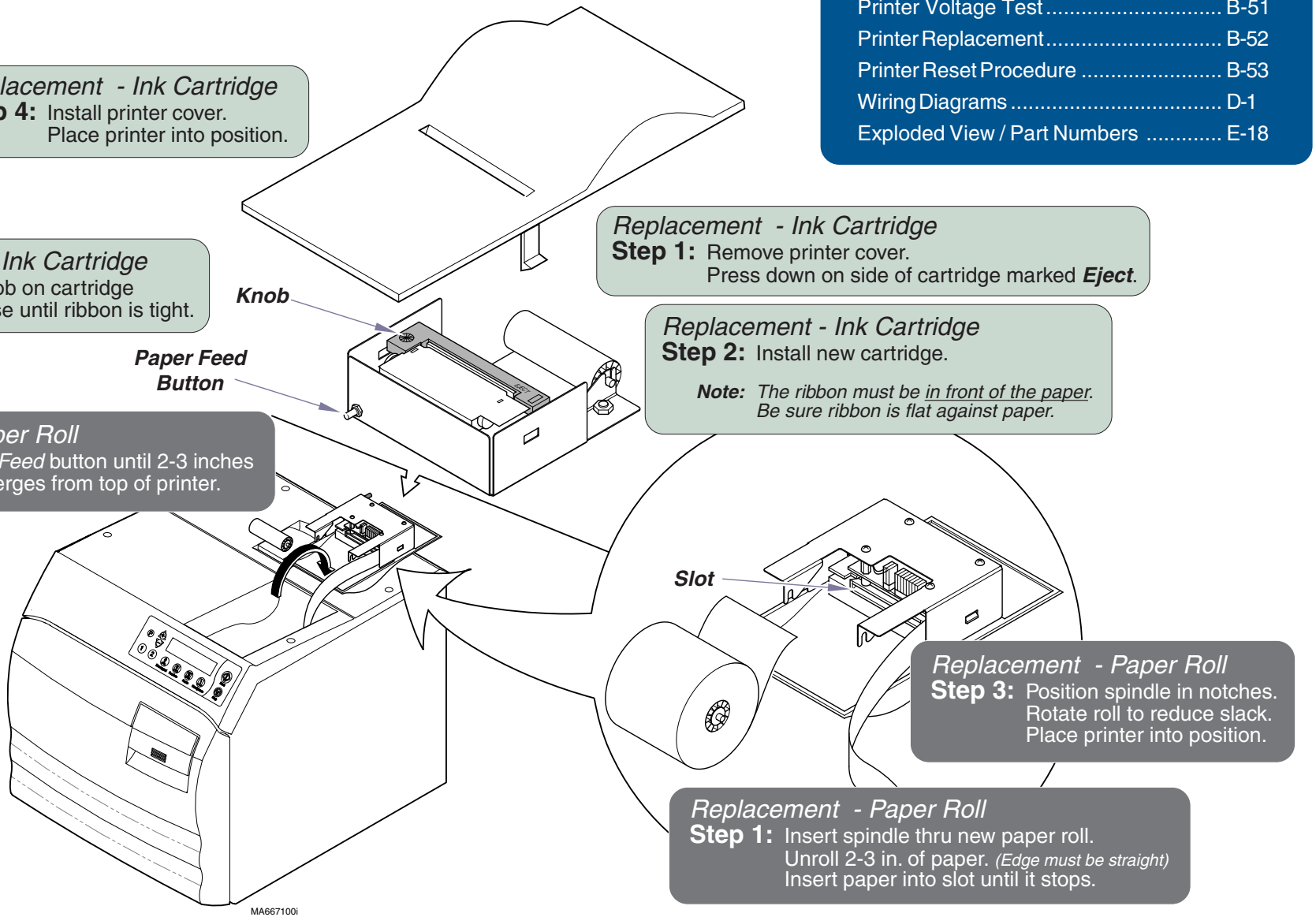
Replacement - Ink Cartridge
Step 2: Install new cartridge.

Note: *The ribbon must be in front of the paper. Be sure ribbon is flat against paper.*

Replacement - Paper Roll
Step 2: Press *Paper Feed* button until 2-3 inches of paper emerges from top of printer.

Replacement - Paper Roll
Step 3: Position spindle in notches.
Rotate roll to reduce slack.
Place printer into position.

Replacement - Paper Roll
Step 1: Insert spindle thru new paper roll.
Unroll 2-3 in. of paper. *(Edge must be straight)*
Insert paper into slot until it stops.



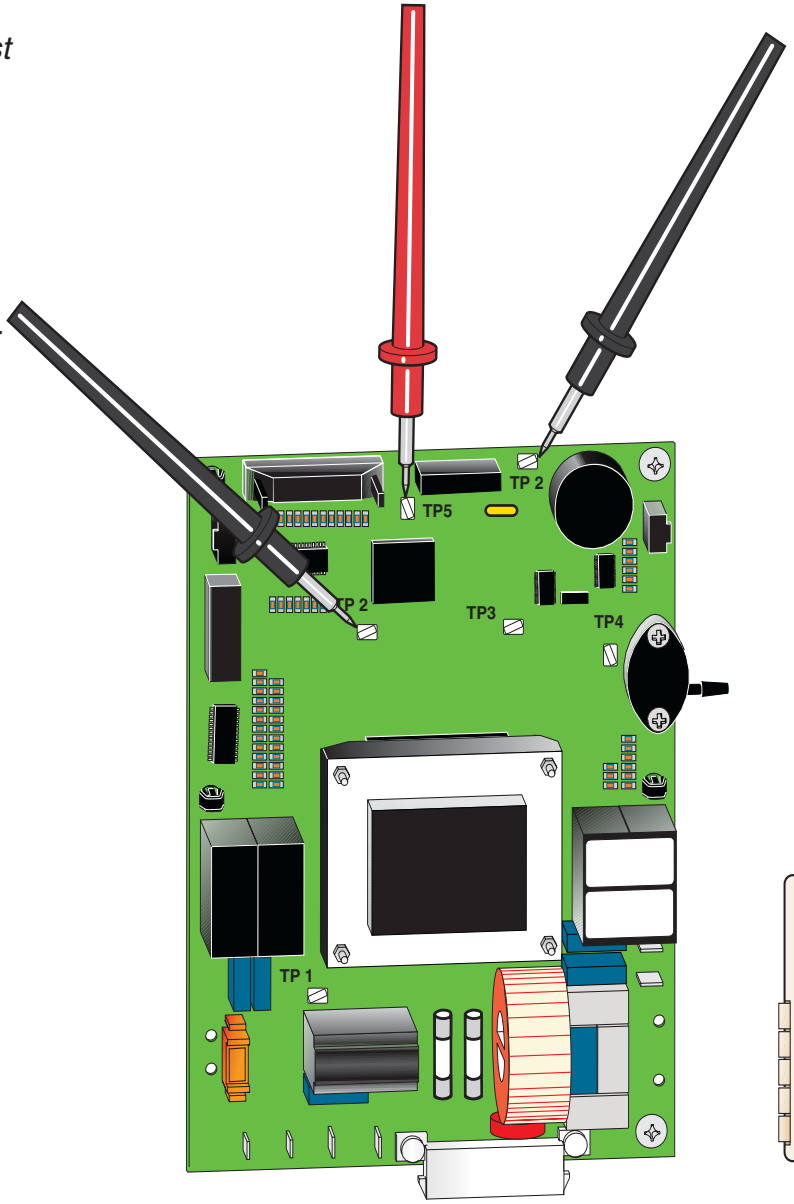
Printer

Models: *Optional on all models*
Serial Numbers:

Component Testing & Repair

Printer (optional)

Printer Voltage Test



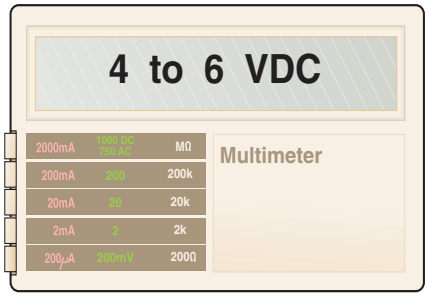
Printer Voltage Test
Step 1: Place meter probes on test points:
Black probe: TP2
Red probe: TP5

[Set meter to 20 VDC]

Printer Voltage Test
If reading is out of acceptable range...
Replace main PC board.

If reading is within acceptable range...
Replace printer and/or printer harness.

Acceptable Range:



SA110401

Component Testing & Repair

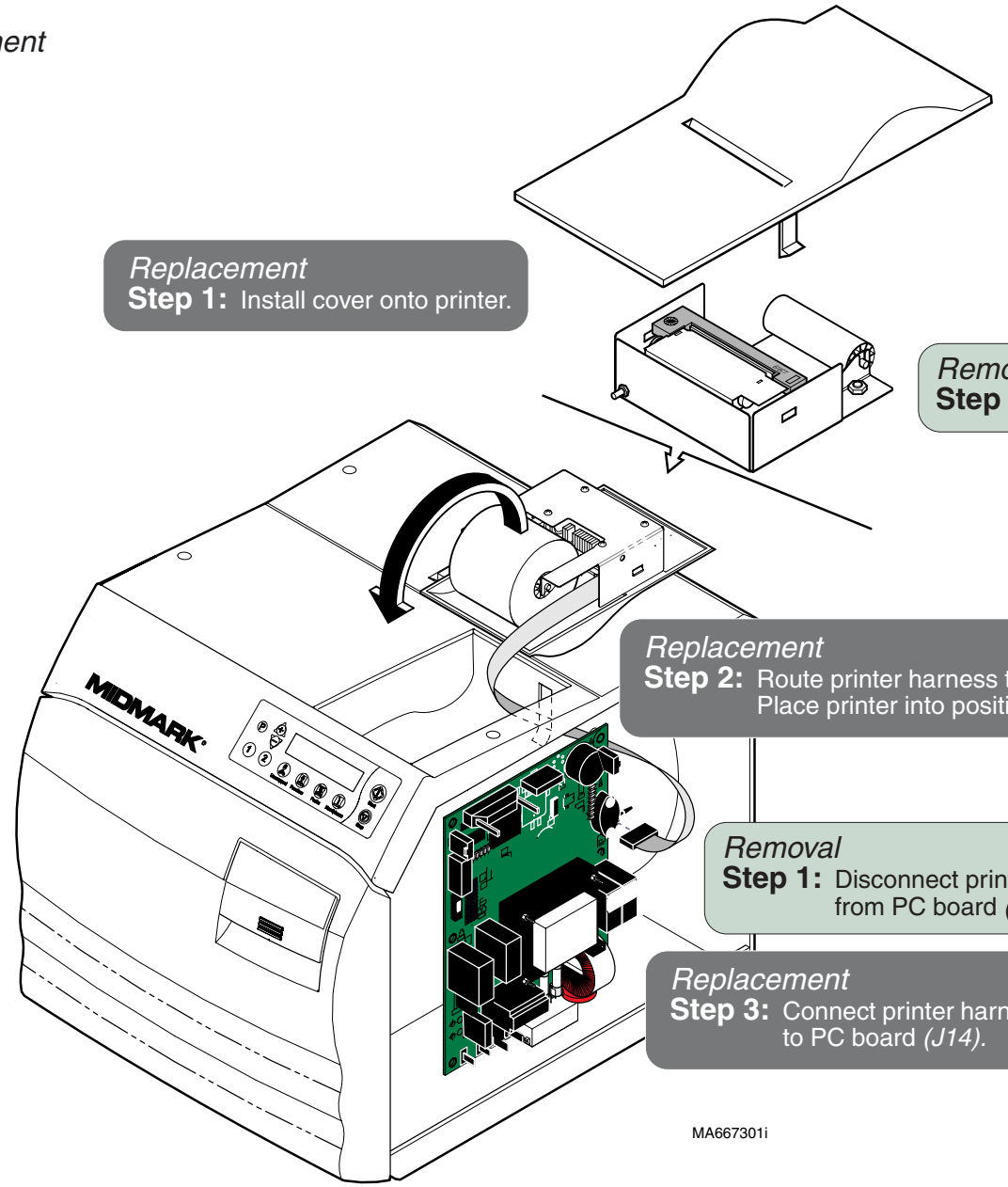
Printer (optional)

Replacement

Refer To:	Go To Page:
Cover Removal	C-2

Replacement
Step 1: Install cover onto printer.

Removal
Step 2: Remove printer and cover.



Replacement
Step 2: Route printer harness thru access hole. Place printer into position.

Removal
Step 1: Disconnect printer harness from PC board *(J14)*.

Replacement
Step 3: Connect printer harness to PC board *(J14)*.

MA667301i

Printer

Models: *Optional on all models*
Serial Numbers:

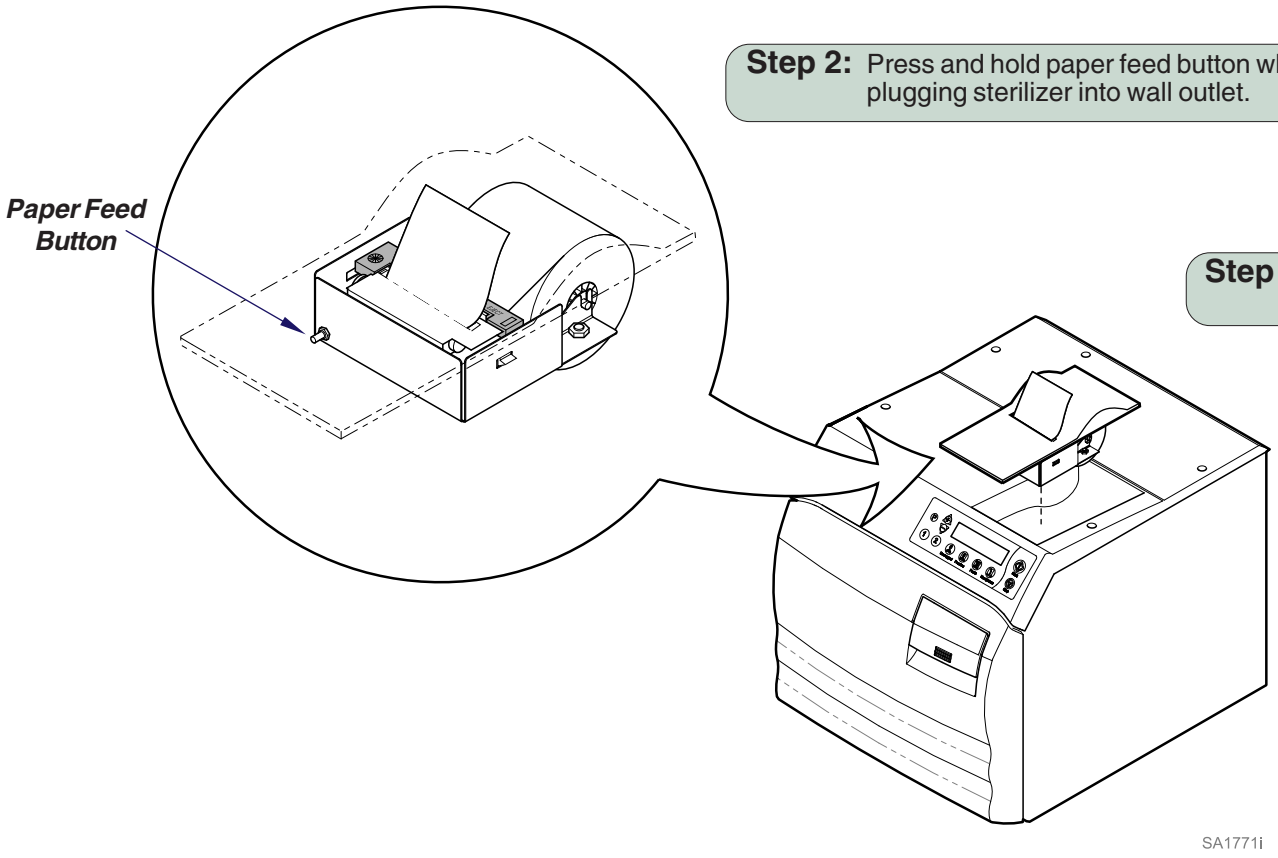
Printer (optional)

Printer Reset Procedure

Step 1: Unplug sterilizer from wall outlet.

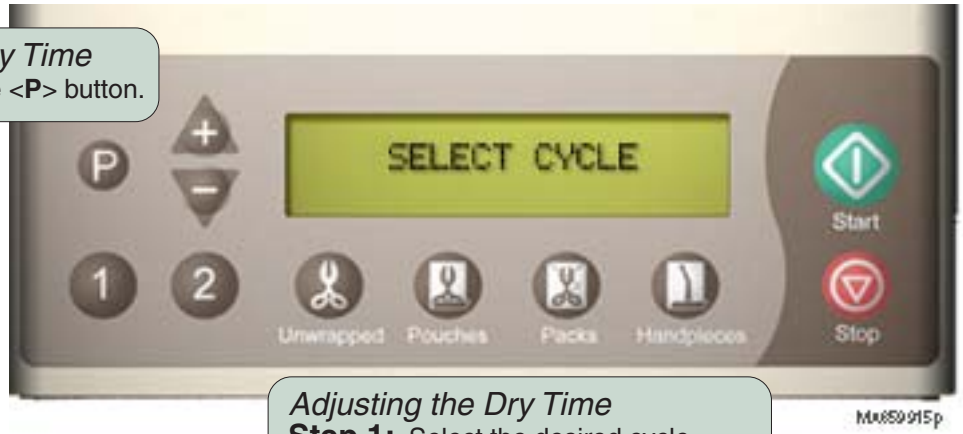
Step 2: Press and hold paper feed button while plugging sterilizer into wall outlet.

Step 3: When test script begins to print, release paper feed button.



Adjusting the Dry Time

Adjusting the Dry Time
Step 2: Press the <**P**> button.



Adjusting the Dry Time
Step 1: Select the desired cycle.
(Unwrapped, Pouches, etc.)

Adjusting the Dry Time
Step 4: Press the <**P**> button.

Note: *The adjusted dry time is stored in memory for the selected cycle. Repeat these steps for other cycles as required.*

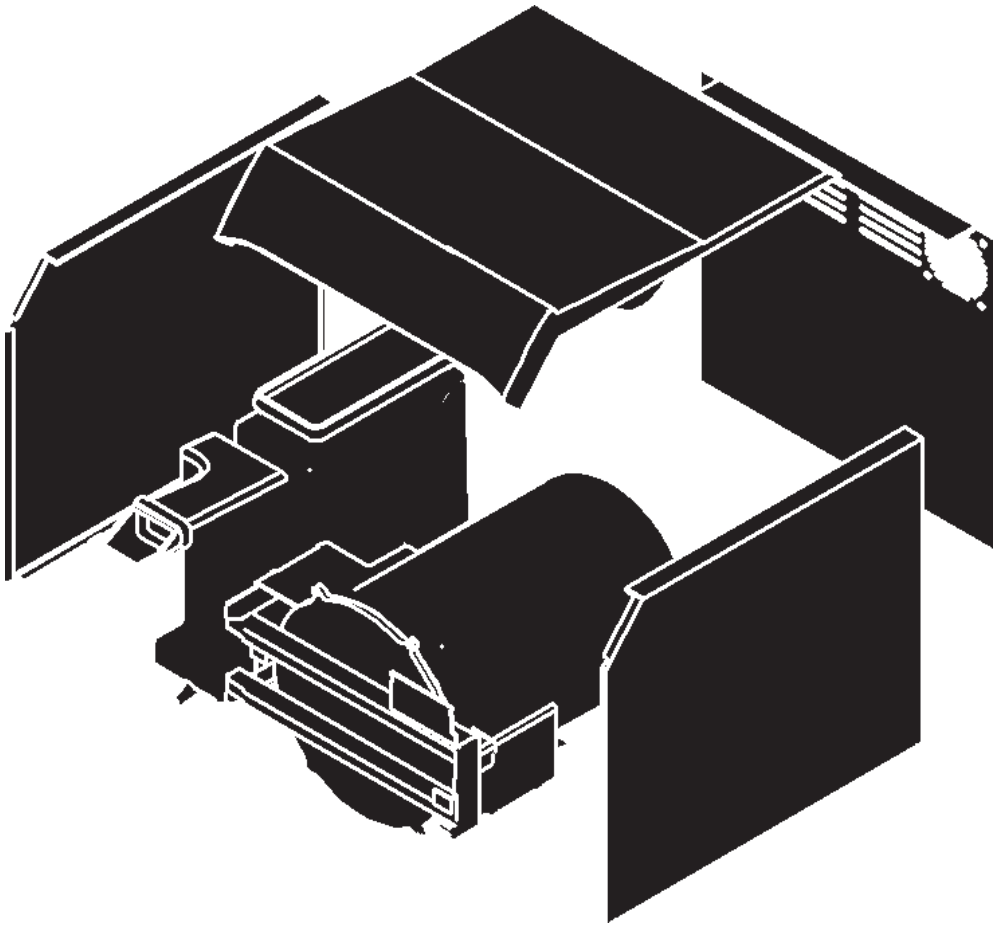
Adjusting the Dry Time
Step 3: Press <+> or <-> button to adjust Dry Time.

ALL

Section C

Access Procedures

Removing & Installing: Go To Page:



Access Procedures

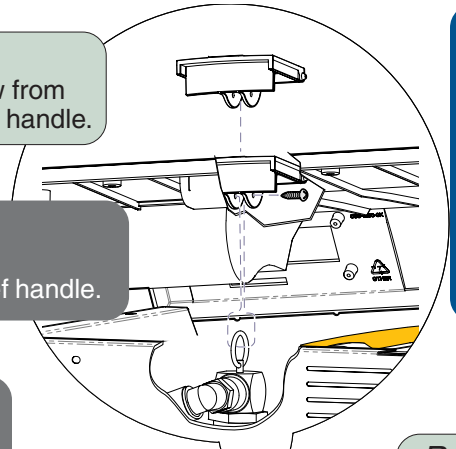
Covers / Panels

Removal / Installation

Caution
Always unplug power cord before removing any covers / panels.

Removal
Step 1: Remove screw from pressure relief handle.

Installation
Step 1: Position top cover. Connect pressure relief handle.



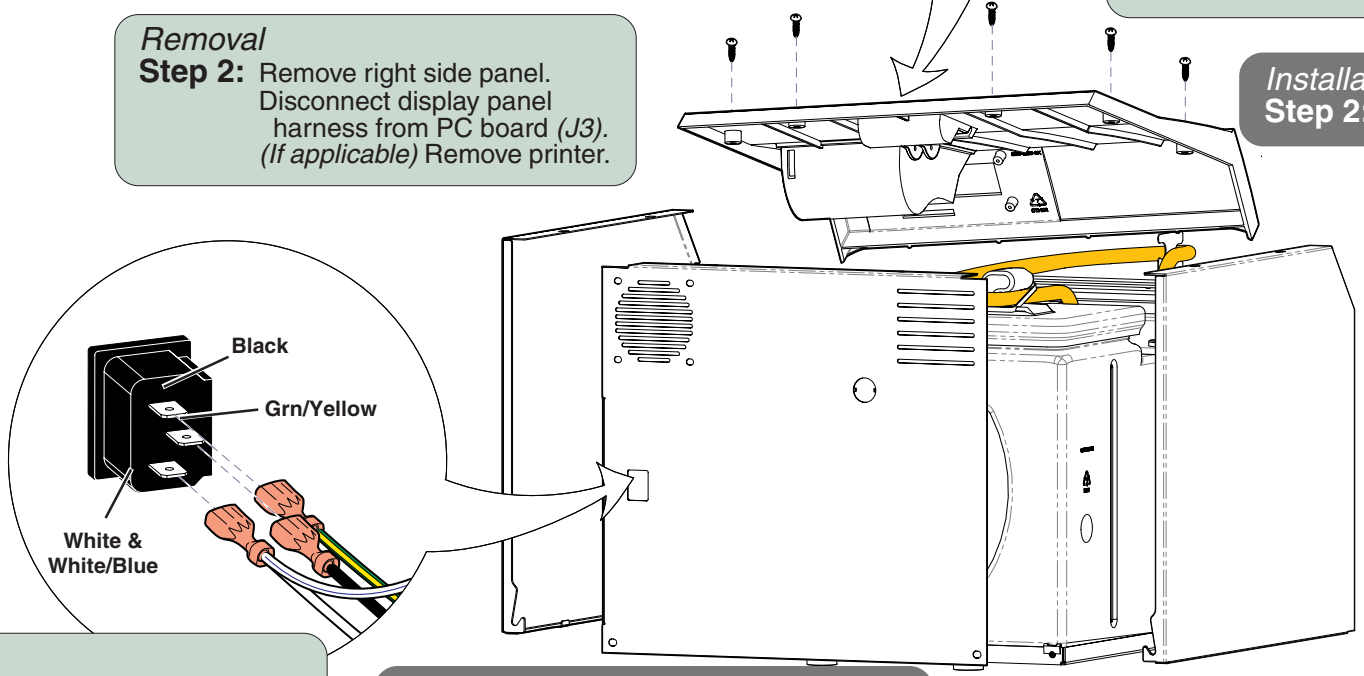
Refer To: **Go To Page:**

Installation
Step 3: Connect display panel harness to PC board *(J3)*. *(If applicable)* Install printer.

Removal
Step 3: Remove remaining screws from top cover. Remove top cover left side panel.

Removal
Step 2: Remove right side panel. Disconnect display panel harness from PC board *(J3)*. *(If applicable)* Remove printer.

Installation
Step 2: Install left and back panels.



Removal
Step 4: Disconnect wires from the receptacle and the fan motor. Remove back panel.

Installation
Step 4: Connect wires to receptacle & fan. Install right side panel

Covers / Panels

Models: ***ALL***
Serial Numbers:

Access Procedures

Tray Plate / Rack

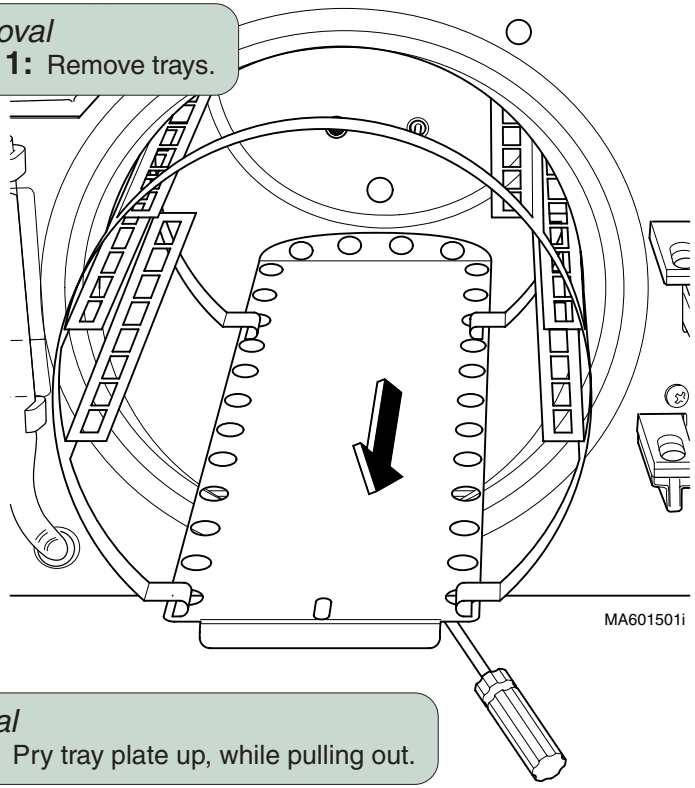
Removal / Installation

> ***Caution***
> Always allow unit to cool before removing trays or rack.

Refer To: — **Go To Page:**

Operation & Troubleshooting A-1
Component Testing / Repair B-1
Access Procedures C-1
Wiring Diagrams D-1
Exploded Views / Part Numbers E-1

Removal
Step 1: Remove trays.

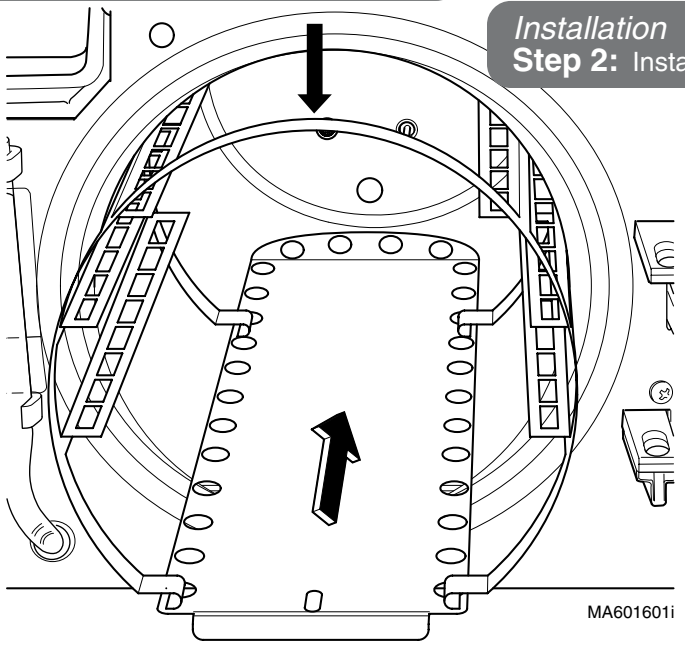


Removal
Step 2: Pry tray plate up, while pulling out.

Equipment Alert
*Install tray plate with the angled end toward the back. Do **not** allow the tray plate to contact the water level sensor.*

Installation
Step 1: Place back edge of tray in chamber. Press down on top of rack while sliding into chamber.

Installation
Step 2: Install trays.



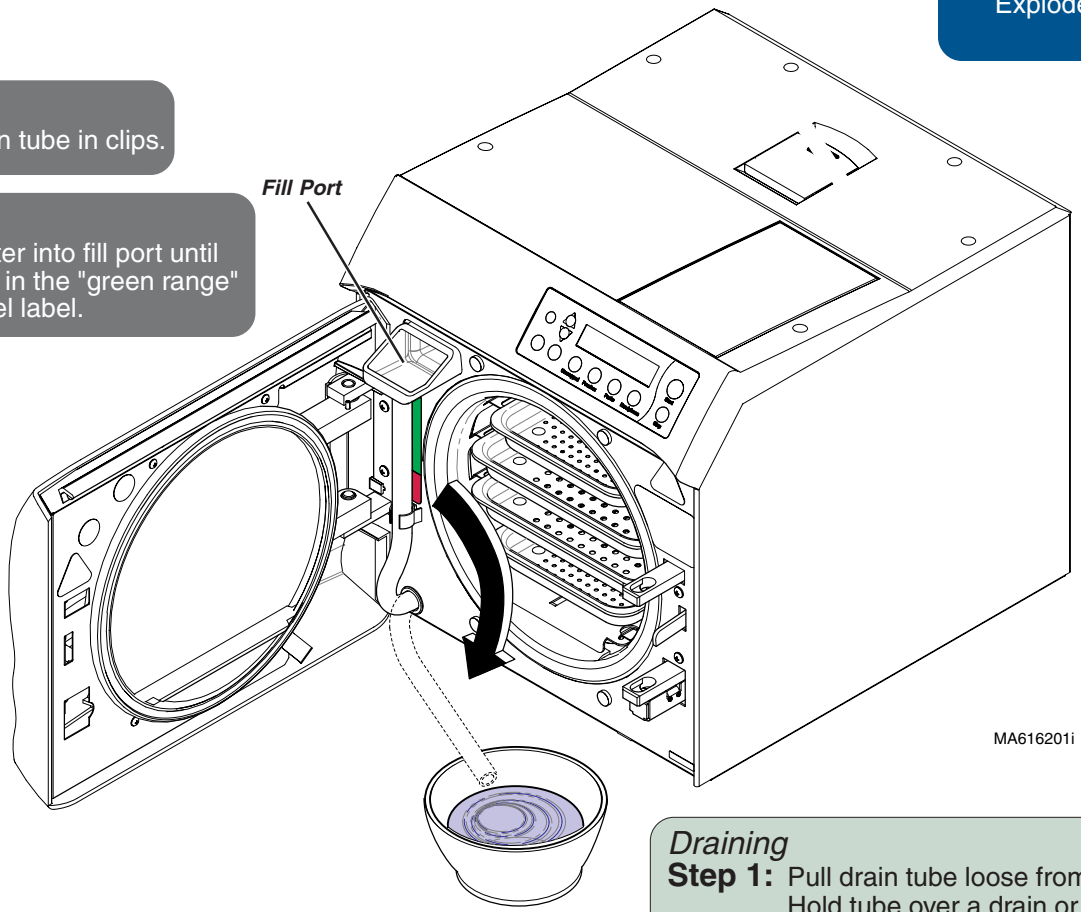
Access Procedures

Draining / Filling the Reservoir

Refer To: **Go To Page:**
Operation & Troubleshooting A-1
Component Testing / Repair B-1
Access Procedures C-1
Wiring Diagrams D-1
Exploded Views / Part Numbers E-1

Filling
Step 1: Secure drain tube in clips.

Filling
Step 2: Pour distilled water into fill port until the water level is in the "green range" on the the fill level label.

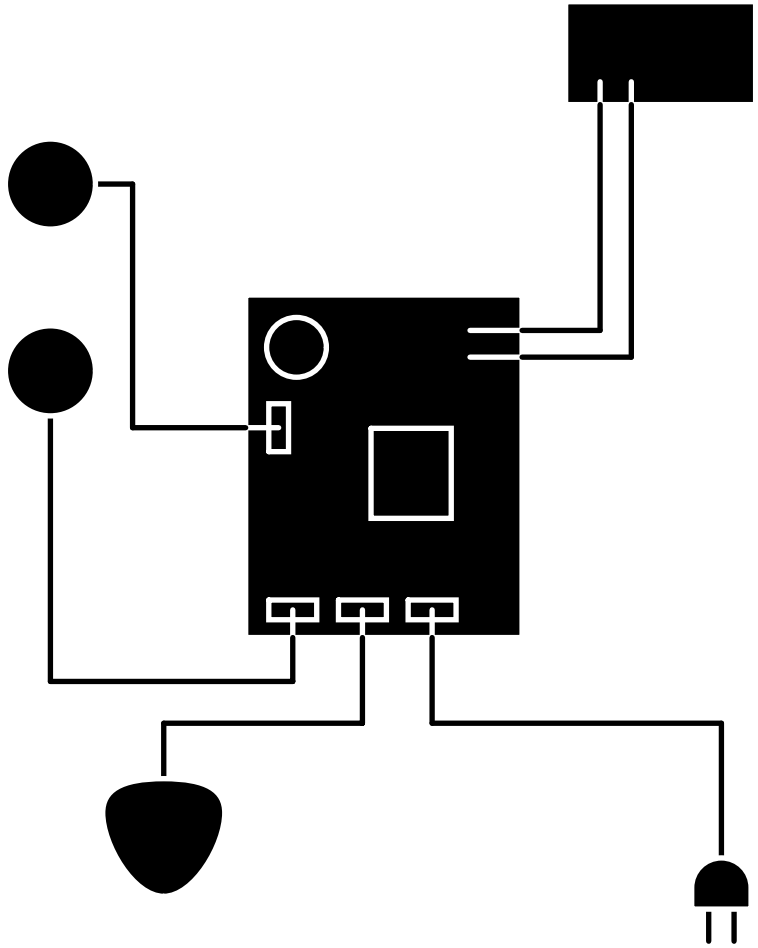


Draining
Step 1: Pull drain tube loose from clips. Hold tube over a drain or suitable container to empty resrevoir.

Note: *The max. reservoir capacity is:*
M9: *1.1 gallon (4.1 liters)*
M11: *1.4 gallon (5.3 liters)*

Section D

Wiring & Flow Diagrams



Wiring Diagrams

Go To Table Of Contents

Equipment Alert
Line voltage is present between Ground and Heater terminals L1 and L/N2 PCB connections at all times.

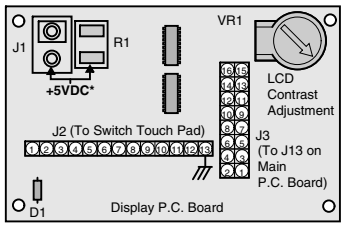
Fuses:

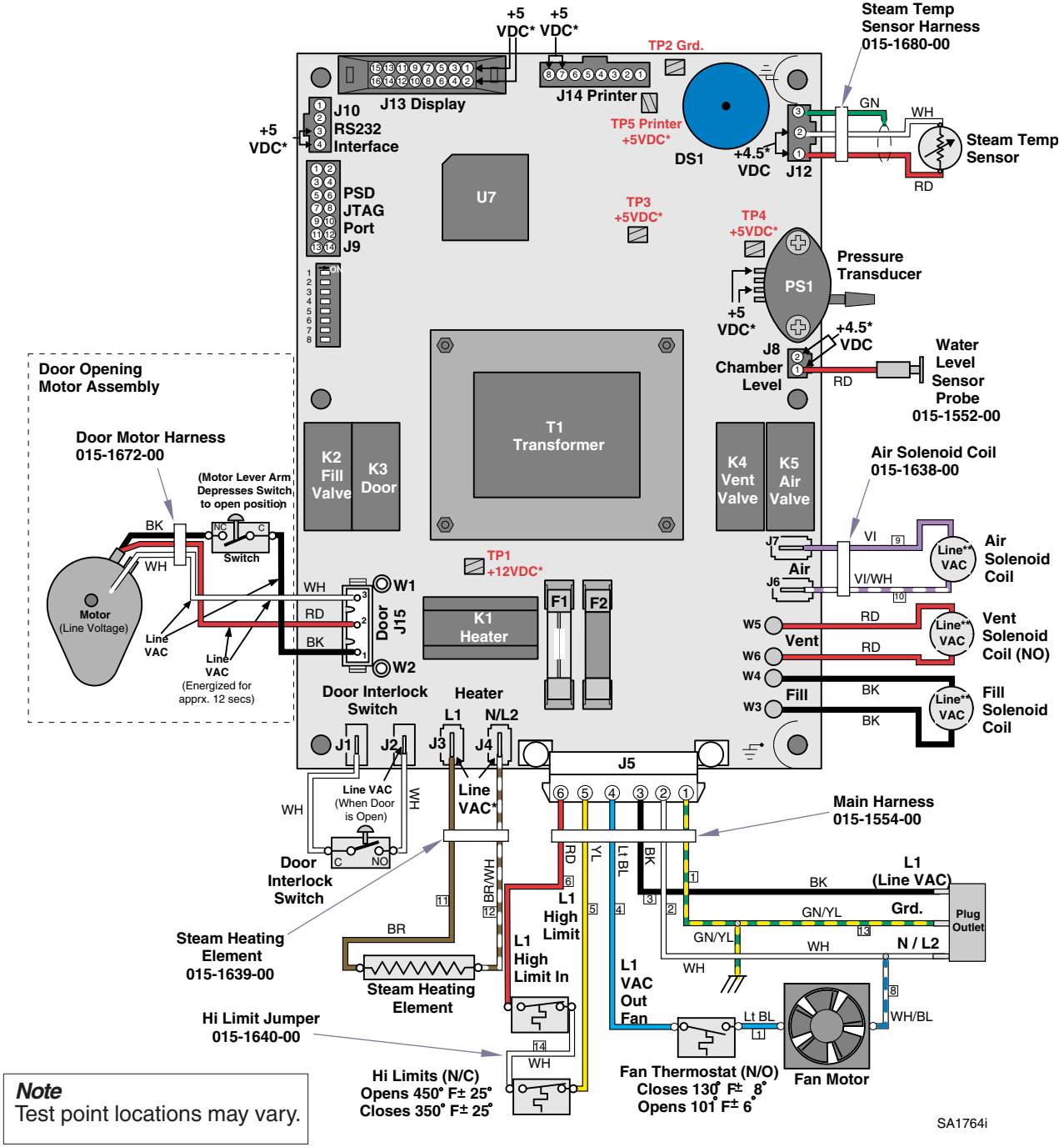
115 VAC models:
- *F1* ..... 0.250 amp, 250 V, Slo-Blo, 1/4" x 1-1/4"
- *F2* ..... 15 amp, 250 V, Fast-Acting, 1/4" x 1-1/4"

230 VAC models:
- *F1* ..... 0.125 amp, 250 V, Slo-Blo, 5mm x 20mm
- *F2* ..... 8 amp, 250 V, Fast-Acting, 5mm x 20mm

* Constant Voltage
** Voltage Present Only During Component Operation
*** Rectified DC Voltage Only Present During Operation

Note: Disconnect plug connector when checking voltage.





Note
Test point locations may vary.

Wiring Diagrams

Go To Table Of Contents

Refer To: **Go To Page:**

Equipment Alert
Line voltage is present between Ground and Heater terminals L1 and L/N2 PCB connections at all times.

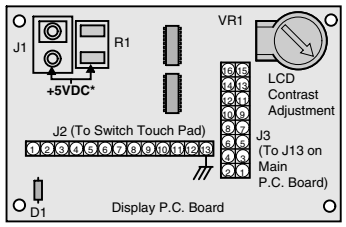
Fuses:

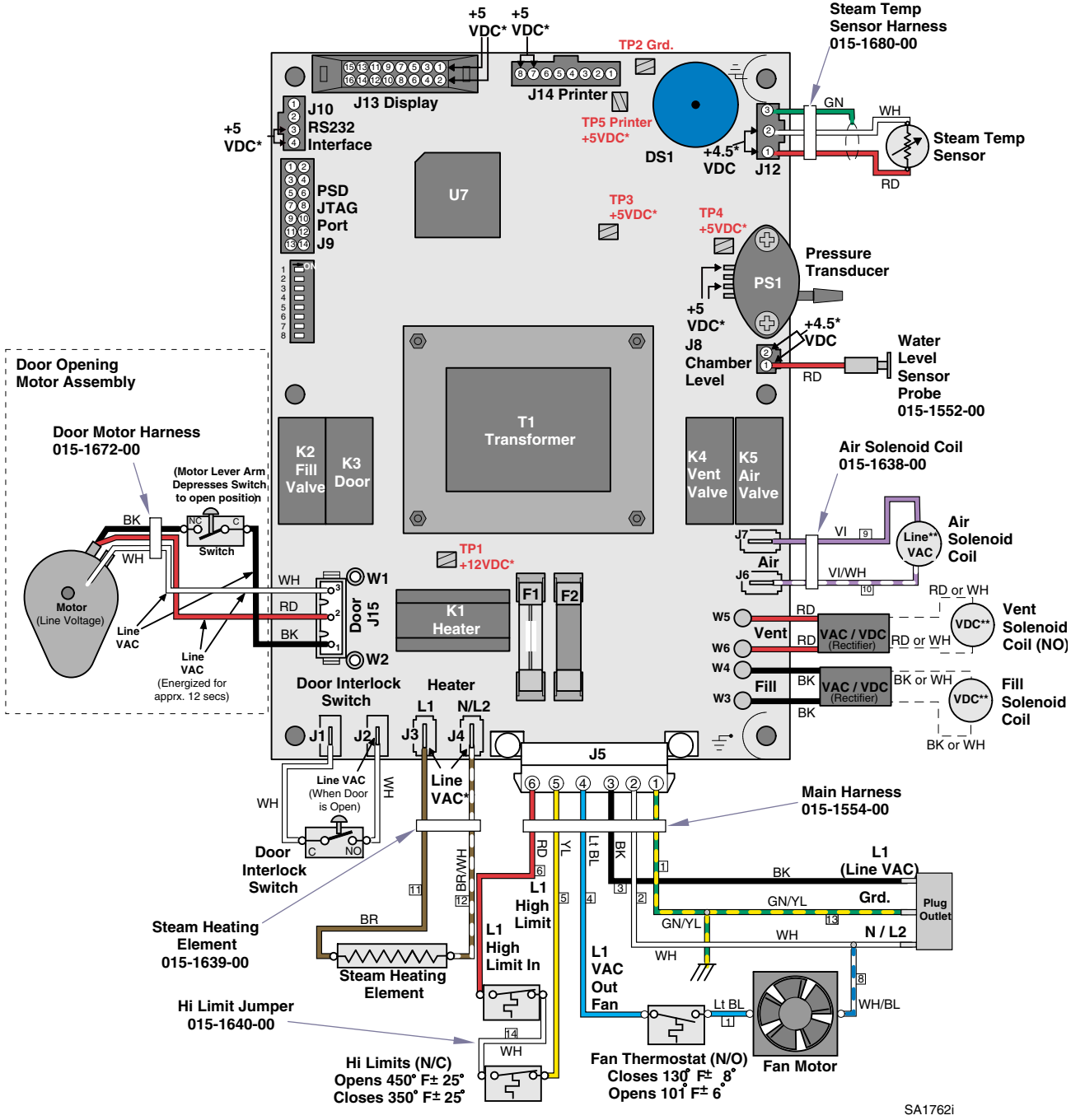
115 VAC models:
- *F1* ..... 0.250 amp, 250 V, Slo-Blo, 1/4" x 1-1/4"
- *F2* ..... 15 amp, 250 V, Fast-Acting, 1/4" x 1-1/4"

230 VAC models:
- *F1* ..... 0.125 amp, 250 V, Slo-Blo, 5mm x 20mm
- *F2* ..... 8 amp, 250 V, Fast-Acting, 5mm x 20mm

* Constant Voltage
** Voltage Present Only During Component Operation
*** Rectified DC Voltage Only Present During Operation

Note: Disconnect plug connector when checking voltage.

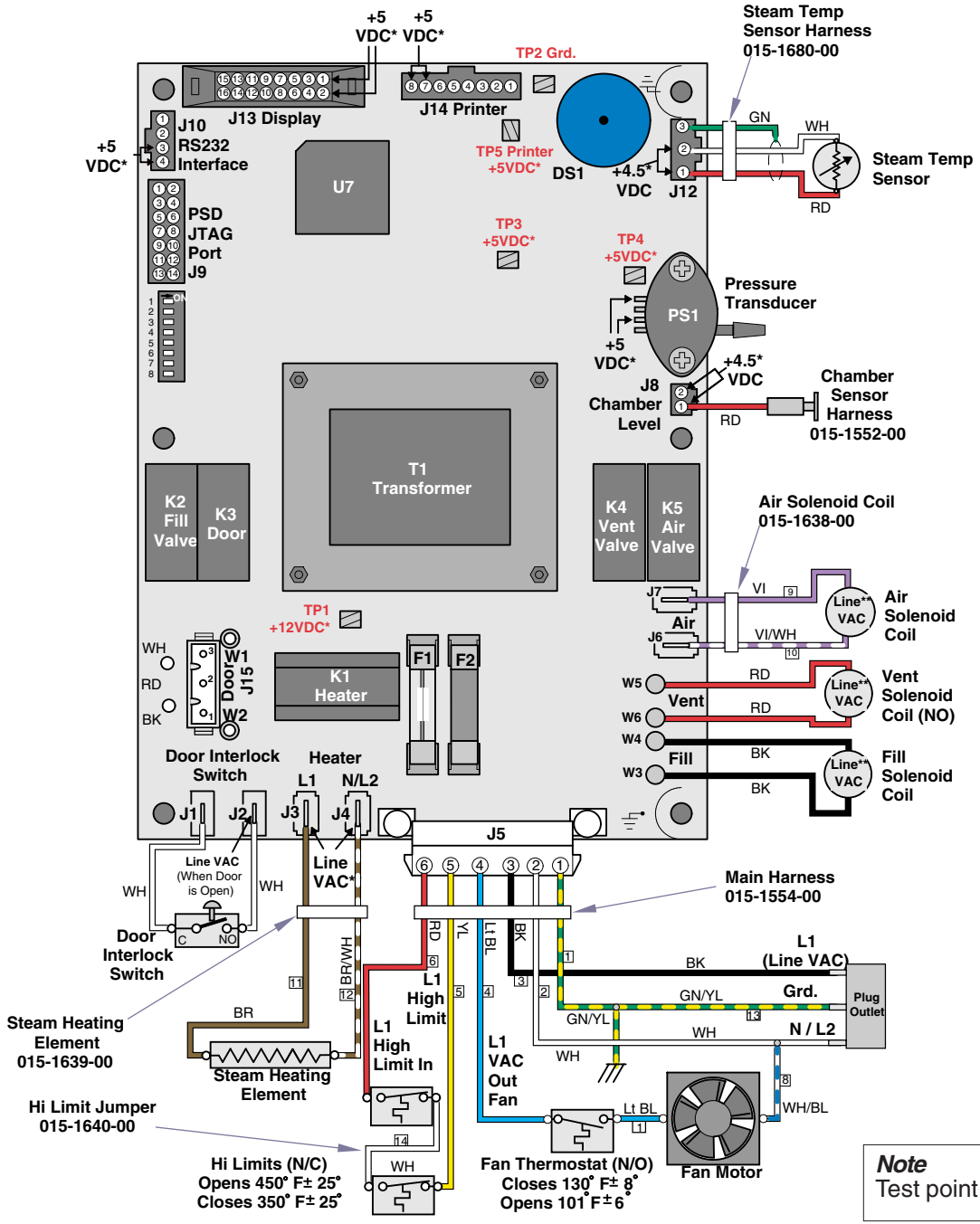




Models:	M9 (-020/-021/-022)	M11 (-020/-021/-022)		
Serial Numbers:	Later Models	Later Models		

Wiring Diagrams

Wiring Diagrams



Equipment Alert
Line voltage is present between Ground and Heater terminals L1 and L/N2 PCB connections at all times.

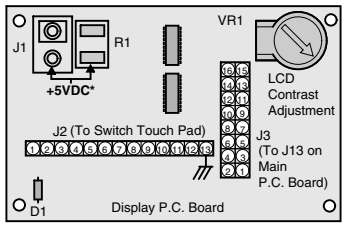
Fuses:

115 VAC models:
- *F1* ..... 0.250 amp, 250 V, Slo-Blo, 1/4" x 1-1/4"
- *F2* ..... 15 amp, 250 V, Fast-Acting, 1/4" x 1-1/4"

230 VAC models:
- *F1* ..... 0.125 amp, 250 V, Slo-Blo, 5mm x 20mm
- *F2* ..... 8 amp, 250 V, Fast-Acting, 5mm x 20mm

* Constant Voltage
** Voltage Present Only During Component Operation
*** Rectified DC Voltage Only Present During Operation

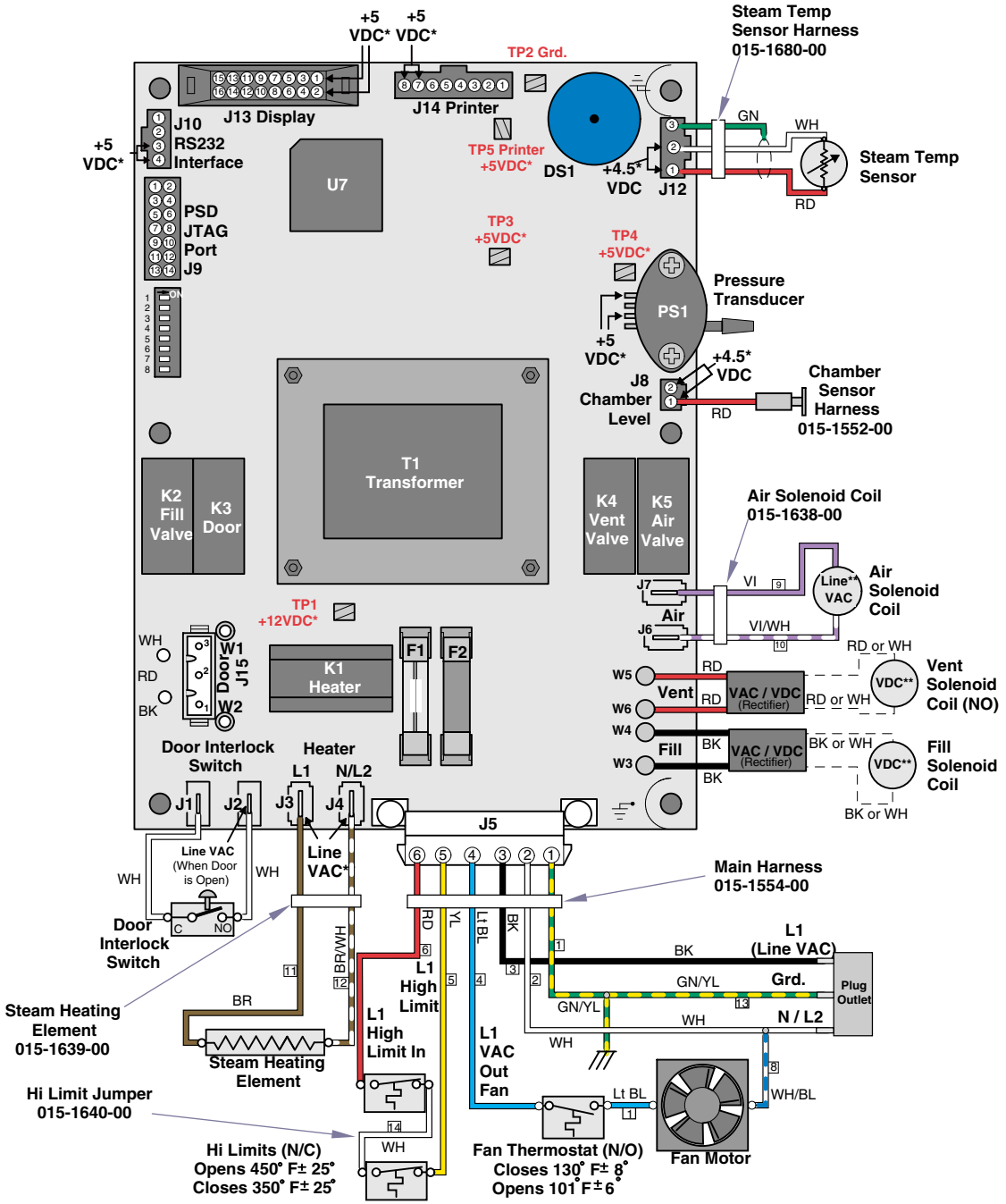
Note: Disconnect plug connector when checking voltage.



Note
Test point locations may vary.

SA1765i

Wiring Diagrams



Equipment Alert
Line voltage is present between Ground and Heater terminals L1 and L/N2 PCB connections at all times.

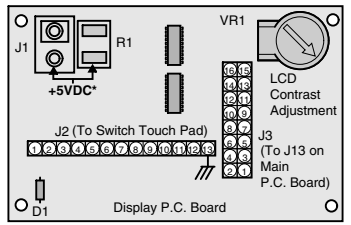
Fuses:

115 VAC models:
- *F1* ..... 0.250 amp, 250 V, Slo-Blo, 1/4" x 1-1/4"
- *F2* ..... 15 amp, 250 V, Fast-Acting, 1/4" x 1-1/4"

230 VAC models:
- *F1* ..... 0.125 amp, 250 V, Slo-Blo, 5mm x 20mm
- *F2* ..... 8 amp, 250 V, Fast-Acting, 5mm x 20mm

* Constant Voltage
** Voltage Present Only During Component Operation
*** Rectified DC Voltage Only Present During Operation

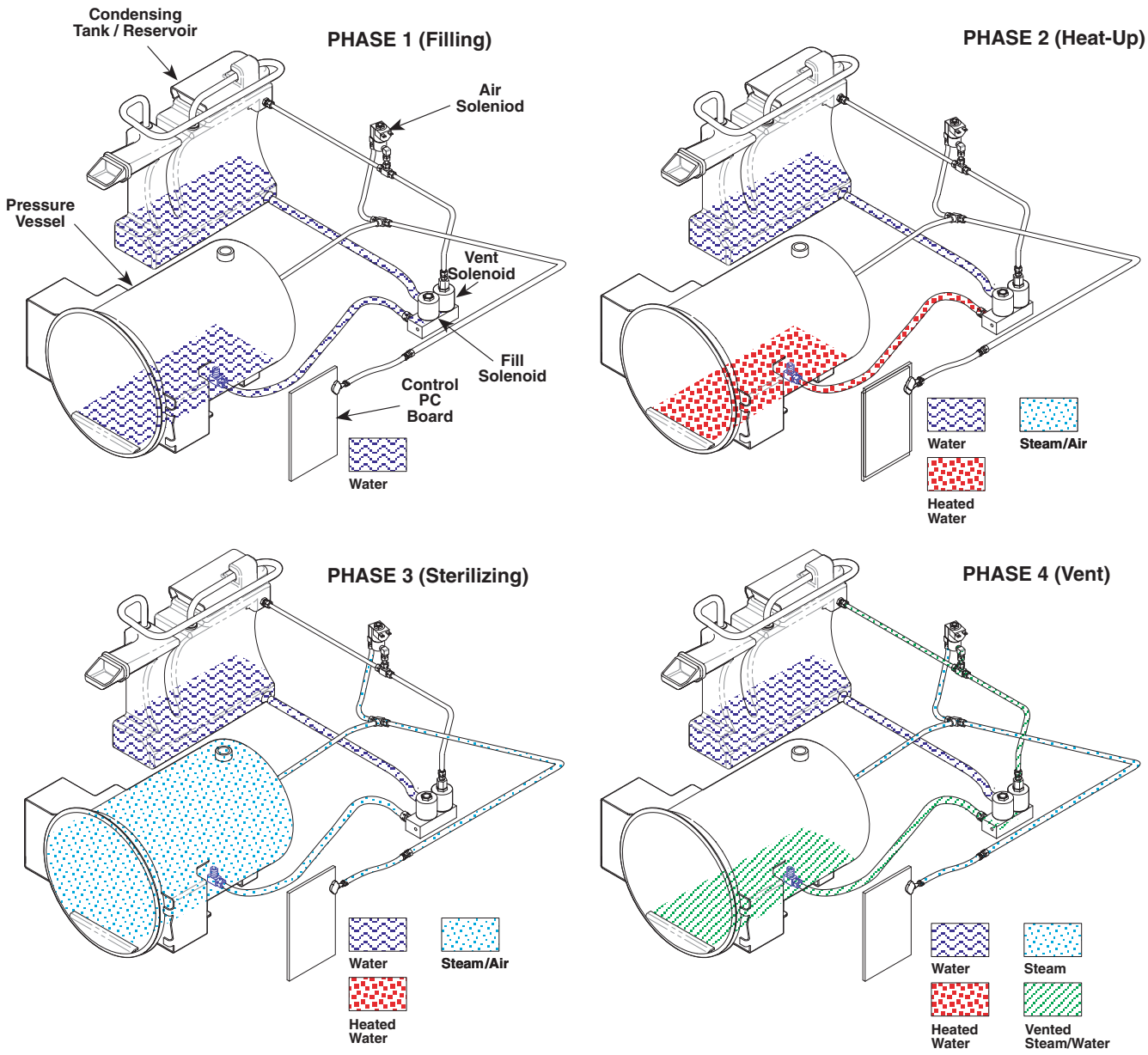
Note: Disconnect plug connector when checking voltage.



SA1763i

Flow Diagrams

This diagram illustrates the flow of water, heated water, steam, and vented steam thru the sterilizer during each phase of a cycle.



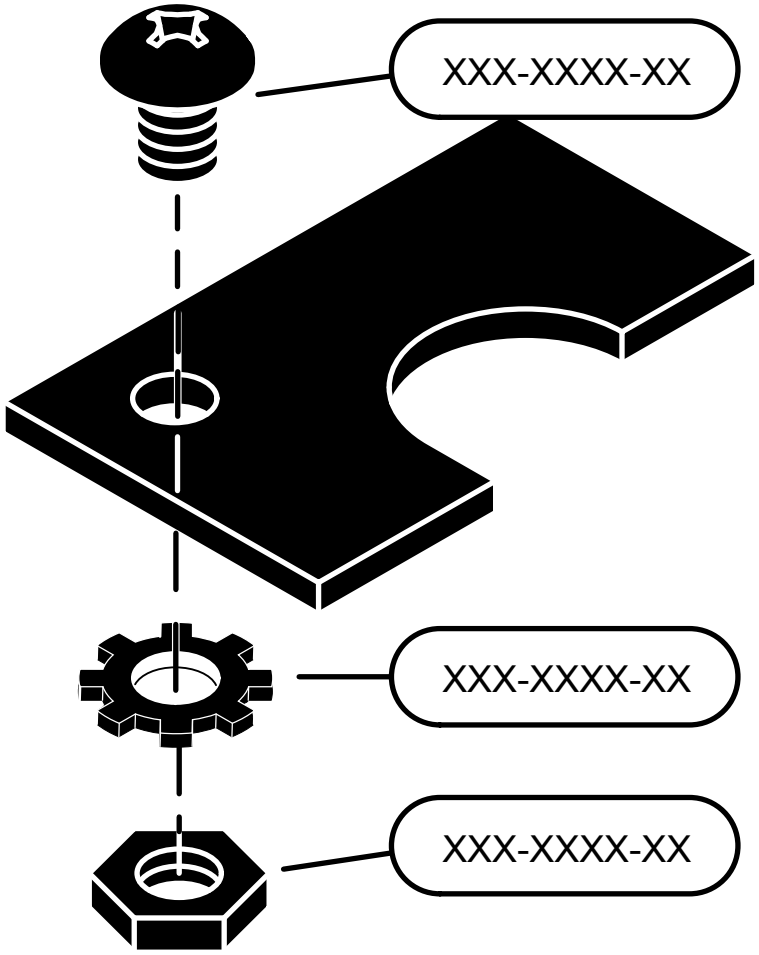
MA618600

Flow Diagrams

Models: ALL
Serial Numbers:

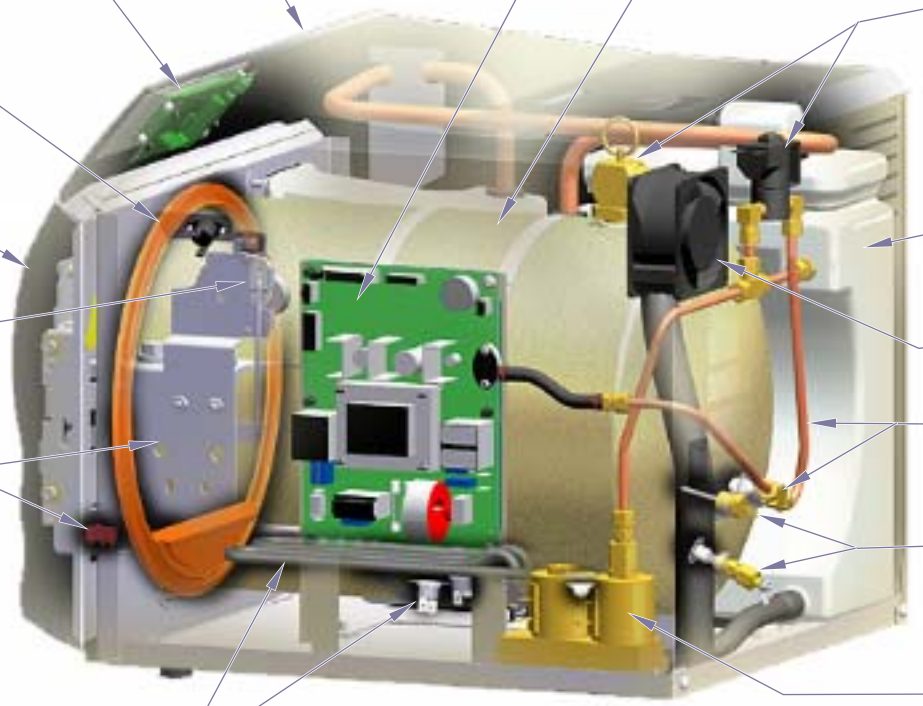
Section E

Exploded Views & Parts Lists



Go To Table Of Contents

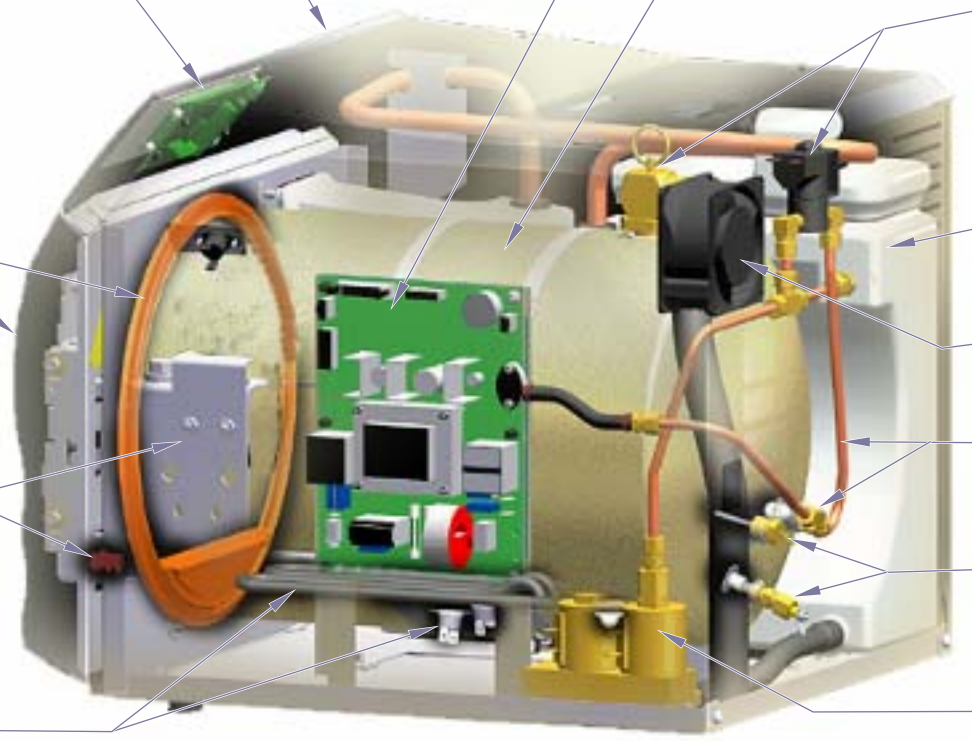
M9 *(-020/-021/-022)* / M11 *(-020/-021/-022)*



MA668900i

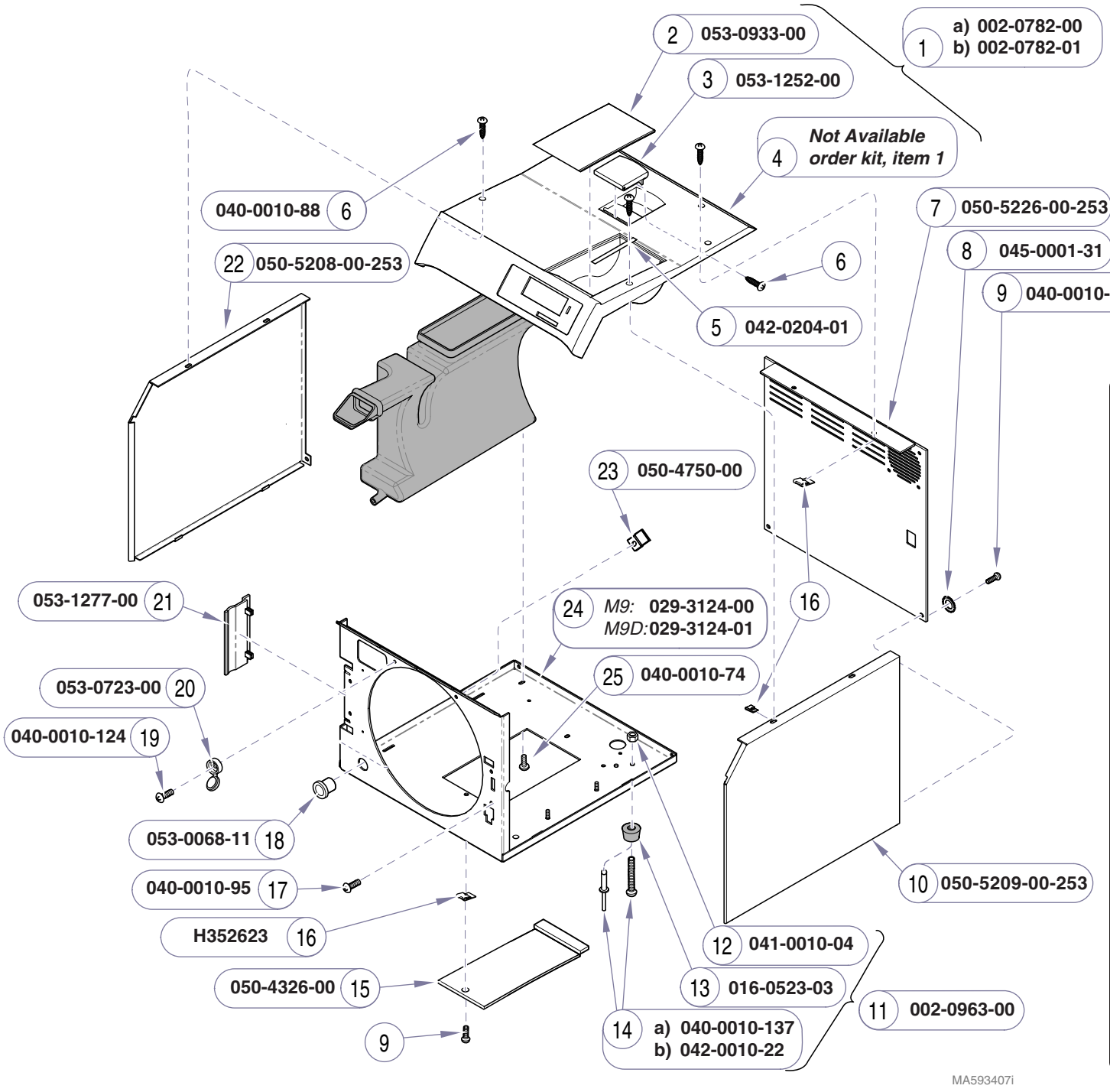
**** Indicates multiple pages due to a serial number break for the parts illustration***

M9D*(-020/-022)* / M11D*(-020/-022)*



MA669000i

**** Indicates multiple pages due to a serial number break for the parts illustration***



Refer To: — **Go To Page:**

Operation & Troubleshooting A-1
Component Testing / Repair B-1
Access Procedures C-1
Wiring Diagrams D-1
Exploded Views / Part Numbers .. E-1

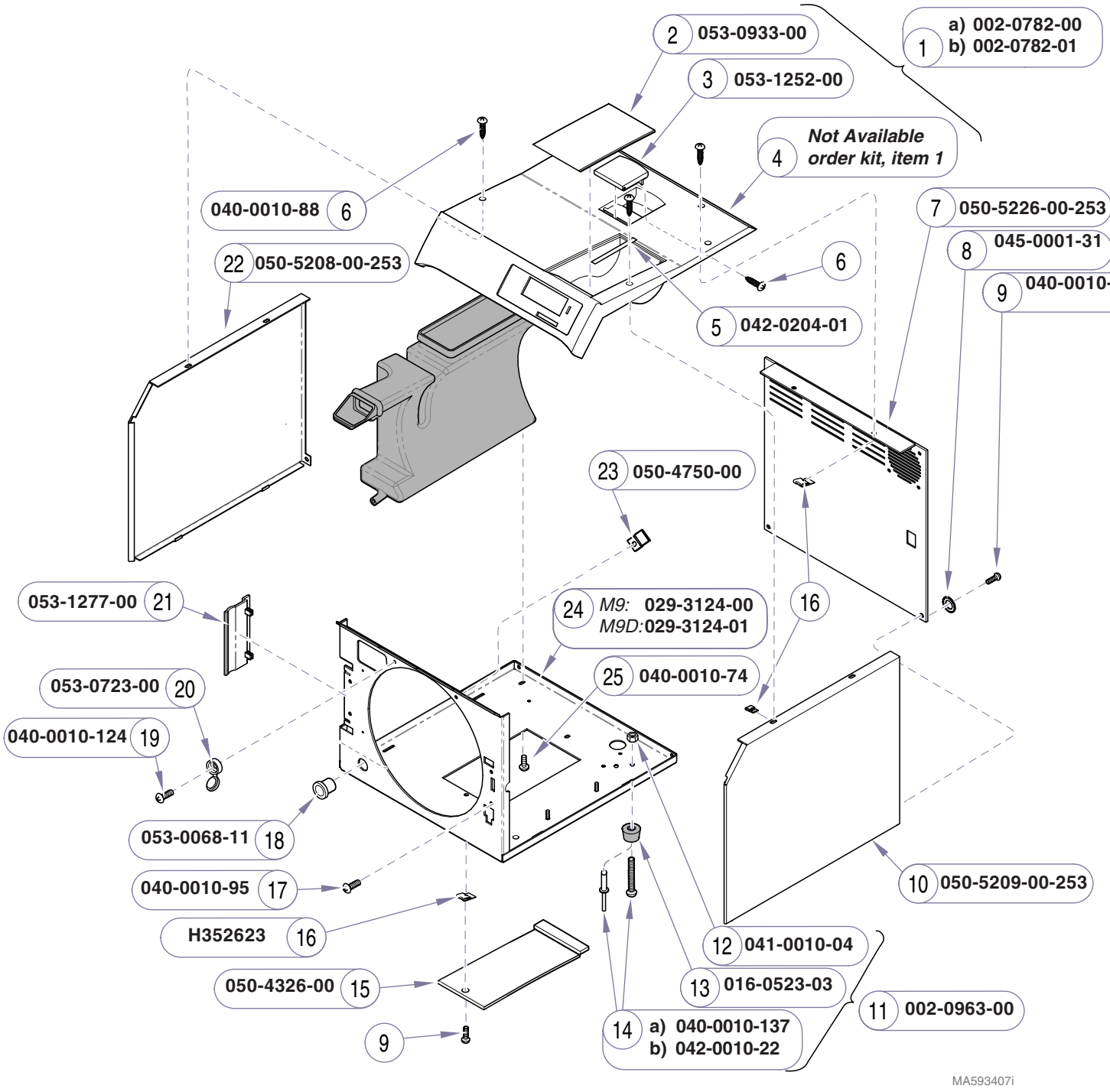
NOTE: All smooth panels are No Longer Available *(N.L.A.)* and are replaced by textured panels.

Item	Description	Qty.
1	Top Cover Assy. *(includes items 2 thru 5 and touch pad, located on page E-15, item #1)*	
	a) *Midmark*	1
	b) *Ritter*	1
2	• Cover Plate	1
3	• Pressure Relief Handle	1
4	• Top Cover:	
	a) *Midmark (order item 1)*	NA
	b) *Ritter (order item 1)*	NA
5	• Adhesive Strip	3
6	Screw *(#10 x 1 -1/4")*	7
7	Back Panel	1
8	Lockwasher	3
9	Screw *(#10 x 1/2", self-tapping)*	3
10	Side Panel *(right)*	1
11	Leveling Foot Kit *(incl. items 12 thru 14a)*	1
12	• Nut *(#10-24 [early units only])*	10
13	• Leveling Foot	4
14a	• Leveling Screw *(early units only)*	4
14b	Rivet	4
15	Inspection Cover	1
16	Tinnerman Clip	9
17	Screw *(#10-24 x 5/8")*	4
18	Bushing	1
19	Screw *(#24 x 3/8")*	2
20	Screw Cover *(early units only)*	2
21	Hinge Cover	1
22	Side Panel *(left)*	1
23	Flange Clamp	4
24	Base Panel	1
25	Screw *(#10-32 x 3/8")*	4

Always Specify Model & Serial Number

Main Enclosure *(M9/M9D)*

Models: / ***Serial Numbers:***	***M9 (-020 thru -022)*** ***RN, RP, RR ..... All***	***M9D (-020 & -022)*** ***RW, RX .... All***	***M9 (-020 thru -022)*** ***V1000 to V659209***	***M9D (-020 & -022)*** ***V1000 to V659209***



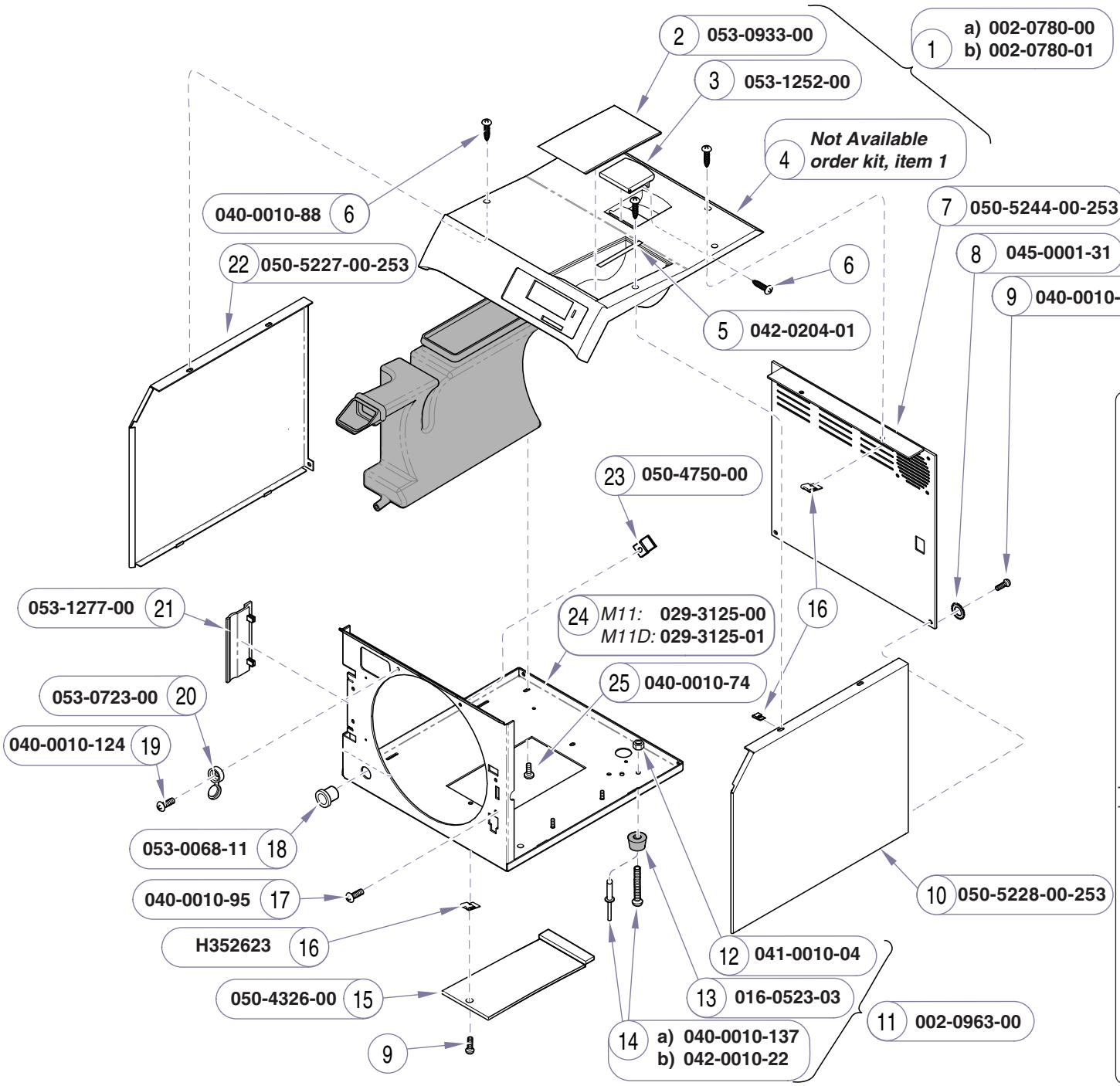
Refer To: — **Go To Page:**

Item	Description	Qty.
1	Top Cover Assy. *(includes items 2 thru 5 and touch pad, located on page E-15, item #1)*	
	a) *Midmark*	1
	b) *Ritter*	1
2	• Cover Plate	1
3	• Pressure Relief Handle	1
4	• Top Cover:	
	a) *Midmark (Order item 1)*	NA
	b) *Ritter (Order item 1)*	NA
5	• Adhesive Strip	3
6	Screw *(#10 x 1 -1/4")*	7
7	Back Panel	1
8	Lockwasher	3
9	Screw *(#10 x 1/2", self-tapping)*	3
10	Side Panel *(right)*	1
11	Leveling Foot Kit *(incl. items 12 thru 14a)*	1
12	• Nut *(#10-24 [early units only])*	10
13	• Leveling Foot	4
14a	• Leveling Screw *(early units only)*	4
14b	Rivet	4
15	Inspection Cover	1
16	Tinnerman Clip	9
17	Screw *(#10-24 x 5/8")*	4
18	Bushing	1
19	Screw *(#24 x 3/8")*	2
20	Screw Cover *(early units only)*	2
21	Hinge Cover	1
22	Side Panel *(left)*	1
23	Flange Clamp	4
24	Base Panel	1
25	Screw *(#10-32 x 3/8")*	4

Always Specify Model & Serial Number

Models: / ***Serial Numbers:***	***M9 (-020 thru -022)*** ***V659210 to Present***	***M9D (-020 thru -022)*** ***V659210 to Present***		

Main Enclosure *(M9/M9D)*

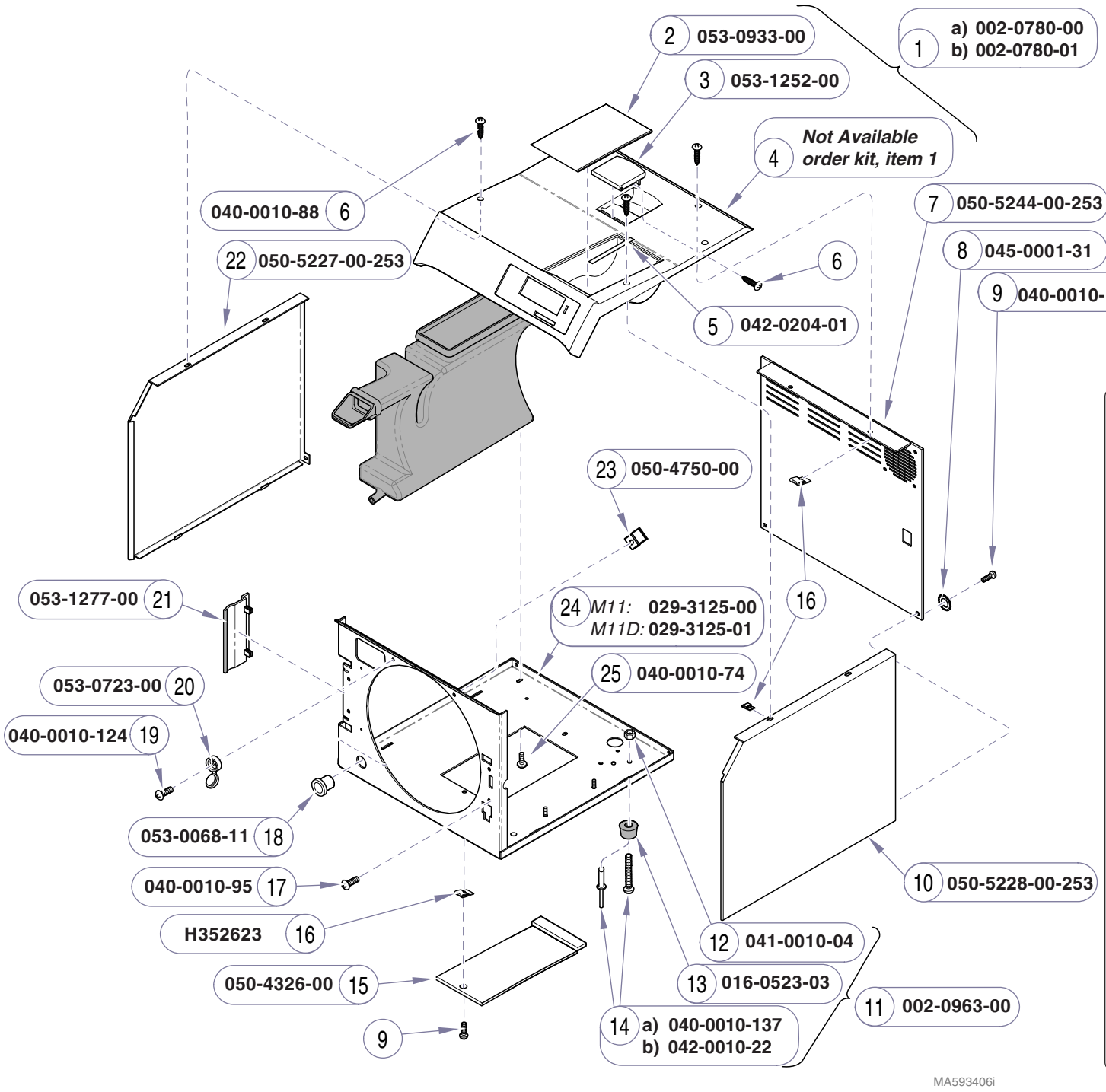


NOTE: All smooth panels are No Longer Available *(N.L.A.)* and are replaced by textured panels.

Item	Description	Qty.
1	Top Cover Assy. *(includes items 2 thru 5and touch pad, located on page E-15, item #1)*	
	a) *Midmark*	1
	b) *Ritter*	1
2	• Cover Plate	1
3	• Pressure Relief Handle	1
4	• Top Cover:	
	a) *Midmark (Order item 1)*	NA
	b) *Ritter (Order item 1)*	NA
5	• Adhesive Strip	3
6	Screw *(#10 x 1 -1/4")*	7
7	Back Panel	1
8	Lockwasher	3
9	Screw *(#10 x 1/2", self-tapping)*	3
10	Side Panel *(right)*	1
11	Leveling Foot Kit *(incl. items 12 thru 14a)*	1
12	• Nut *(#10-24 [early units only])*	10
13	• Leveling Foot	4
14a	• Leveling Screw *(early units only)*	4
14b	Rivet	4
15	Inspection Cover	1
16	Tinnerman Clip	9
17	Screw *(#10-24 x 5/8")*	4
18	Bushing	1
19	Screw *(#24 x 3/8")*	2
20	Screw Cover *(early units only)*	2
21	Hinge Cover	1
22	Side Panel *(left)*	1
23	Flange Clamp	4
24	Base Panel	1
25	Screw *(#10-32 x 3/8")*	4

Always Specify Model & Serial Number

Go To Table Of Contents



MA593406i

Refer To: — **Go To Page:**

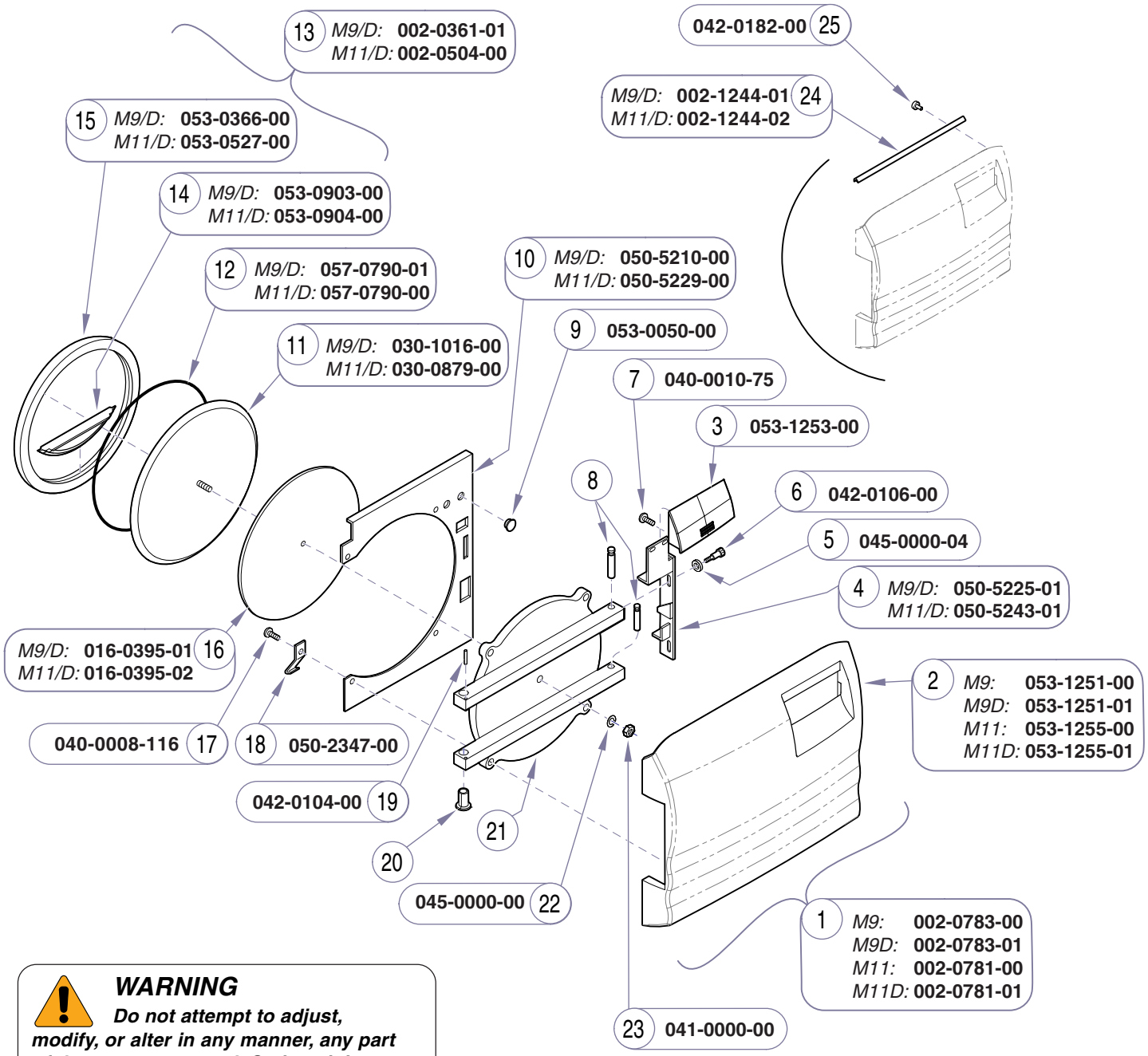
Item	Description	Qty.
1	Top Cover Assy. *(includes items 2 thru 5and touch pad, located on page E-15, item #1)*	
	a) *Midmark*	1
	b) *Ritter*	1
2	• Cover Plate	1
3	• Pressure Relief Handle	1
4	• Top Cover:	
	a) *Midmark (Order item 1)*	NA
	b) *Ritter (Order item 1)*	NA
5	• Adhesive Strip	3
6	Screw *(#10 x 1 -1/4")*	7
7	Back Panel	1
8	Lockwasher	3
9	Screw *(#10 x 1/2", self-tapping)*	3
10	Side Panel *(right)*	1
11	Leveling Foot Kit *(incl. items 12 thru 14a)*	1
12	• Nut *(#10-24 [early units only])*	10
13	• Leveling Foot	4
14a	• Leveling Screw *(early units only)*	4
14b	Rivet	4
15	Inspection Cover	1
16	Tinnerman Clip	9
17	Screw *(#10-24 x 5/8")*	4
18	Bushing	1
19	Screw *(#24 x 3/8")*	2
20	Screw Cover *(early units only)*	2
21	Hinge Cover	1
22	Side Panel *(left)*	1
23	Flange Clamp	4
24	Base Panel	1
25	Screw *(#10-32 x 3/8")*	4

Always Specify Model & Serial Number

Models:	*M11 (-020 thru -022)*	*M11D (-020 thru -022)*		
Serial Numbers:	*V655565 to Present*	*V655565 to Present*		

Main Enclosure (M11/M11D)

Go To Table Of Contents



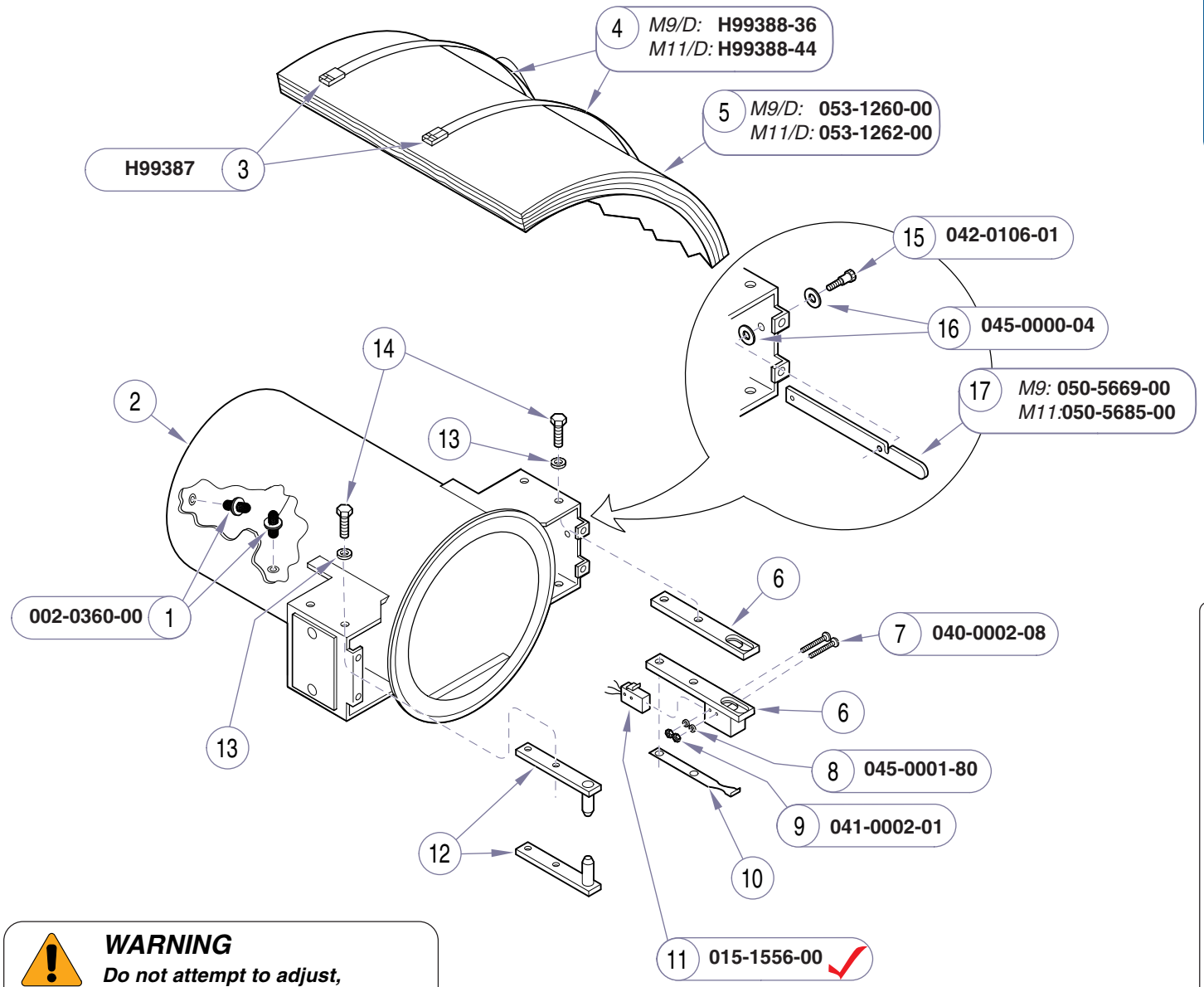
MA668200i

Item	Description	Qty.
1	Door Cover Kit *(includes items 2 & 3)*	1
2	• Door Cover	1
3	• Door Handle	1
4	Latch Bracket	
5	Washer	2
6	Shoulder Screw	2
7	Screw *(#10-24 x 3/8")*	2
8	Door Bolt *(n/a)*	2
9	Hole Plug	2
10	Inside Door Cover	1
11	Housing	1
12	Gasket Ring	1
13	Gasket Kit *(includes items 12, 14 & 15)*	1
14	• Dam Gasket	1
15	• Door Gasket	1
16	Door Insulation Pad	1
17	Screw	4
18	Door Spring	1
19	Roll Pin	1
20	Flange Bearing *(see warning)*	2
21	Door *(see warning)*	1
22	Lockwasher	1
23	Nut *(1/4-20)*	1
24	Steam Block Kit *(includes item 25)*	1
25	• Snap Clip	4

Always Specify Model & Serial Number

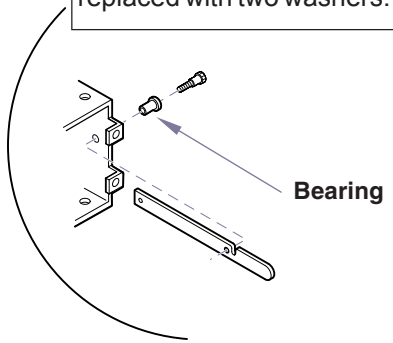
WARNING

Do not attempt to adjust, modify, or alter in any manner, any part of the pressure vessel. Serious injury and/or damage to the unit could result.



MA668400i

***NOTE**
The bearing on early models is replaced with two washers. (Item 16)



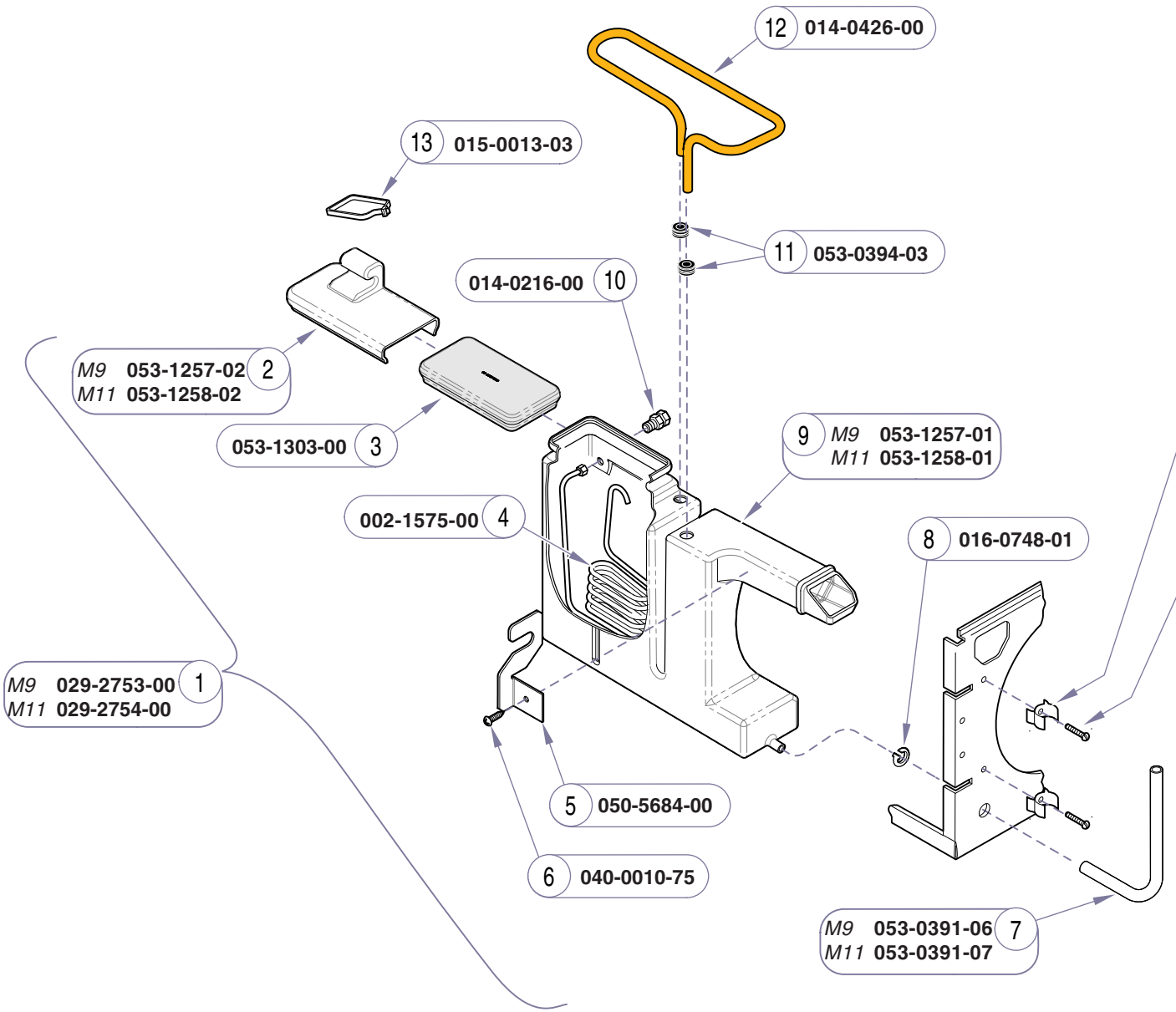
Item	Description	Qty.
1	Chamber Filter	2
2	Chamber *(see warning)*	1
3	Strap Fastener	2
4	Insulation Strap	2
5	Insulation Wrapper	1
6	Latch Brackets *(see warning)*	2
7	Screws *(#2-56 x 1")*	2
8	Lockwasher *(#2)*	2
9	Nut *(#2-56)*	2
10	Switch Spring Arm *(see warning)*	1
11	Door Switch	1
12	Hinge Brackets *(see warning)*	2
13	Washer *(see warning)*	8
14	Bolt *(see warning)*	8
	Items 15 thru 17 apply to M9 & M11 units only	
15	Shoulder Screw *(apply valve lubricant)*	2
16	Flat Washer, Brass	2
17	Latch Lever	1

Always Specify Model & Serial Number

WARNING
Do not attempt to adjust, modify, or alter in any manner, any part of the pressure vessel. Serious injury and/or damage to the unit could result.

Models:	***ALL***			
Serial Numbers:				

Chamber & Door Latch



Item	Description	Qty.
1	Reservoir Tank Assembly *(incl. items 2 thru 13)*	1
2	• Tank Lid	1
3	• Tank Seal	1
4	• Condensing Coil	1
5	• Bracket	1
6	• Screw	1
7	• Drain Tube	1
8	• Hose Clamp	1
9	• Tank	1
10	• Bulkhead Fitting	1
11	• Grommet	2
12	• Equalization Tube	1
13	• Cable Tie	1
14	Hose Clip	2
15	Pop Rivet	2

Always Specify Model & Serial Number

Reservoir Tank

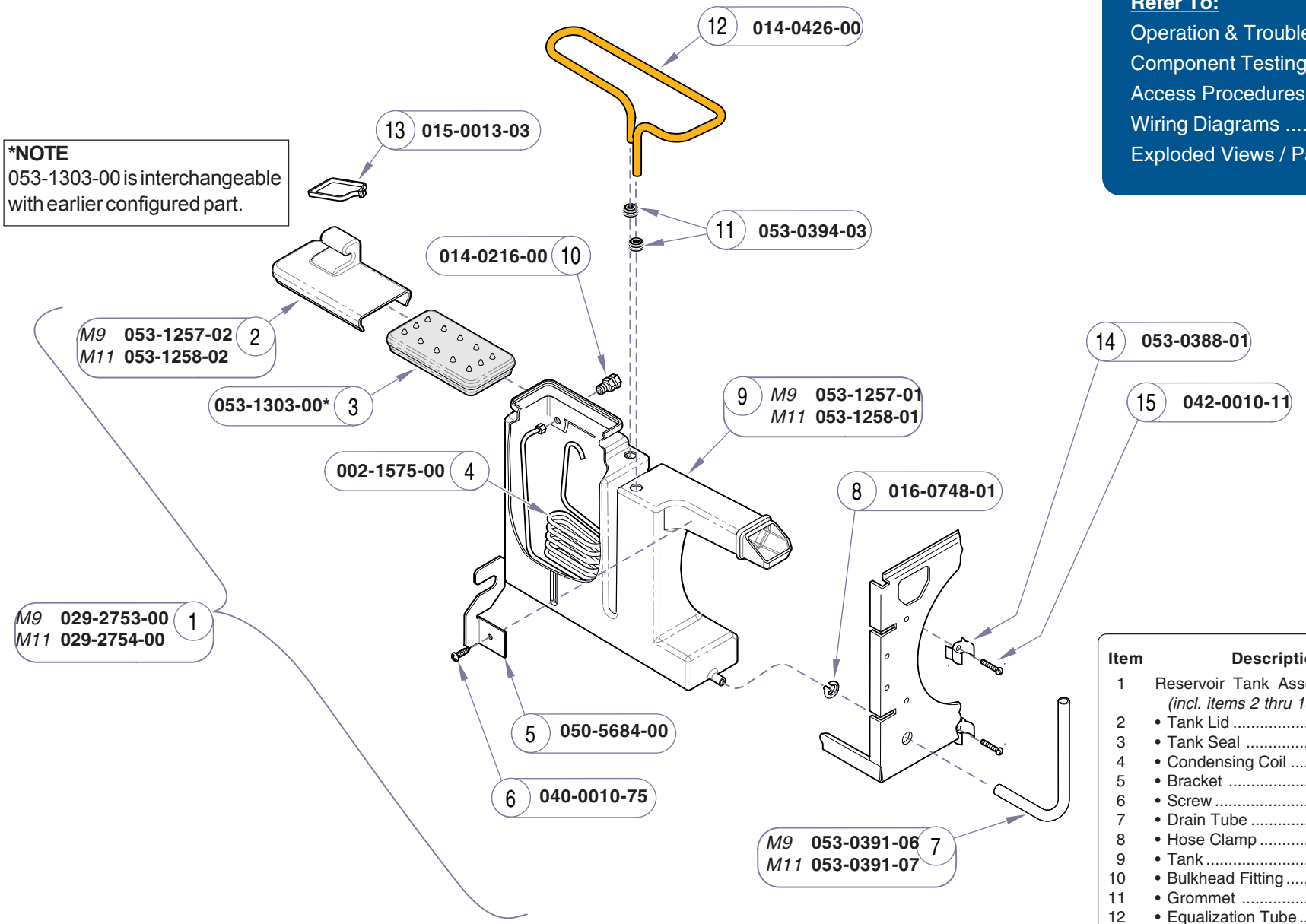
Models: / *Serial Numbers:*	*M9 (-020 thru -022) M11 (-020 thru -022)* *RN, RP, RR ..... All*	*M9D (-020 thru -022) M11D (-020 & -022)* *RW, RX .... All*	*M9 (-020 thru -022) M11 (-020 thru -022)* *V1000 to V400876*	*M9D (-020 & -022) M11D (-020 & -022)* *V1000 to V400876*

 SF-1854 Rev. (4/25/12)

Go To Table Of Contents

Refer To: *Go To Page:*
Operation & Troubleshooting A-1
Component Testing / Repair B-1
Access Procedures C-1
Wiring Diagrams D-1
Exploded Views / Part Numbers .. E-1

***NOTE**
053-1303-00 is interchangeable with earlier configured part.



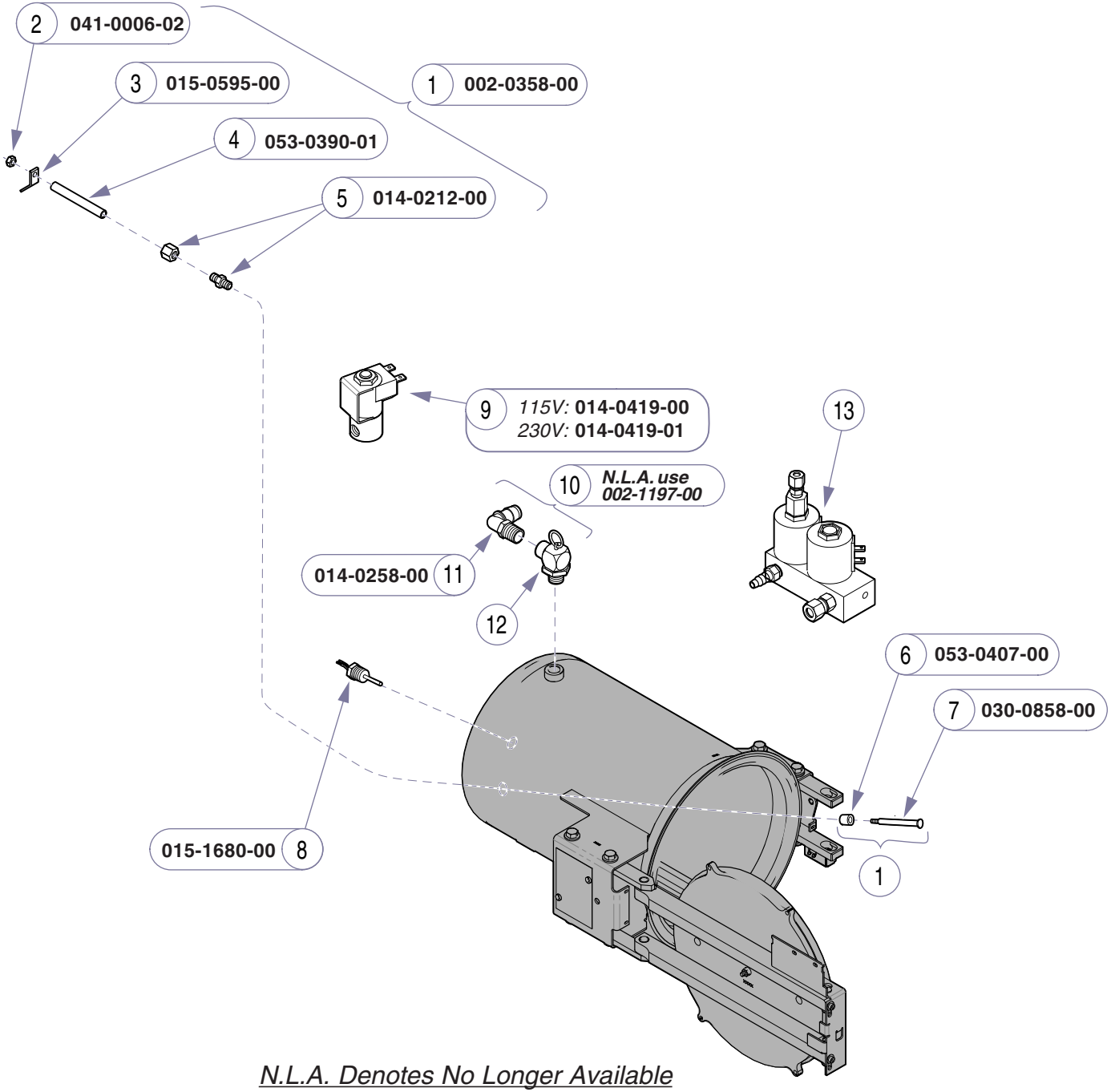
Item	Description	Qty.
1	Reservoir Tank Assembly *(incl. items 2 thru 13)*	1
2	• Tank Lid	1
3	• Tank Seal	1
4	• Condensing Coil	1
5	• Bracket	1
6	• Screw	1
7	• Drain Tube	1
8	• Hose Clamp	1
9	• Tank	1
10	• Bulkhead Fitting	1
11	• Grommet	2
12	• Equalization Tube	1
13	• Cable Tie	1
14	Hose Clip	2
15	Pop Rivet	2

Always Specify Model & Serial Number

Models:	M9 (-020 thru -022) M11 (-020 thru -022)	M9D (-020 & -022) M11D (-020 & -022)	
Serial Numbers:	V400877 thru Present	V400877 thru Present	

Reservoir Tank

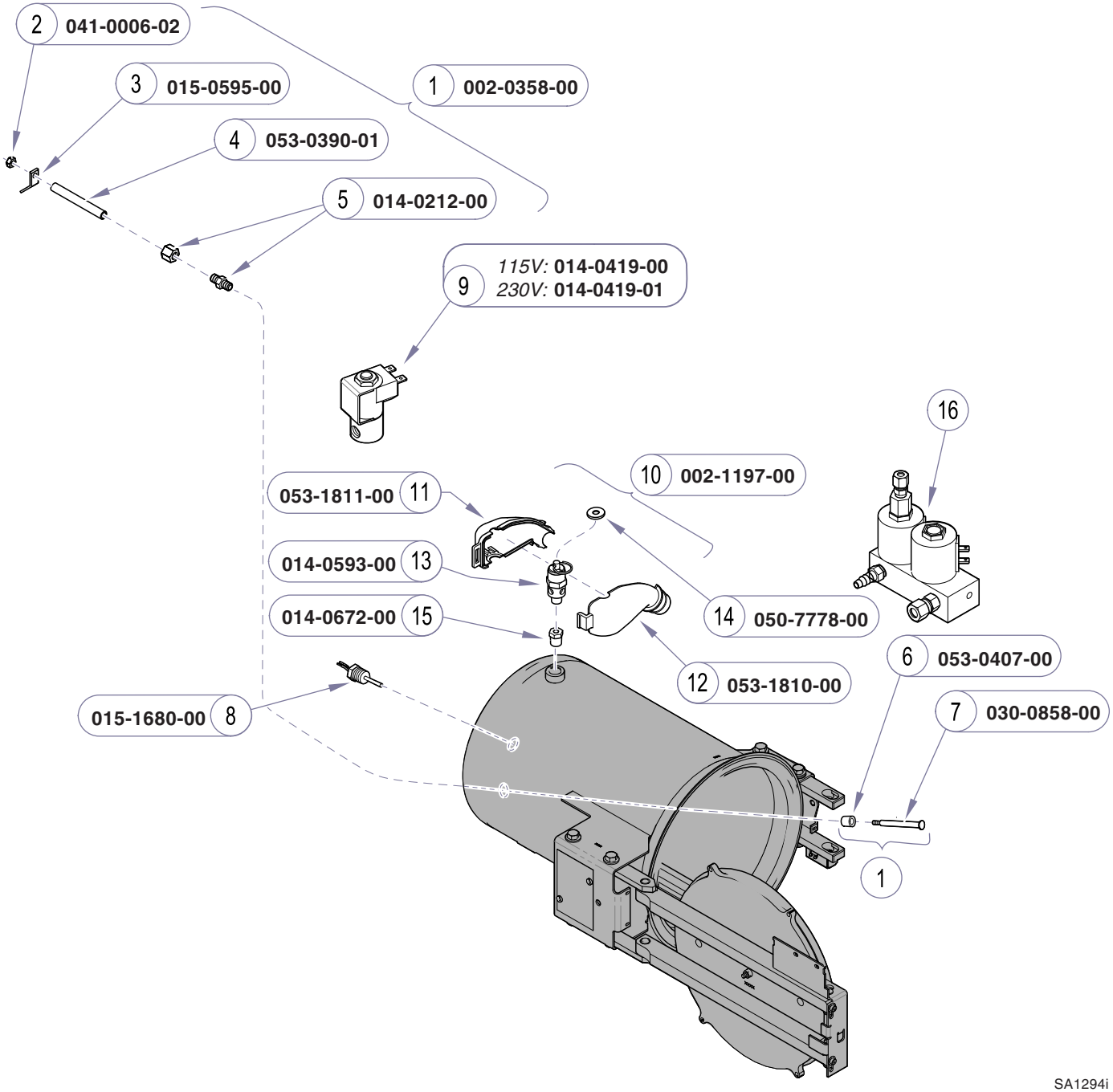
Refer To: *Go To Page:*
Operation & Troubleshooting A-1
Component Testing / Repair B-1
Access Procedures C-1
Wiring Diagrams D-1
Exploded Views / Part Numbers .. E-1



Item	Description	Qty.
1	Water Level Sensor *(incl. items 2 thru 7)*	1
2	• Nut	1
3	• Terminal	1
4	• Teflon Tube	1
5	• Compression Fitting	1
6	• Spacer	1
7	• Water Level Sensor Probe	1
8	Temperature Sensor Assembly	1
9	Air Valve	1
10	Pressure Relief Valve Kit *(includes items 11 & 12)*	*(N.L.A.)*
11	• Elbow Fitting	*1*
12	• Pressure Relief Valve	*(N.L.A.)*
13	Refer to ***Fill / Vent Valve*** page	1

Always Specify Model & Serial Number

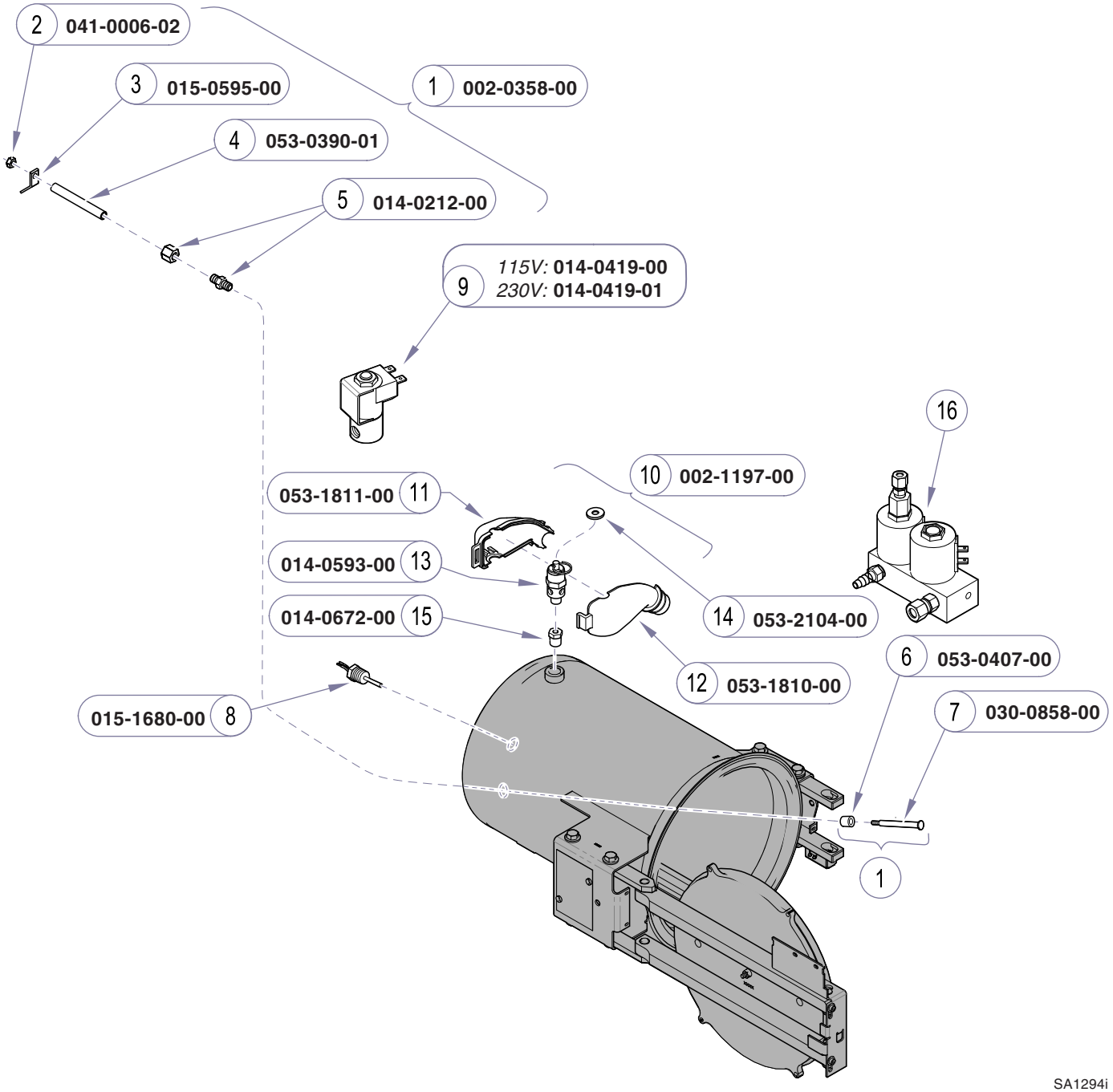
N.L.A. Denotes No Longer Available



Item	Description	Qty.
1	Water Level Sensor *(incl. items 2 thru 7)*	1
2	• Nut	1
3	• Terminal	1
4	• Teflon Tube	1
5	• Compression Fitting	1
6	• Spacer	1
7	• Water Level Sensor Probe	1
8	Temperature Sensor Assembly	1
9	Air Valve	1
10	Pressure Relief Valve Kit *(includes items 11 & 15*	1
11	• LH Enclosure (PRV)	1
12	• RH Enclosure (PRV)	1
13	• Pressure Relief Valve	1
14	• Washer	1
15	• Reducer	1
16	Refer to ***Fill / Vent Valve*** page	1

Always Specify Model & Serial Number

Refer To: *Go To Page:*
Operation & Troubleshooting A-1
Component Testing / Repair B-1
Access Procedures C-1
Wiring Diagrams D-1
Exploded Views / Part Numbers .. E-1



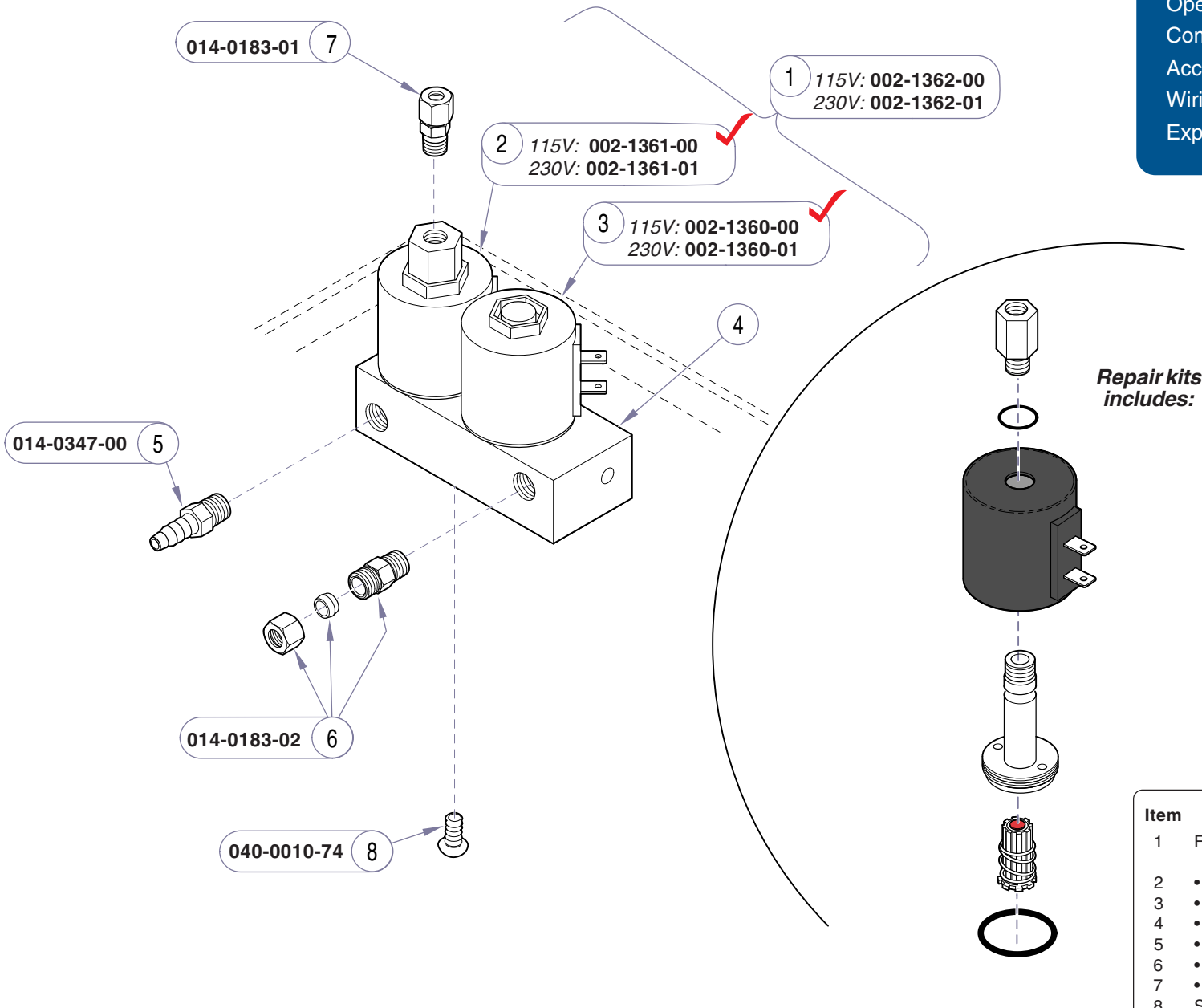
Item	Description	Qty.
1	Water Level Sensor *(incl. items 2 thru 7)*	1
2	• Nut	1
3	• Terminal	1
4	• Teflon Tube	1
5	• Compression Fitting	1
6	• Spacer	1
7	• Water Level Sensor Probe	1
8	Temperature Sensor Assembly	1
9	Air Valve	1
10	Pressure Relief Valve Kit *(includes items 11 & 15*	1
11	• LH Enclosure (PRV)	1
12	• RH Enclosure (PRV)	1
13	• Pressure Relief Valve	1
14	• Washer	1
15	• Reducer	1
16	Refer to ***Fill / Vent Valve*** page	1

Always Specify Model & Serial Number

Sensors & Valves

Models: ***M9 (-020 thru -022)*** ***M9D (-020 & -022)***
Serial Numbers: ***M11 (-020 thru -022)*** ***M11D (-020 & -022)***
V759603 thru Present ***V759603 thru Present***

Refer To: *Go To Page:*
Operation & Troubleshooting A-1
Component Testing / Repair B-1
Access Procedures C-1
Wiring Diagrams D-1
Exploded Views / Part Numbers .. E-1



Item	Description	Qty.
1	Fill / Vent Valve Assembly *(incl. items 2 thru 7)*	1
2	• Vent Valve Repair Kit	1
3	• Fill Valve Repair Kit	1
4	• Manifold Block *(n/a)*	1
5	• Barb Fitting	1
6	• 3/8" Fitting	1
7	• 1/4" Fitting	1
8	Screw *(#10-32 x 3/8")*	1

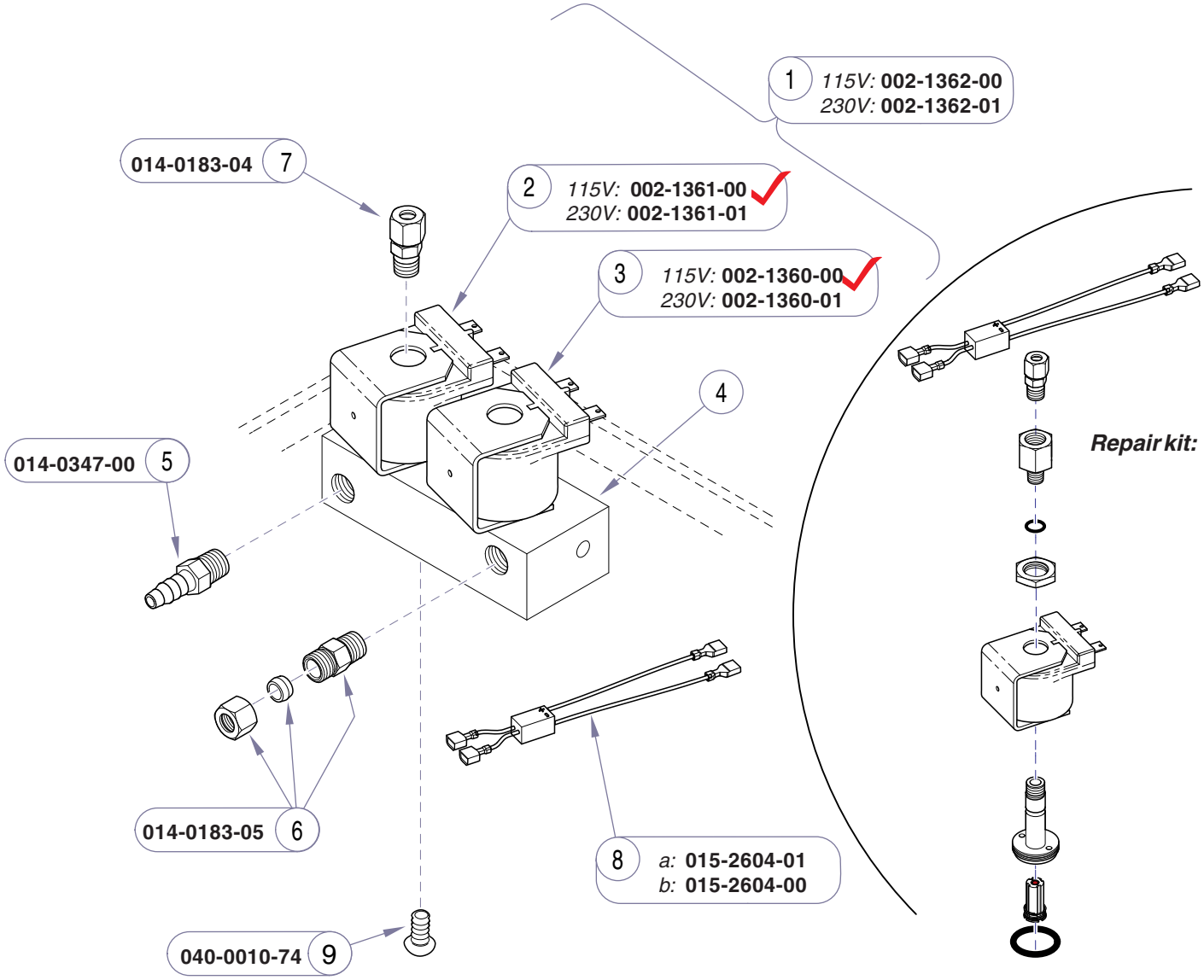
Always Specify Model & Serial Number

Models:	***ALL***		
Serial Numbers:	***RS, RT, RV, RN, RP, RR, RW, RX, RY, RZ, V1000 thru V933375***		

Fill / Vent Valve

Go To Table Of Contents

Refer To: **Go To Page:**
Operation & Troubleshooting A-1
Component Testing / Repair B-1
Access Procedures C-1
Wiring Diagrams D-1
Exploded Views / Part Numbers .. E-1

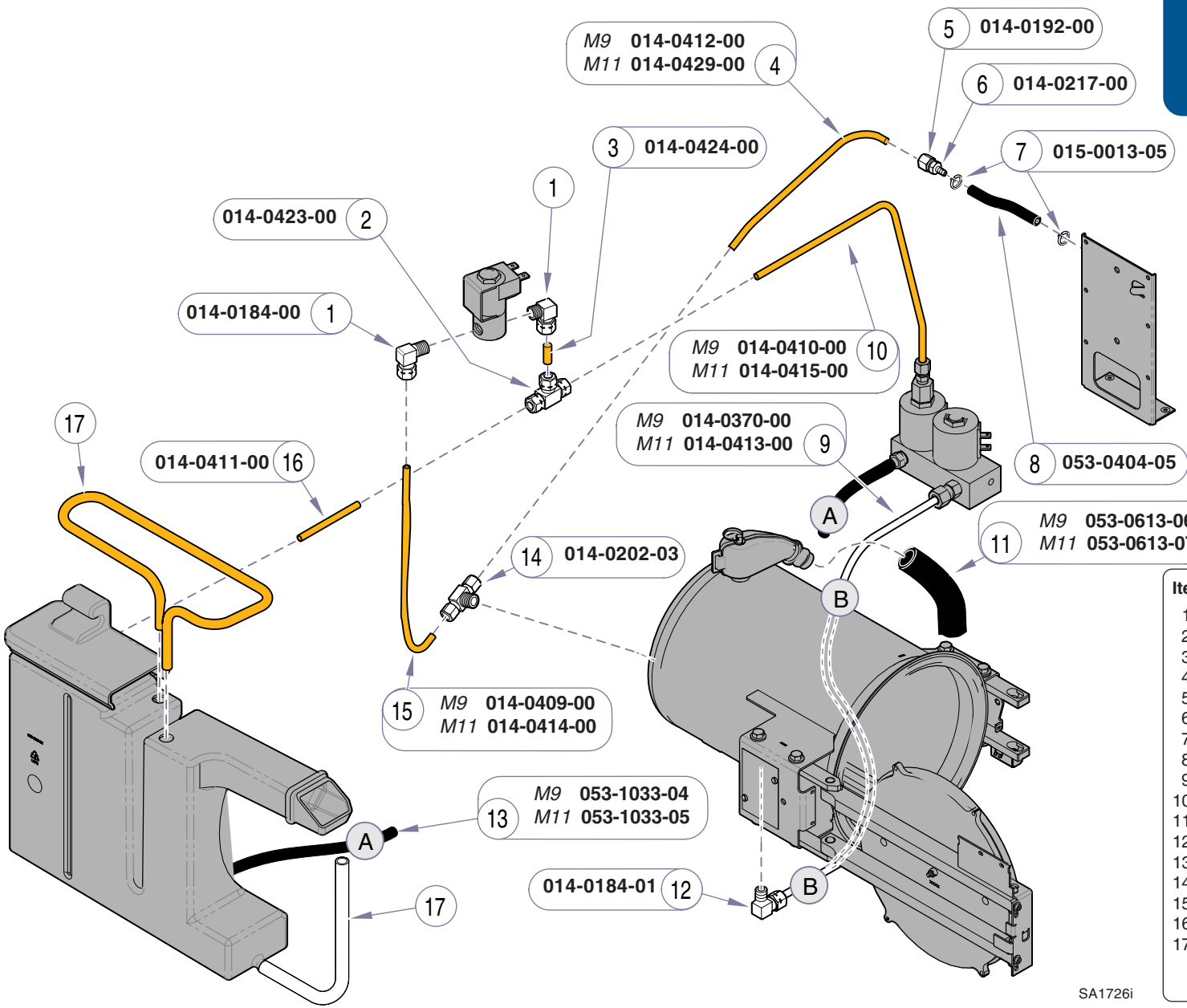


Item	Description	Qty.
1	Fill / Vent Valve Assembly *(incl. items 2 thru 8)*	1
2	• Vent Valve Repair Kit	1
3	• Fill Valve Repair Kit	1
4	• Manifold Block *(not servicable)*	1
5	• Barb Fitting	1
6	• 3/8" Fitting	1
7	• 1/4" Fitting	1
8	• *a:* Vent Valve Wiring Harness *(Red)*	1
	• *b:* Fill Valve Wiring Harness *(Black)*	1
9	Screw *(#10-32 x 3/8")*	1

Always Specify Model & Serial Number

Fill / Vent Valve

Models:	***ALL***			
Serial Numbers:	***V933375 to Present***			



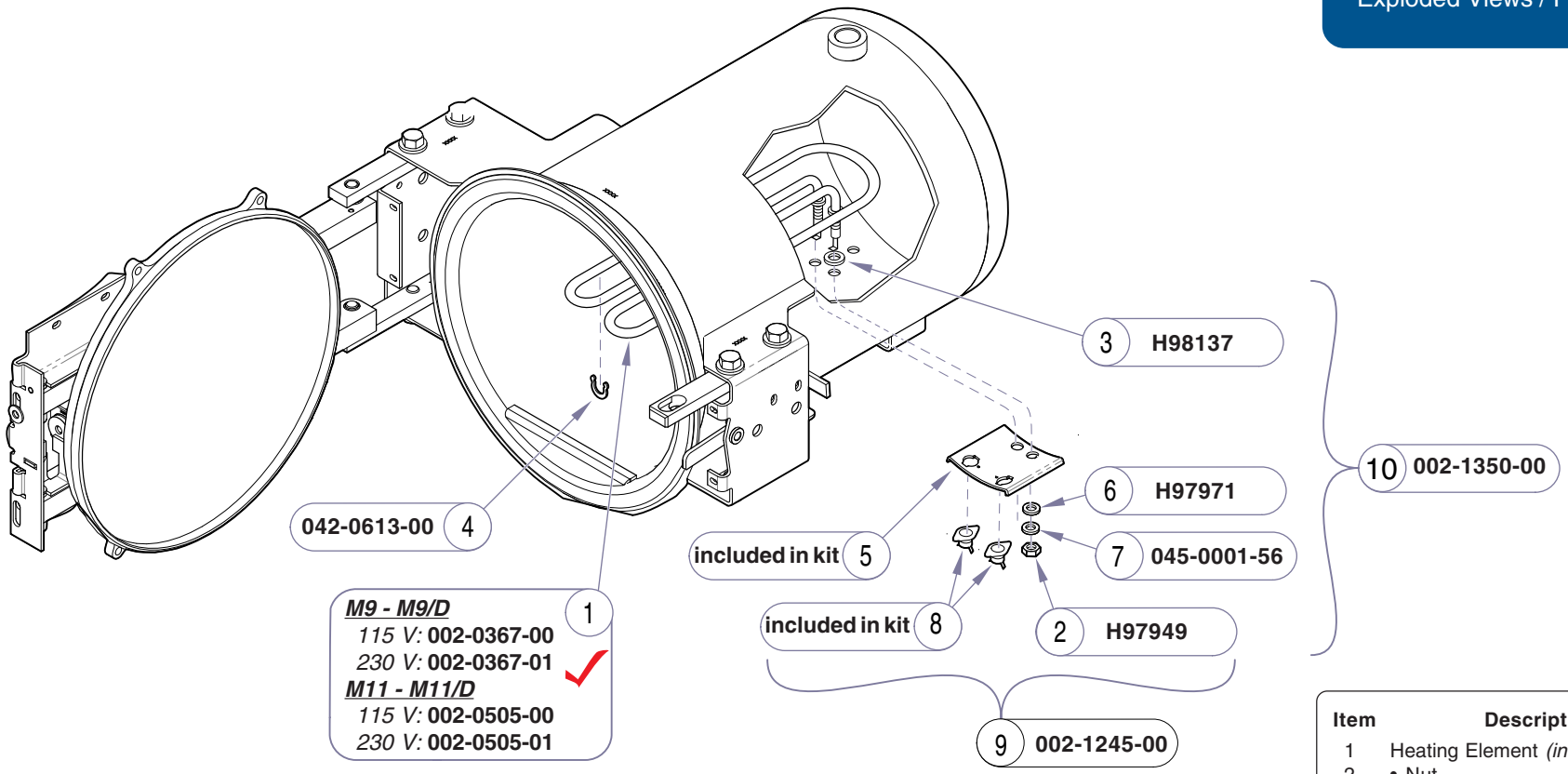
Item	Description	Qty.
1	Elbow Fitting	2
2	Tee Fitting	1
3	Tubing	1
4	Tubing	1
5	Compression Nut	1
6	Compression Connector	1
7	Hi-Temp Cable Tie	2
8	Tubing	1
9	Tubing	1
10	Tubing	1
11	Pressure Relief Tubing	1
12	Elbow Fitting	1
13	Reservoir Tubing	1
14	Tee Fitting	1
15	Tubing	1
16	Tubing	1
17	Refer to ***Reservoir Tank*** page	Ref

Always Specify Model & Serial Number

Models:
Serial Numbers:

Tubing & Fittings

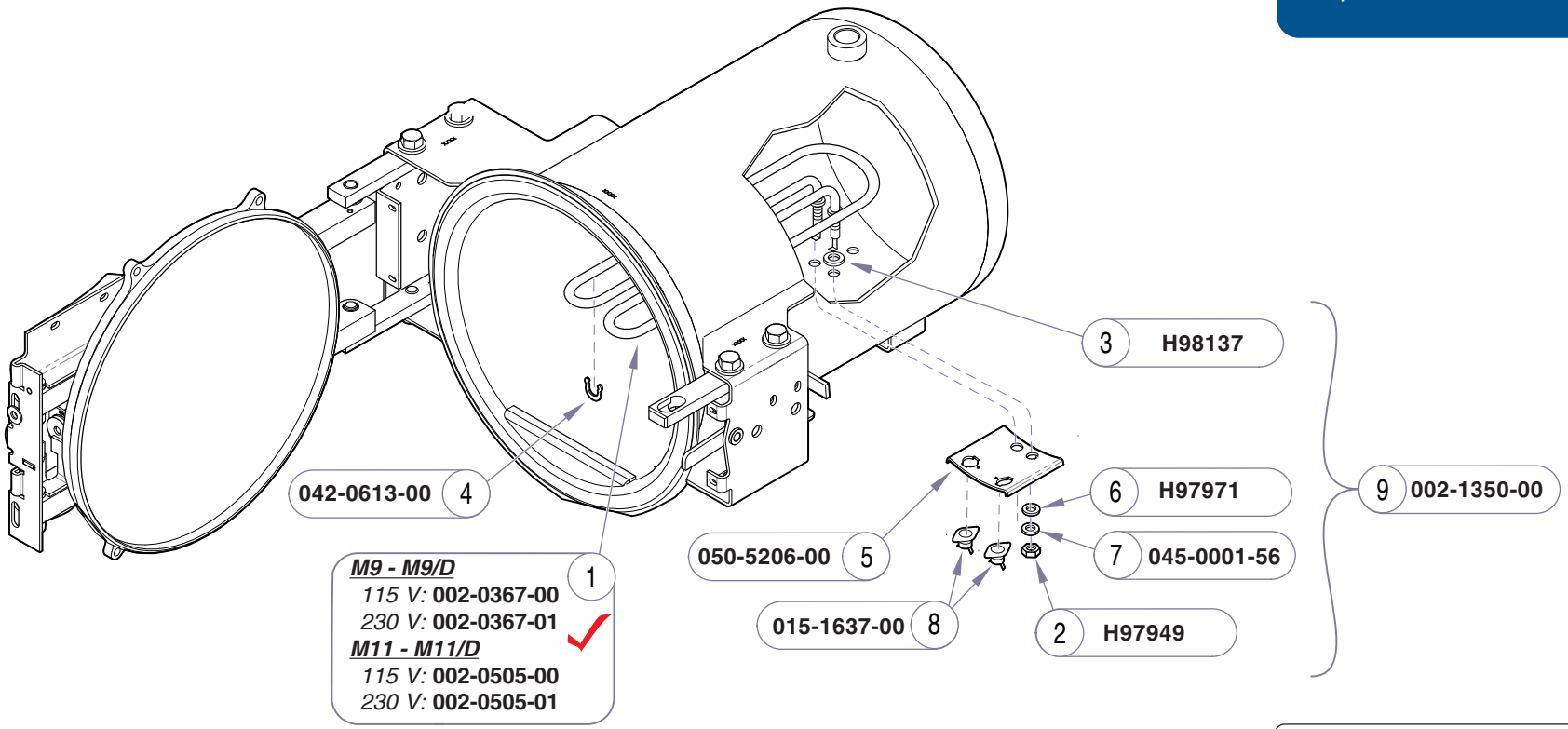
Refer To: *Go To Page:*
Operation & Troubleshooting A-1
Component Testing / Repair B-1
Access Procedures C-1
Wiring Diagrams D-1
Exploded Views / Part Numbers .. E-1



Item	Description	Qty.
1	Heating Element *(includes items 2 thru 4)*	1
2	• Nut	2
3	• Gasket	2
4	• Radial Gripring	4
5	Thermostat Bracket	1
6	Washer	2
7	Lockwasher *(7/16", internal tooth)*	2
8	High-Limit Thermostat	2
9	Thermostat Kit (incl. items 2, 3, 5, & 8)	1
10	Gasket Kit (incl. items 2, 3, 6, & 7)	1

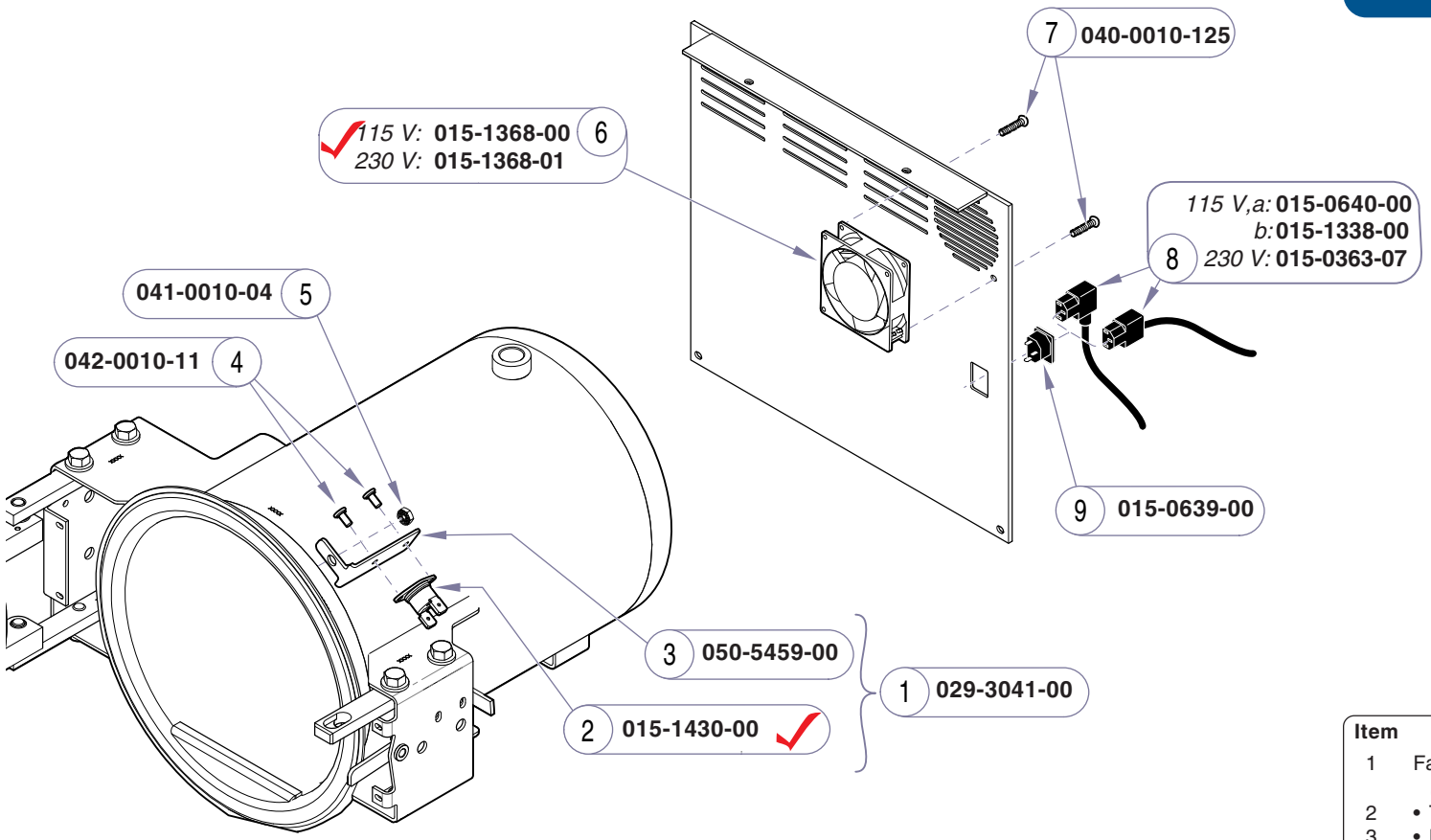
Always Specify Model & Serial Number

Go To Table Of Contents



Item	Description	Qty.
1	Heating Element *(includes items 2 thru 4)*	1
2	• Nut	2
3	• Gasket	2
4	• Radial Gripring	4
5	Thermostat Bracket	1
6	Washer	2
7	Lockwasher *(7/16", internal tooth)*	2
8	High-Limit Thermostat	2
9	Gasket Kit (incl. items 2, 3, 6, & 7)	1

Always Specify Model & Serial Number



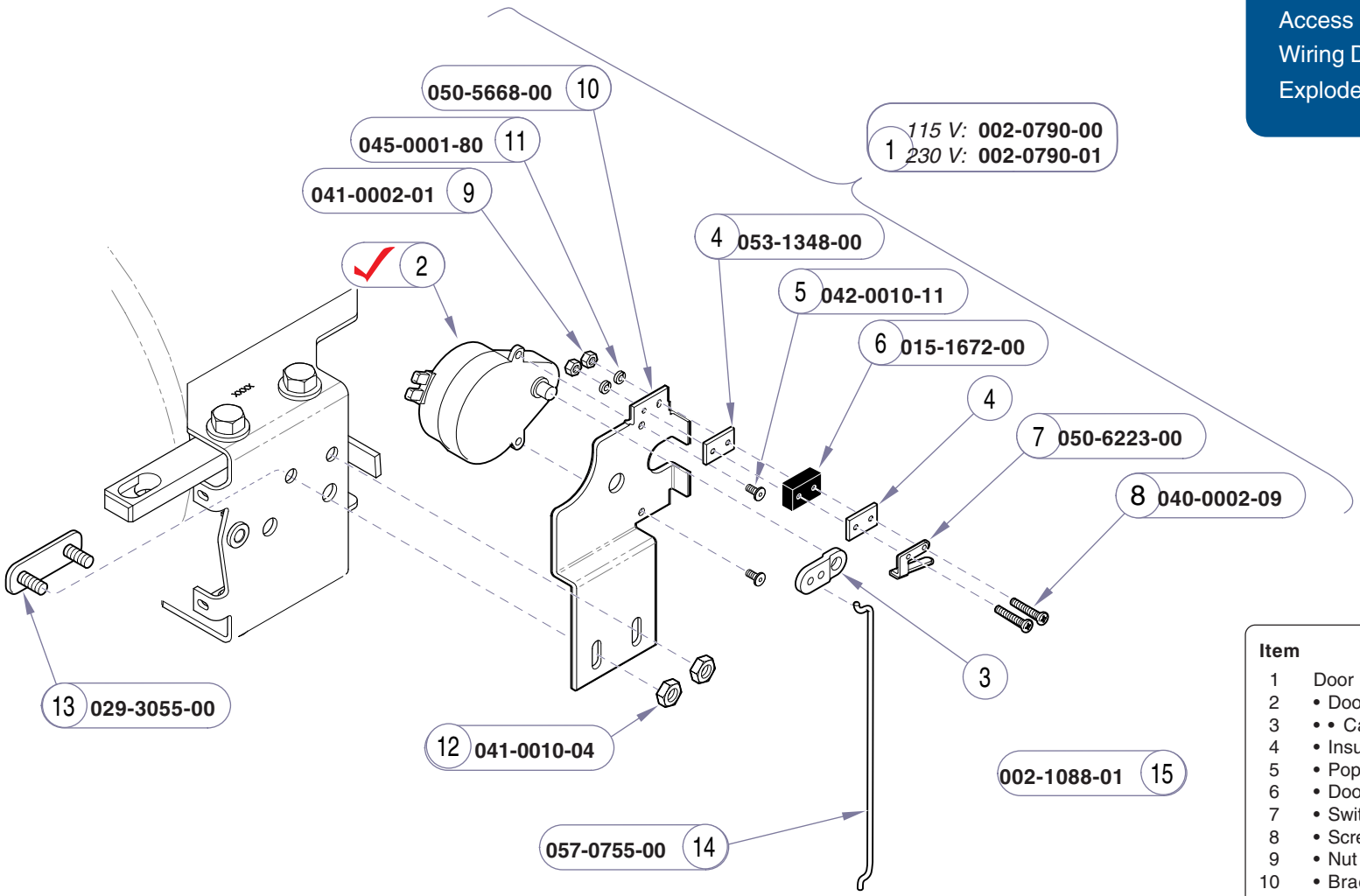
MA668602i

Item	Description	Qty.
1	Fan Thermostat Assembly *(includes items 2 thru 4)*	1
2	• Thermostat	1
3	• Bracket	1
4	• Pop Rivet	2
5	Nut *(#10-24)*	1
6	Fan	1
7	Screw *(#10 x 1/2", self-tapping)*	2
8	Power Cord *(a)- 90 degree plug*	1
	(b)- straight plug	1
9	Power Cord Receptacle	1

Always Specify Model & Serial Number

Fan System

Models: ALL
Serial Numbers:



MA668507i

Item	Description	Qty.
1	Door Motor Kit *(includes items 2 thru 11)*	1
2	• Door Motor *(includes item 3)*	1
3	• • Cam	1
4	• Insulation	1
5	• Pop Rivet	4
6	• Door Motor Switch	1
7	• Switch Actuator	1
8	• Screw *(#10-24 x 3/8")*	2
9	• Nut *(#2-56)*	2
10	• Bracket	1
11	• Lock Washer *(#2)*	2
12	Nut *(#10-24)*	2
13	Stud Plate *(used on earlier models w/o studs)*	1
14	Connecting Rod	1
15	M9/M11 Switch Mounting/Insulator Kit *(includes items 4, 7, 8, 9 and 11)*	1

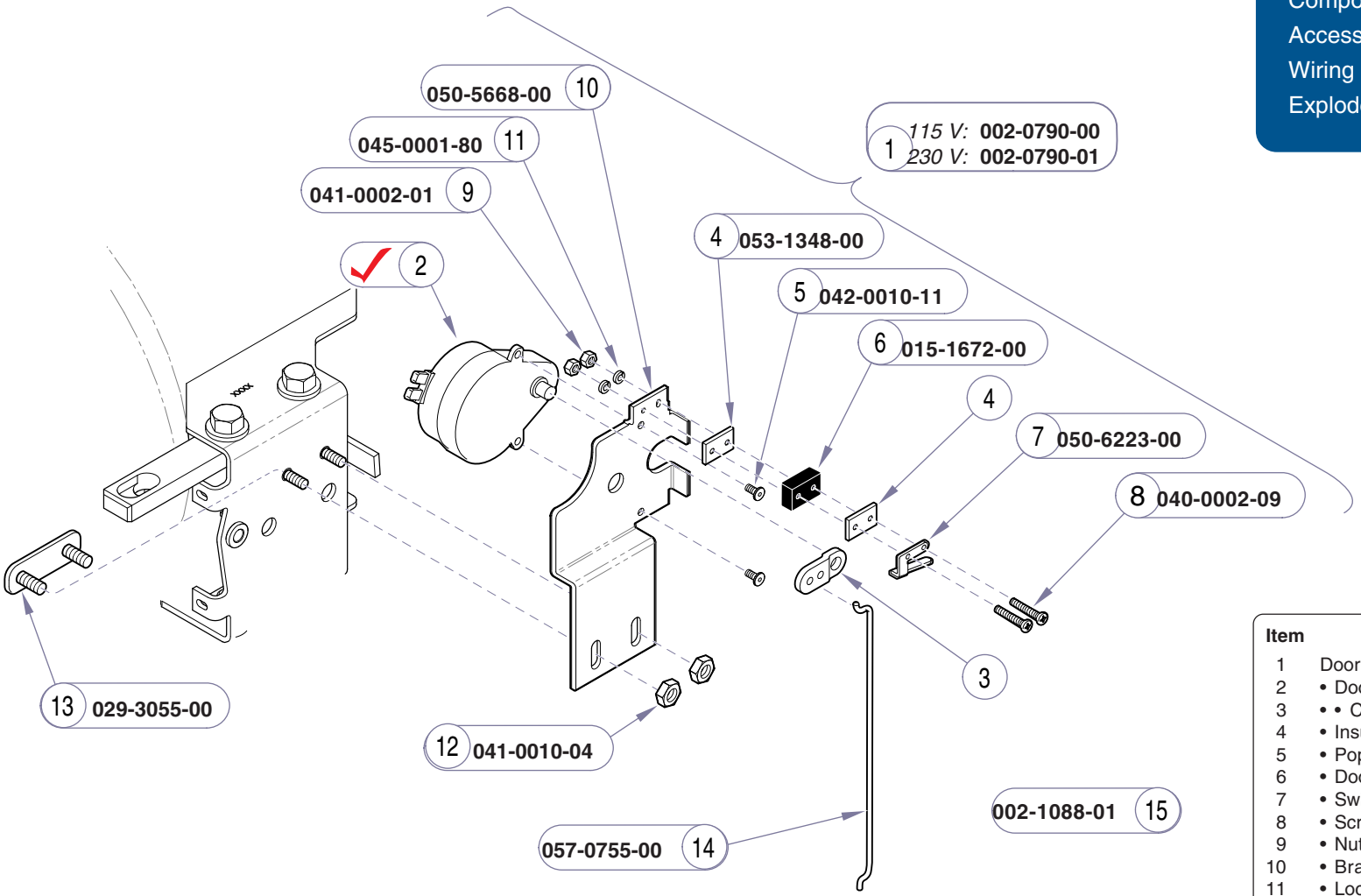
Always Specify Model & Serial Number

Models: *Serial Numbers:*	***M9*** *(-020)* RN1000 thru RN1184 RN1236 thru RN1240	***M9*** *(-021 / -022)* RP1000 thru RP1368 RR1000 thru RR1368	***M11*** *(-020/-021/-022)* RS1000 thru RS1299 RT1000 thru RT1025 RV1000 thru RV1179	

Door Motor System

Go To Table Of Contents

Refer To: *Go To Page:*
Operation & Troubleshooting A-1
Component Testing / Repair B-1
Access Procedures C-1
Wiring Diagrams D-1
Exploded Views / Part Numbers .. E-1



Item	Description	Qty.
1	Door Motor Kit *(includes items 2 thru 11)*	1
2	• Door Motor *(includes item 3)*	1
3	• • Cam	1
4	• Insulation	1
5	• Pop Rivet	4
6	• Door Motor Switch	1
7	• Switch Actuator	1
8	• Screw *(#10-24 x 3/8")*	2
9	• Nut *(#2-56)*	2
10	• Bracket	1
11	• Lock Washer *(#2)*	2
12	Nut *(#10-24)*	2
13	Stud Plate *(used on earlier models w/o studs)*	1
14	Connecting Rod	1
15	M9/M11 Switch Mounting/Insulator Kit *(includes items 4, 7, 8, 9 and 11)*	1

Always Specify Model & Serial Number

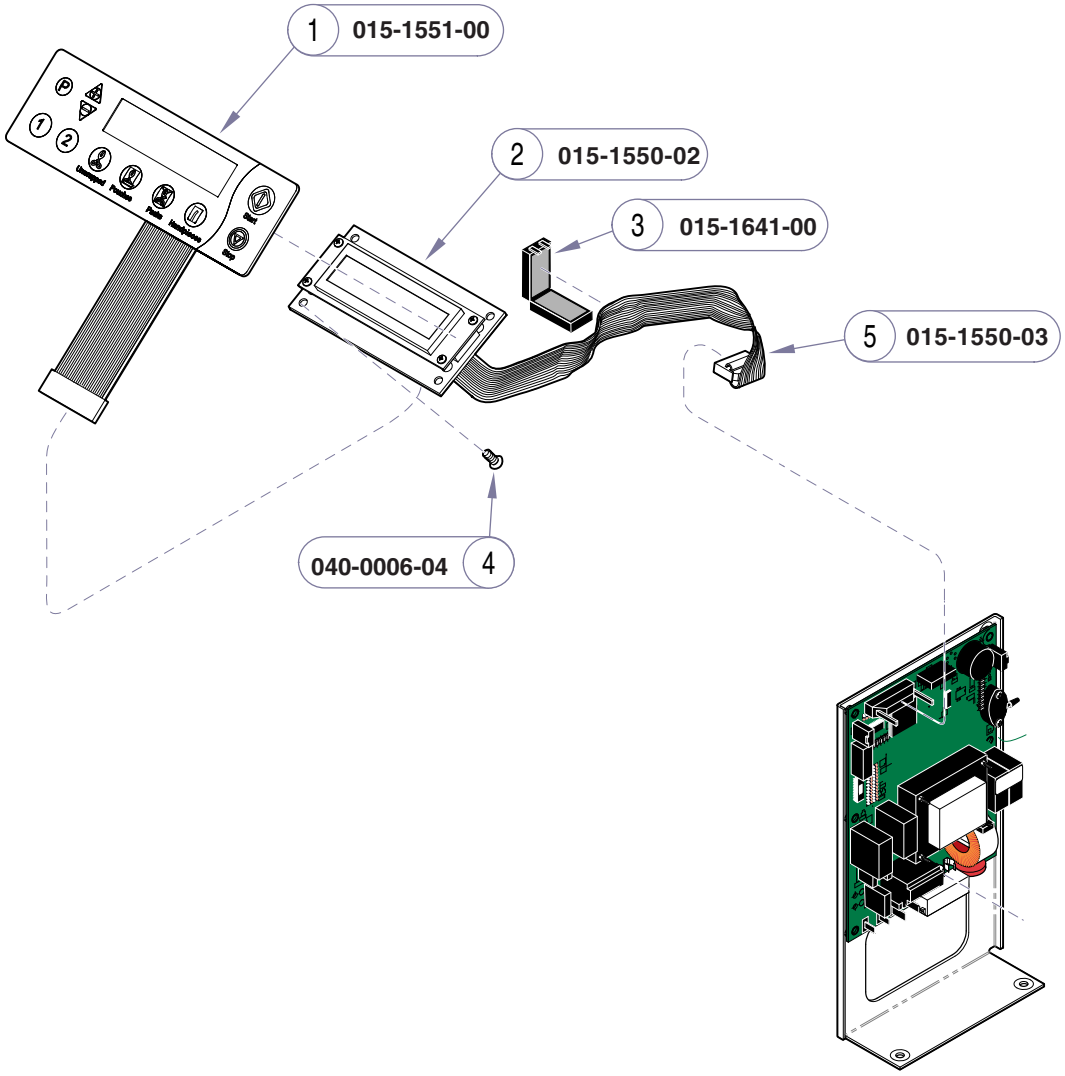
MA668508i

Models: *Serial Numbers:*	***M9*** *(-020)*	***M9*** *(-021 / -022)*	***M11*** *(-020/-021/-022)*
	RN1185 thru RN1235 RN1241 thru present V1000 thru present	RP1005 thru present RR1369 thru present V1000 thu present	RS1300 thru present RT1026 thru present RV1180 thru present V1000 thru present

Door Motor System

Go To Table Of Contents

Refer To: *Go To Page:*
Operation & Troubleshooting A-1
Component Testing / Repair B-1
Access Procedures C-1
Wiring Diagrams D-1
Exploded Views / Part Numbers .. E-1



MA668801i

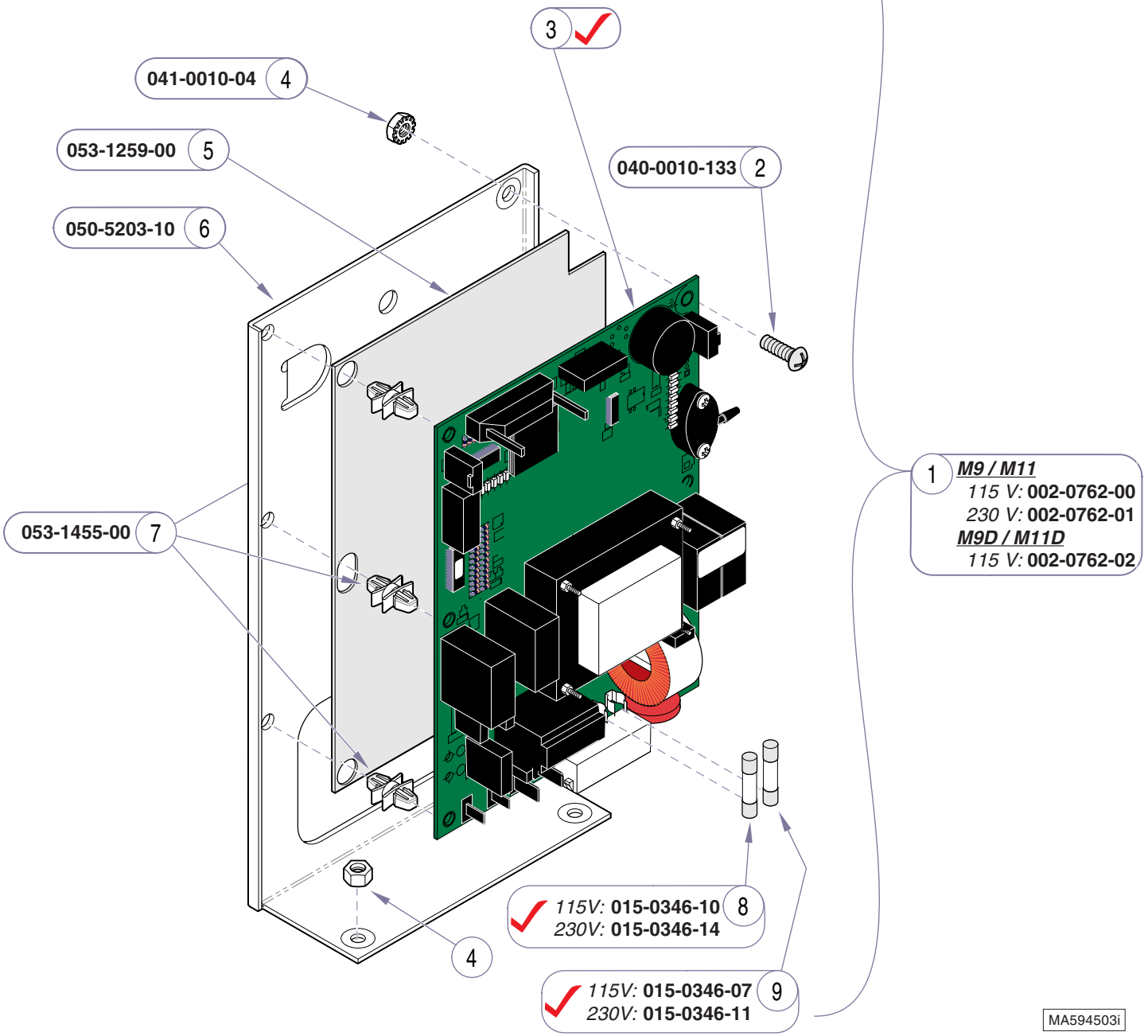
Item	Description	Qty.
1	Touch Pad	1
2	Display Panel *(includes item 5)*	1
3	Suppression Coil	1
4	Screw *(#6 x 3/8")*	2
5	Ribbon cable	1

Always Specify Model & Serial Number

Models: / ***Serial Numbers:***	***ALL***			

Touch Pad & Display Panel

Go To Table Of Contents

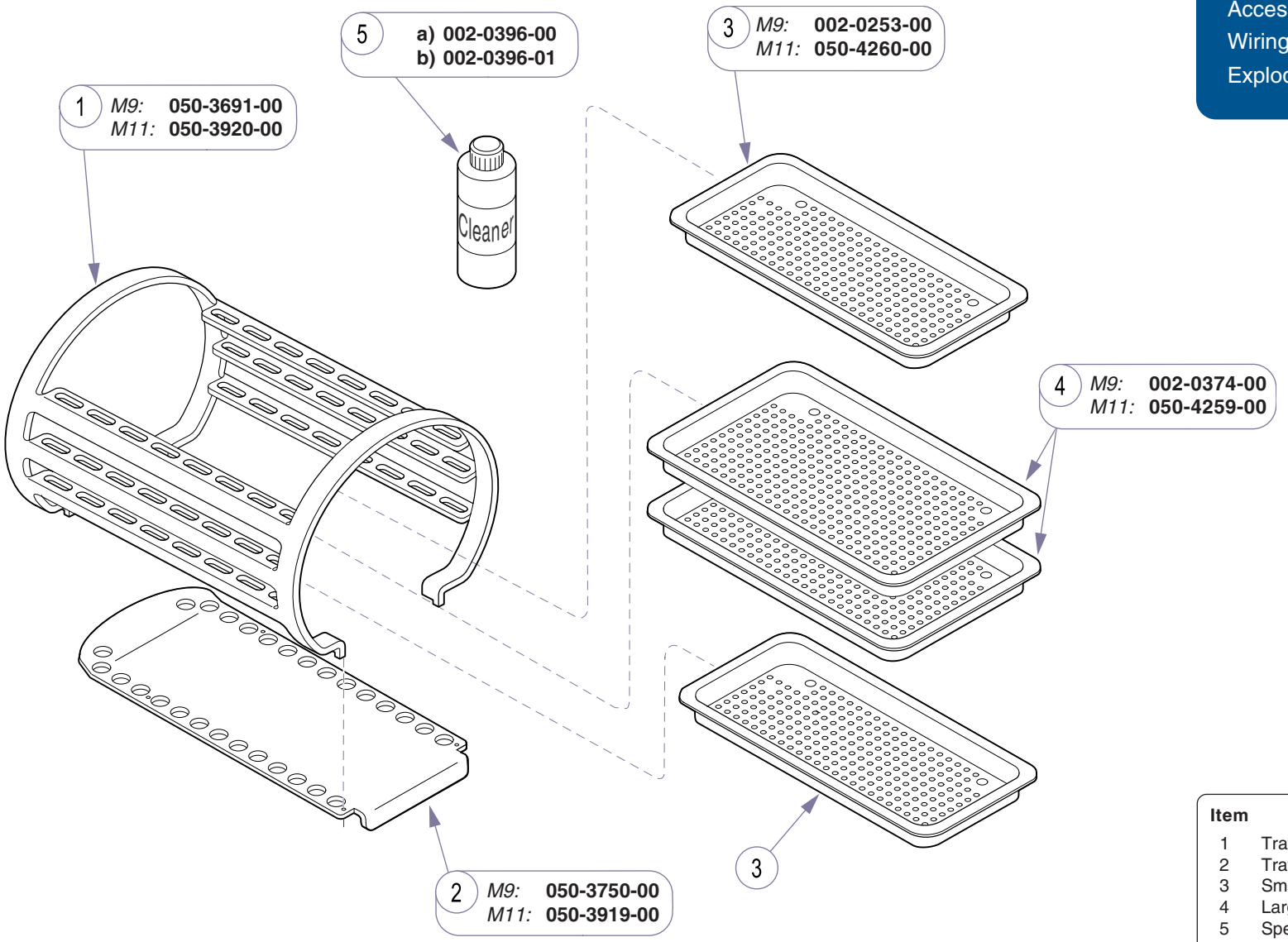


Item	Description	Qty.
1	PC Board Kit *(includes items 2 thru 9)*	1
2	• Screw *(#10-24 x 5/8")*	2
3	• PC Board	1
4	• Nut *(#10-24)*	2
5	• Insulator	1
6	• Mounting Bracket	1
7	• Standoff	4
8	• F1 Fuse	
	115 VAC *(0.250 amp 250 volt Slo Blo)*	1
	230 VAC *(0.125 amp 250 volt Slo Blo)*	1
9	• F2 Fuse	1
	115 VAC *(15 amp, 250 volt, Fast-Acting)*	1
	230 VAC *(8 amp, 250 volt, Fast-Acting)*	1

Always Specify Model & Serial Number

Main PC Board

Models: ***ALL***
Serial Numbers:



MA604902i

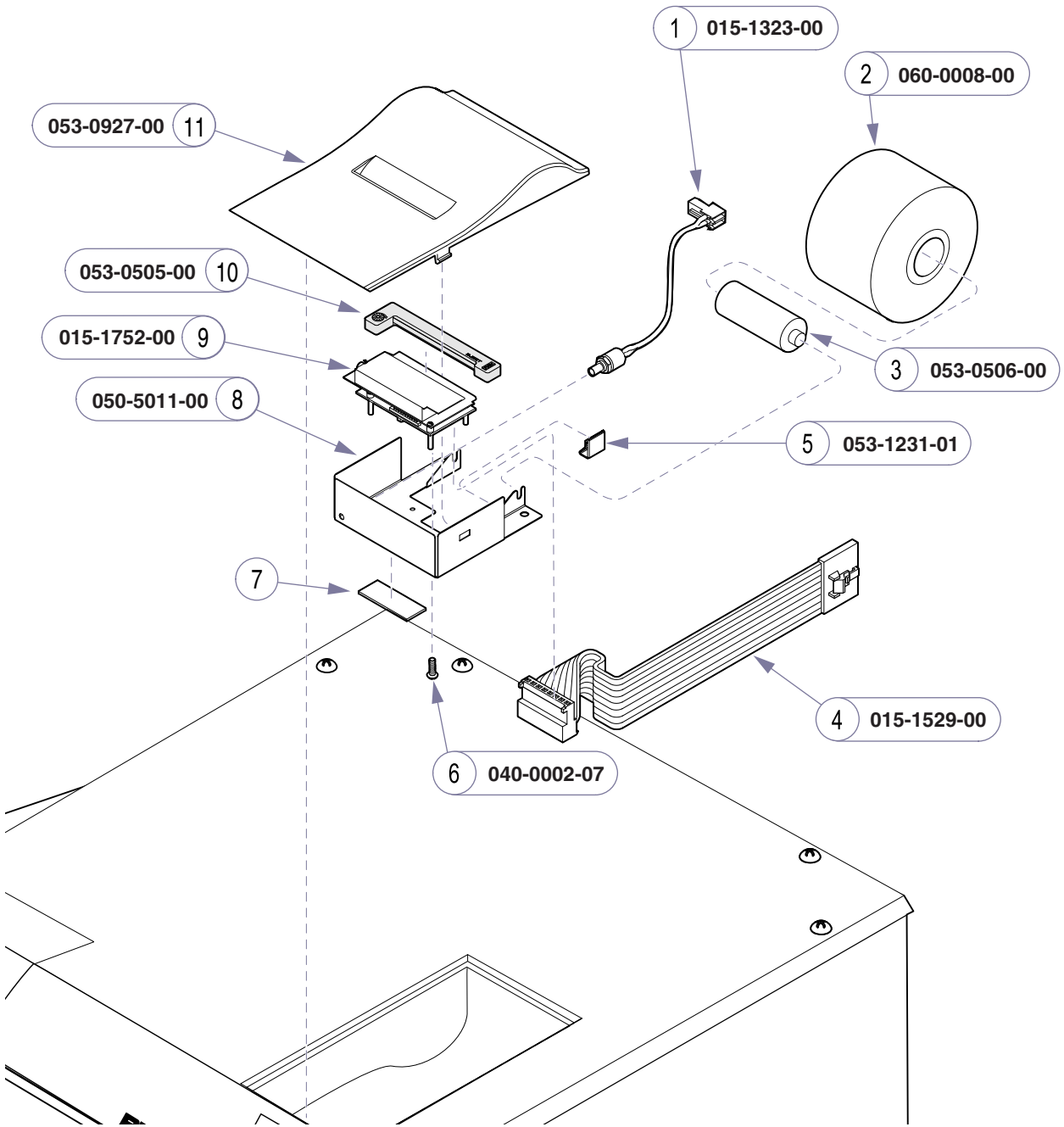
Item	Description	Qty.
1	Tray Rack	1
2	Tray Plate	1
3	Small Tray	2
4	Large Tray	2
5	SpeedClean *(w/MSDS)*:	
	a) *One Bottle - Midmark*	AR
	b) *One Case - Midmark (12 bottles)*	AR

Always Specify Model & Serial Number

Models: ALL
Serial Numbers:

Trays / Rack / Cleaner

 SF-1854 Rev. 1/07



MA598601i

Refer To: *Go To Page:*

Operation & Troubleshooting A-1
Component Testing / Repair B-1
Access Procedures C-1
Wiring Diagrams D-1
Exploded Views / Part Numbers .. E-1

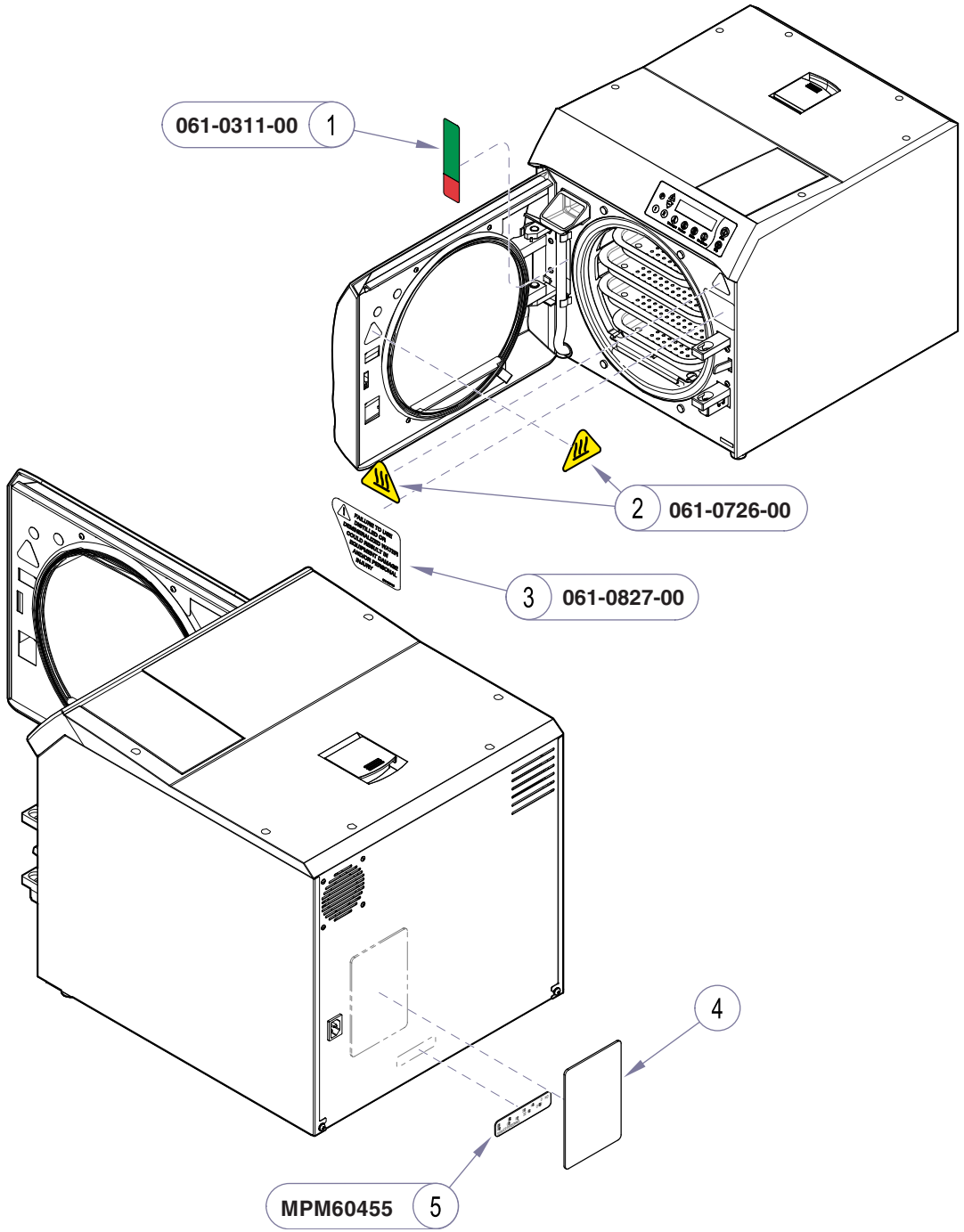
Item	Description	Qty.
1	Feed Cable	1
2	Paper Roll	1
3	Spindle	1
4	Ribbon Harness	1
5	Cable Clamp	1
6	Screw (#2-56 x 1/4")	4
7	Serial Number Label *(n/a)*	1
8	Bracket	1
9	Printer Module	1
10	Ribbon Cartridge	1
11	Cover	1

Always Specify Model & Serial Number

9A259001 Printer
(optional)

Models: ***ALL***
Serial Numbers:

Refer To: *Go To Page:*
Operation & Troubleshooting A-1
Component Testing / Repair B-1
Access Procedures C-1
Wiring Diagrams D-1
Exploded Views / Part Numbers .. E-1



MA606103i

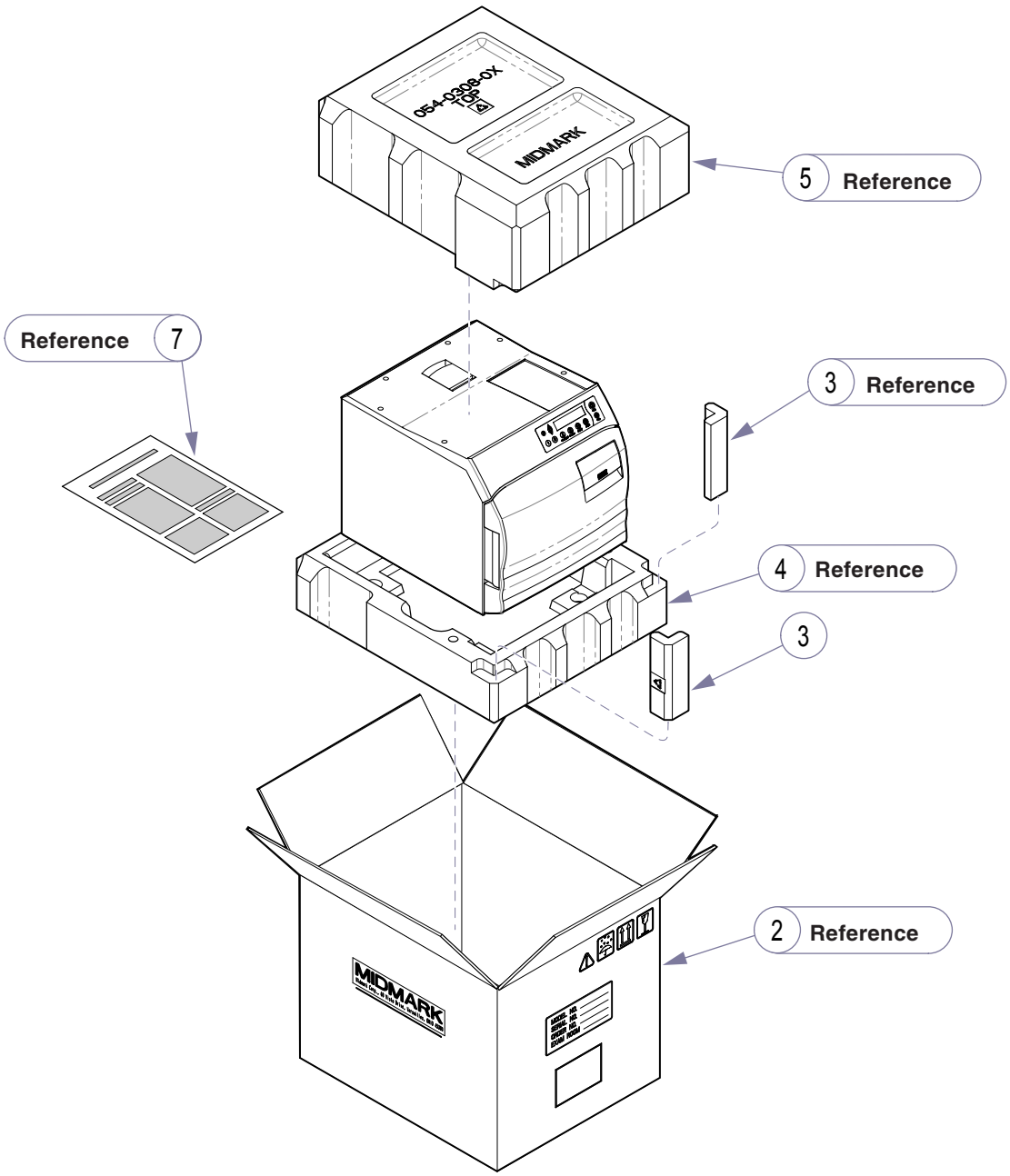
Item	Description	Qty.
1	Water Level Label	1
2	Hot Surface Label	2
3	Distilled Water Label	1
4	Serial Number Label *(n/a)*	1
5	Caution Label	1

Always Specify Model & Serial Number

Models: ALL
Serial Numbers:

Labels & Decals

Refer To: *Go To Page:*
Operation & Troubleshooting A-1
Component Testing / Repair B-1
Access Procedures C-1
Wiring Diagrams D-1
Exploded Views / Part Numbers .. E-1



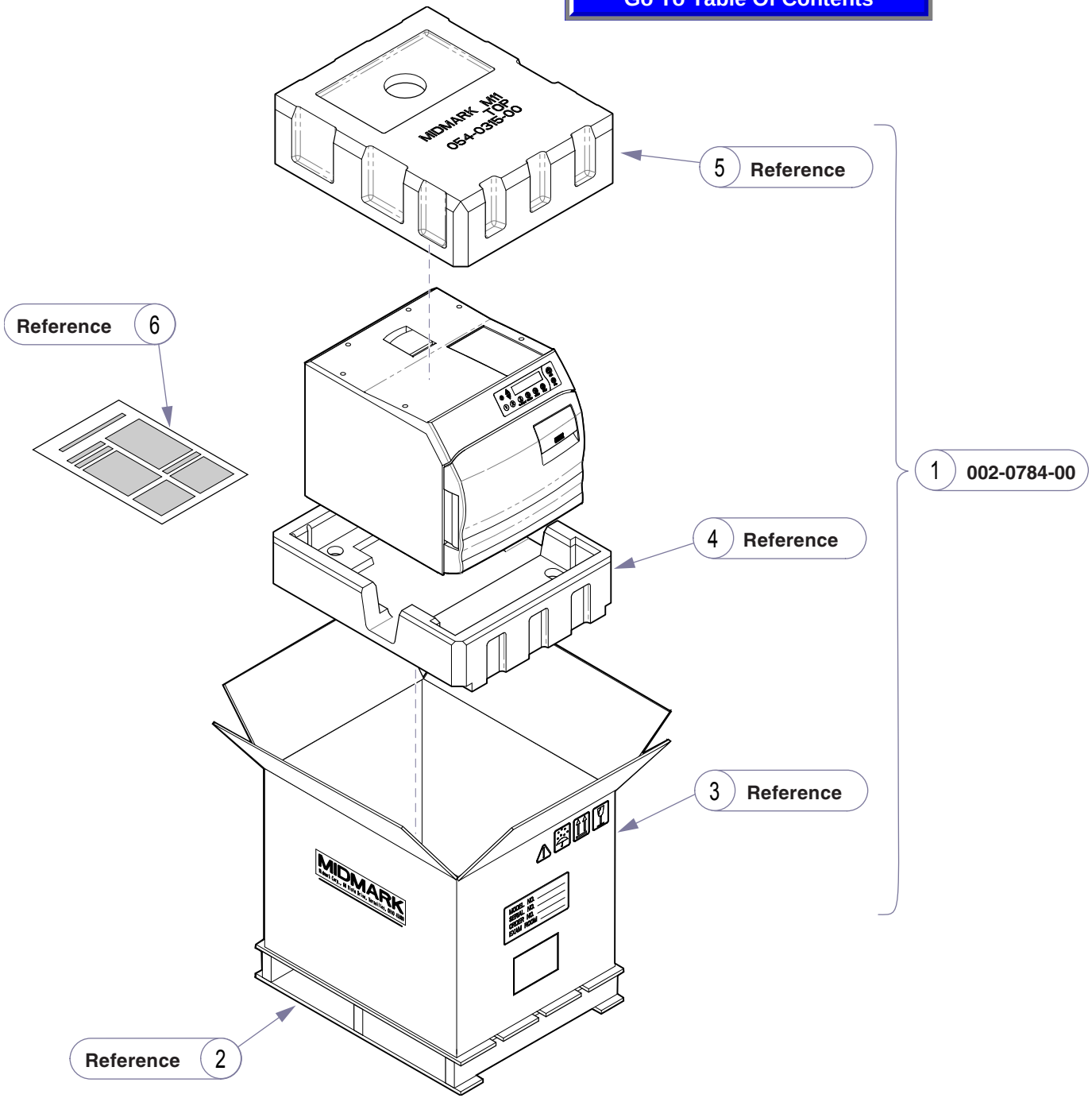
MA594604i

Item	Description	Qty.
1	M9/M9D Packaging *(includes items 2 thru 6)*	1
2	• Carton	1
3	• Corners	1
4	• Bottom Pad	1
5	• Top Pad	1
6	• Plastic Bag	1
7	Material Safety Data Sheet	1

Always Specify Model & Serial Number

Packaging *(M9/D)*

Models: *Serial Numbers:*	***M9*** *(-020 /-021/-022)* ALL	***M9D*** *(-020 / -022)* ALL		



MA598505i

Item	Description	Qty.
1	M11/M11D Packaging *(includes items 2 thru 8)*	1
2	• Skid	1
3	• Carton	1
4	• Bottom Pad	1
5	• Top Pad	1
6	• Plastic Bag	1
7	Material Safety Data Sheet	1

Always Specify Model & Serial Number

Models: / ***Serial Numbers:***	***M11*** *(-020 /-021/-022)* ALL	***M11D*** *(-020 /-020/-022)* ALL		

Packaging ***(M11/D)***

Go To Table Of Contents

COMMENTS

The Technical Publications Department of Midmark Corporation takes pride in its manuals. We are sure that our manuals will fill all your needs when you are performing scheduled maintenance, servicing, or repairs on a Midmark product. However, if you find any errors or feel there should be a change, addition, or deletion to the manuals, please let us know. We will correct any errors that we are made aware of and we will review requests for changes, additions, or deletions to the manuals and incorporate those requests deemed appropriate. If you see something in one of our manuals that you like or dislike, please let us know. Also, if there is something you feel we could do to produce a better manual, please let us know.

If an error is found, please list the page and paragraph/figure in which the error was found along with a brief description of what the error is. If the correction to the error is known, please include that information also. If a change, addition, or deletion is being requested, please list the page and paragraph/figure needing the change, along with a brief description of how you feel the paragraph/figure should be changed.

Please fax or mail a copy of this completed comment sheet to:

Midmark Corporation
ATTN: Technical Publications Dept.
60 Vista Drive
Versailles, Ohio 45380
Fax: (937) 526-5542

Page Number	Paragraph/Figure	Description

Go To Table Of Contents

SERVICE PARTS FAX ORDERING FORM

(Do not tear out this page. Photo copy this page for use only.)

MIDMARK®

ATTENTION: CUSTOMER SERVICE DEPARTMENT

IMPORTANT NOTES:

1) ***Use this form for all non-warranty orders only***. *Warranty orders must be telephoned in (1-800-643-6275).*

2) *FAX number to send order to: 877-249-1793*

3) *All emergency orders must be received @ Midmark by 1:00 pm EST.*

4) *All underlined headings should be filled in prior to submittal.*

ADDITIONAL COMMENTS:

DATE: ____ / ____ / _____ **TIME:** _____ am pm

METHOD OF SHIPMENT: _____

PRIORITY:

☐ **NON-EMERGENCY ORDER {to ship within 72 hours if part(s) are in stock.}**

☐ **EMERGENCY ORDER {to ship within 24 hours if part(s) are in stock.} [see note 3]**

DEALER P.O. #: _____

ACCOUNT #: _____

MODEL #:	**SERIAL #:**	**SALES ORDER #** (if applicable)

NAME: _____

ADDRESS: _____

CITY: _____ **STATE:** ____ **ZIP:** _____

CONTACT: _____

PHONE: _____

FAX #: _____

SHIP TO: _____

LINE #	PART NUMBER	QTY.	DESCRIPTION	COLOR (if applicable)

CREDIT CARD INFORMATION

CARD TYPE _____ **CARD #**_____-_____-_____-_____ **EXP. DATE** _____ / _____ / _____

NAME ON CARD _____ **SIGNATURE**_____

Go To Table Of Contents

Subject to change without notice.
Refer to www.Documark.com for latest revision.

Midmark Corporation
60 Vista Drive
P.O. Box 286
Versailles, OH 45380-0286
937-526-3662
Fax 937-526-5542
www.midmark.com

MIDMARK®
Because we care.