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La Marzocco Training Manual

The La Marzocco is set apart from most other espresso machines due to its two-boiler system. Having separate coffee and steam boilers allows the machine to achieve and maintain exceptional thermal balance.

Single boiler espresso machines' brewing water comes from a heat exchanger located inside the steam boiler. Brewing water temperature is solely dependent on the pressure of the water in the boiler used for steaming. As the steam boiler's pressure rises and falls during normal operation so does the water temperature in the heat exchanger used for brewing.

The LaMarzocco has a separate boiler for each function. A coffee boiler to heat water for brewing espresso and a steam boiler used to generate steam for preparing milk and hot water for tea or americanos. This two-boiler system allows for the perfect brewing temp even if the steam boiler has been under extremely heavy steaming or water usage.

Safety & Tools

Safety Precautions

Before performing maintenance on the steam boiler:

* Turn the machine off.
* Depressurize the steam boiler by opening one or both steam arms.

The only exception would be when rebuilding the steam assemblies, then it will be necessary to close the ball valves located on the steam tank.

Before performing maintenance on the coffee boiler:

* Turn the machine off.
* Turn off the incoming water supply.
* Depressurize the coffee boiler by opening the expansion valve.

When performing maintenance on any electrical wiring in the machine, apart from taking voltage or amp readings ensure the machine is unplugged from the wall outlet.

Tools

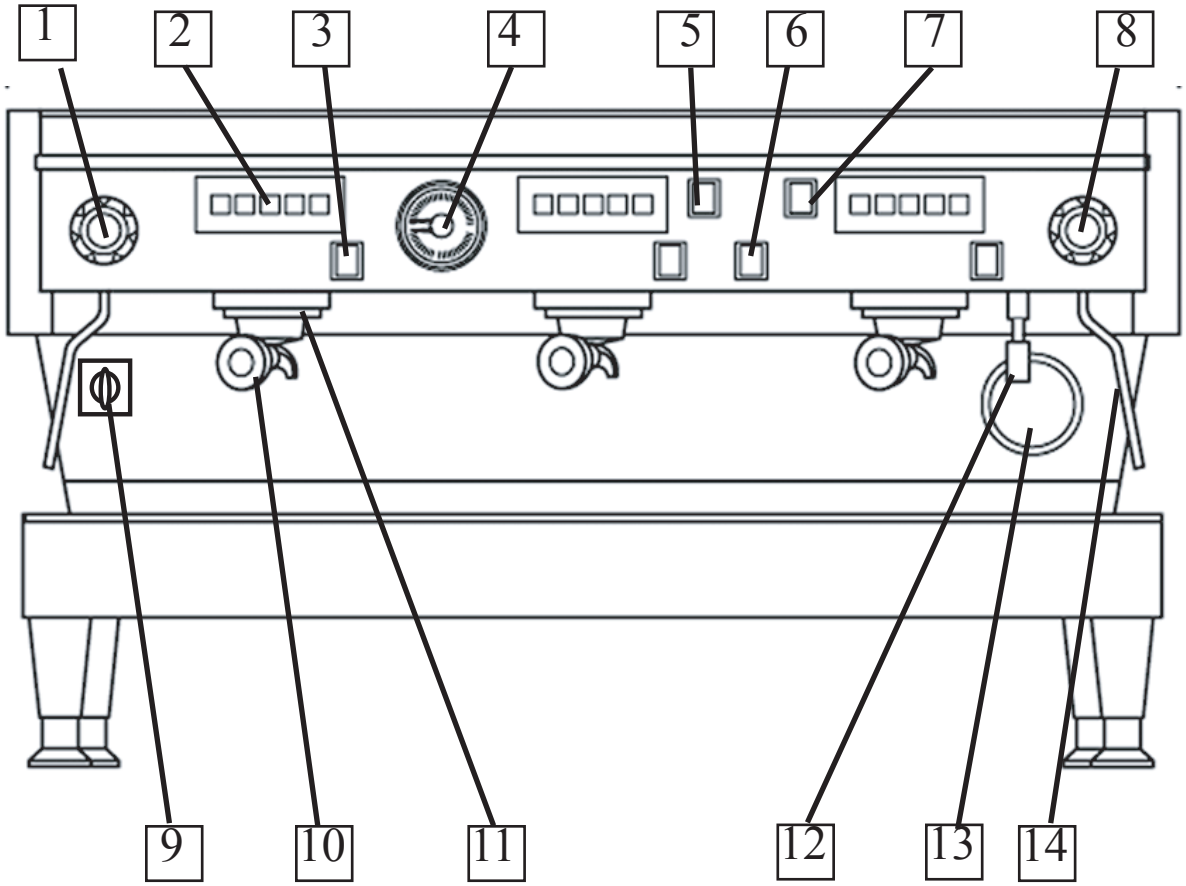
Certain maintenance procedures may require one of the following tools, which are unique to the La Marzocco.

1. Sight Glass Tool
2. Heating Element Wrench
3. Diffuser Tool (only for machines prior to April 2003)

Other tools required are common tools available at most hardware stores:

* Combination metric wrench set ranging from 10mm to 26mm
* Metric Allen wrench set
* Multi-meter
* 3/16 x 4" Standard screwdriver
* 1/4 x 4" Standard screwdriver
* Stubby standard screwdriver
* #2 Phillips screwdriver
* Mini Screwdriver set
* Fuse puller
* Small wire brush
* Wire stripper/crimpers
* Diagonal cutters
* Slip-joint pliers
* Needle-nose pliers
* Snap-ring pliers
* 6, 8 & 10" Adjustable wrenches
* Teflon tape
* Food Grade lube gel
* Fuses - (5 x 20mm) 40mAmp, 125mAmp, 1 amp, 10amp and 6.3 amp

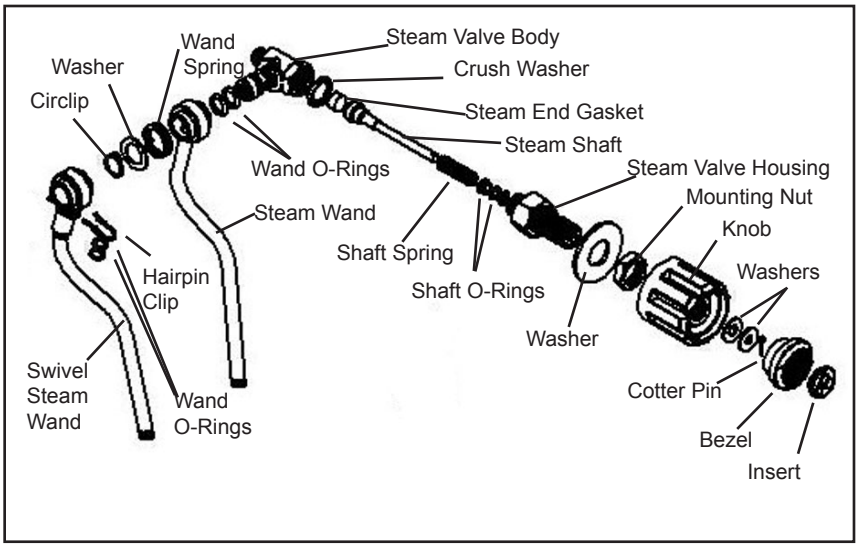
Machine Overview, Linea



1. Steam Knob, Left
2. Keypad
3. Semi-automatic Dispense Switch
4. Dual-scale Pressure Gauge
5. Coffee Boiler Heating Element Indicator Light
6. Hot Water Dispense Switch
8. Steam Knob, Right
9. Main Switch
10. Portafilter
11. Group Head
12. Hot Water Nozzle
13. Sight Glass
14. Steam Wand

1 & 8 Steam Knobs

The steam knob allows the barista to open and close the steam assembly to prepare the milk used in milk-based drinks.



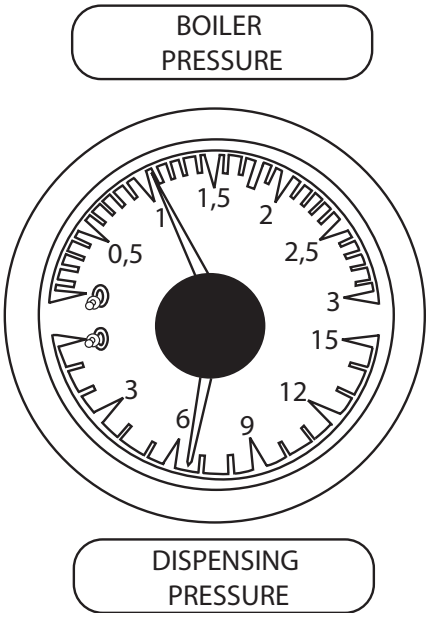
2. Keypads

The keypads contain up to four seperate product buttons, single ristretto, single shot, double ristretto, and double shot. Generally, the buttons are programmed to dispense 3/4 oz, 1 oz, 1-1/2 oz, and 2 ounces respectively, but they can be programmed to any desired volume.

3. Semi-Automatic Dispense Switch

The semi-automatic dispense switch allows you to brew with the machine while by-passing the electronic keypads. Activating the switch sends power directly to the group valve allowing water to flow through the group head. This switch is generally used when the fuse in the control box has blown.

4. Dual-Scale Pressure Gauge



The pressure gauge is divided into two sections, top and bottom. The top portion of the gauge reads the steam pressure in the rear boiler. The steam pressure is factory set to 1.2 bar. The bottom portion of the gauge reads the brewing pressure in the front boiler. The gauge will read the static water pressure going to the espresso machine, when the machine is turned off. When the machine is turned on, the heating elements will activate, heating the water in both boilers. As the water heats up in the front boiler, it expands. The front boiler is a closed, totally saturated vessel, with no room for the water to expand into. This causes the pressure to increase, evidenced by the bottom protion of the gauge climbing. Once the gauge needle reaches 12 bar, the expansion valve, located in the drain box, should unseat and prevent the pressure from climbing higher than 12 bar. If the gauge does not reach or exceeds 12 bar, adjust the barrel of the expansion valve accordingly.

5. Coffee Boiler Heating Element Indicator Light

This red light illuminates whenever the heating element in the front, or coffee, boiler is activated. When the water in the coffee boiler reaches the temperature the thermostat has been set to, the thermostat will cut power to the heating element and the light will go out. During initial machine start-up, wait for this light to go out before brewing.

6. Hot Water Dispense Switch

Depressing this switch activates the hot water solenoid valve, allowing the valve to open and water from the steam boiler to exit the hot water nozzle. Steam pressure must be present in the steam boiler to force water through the valve.

7. Manual Fill Switch

Depressing this switch activates the auto-fill valve, allowing cold water to flow into the steam boiler. This switch would only be used if the fuse in the control box has blown.

9. Main Switch

The main power switch has three positions: OFF, FILL and RUN (or 0,1,2 on older machines.)

Off - The machine is off
Fill - The electonics are activated, but NOT the heating elements. This allows the machine to auto-fill prior to the elements heating up.
Run - The electronics as well as the heating elements are activated allowing the machine to build steam pressure and the coffee boiler to heat up.

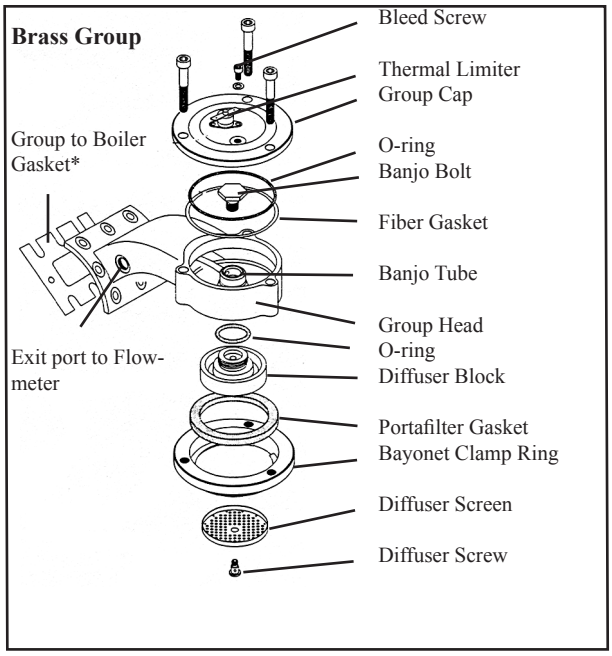
10. Portafilter

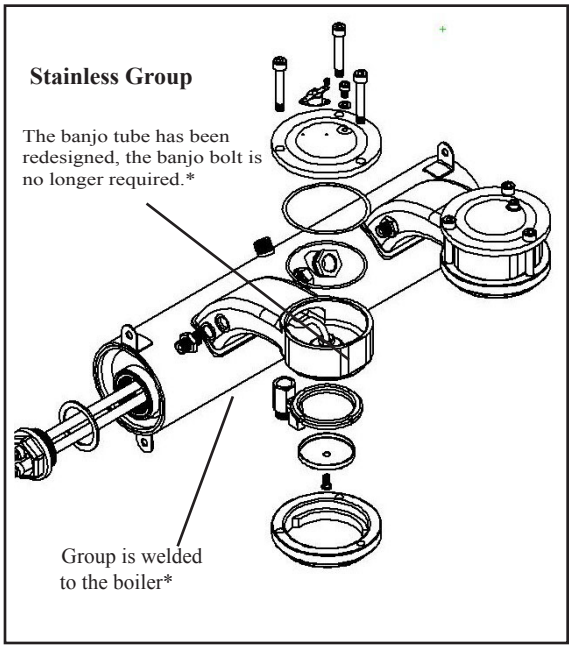
The portafilter holds the ground coffee dosed from the grinder. The portafilter, dosed and tamped with coffee is then inserted into the group head to brew espresso.

11. Group Head

The group head is where the brewing water meets with the ground coffee in the portafilter to brew espresso.

The La Marzocco's group head is called a saturated group. It is either a nickle-plated brass group, (machines manufactured prior to March 2003) or a stainless steel group, (machines manufactured from March 2003 to the present).



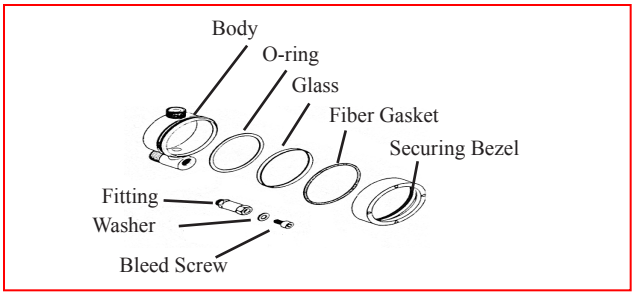


12. Hot Water Nozzle

The hot water nozzle is installed on the outlet of the hot water valve. When the valve is energized, hot water from the steam boiler is forced, by steam pressure, through the valve and out of the nozzle.

13. Sight Glass

The sight glass indicates the amount of water in the steam boiler only,as the coffee boiler is always fully saturated with water. The sight glass should read between 2/3 and 3/4 during normal operation.



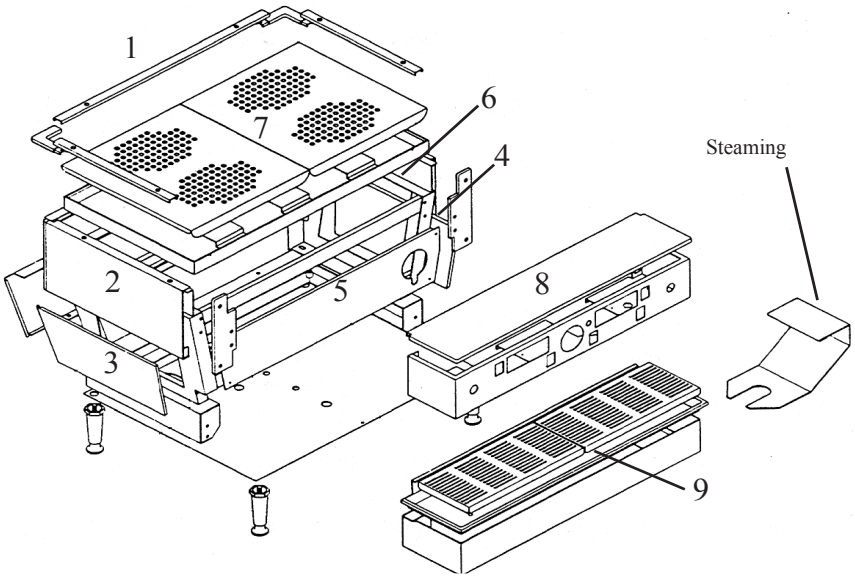
14. Steam Wand

The steam allows the barista to prepare milk for drinks suchs as lattes, cappuccinnos, and mochas. The La Marzocco uses stainless steel wands that rotate 360 degrees.

Body Panels

For most repairs, it may be necessary to remove a body panel.

1. Top Trim
2. Upper Surround Panel
3. Left Side Panel
4. Right Side Panel
5. Front Panel
6. Cup Tray
7. Cup Tray Grates
8. Group Cover
9. Drip Tray & Grates



Installation

Contents

When unpacking the machine, the following items should be included:

* 4 NSF Legs (6 for a 4 group machine)
* Pump & motor assembly
* Portafilters
* Drain Hose
* Tamper
* PuroCaff Cleaner
* Owners manual
* Inlet hoses, 24”, 48”, and 84” lengths
* Warranty card with water test strip attached

Water Requirements

A dedicated water line with its own shut-off valve should be placed within four feet of machine installation location. The shut-off valve should be equipped with a male 3/8 compression fitting.

The machine operates best with water between 0-3 grains of hardness. Higher hardness levels may cause damage due to scale forming inside the machine. If the supply water has a hardness above 3 grains per gallon install the appropriate water softener. **ENSURE ALL SOFTENING/FILTERING CARTRIDGES HAVE BEEN ADEQUATELY FLUSHED BEFORE CONNECTING TO THE MACHINE.**

ESI recommends our H_2O for Espresso system. This cartridge provides both a carbon block to filter out tastes and odors as well as ion exchange resin for softening of the incoming water. The cartridge also incorporates a 20% bypass to neutralize the pH allowing for a water “recipe” that provides the best tasting espresso.

In some areas of the country, the use of a Reverse Osmosis system, is necessary. When using an RO system, ensure a small percentage of raw water bypasses the RO system and is then reintroduced into the RO water fed to the espresso machine. This helps prevent corrosion due to aggressive water properties. The “postmix” water should then be fed through a carbon block filter to remove tastes and odors.

Power Requirements

The following voltages and amperage ratings apply.

* 1AV OR EE – 208 - 240v, 20amp
* 2AV OR EE– 208 - 240v, 30amp
* 3AV OR EE– 208 - 240v, 50amp
* 4AV OR EE– 208 - 240v, 50amp

There are two electrical cords attached to the machine. **The smaller diameter cord supplies power to the pump motor assembly and should be connected to the pump motor, NOT plugged into a wall outlet.**

Drainage Requirements

Ensure the drain hose provided with the machine runs downhill to an appropriate floor drain.

First time machine start-up

Once the machine has been properly installed:

* Turn on the water supply.
* The coffee boiler(s) will automatically begin to fill.
* Locate the group caps and loosen the bleed screw 1/4 turn until a water bead is visible. Once a water bead is visible, re-tighten the bleed screw snugly.
* Once the groups have been bled, turn the main power switch to the FILL position. Within 6 seconds, the rear (steam) boiler will automatically begin to fill .
* Once the rear (steam) boiler has filled, (check the sight glass to ensure the rear boiler has filled to the appropriate level, between 2/3 - 3/4 full), turn the main power switch to the RUN position.
* While the boilers are heating, press any dispense switch and ensure the pump pressure (bottom scale of the gauge) reads 9 bar while dispensing. Adjust if necessary.
* Wait for the boilers to heat fully indicated by the coffee boiler heating light going off and the top scale of the pressure gauge reaching 1.2 - 1.5 bars.

Pre-infusion

Pre-infusion is the dampening of the coffee grounds allowing them to expand in the portafilter prior to the actual brewing process beginning. This seems to improve the coffee flavor of single shots.

To program the machine to pre-infuse, perform the following:

* Turn the main power switch to the OFF position.
* While holding the **far left** (single ristretto) button on the left most keypad turn the power switch to FILL.
* The light above the “Swirl” button will illuminate indicating that the control box has received the pre-infusion command.

To disable pre-infusion, perform the following:

* Turn the main power switch to the OFF position.
* While holding the **second** button on the left most keypad turn the power switch to the FILL position.
* The light above the “Swirl” button will illuminate indicating that the control box has received the pre-infusion command.

Programming

* Using the left most keypad, depress and hold the continuous pour (swirl) button for about 5 seconds.
* Once all of the lights on the keypads begin blinking press the button you wish to program.
* Once the desired volume has been reached, (measure from the bottom of the crema), push the button again.
* Repeat this procedure for each button.
*Any programming performed on the left group will carry over to all of the groups to the right. After programming the left group, verify that groups to the right are dispens -ing the proper volume. You can also individually program the right groups without affecting the others.

Temperature and Pressure Adjustments

Machines ship from ESI with the coffee boiler thermostat adjusted to heat and brew water for espresso at 197 degrees Fahrenheit or 92 degrees Celsius. If you prefer to adjust the temperature to fit your coffee roast perform the following:

* Make certain that the machine is at operating temperature and that the coffee boiler heating indicator light is off.
* Remove the top cover from the machine and locate the thermostat between the groups.
* Turn the main switch to the OFF position.
* Using a long insulated screwdriver adjust the thermostat clockwise to increase tempera ture and counter-clockwise to lower temperature.
* This adjustment is very sensitive and only slight adjustments should be made. Each 1/4 turn represents a 3 degree Fahrenheit temperature change.
*Turn the main switch back to the RUN position.

If your steam pressure gauge does not read 1.2 bar, adjust the pressure switch as follows:

*Turn the main switch to the OFF position.
* Remove the top panel of the machine.
* Locate the pressure switch in the back, top, left-hand corner of the machine.
* For machines equipped with Sirai pressure switches (Rectangular switch approximately 2” x 4”), remove the screw and lift cover from pressure switch to access the adjust ment screw. There will be arrows pointing towards - and +. Turn towards - to lower the steam pressure and turn towards + to raise steam pressure.
* For machines equipped with Giemme pressure switches (Round switch approximately 1-1/4 in diameter), locate the samll adjustment screw in the center of the switch and adjust very delicately towards - to decrease the presure and + to increase the presure.
*Turn the main switch back to the RUN position.

Section 1 Questionnaire

1. What's unique about the La Marzocco espresso machine compared to other traditional machines on the market?

2. Why are two boilers in an espresso machine better than having only one?
   A. The heat exchangers require less maintenance.
   B. More stable brewing temperature.
   C. The machine uses less electricity.
   D. You can operate the machine at a higher steam pressure.

3. What safety precautions must be carried out before performing maintenance on the coffee boiler?

   A.

   B.

   C.

4. What are the three special La Marzocco tools?

   A.

   B.

   C.

5. There are two electical cords coming out of the machine. What are each of them for?

6. What must you do to the coffee boiler after initial installation before you operate the machine?

7. Explain why the bottom portion of the pressure gauge travels up and down between 3 bar and 12 bar during normal operation?

8. What design change allows for a more stable and effecient brew temperature on machines manufactured after March 2003?

9. How should the water supplying the machine be treated to ensure its quality?

10. What are the proper steps to take when programming the machine?

_____ A. Turn the machine offand hold down the continuous pour button while turning the machine on.
_____ B. Press and hold the continuous pour button until the LED above the button illuminates. Then press the button you wish to program.
_____ C. Press the continuous pour and the button you wish to program at the same time. When the lights blink, press the button you wish to program again.

11. Which keypad do you program to facilitate programming of the entire machine?

12. Why don't we generally recommend using water treated by reverse osmosis, except in extenuating circumstances?

A. It's more expensive and complicated to use than filter/softening cartridges.
B. It can cause the water to become very agressive, causing corrosion.
C. It can remove too much of the TDS in the water, causing the auto-fill system to not function properly.
D. The coffee usually doesn't taste as good.

13. If circumstances require you to use RO water, what step should you take to alleviate the negative side effects of RO water in espresso machines?

14. Explain the three positions of the main power switch.

A. Off -

B. Fill -

C. Run -

15. What does the red light on the machines control panel indicate when illuminated?

16. How do you initiate the pre-infusion feature of the La Marzocco?

4. Hydraulic System

Tubing and fittings

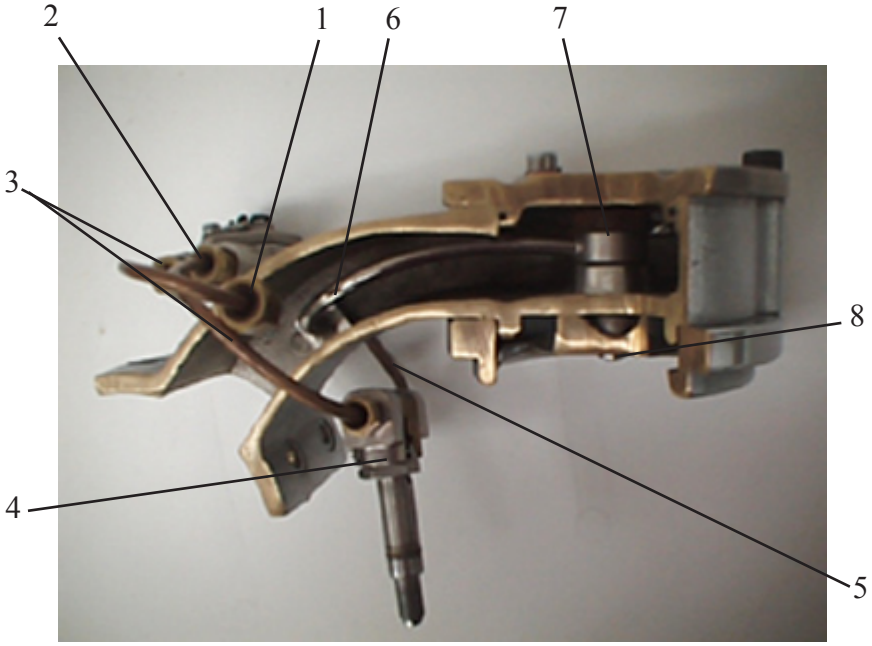
* Virtually all of the fittings on the LaMarzocco are of the compression or flare type. Most are made from brass, which will strip or crack if over-tightened.
* It is important when working with tubing not to bend or twist the sections you are working with, as this will restrict the water flow or cause fatigue or leaks in the tubing.

Boilers & Groups

The La Marzocco uses hollow plated brass group castings attached to a stainless steel boiler on machines manufactured prior to March 2003, and stailess steel groups welded to the boiler on machines manufactured beginning March 2003.

*In auto-volumetric models, the water from the group exits through a small tube on the left side of the group and flows to the flowmeter, which meters the volume of the water. From the flowmeter the water passes through to the group valve. From the group valve, the water then flows back into a small tube inside of the group head and then to the diffuser block, the diffuser screw, diffuser screen and finally to the ground coffee in the portafilter

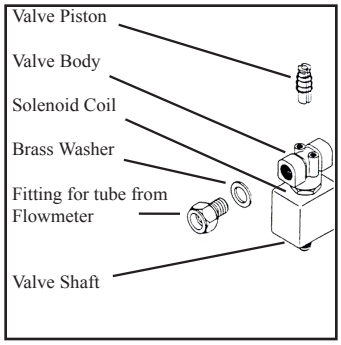
Below is a cutaway of a grouphead. Below the photo is the sequence of water flow through the group to the portafilter.



1. Water exits the group head and travels through a tube to the flowmeter.
2. Water enters the flowmeter and rotates the impellor.
3. Water exits the flowmeter and travels through a tube to the group valve.
4. Water passes through the group valve...
5. And travels through a tube to the banjo tube inlet.
6. Water enters the banjo tube and flows to the banjo bolt.
7. Water passes through the banjo bolt and down towards the diffuser block.
8. Water passes through the diffuser block and enters the diffuser screw and screen where it then meets with the tamped coffee in the portafilter.

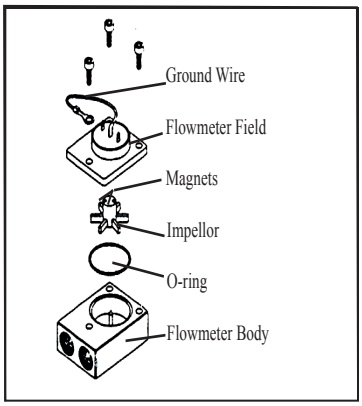
Group Valves

Each group has a three-way solenoid valve mounted underneath each head to allow for water flow through the group.



* Each valve consist of valve body, valve stem, spring-loaded piston and a coil.
* The valve is mechanically closed by spring pressure.
* The coil receives electrical power when the brew switch or keypad is depressed.
* When energized, the coil creates a magnetic field which opens the piston, allowing water to flow through the valve body.
* When the valve closes, pressurized water from the valve outlet to the diffuser block discharges through the bottom of the valve stem to the drain box.

Flowmeters



The flowmeters measure the volume of water passing through to the groups.

* The Flowmeter is made up of an electromagnetic field, an impeller and a body.
* As water enters the Flowmeter body it causes the impeller to rotate. The impeller has two small magnets imbedded in it. As the impeller spins, the magnets pass the magnetic field, causing a switch to close, which sends a pulse signal to the microprocessor.

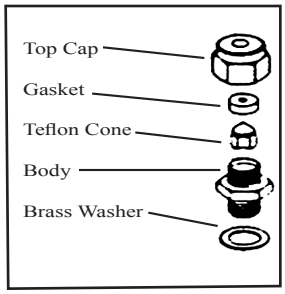
Autofill System

The autofill system maintains the water level in the steam boiler.

* The autofill system consists of an autofill circuit on the control box, an auto-fill probe and an autofill valve.
* The autofill probe is a metal probe, which sticks down into the boiler. An electrical lead is at tached to the top of the probe, approximately 1-2 vac travels through this probe from the control box.
* As the water rises in the boiler, and reaches the probe, the 1-2 vac travels through the water and grounds itself against the sidewall of the boiler. When this ground signal travels back to the control box, it signals the auto-fill circuit to switch off the auto-fill valve.
* As water is depleted from the boiler it lowers below the probe causing the signal to be interrupted. When the auto-fill circuit can no longer read a ground signal, it activates the autofill valve allowing water to enter the boiler.
* The autofill valve consist of an electromagnetic coil and a valve.
* The valve is mechanically closed by spring tension. When the coil is energized it creates a magnetic field, which pulls the valve piston open, allowing water to pass through it.

Vacuum Breaker

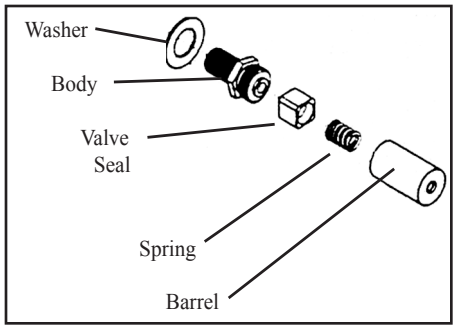
The vacuum breaker is a mechanical valve located on the steam boiler. As pressure builds in the boiler, steam pressure lifts a plunger, sealing the boiler, allowing steam pressure to increase above atmospheric pressure.



Expansion Valve

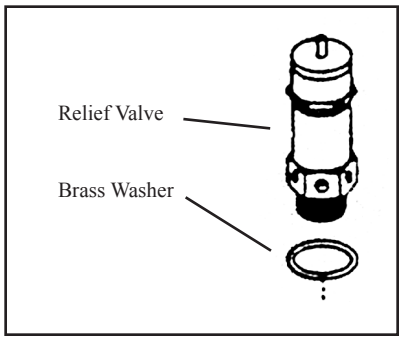
The expansion valve relieves front boiler pressure at 12 bar.

* The expansion valve is located in the drain box, which is underneath the drip tray.
*It consists of a valve body, a valve seal and spring, which are enclosed by an adjustable brass barrel.
*The expansion valve is adjusted by adding or relieving tension on the spring by turning the adjusting barrel.



Safety Relief Valve

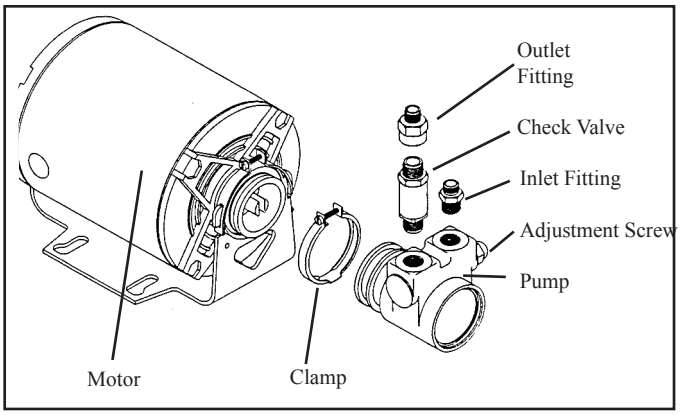
The pressure relief valve relieves boiler pressure at 1.8 bar preventing the boiler from over-pressurizing. It is factory adjusted and sealed and cannot be adjusted.

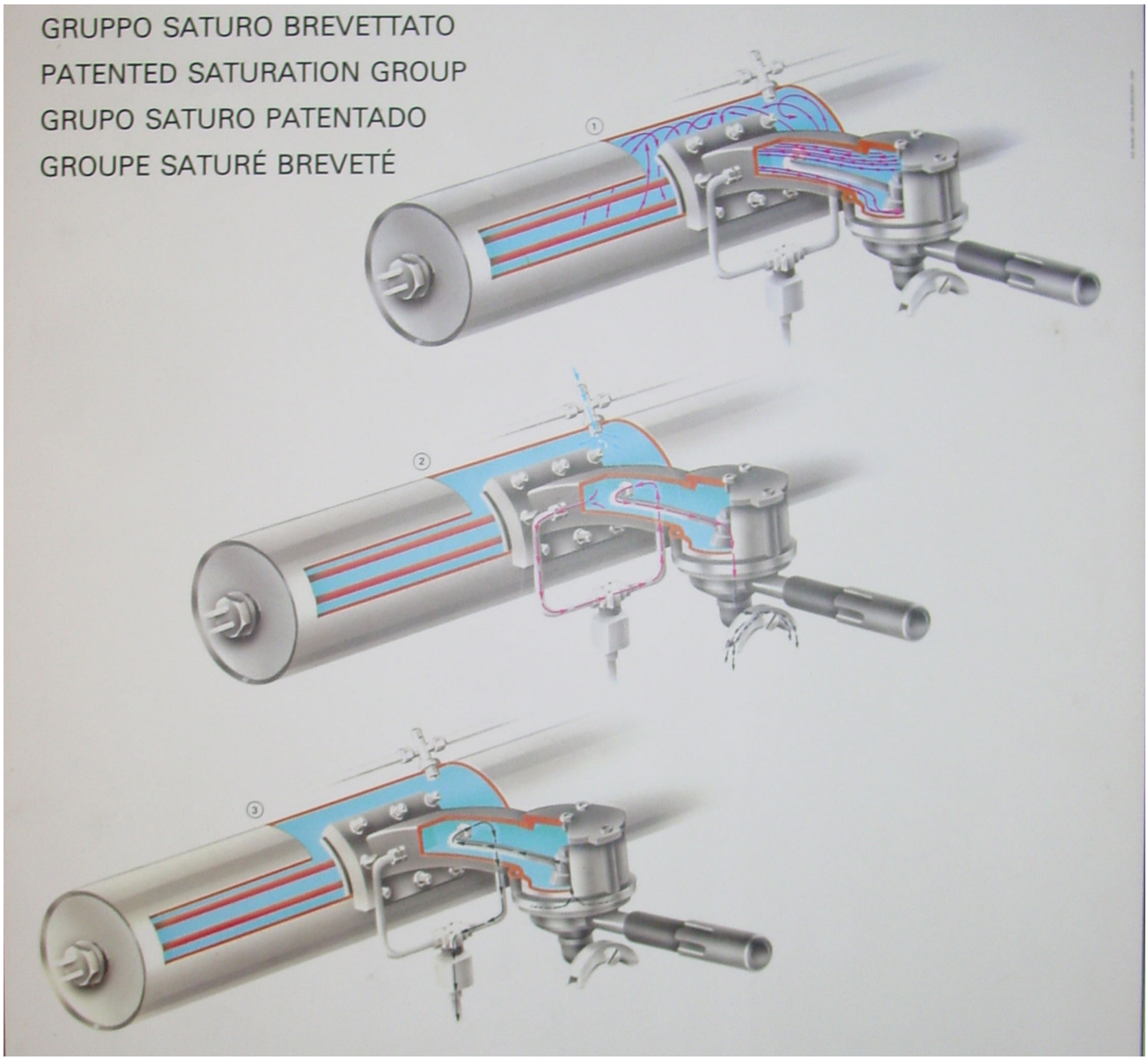


External Boost Pump

The boost pump increases existing water pressure to 135 psi or 9 bar, which is required to properly brew espresso.

* The pump pressure can be adjusted by adjusting the screw on the side of the pump.
* Rotating the screw clockwise will increase pump pressure, while rotating counter-clockwise will decrease pump pressure.
*Ensure your waterline is stable, as fluctuations in line pressure will affect output pressure.



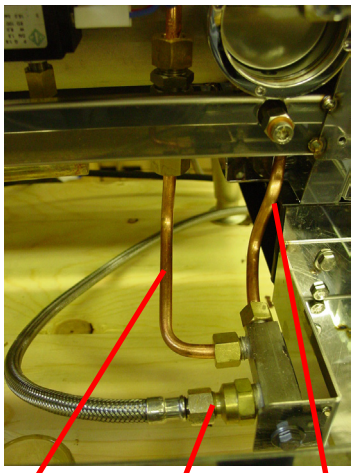


* Note - The boilers shown are from an EE, semi-automatic machine, an AV model would have flowmeters.

1. Circulation of water within the boiler and group head.

2. Water flow during the brew cycle.

3. Discharge of water after completion of brewing cycle.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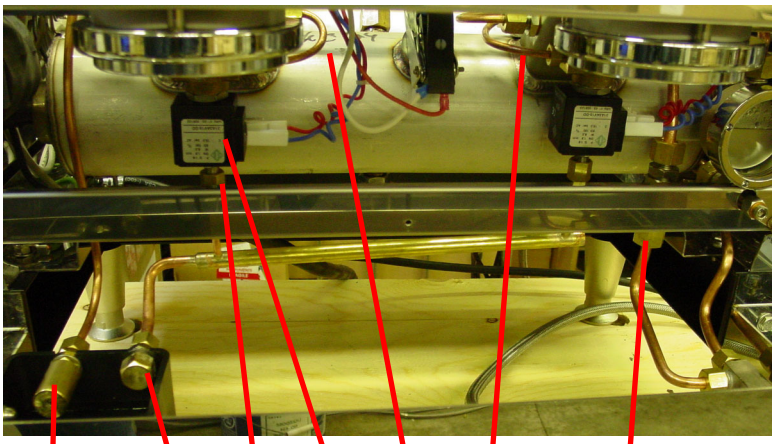
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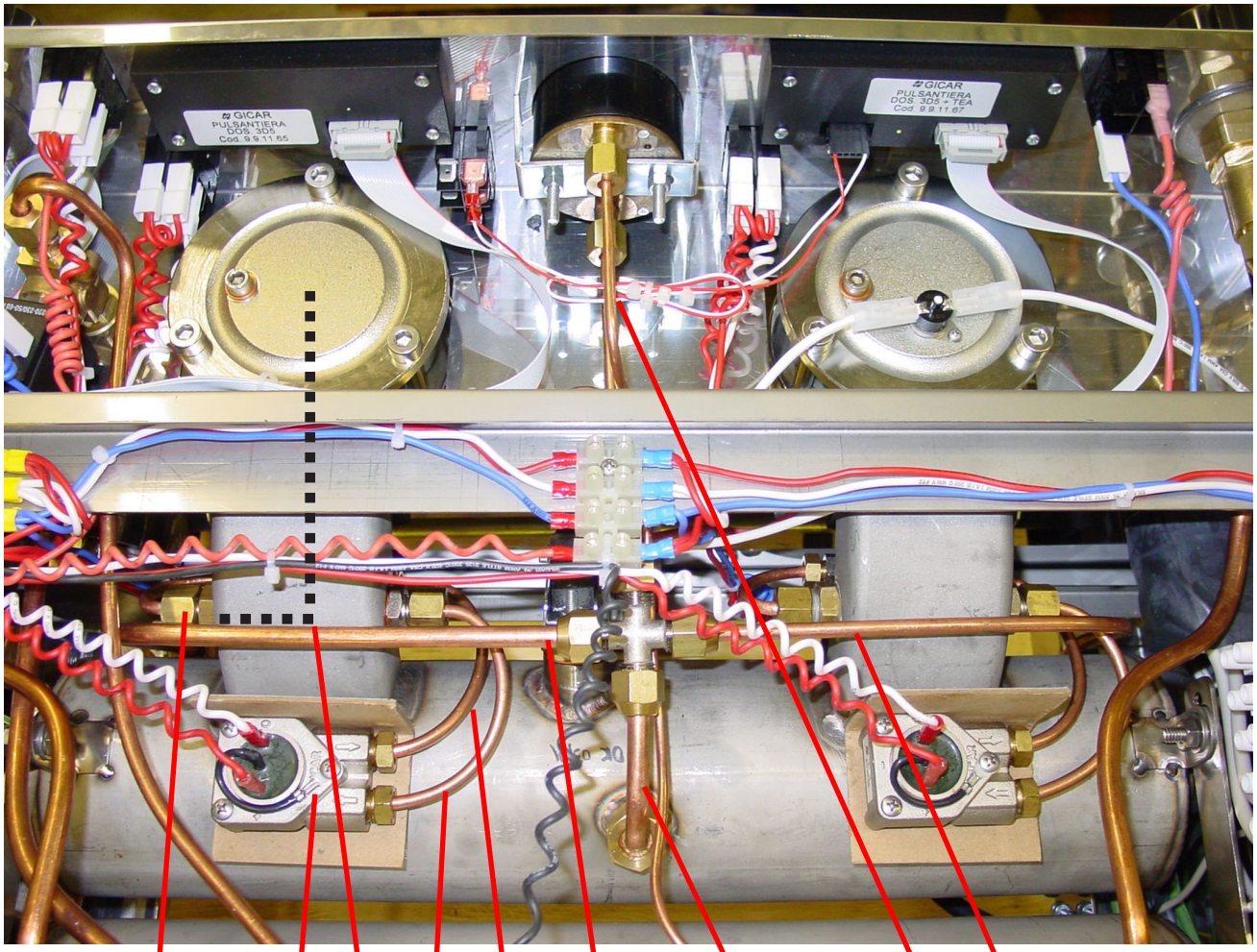
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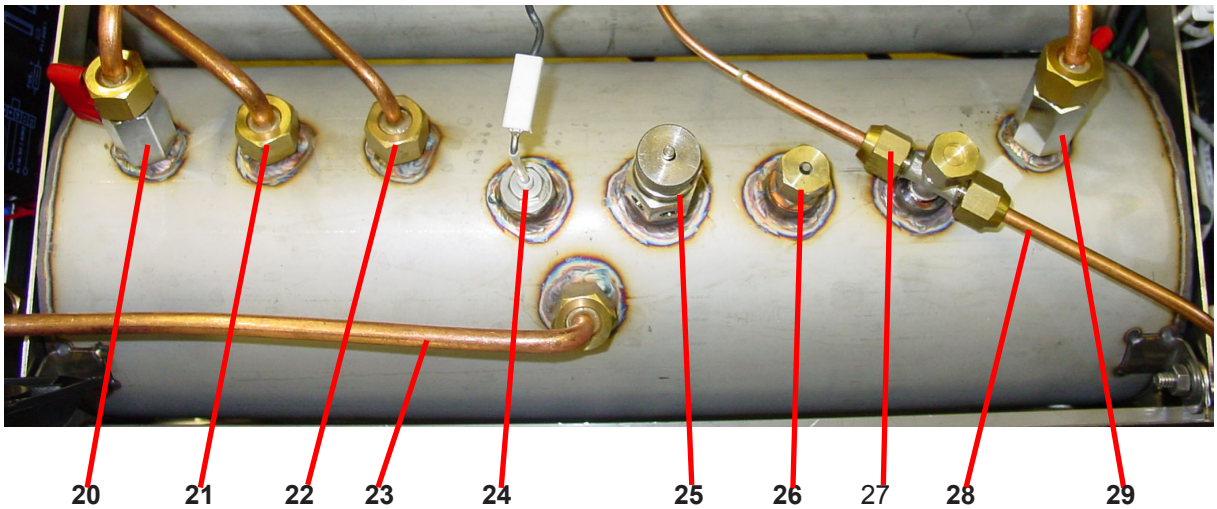
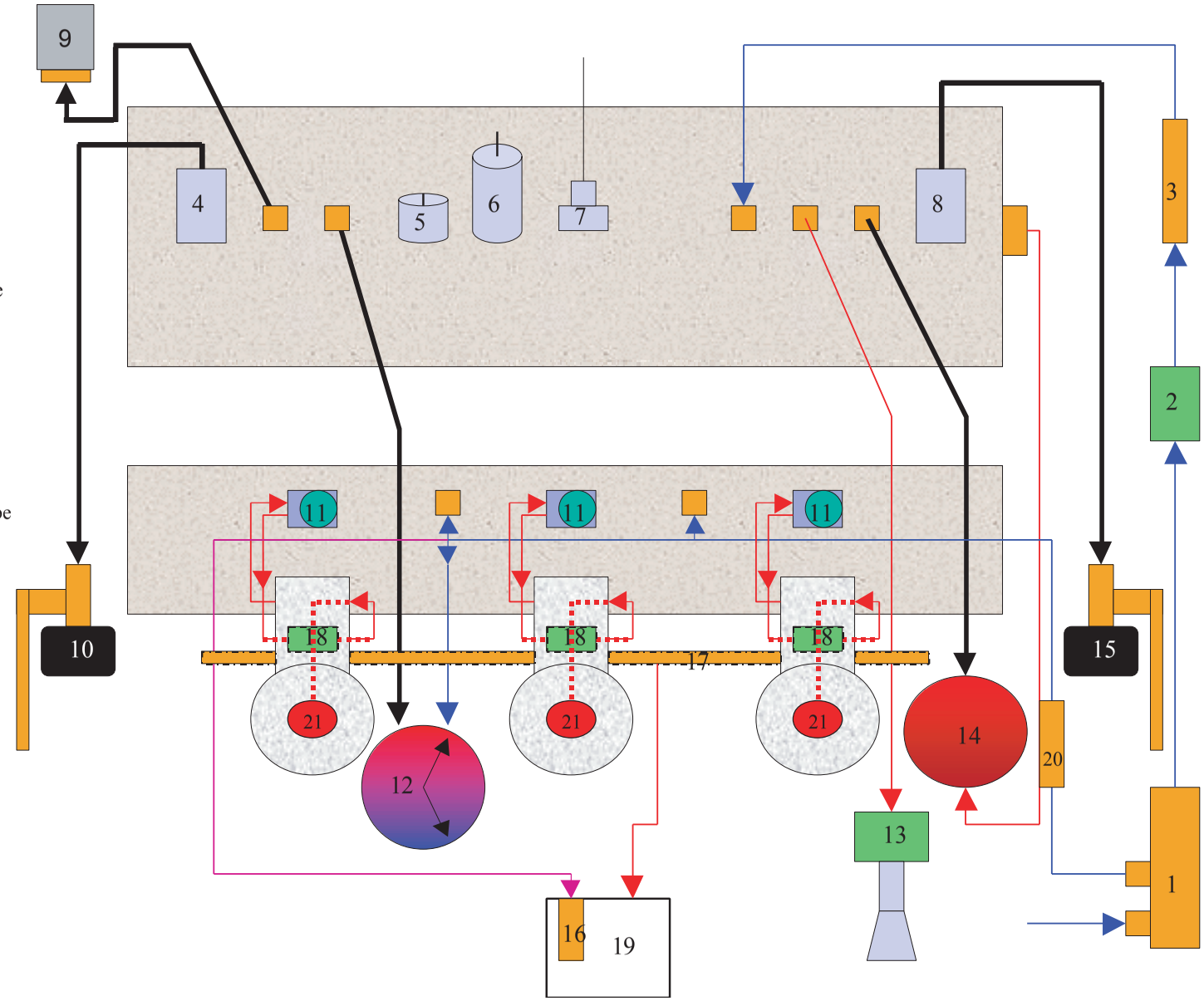


Hydraulic Lines and Components

1. Inlet water tube to the coffee boiler.
2. Inlet water line feeding the inlet manifold.
3. Inlet water tube to the steam boiler.
4. Expansion valve.
5. Discharge fitting.
6. Discharge from the 3-way group valve.
7. Group valve.
8. Tube feeding water from the group valve to the banjo tube.
9. Tube feeding water from the flowmeter to the group valve.
10. Check valve for the coffee boiler.
11. (Same tube as #8).
12. Flowmeter.
13. Banjo tube (located inside of the group head).
14. Tube feeding water from the group to the flowmeter.
15. Tube feeding water from the flowmeter to the group valve.
16. Tube feeding water from the coffee boiler check valve to the “X” fitting.
17. Tube feeding water into the coffee boiler.
18. Tube feeding water to the gauge.
19. Tube feeding water to the expansion valve.
20. Tube feeding steam to the right steam assembly.
21. Tube feeding the top of the sight glass.
22. Tube feeding water to the hot water valve.
23. Tube feeding water to the steam boiler.
24. Auto-fill probe.
25. Pressure relief valve.
26. Vacuum breaker
27. Tube feeding steam to the pressure gauge.
28. Tube feeding steam to the pressure switch.
29. Tube feeding steam to the left steam assembly.

LaMarzocco Hydraulic Schematic

1. Water Inlet
2. Auto-fill Valve
3. Inlet Check Valve
4. Left Steam Assy. Valve
5. Vacuum Breaker
6. Safety Valve
7. Auto-fill Probe
8. Right Steam Assy. Valve
9. Pressure Switch
10. Left Steam Assembly
11. Flowmeter
12. Dual Scale Gauge
13. Hot Water Valve
14. Sight Glass
15. Right Steam Assembly
16. Expansion Valve
17. Group Valve Drain Tube
18. Group Valve
19. Drain Box
20. Check Valve
21. Banjo Bolt



Section 2 Questionnaire

1. What material are the machines tubes made from? What precaution should you take in working with them?

2. What is the order of water flow while brewing in an AV machine?

    A. Banjo tube, group, flowmeter, group valve, diffuser block.

    B. Group, flowmeter, group valve, banjo tube, diffuser block.

    C. Flowmeter, banjo tube, group, group valve, diffuser block.

    D. Diffuser block, banjo tube, group valve, flowmeter, group.

3. Explain how the machine maintains the water level in the steam boiler.

4. What does the vacuum breaker do?

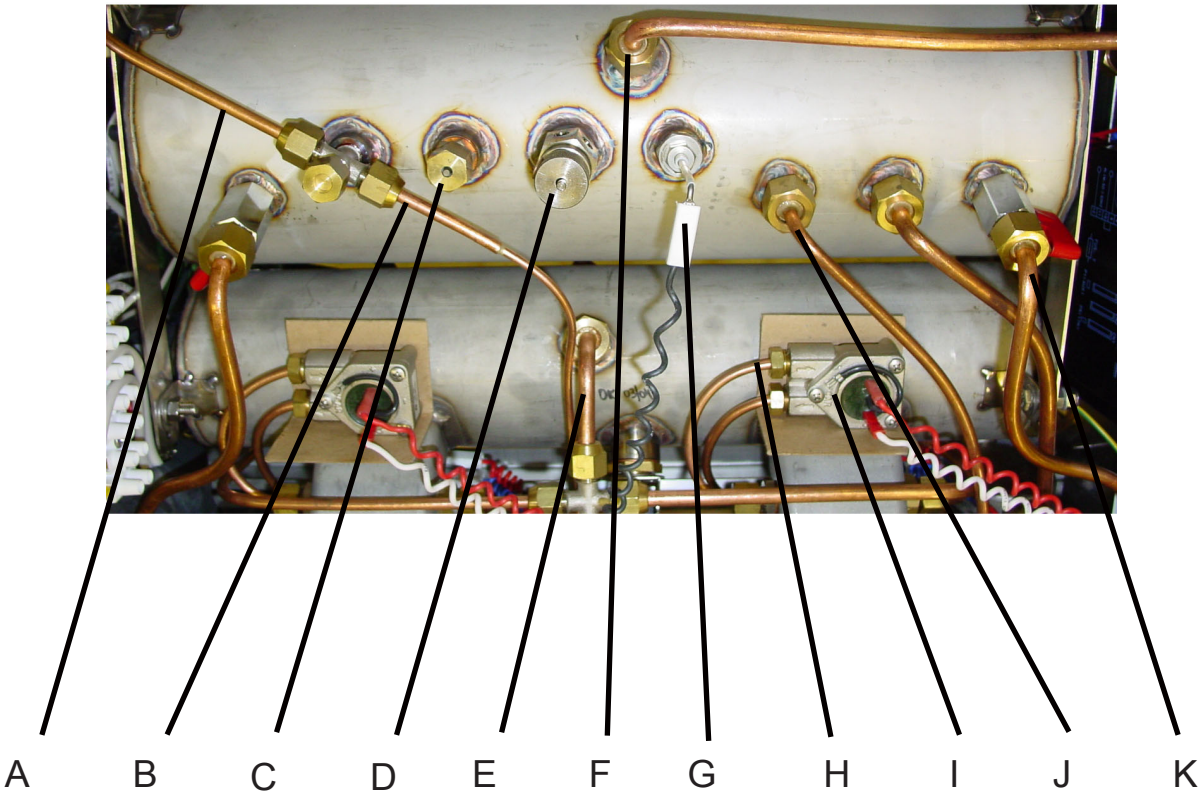
5. Why must the group valve be a 3-way valve?

6. What problem can cause damage to the machine's entire hydraulic system?

7. What products are dispensed from the steam boiler?

8. When backflushing the machine, what specific areas of the hydraulic system are being cleaned?

9. Describe what kind of water should be fed to the espresso machine.



10. Identify the hydraulic compents in the above picture.

A. _____

B. _____

C. _____

D. _____

E. _____

F. _____

G. _____

H. _____

I. _____

J. _____

K. _____

_____

5. Electrical System

Safety

* **Always** ensure power is off at the circuit breaker before removing or cutting any wires on the machine.
* **Never** apply power to the machine without first insuring that all connections are properly insulated and no live wires are touching the frame.
* **Never** replace a wire or fuse in a machine that is not of the same rating as the one you are replac ing.

Using your Multi-meter

* Ensure power is off when measuring resistance.
* Ensure the lead you are testing voltage with does not come in contact with the frame.
* Do not use leads that are damaged.

Overview

* Power enters the machine through the power cord, which then enters a large terminal block, and then to the main power switch.
* The main power switch has three positions:
    * The first position, “0”, is the off position.
    * The second position, “1” (fill), provides power to the controller, pump, and the solenoid coils.
    * The third position, “2” (run), provides power to the heating elements.

Main High Voltage Wiring

The main wiring harness begins with the power cord and continues on throughout the machine.

* Two wires (one red, the other blue) provide ac power to the microprocessor as well as the valve coils and brew switches.
* One leg is attached to all ac components at all times. (Unswitched leg)
* While the other leg is switched on either by the brew switch or the microprocessor, to activate the component (switched leg).
* Each solenoid valve coil and the pump are supplied with one leg of 110v at all times.
* The control box and manual override switches provide the coils and pump with the second leg of 110v necessary to activate them.

Rocker Switches

All of the rocker switches on the LaMarzocco are double pole single throw.

* Contact is always made from top to bottom.
* Left and right sides are isolated from one another.
* Test rocker switches by turning the machine off and disconnecting the wires from the suspect switch. Use a multi-meter to measure ohms from top to bottom with the switch on. A reading of 0 ohms indicates a functional switch.

Solenoid Coils

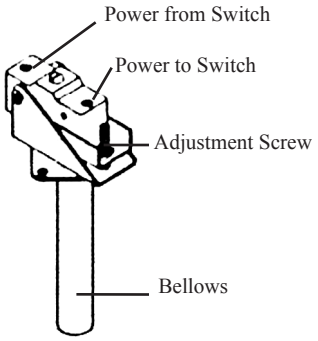
The solenoid valves operate by energizing an electromagnetic coil that causes a valve piston to move downward, opening the valve.

* Test the coil by turning the machine off and disconnecting the wires, then read between the left and right terminal with a multi-meter. The reading of a good coil should read between .7K ohms and .8K ohms.

Thermostat

The thermostat controls the temperature of water in the front boiler.

* The thermostat rests in a well in the coffee boiler.
* The thermostat contains a bellows filled with a thermal fluid that expands and contracts depending on the surrounding temperature.
* As the water heats in the coffee boiler it causes the fluid in the bellows to expand, which pushes up a piston.
* When the piston rises far enough, it actuates a switch, which turns off the thermostat and cuts power to the heating element.
* When you adjust the screw on top of the thermostat you are adjusting the distance the switch is from the piston. Turning clockwise increases the distance causing the piston to travel farther to actuate he switch, therefore increasing the temperature of the water in the boiler. Turning counter-clockwise has the opposite effect. Shorter distance to travel and therefore lower water temperature.

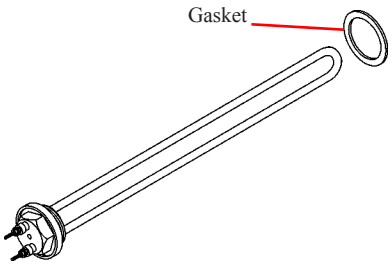


* Each 1/4 turn of the adjustment screw represents approximately a 3 degree F change in temperature.

Heating Element

Each boiler has a heating element.

* The element for the steam boiler receives electrical power from the pressure switch.
* The element(s) for the coffee boiler(s) receive electrical power from the thermostat(s).
* As electrical power is applied to the element it heats up the surrounding water in the boiler.
* To determine amp draw, divide wattage by incoming voltage.



Pump Motor

The pump motor turns the pump, which boosts existing water pressure. The LM uses several types of motors.

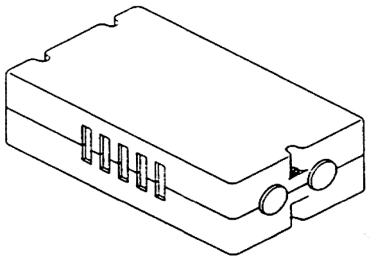
* All motors feature an internal thermal overload protector.
* Some pump motors are equipped with a capacitor, which provides the initial “push” required to start the motor.
*Over time the capacitor may weaken causing a slight delay in the motor turning on after the group is activated.

Control Box

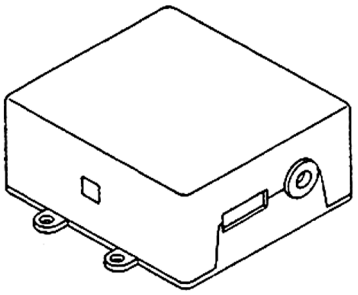
The control box is the most complicated piece in the machine. It can be divided into the following systems:

* Power supply - Turns high AC voltage into 18 volts DC (to power the board relays), and 5 volts DC (to power the microprocessor and logic circuits.)
* Auto-fill sensing circuit - Sends power to the auto-fill probe looking for ground.
* Input - Ribbon cables carry information between the menu button pads and control box.
* High voltage output - This provides power to the coils and pump motor when the machine is called upon to brew espresso.

Non-Mask & Mask



Wizard



The power supply in the control box consists of:

* A 6.3 amp fuse, which protects the brain from a direct short to ground.
* A 40mA fuse, on 4 groups only, which protects the rest of the components in the event that something has shorted in the DC system.
  (i.e.: a Flowmeter)
* The transformer is the cube on the board. Its purpose is to reduce the high AC voltage to 18v AC. The 18v AC then passes through a bridge rectifier, which is a series of diodes, that convert the AC signal into DC, which then goes through a 1000mfd capacitor, which filters out any remaining AC signal.

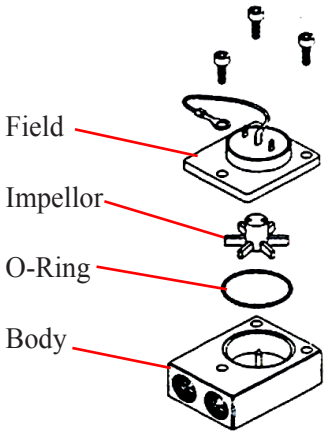
*The best test point to verify DC voltage is on connector #2, pins 5 and 6, or from the red flow meter wire to chassis ground.

There are three different versions of control boxes that have been used with the LaMarzocco. Until approximately 1990 there was a Non-Mask Control Box. It has 8 pin connectors and colored ribbon cables. Until approximately 1995 the Mask Control Box was in use. It has 10 pin connectors and grey ribbon cables.

Flowmeter

There are three electrical connections on the top of the flowmeter:

* The “+” corresponds to the DC power supply and should always read 16-22 volts.
* The “-” should go directly to a ring terminal attached to the hous ing of the flowmeter. This is the ground wire and should always read 0 volts.
* The “0” is the signal output to the control box. The signal from this terminal will switch rapidly from 18 volts to 0 volts.
* To test the flowmeter disconnect the red and white wires and measure ohms to verify that approximtely 2.2K ohms is present between the “+” and “0” terminals. A reading of 0 indicates a problem requiring replacement of the sensor.
* The acceptable range is 1.8--2.4K ohms.

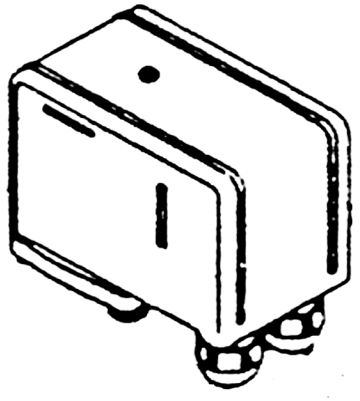


Pressure Switch

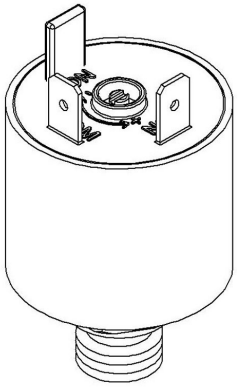
The pressure switch controls the steam pressure in the rear boiler by opening and closing the electrical circuit to the heating element.

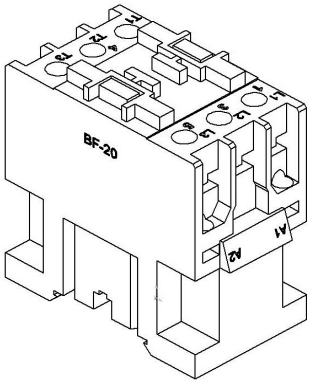
* The pressure switch receives power generally to the bottom set of input leads. When the steam pressure lowers in the boiler (usually .9 to 1.0 bar) the contacts close allowing power to flow from the bottom leads through to the top leads and then to the heating element.
* As the steam pressure rises and reaches 1.2 bar the contacts open and cut the power to the heat ing element.

Sirai Pressure Switch
Controls pressure and takes the amp load of power to the heating element.



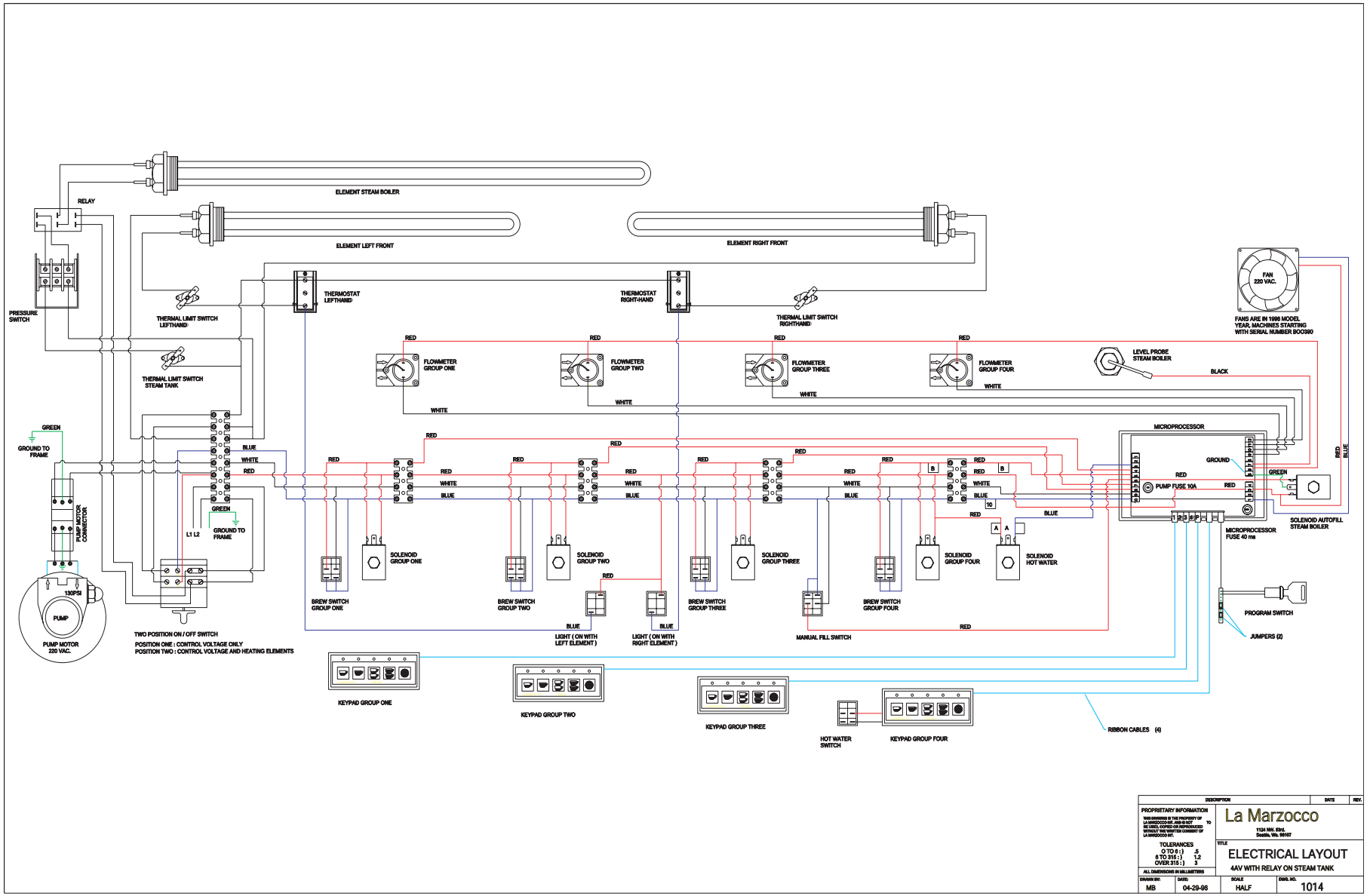
Giemme Pressure Switch and Contactor
Controls pressure by opening and closing the contactor, which sends power to the element and carries the amp load.





Quick Guide to Testing Electronic/Electrical Components

Capacitor	Set your multi-meter to its highest ohms setting. Place your leads on the capacitor terminals. The tester's display should read a value that rapidly decreases then suddenly begins increasing after reaching zero, now reverse the leads on the capacitor, if the same decreasing then increasing readout occurs the capacitor is good.
Flowmeter	1.8--2.4k Ohms between the "-" and "+" terminals means field is good.
Solenoid Coils	.7 - .8k Ohms between terminals means coil is good.
Fuses	Continuity between fuse ends means fuse is good.
Pressure Switch	110v between top and bottom terminals while contacts closed means switch is good.
Heating Elements	Appropriate amp draw while pressure switch closed means element is good.
Rocker Switches	0 Ohms reading from top to bottom means switch is good.



DESCRIPTION	DATE	REV.

PROPRIETARY INFORMATION

THIS MATERIAL IS THE PROPERTY OF LA MARZOCCO INC. AND IS NOT TO BE USED, COPIED OR REPRODUCED WITHOUT THE WRITTEN CONSENT OF LA MARZOCCO INT.

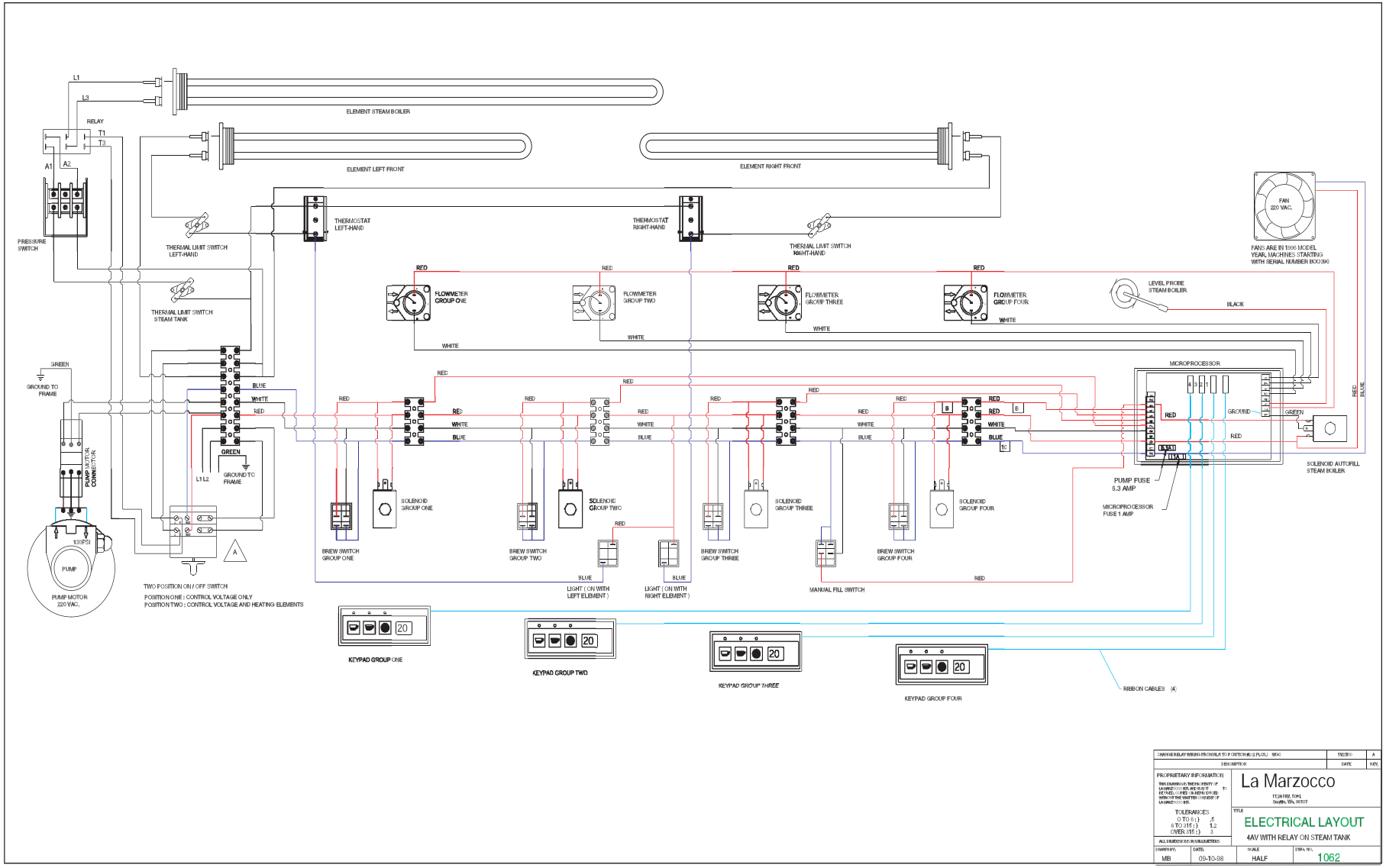
TOLERANCES
0 TO 6 :) .5
6 TO 316 :) 1.2
OVER 316 :) 3

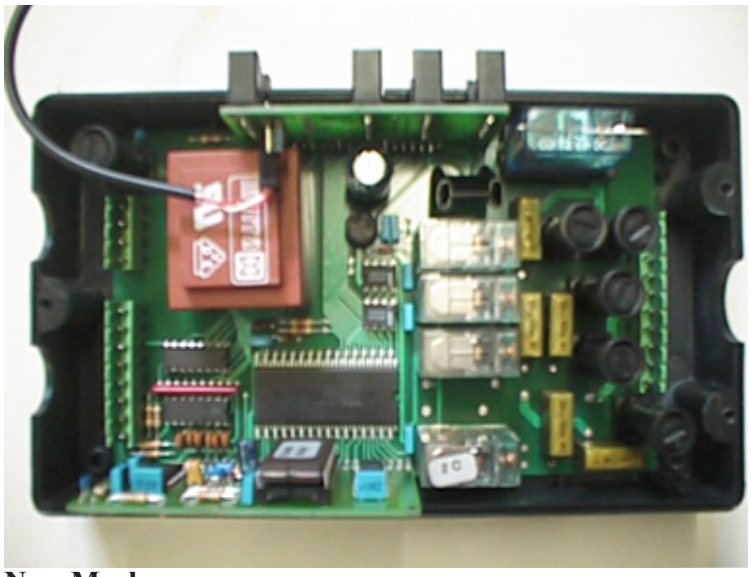
ALL DIMENSIONS IN MILLIMETERS

La Marzocco
1124 NW. 63rd.
Seattle, Wa. 98107

TITLE
ELECTRICAL LAYOUT
4AV WITH RELAY ON STEAM TANK

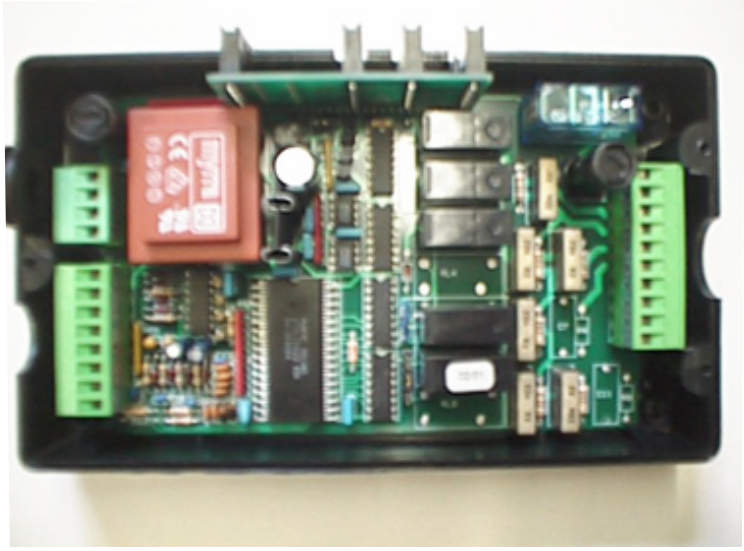
DRAWN BY:	DATE:	SCALE	DWG. NO.
MB	04-29-96	HALF	1014


L1
L3
RELAY
T1
T3
A1
A2
PRESSURE SWITCH
ELEMENT STEAM BOILER
ELEMENT LEFT FRONT
ELEMENT RIGHT FRONT
THERMOSTAT LEFT-HAND
THERMOSTAT RIGHT-HAND
THERMAL LIMIT SWITCH LEFT-HAND
THERMAL LIMIT SWITCH RIGHT-HAND
THERMAL LIMIT SWITCH STEAM TANK
FAN 220 VAC.
FANS ARE IN 1996 MODEL YEAR, MACHINES STARTING WITH SERIAL NUMBER B00390
FLOWMETER GROUP ONE
FLOWMETER GROUP TWO
FLOWMETER GROUP THREE
FLOWMETER GROUP FOUR
LEVEL PROBE STEAM BOILER
BLACK
RED
WHITE
BLUE
GREEN
GROUND TO FRAME
MICROPROCESSOR
GROUND
SOLENOID AUTOFILL STEAM BOILER
PUMP FUSE 6.3 AMP
MICROPROCESSOR FUSE 1 AMP
PUMP MOTOR CONNECTOR
L1 L2
130PSI
PUMP
PUMP MOTOR 220 VAC.
TWO POSITION ON / OFF SWITCH
POSITION ONE : CONTROL VOLTAGE ONLY
POSITION TWO : CONTROL VOLTAGE AND HEATING ELEMENTS
SOLENOID GROUP ONE
SOLENOID GROUP TWO
SOLENOID GROUP THREE
SOLENOID GROUP FOUR
BREW SWITCH GROUP ONE
BREW SWITCH GROUP TWO
BREW SWITCH GROUP THREE
BREW SWITCH GROUP FOUR
LIGHT (ON WITH LEFT ELEMENT)
LIGHT (ON WITH RIGHT ELEMENT)
MANUAL FILL SWITCH
KEYPAD GROUP ONE
KEYPAD GROUP TWO
KEYPAD GROUP THREE
KEYPAD GROUP FOUR
RIBBON CABLES (4)
PROPRIETARY INFORMATION
La Marzocco
TITLE
ELECTRICAL LAYOUT
4AV WITH RELAY ON STEAM TANK
TOLERANCES
ALL DIMENSIONS IN MILLIMETERS
DRAWN BY: MB
DATE: 09-10-98
SCALE: HALF
DWG. NO. 1062



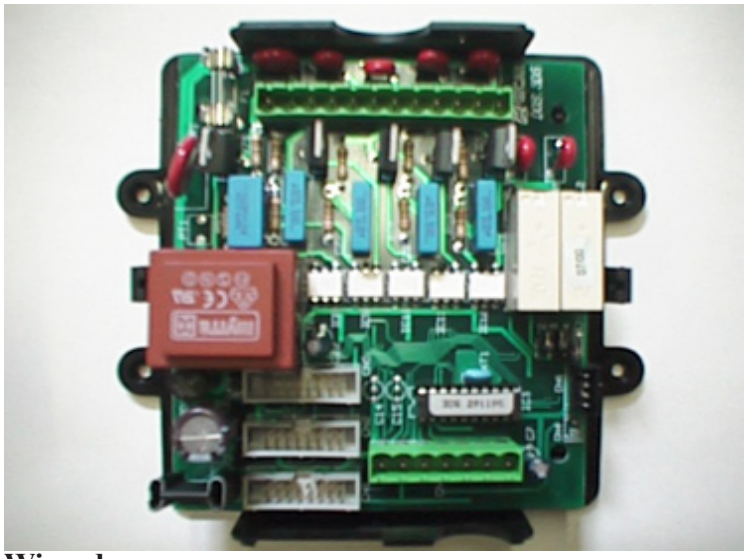
Non-Mask

Non Mask control box and keypads use 8 pin connectors. Control box has internal programming key attachment. Keypad has all red LED's and square buttons.



Mask

Mask control box and keypads use 10 pin connectors. Programming key connection is external, located on the bottom pin set. Keypad has four green LED's over the shot buttons and one amber LED over the continous pour button.



Wizard

Wizard control box and keypads use 16 pin connectors. There are two keypads available, the standard keypad and the chronos keypad with a timer function.

Section 3 Questionnaire

1. What safety precaution should be adhered to before performing maintenance on any electrical component, apart from taking voltage and amperage readings?

_____

2. Which statement best describes the La Marzocco's high voltage circuit operation?

   A. Each high-volt component receives 0 volts while the machine is operational. When the keypad or semi-automatic brew switch is activated, 110 volts flows to the component to activate it.

   B. Each high-volt component receives 110 volts while the machine is operational. When the keypad or semi-automatic brew switch is activated, an additional 110 volts flows to the component to activate it.

   C. Each high-volt component receives 0 volts while the machine is operational. When the keypad or semi-automatic brew switch is activated, 220 volts flows to the component to activate it.

3. Explain how the coils on the solenoid valves open the valve to allow water to flow through the valve.

_____

4. What generation of electronics does the La Marzocco currently use? What is the major difference between this generation of electronics and the electronics used in the past?

_____

5. What component controls voltage to the coffee boiler's heating element?

_____

6. What component controls voltage to the steam boiler's heating element?

_____

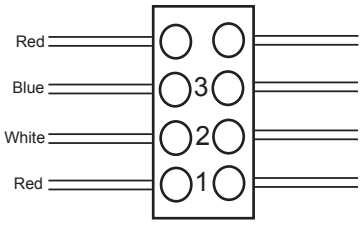
7. There is a four-position terminal block behind, and to the right of each group, match the terminal position with its proper definition. (Match the description on the left with the number on the right.)

A. 110vac traveling to the contol box ____

B. 110vac traveling to the solenoid valve ____

C. 110vac traveling to the control box ____

D. 110vac traveling to the pump motor ____



LA·MARZOCCO

Troubleshooting Manual

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- Solution 1 - Adjust the external boost pump. Page 44

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Problem 13 - No water flow from the grouphead.
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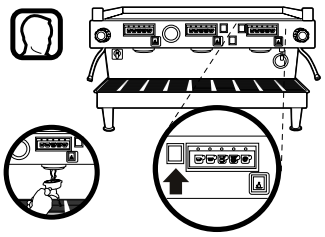
- Solution 3 - Inspect the group for a missing diffuser screen and screw. Unclog the banjo tube if necessary. Page 56

Problem 1 - Shot volumes are inconsistent.

Solution 1 - Limit rinsing of the portafilters with water from the brew group.

Excessive rinsing of the portafilters with water from the brew group will gradually drive down the temperature in the brew boiler. This lowering of the brew temp will result in espresso shots that are less than ideal: weak extraction, very little crema, and unusually high volume.



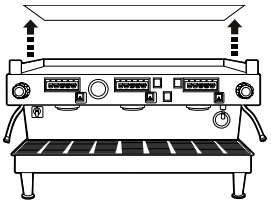
Use water from the machine's hot-water tap to rinse portafilters.

Solution 2 - Inspect the flowmeter for proper operation.

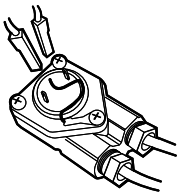
On automatic models, the flowmeter measures the quantity of water flowing to the brew group. The flowmeter uses an impeller, imbedded with two magnets, to actuate a hal-effect switch to send pulse signals to the control box. The control box counts the pulses received from the flowmeter to gauge water volume.

Important! - Before proceeding with solution 2, the following steps must be accomplished.

1. Turn off the main water supply to the machine.
2. Locate the expansion valve in the drain box.
3. Turn the barrel of the expansion valve counter-clockwise to relieve pressure in the front boiler.
4. When the lower portion of the gauge reads 0 bar, you may proceed.

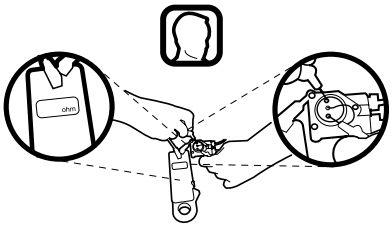


1. Remove the machine's top panel.



2. Remove the red and white wires from the flowmeter field.

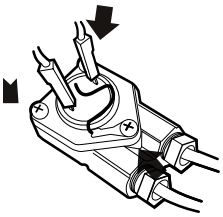
Measure DC voltage from the red wire to ground, you should get a reading of 18vdc +/- 10%.
Any other reading indicates a faulty transformer on the control board.



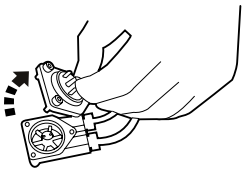
3. Using a multi-meter, test the flowmeter field for an electrical short. Place both leads on the terminals of the field. A functional flowmeter will result in a reading of 2.2k ohms +/- 10%.

If the ohm reading is not within the proper range, the field is faulty and should be replaced.

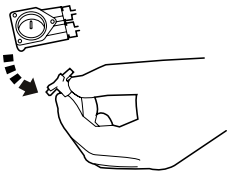
If the reading is with the proper range, proceed to step 4.



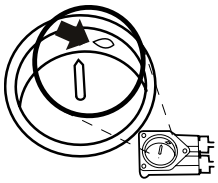
4. Remove the three screws that secure the field to the flowmeter body.



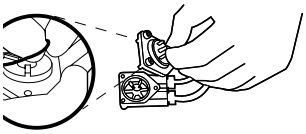
5. Remove the flowmeter field.



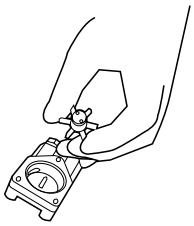
6. Inspect the impellor for smooth rotation and scale build-up on the magnets. Replace if necessary.



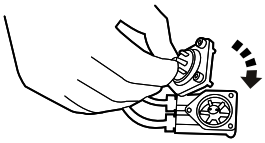
7. Inpect the flowmeter jet for scale build-up. Clean out the jet if necessary.



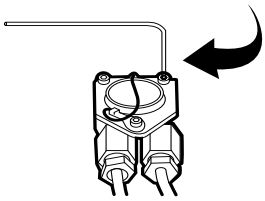
8. Replace the o-ring.



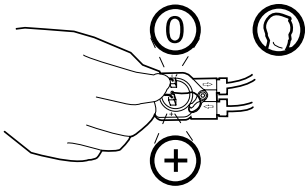
9. Reinstall the flowmeter impellor.



10. Reposition the flowmeter field.



11. Resecure the three screws.

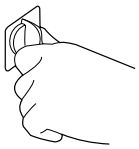


12. Reconnect the terminal leads. Ensure the red wire is attached to the “+” terminal and the white wire is attached to the “0“ terminal.

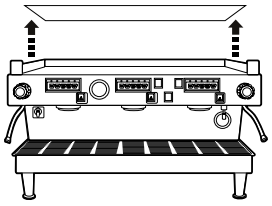
Reprogram the machine and check for proper operation.

Solution 3 - Ensure the group heads are bled of any air.

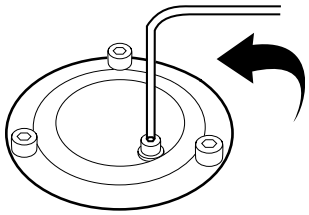
The La Marzocco uses a hollow, water-filled group casting, sometimes referred to as a saturated group. This design allows the convection of heat through the group. During installation, the air is bled from the system, to enable larger volumes of water in the group head, resulting in more stable brewing temperatures.



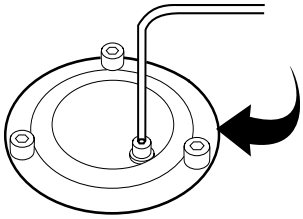
1. Turn the machine off



2. Remove the control panel cover.



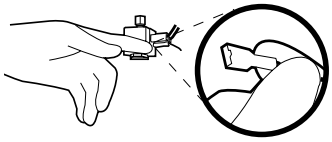
3. Using a 5mm allen wrench, loosen the bleed screw 1/4 turn.



4. Once any air has been relieved, tighten the bleed screw securely.

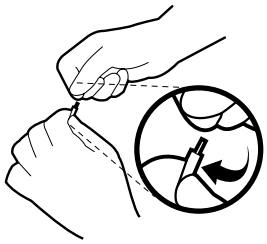
Solution 4 - Check for and repair a faulty ground connection.

The control board on the AV, or automatic models, as well as the auto-fill board on the EE or semi-automatic models, each have step-down transformers that drop 220vac down to 24vac. The voltage that has been dropped down is then passed through a rectifyer which converts the AC voltage into DC voltage. AC voltage alternates it's direction of flow, whereas DC voltage flows in one specific direction, either towards positive (+), or towards negative (-). Without a proper ground connection, the DC voltage has no reference point for 0 or neutral. This causes sporatic behavior in DC componets such as the flowmeters which can cause erratic shot volume.

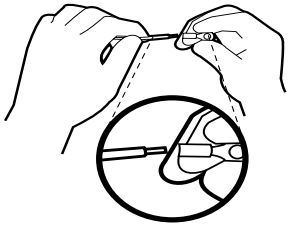


1. If you identify a faulty ground connection.

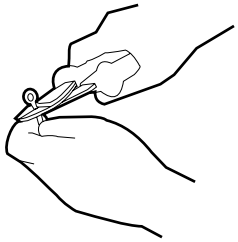
2. Cut and strip the end of the ground wire.



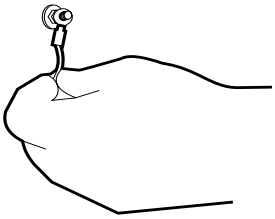
3. Twist the wire end.



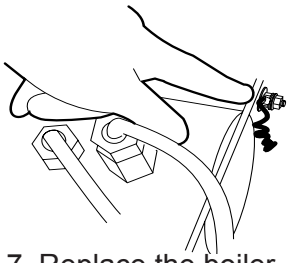
4. Place a ring terminal over the wire end.



5. Crimp firmly.



6. Remove a boiler mounting nut and install the ground wires ring terminal to the bolt.



7. Replace the boiler mount nut and tighten securely.

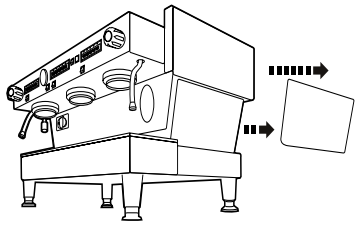
Problem 2 - The buttons on the keypad won't respond, but the manual override does.

Solution 1 - Check the fuse on the control board.

The control board stores the shot volume settings and controls the auto-fill circuit. The control board uses a 6.3 amp fuse to protect it against damage due to faulty electrical/electronic components. If this fuse trips, it causes the machine's automatic functions to stop.

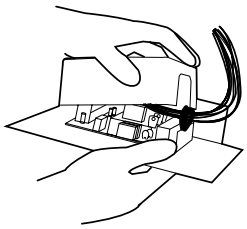
Important! Before proceeding with solution 1, the following steps must be accomplished.

1. Turn the machine off.
2. Disconnect the power cord from the wall outlet.

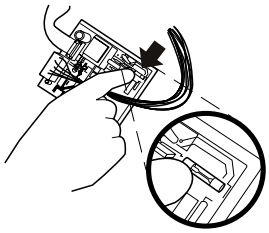


1. Remove the machines left-side panel by removing one phillips-head screw.

2. Remove the control board bracket and pull the unit from the side of the machine.

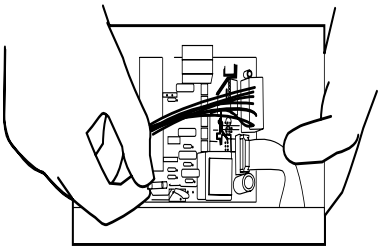


3. Remove the three phillips-head screws and lift off the control box cover.

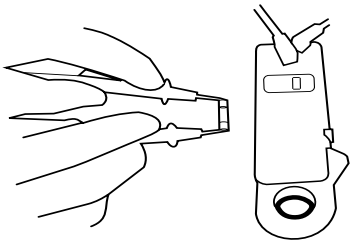


4. Locate the fuse and visually inspect for burn marks or damage.

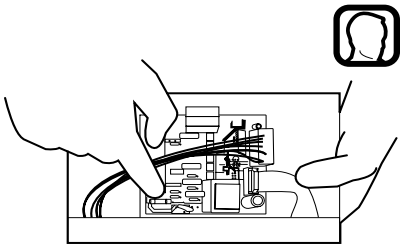
Replace if discolored or damaged.



5. If the fuse appears functional, carefully remove it from the board.



6. Ohm out the fuse using a multi-meter.



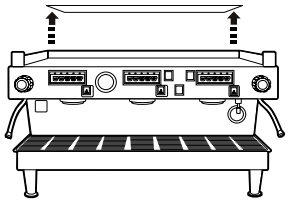
7. Replace the fuse if a reading greater than zero ohms is registered.

Replace only with a fuse of the same size and rating.

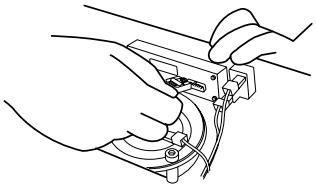
Return the machine to service.

Solution 2 - Check the keypads for proper operation.

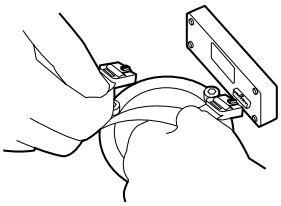
The keypads allow the operator to program shots to the desired volume, and to engage the pre-infusion feature. The keypads are connected to the controller by an 8 - 16 pin ribbon cable (depending on model).



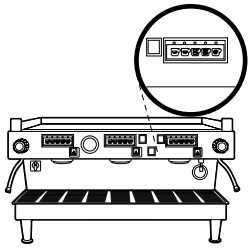
1. Remove the machine's top panel.



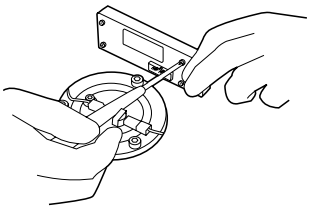
2. Remove the ribbon cable from the functioning keypad.



3. Switch the cables between a functioning keypad and the suspect keypad.

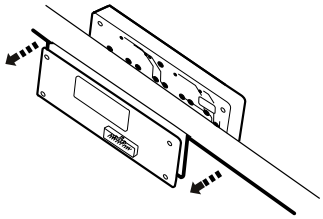


4. Test the suspect keypad. If it is now functioning, you have identified a faulty ribbon cable. Replace the cable.

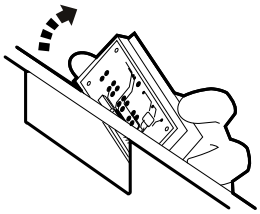


5. If the keypad still fails to function, replace it.

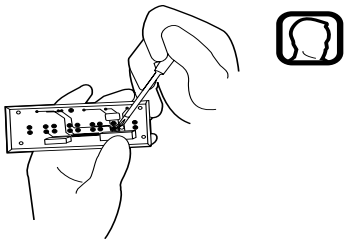
6. Remove the four screws on the back of the keypad.



7. Separate the back cover from the keypad.



8. Remove the keypad from the front of the machine.



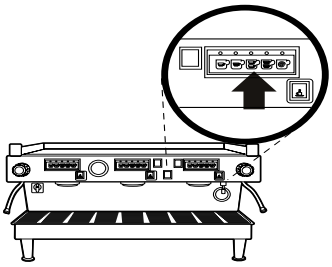
9. Check the solder joints and connections for evidence of water damage.

If water damage is apparent, it may be possible to displace the moisture and restore functionality by cleaning the keypad with contact cleaner.

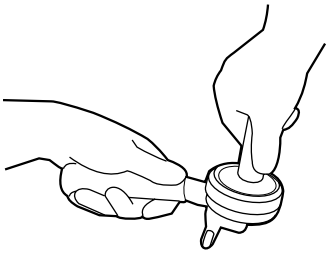
Problem 3 - A single LED flashes above a selected keypad product button.

Solution 1 - Ensure the grind is not too fine and/or the tamp too hard.

If the grind is too fine and/or the tamp too hard, water-flow may be restricted. This slows down or stops the movement of the flowmeter's impellor causing the control board to not register a proper pulse signal. A flashing LED above the selected keypad button signals the operator that something is wrong.

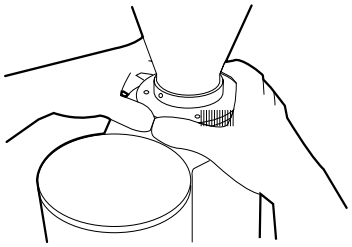


1. Ensure the LED consistently goes into flashing mode when you press it.



2. When coffee is packed too tightly, water flow is restriced.

Tamp with less pressure.



3. You can also try adjusting the grind coarser.

Solution 2 - Check for and repair a faulty ground connection.

The control board on the AV, or automatic models, as well as the auto-fill board on the EE or semi-automatic models, each have step-down transformers that drop 220vac down to 24vac. The voltage that has been dropped down is then passed through a rectifier which converts the AC voltage into DC voltage. AC voltage alternates it's direction of flow, whereas DC voltage flows in one specific direction, either towards positive (+), or towards negative (-). Without a proper ground connection, the DC voltage has no reference point for 0 or neutral. This causes sporatic behavior in DC componets such as the flowmeters which can cause erratic shot volume.

See Problem 1, Solution 4 for detailed instructions.

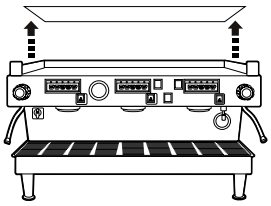
Solution 3 - Inspect the flowmeter for proper operation.

On automatic models, the flowmeter measures the quantity of water flowing to the brew group. The flowmeter uses an impeller imbedded with two magnets to actuate a hal effect switch to send pulse signals to the control box. The control box counts the pulses received from the flowmeter to gauge water volume.

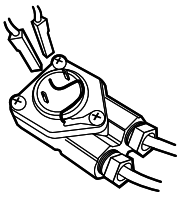
Important! - Before proceeding with solution 3, the following steps must be accomplished.

1. Turn off the main water supply to the machine.
2. Locate the expansion valve in the drain box.
3. Turn the barrel of the expansion valve counter-clockwise to relieve pressure in the front boiler.
4. When the lower portion of the gauge reads 0 bar, you may proceed.

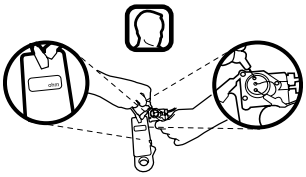
Refer to Problem 1, Solution 2 for more detailed instructions.



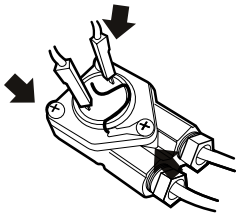
1. Remove the machine's top panel.



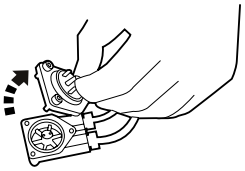
2. Remove the leads from the flowmeter field.



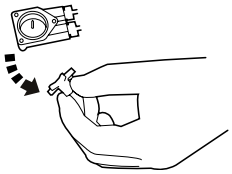
3. Using a multi-meter, test the flowmeter field for an electical short. Also check the red wire for 18vdc.



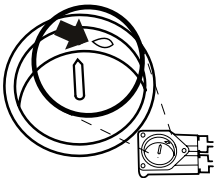
4. Remove the three screws.



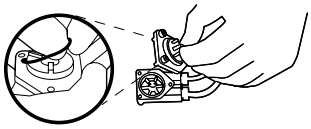
5. Remove the flowmeter field.



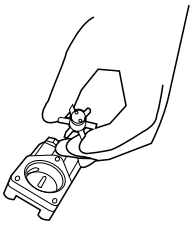
6. Inspect the impellor for smooth rotation and scale build-up on the magnets.



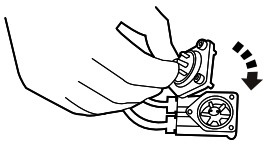
7. Inpect the flowmeter jet for scale build-up.



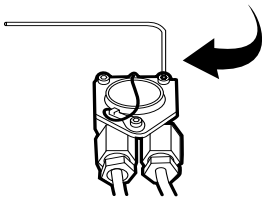
8. Replace the o-ring.



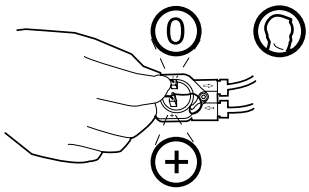
9. Reinstall the flowmeter impellor.



10. Reposition the flowmeter field.



11. Resecure the three allen head screws.



12. Reconnect the terminal leads.

Problem 4 - All of the LEDs on every keypad are blinking.

The autofill valve allows water to flow into the steam boiler. The control board on the machine will not allow the autofill valve to remain activated for no more than approximately 120 seconds. If the autofill valve remains activated for more than 120 seconds, the machine will shut power to the autofill coil off, and cause all of the LEDs on every keypad to start blinking to indicate that the autofill circuit has timed-out.

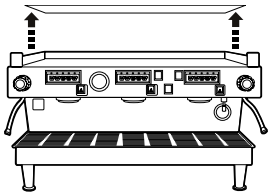
Solution 1 - Ensure the water supply is turned on and the filters/softeners are operating properly.

If the water supply is turned off or the in-line water filters and/or softeners are clogged, water flow into the machine will either be cut off completely or restricted. Lack of water flow into the machine will cause the autofill circuit to time-out.

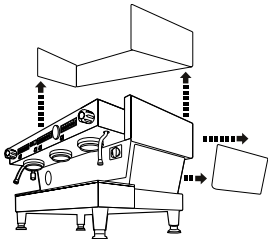
Solution 2 - Inspect the auto-fill valve for proper operation.

Important! - Before proceeding with solution 2, the following steps must be accomplished.

1. Turn off the main water supply to the machine.
2. Locate the expansion valve in the drain box.
3. Turn the barrel of the expansion valve counter-clockwise to relieve pressure in the front boiler.
4. When the lower portion of the gauge reads 0 bar, you may proceed.

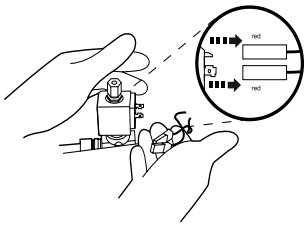


1. Remove the machine's top panel.

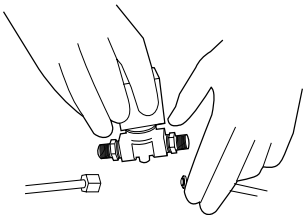


2. Remove the machine's right side panel and surround.

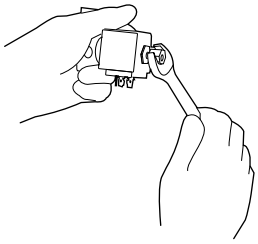
3. Remove the control box mounting bracket from the machine.



4. Disconnect the power leads going to the solenoid coil.

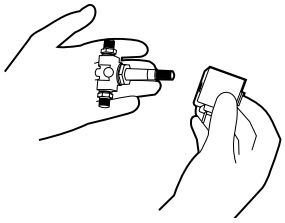


5. Disconnect the inlet and outlet tubes and remove the autofill valve from the machine.

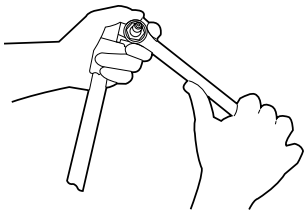


6. Remove the end-cap from the valve stem.

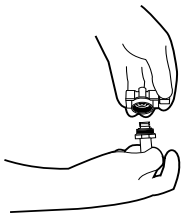
7. Remove the coil retaining nut.



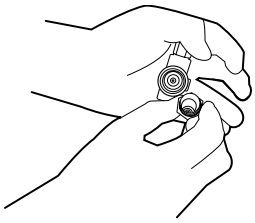
8. Remove the coil from the valve stem.



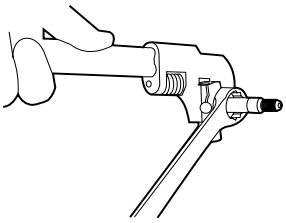
9. Using a 22 mm wrench, loosen the valve stem from the valve body.



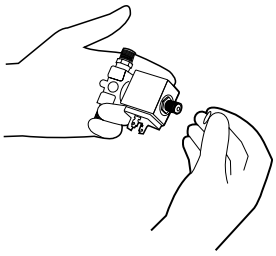
10. Remove the valve stem and plunger.



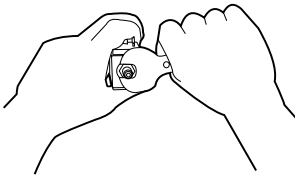
11. Inspect the plunger for a damaged or worn seal. Inspect the valve stem and seat for scale build-up. Replace as nec-



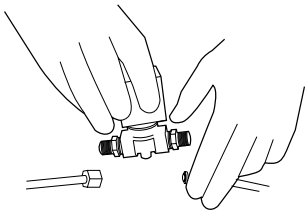
12. Reinstall the valve plunger and stem. Reinstall the stem to the valve body.



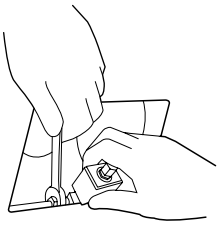
13. Reinstall the valve coil and retaining nut. Reinstall the valve stem cap.



14. Using a 14 mm wrench, tighten the cap to the stem.



15. Reinstall the valve.



16. Tighten both fittings.

17. Reattach the power leads to the coil.

18. Replace the control board bracket.

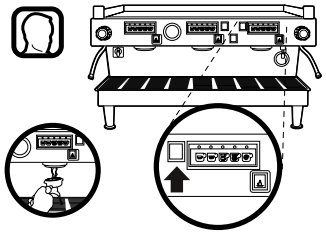
19. Replace the machine’s surround and right side panel.

20. Replace the machine’s top panel.

Problem 5 - The espresso seems cold and under-extracted.

Solution 1 - Limit rinsing of the portafilters with water from the brew group.

Excessive rinsing of the portafilters with water from the brew group will gradually drive down the temperature in the brew boiler. This lowering of the brew temp will result in espresso shots that are less than ideal: weak extraction, very little crema, and unusually high volume.



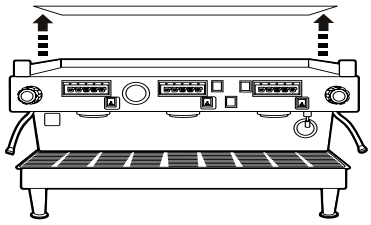
Use water from the machine's hot-water tap to rinse portafilters.

Solution 2 - Reset the thermal limit switch or replace if necessary.

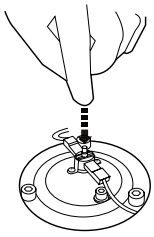
If the temperature of the group cap reaches 266 F, the thermal limiter will trip, cutting power to the heating element.

Important ! Before proceeding with solution 2, the following safety measures must be taken.

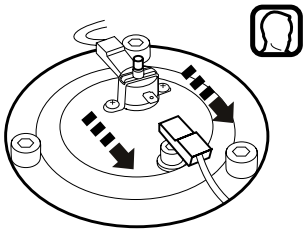
1. Turn the machine off.
2. Disconnect the machine's power cord from the wall outlet.



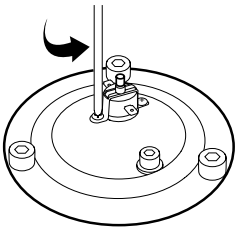
1. Inspect the thermal limiter to determine whether or not it has tripped. If tripped, the red or black reset button will protrude upward slightly. Press down firmly to reset.



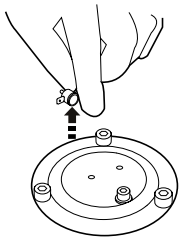
2. Replacement of the thermal limiter may be necessary if it fails to reset properly.



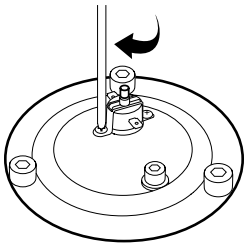
3. Disconnect the two wires on either side of the thermal limiter.



4. Loosen the two screws securing the thermal limiter to the group cap.



5. Remove and replace the thermal limiter.



6. Tighten the securing screws and reattach the wires. Test for proper operation.

Solution 3 - Adjust the coffee boiler's thermostat. Replace if necessary.

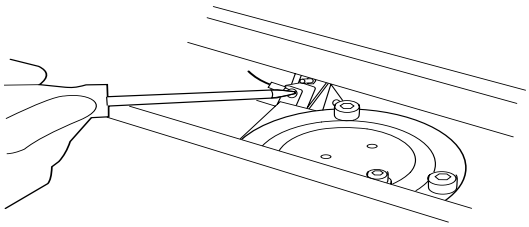
The temperature in the coffee boiler is controlled by a thermostat. If the thermostat is set improperly or is not functioning properly, the water temperature for brewing espresso will be inconsitent, resulting in espresso shots that are less than ideal.

Important ! Before proceeding with solution 3, the following safety measures must be taken.

1. Turn the machine off.
2. Disconnect the machine's power cord from the wall outlet.

1. Measure the temperature of the water leaving the group head. This is most accurately measured by using a portafilter equipped with a digital thermometer.

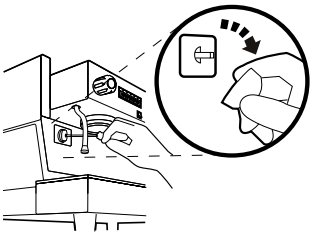
2. Most coffees brew best between 195 - 205 F. If the temperature of the brewing water is outside of the proper brewing range, adjustment of the thermostat is required.



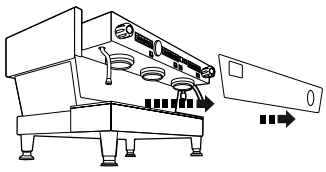
3. Remove the machine's control panel cover. Locate the metal adjustment screw at the top of the thermostat and, using a 1/4 x 14" screwdriver, adjust the thermostat.

Turn the screw clockwise to increase the brewing temperature. Turn counter-clockwise to decrease the brewing temperature. Each 1/4 turn of the screw equals approximately 3 degrees F.

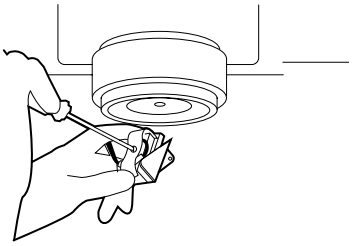
If adjustment of the thermostat does not seem to have any effect on the brewing temperature, most likely the thermostat's switch is faulty and should be replaced.



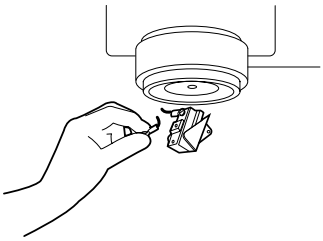
4. Remove the small phillips screw securing the on/off knob and remove the knob.



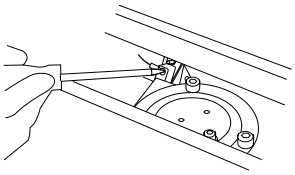
5. Remove the phillips screws securing the machine's front panel. Remove the panel from the machine.



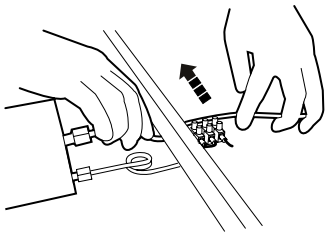
6. Remove the plastic insulator screw from the thermostat.



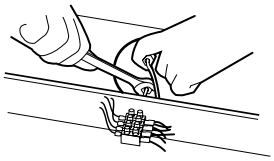
7. Remove the blue and white wires from the lower portion of the thermostat.



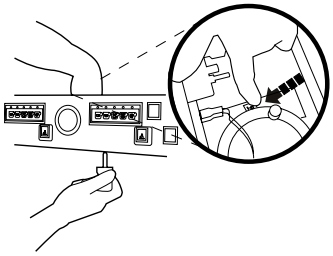
8. Remove the upper wire.



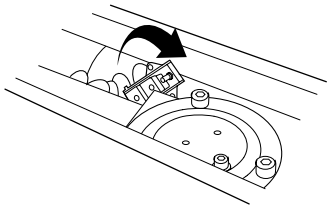
9. Remove the upper gauge tube and carefully move it to the side.



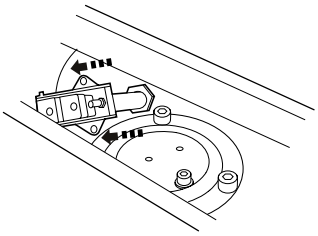
10. Remove the lower gauge tube and carefully move it to the side.



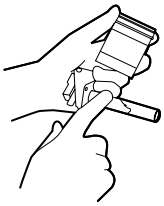
11. Using a small Phillips screwdriver, remove the trim screws.



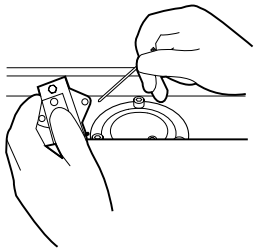
12. Gently flex the panel downward and then rotate the thermostat 90 degrees.



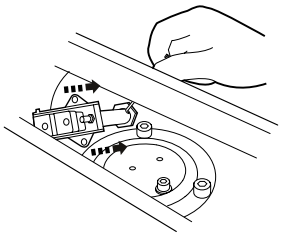
13. Pull the thermostat from the well.



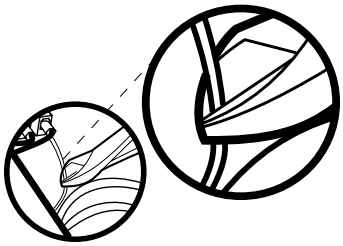
14. Apply a liberal amount of thermal compound to the bellows on the new thermostat.



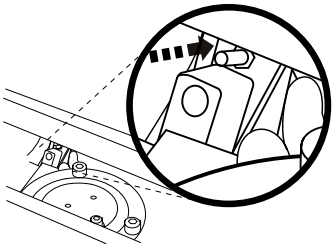
15. Use a small cable tie to aid in inserting the thermostat.



16. Insert the thermostat and cable tie together.



17. Clip off the cable tie when approximately 1/2” has been inserted.

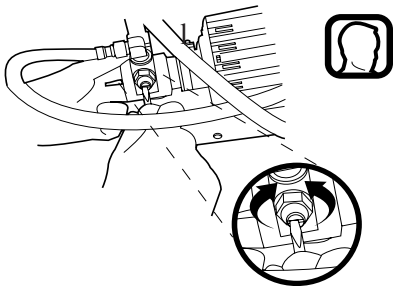


18. Press firmly on the thermostat to fully seat it into the well.

Problem 6 - The dispensing pressure is incorrect.

Solution 1 - Adjust the external boost pump.

The water pressure required to properly brew espresso is 9 bar. Most municipalities supply water between 3-5 bar. Most espresso machines incorporate a boost pump to increase the incoming water pressure to the required 9 bar to properly brew. If the dispensing pressure portion of the gauge is not a 9 bar while brewing, adjust the pump pressure.

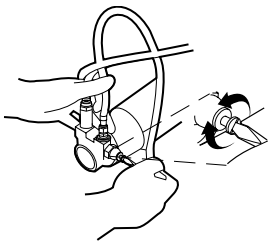


1. Locate the adjustment screw on the side of the pump. Load a portafilter with coffee and insert it into a group head. Press the manual dispense switch and notice the brewing pressure on the lower portion of the gauge. Using a flat-tip screwdriver, turn the screw clockwise to increase brewing pressure. Turn counter-clockwise to decrease brewing pressure.

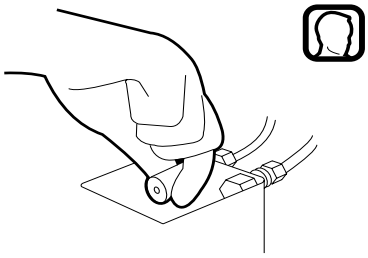
Problem 7 - The machine makes a high-pitch squealing noise while brewing.

The La Marzocco uses an expansion valve to bleed off excessive pressure from the coffee boiler. The expansion valve should be set to relieve pressure at 12 bar. If the expansion valve is set too low and the pump pressure is too high, water will discharge through the expansion valve, making a squealing noise.

Solution 1 - Adjust the pump and/or expansion valve.



1. Ensure the dispensing pressure is set to 9 bar while brewing.

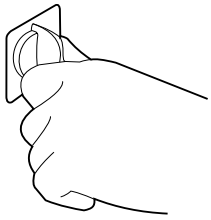


2. Activate one of the group heads and allow water to exit the group until the red heating element indicator light illuminates. While the light is illuminated the dispensing pressure portion of the gauge should start to climb. Adjust the expansion valve so that it starts to releive pressure at 12 bar. Turn the expansion valve barrel clockwise to increase pressure and turn counter-clockwise to decrease pressure.

Problem 8 - No steam pressure.

If no steam pressure is present in the steam boiler, there are several items to check. The main power switch, the heating element, and the pressure switch.

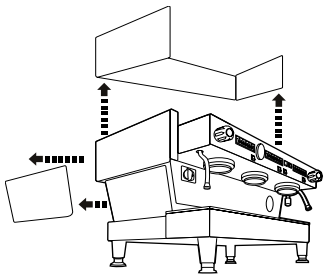
Solution 1 - Ensure the main power switch is in the proper postition.



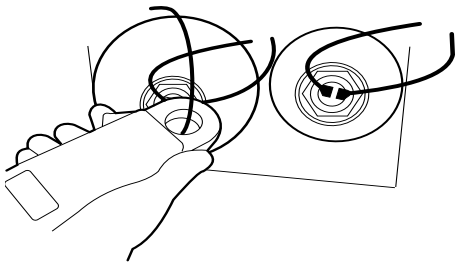
1. For power to run to the heating elements, the main power switch must be in the “2” or “Run” position.

If the switch is in the “1” or “Fill” position, all other functions except the heating elements will operate. This may lead the operator to believe the machine is operational.

Solution 2 - Ensure the heating element is receiving voltage and operational.



1. Remove the machines top and left side panel.



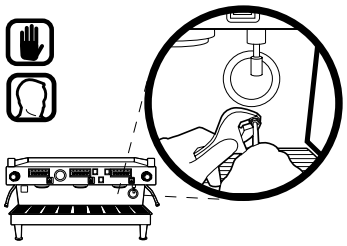
2. Using a multi-meter equipped with an amp clamp, check the amperage the element is pulling. To determine the proper amperage an element should pull, divide the wattage of the element by the voltage going to the element.

If the amperage is zero, turn the machine off, disconnect the leads powering the element, switch the multi-meter to ohms and check the element for continuity. If the continuity is zero, the element is damaged and must be replaced.

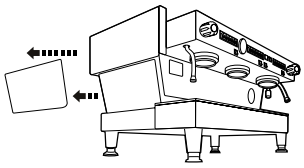
If the amperage is lower than it should be. Switch the multi-meter to ac voltage and check the voltage at the elements leads. The proper voltage reading should be between 208-230. If the voltage is too low, check the pressure switch for proper operation (Problem 8, Solution 3). You can also check the wall outlet to ensure voltage is

3. If the heating element requires replacement, following the instructions on the following page.

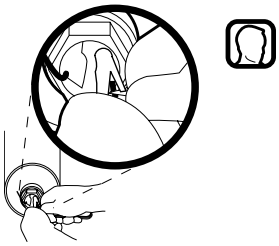
Solution 2.1 - Replacing the heating element.



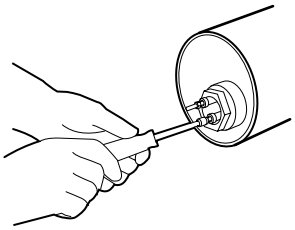
1. Turn the machine off and depressurize the steam boiler. Remove the 5mm bolt located at the bottom of the sight glass.



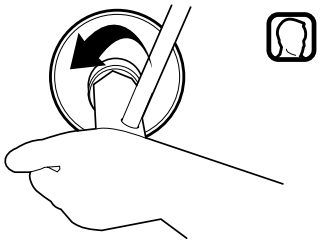
2. Remove the machines top and left side panel.



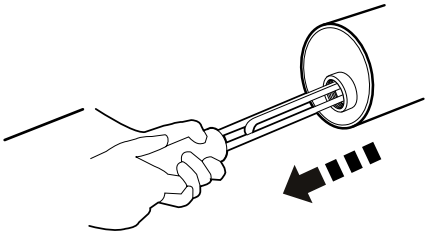
3. Trim the heat-shrink from the heating element terminals. Be carefull not to cut the insulation on the wires.



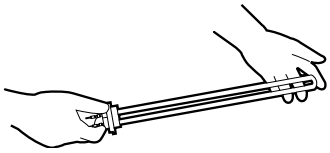
4. Using a 7mm nut-driver, remove the nuts and wires from the element terminals.



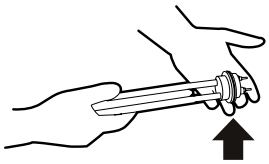
5. Using either a heating element wrench in conjuction with a pry bar or a 42mm socket, unscrew the heating element.



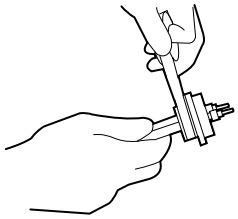
6. Pull the element from the end of the boiler.



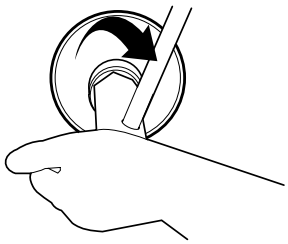
7. Inspect the old element for damage or excessive scale build-up.



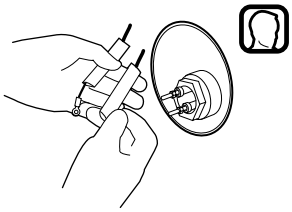
8. Install a new element gasket on the new heating element.



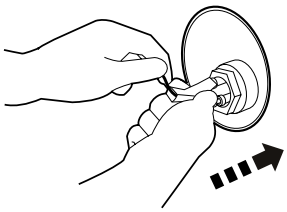
9. Apply a liberal amount of teflon tape to the threads of the elements



10. Install and tighten the new element.



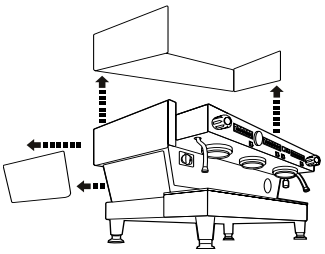
11. Install new sleeves of heat-shrink to the wires.



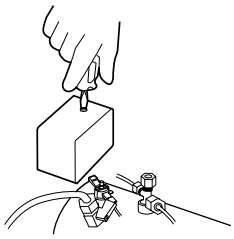
12. Reconnect the wires to the element and check for proper operation.

Solution 3 - Ensure the pressure switch is functioning properly.

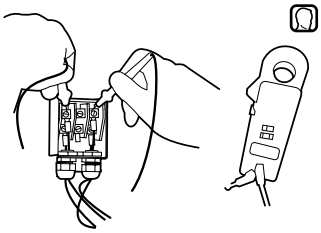
The pressure switch controls the steam pressure in the steam boiler. The pressure switch uses a spring-loaded diaphragm to open and close a set of contacts, controlling electrical power to the heating element. Over time, the contacts may become pitted and built up with carbon. If too much carbon builds-up, it may restrict the electrical current flowing through the contacts, preventing the element from heating up. The diaphragm can also dry out and lose its resiliency. This can cause pressure switch to allow the pressure to drop too low before it provides power to the element. (Newer machines use a Giemme pressure switch, which does not use contacts, but sends a signal to a contactor. The contactor then opens and closes a set of contacts to power the element.)



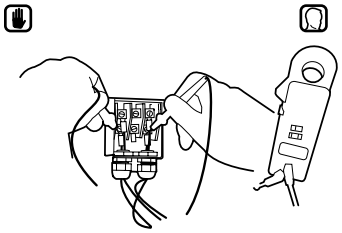
1. Remove the machines top and left side panels.



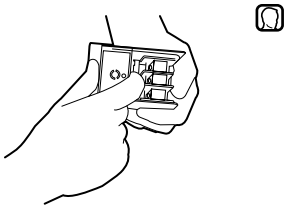
2. Remove the screw and cover from the pressure switch.



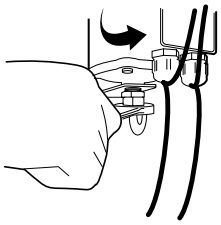
3. Using a multi-meter, check for voltage at the top two terminals. If no voltage is present, inspect the wires going to the switch from the terminal block.



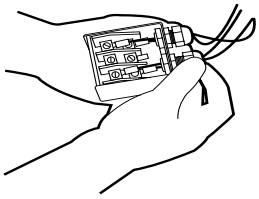
4. If voltage is present at the top terminals, check for the proper voltage at the bottom terminals with the contacts closed. If now voltage is present, proceed to step 5.



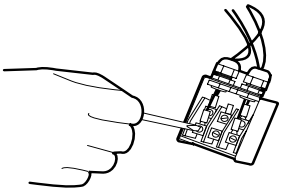
5.Inspect the contacts for pitting or excessive carbon build-up. It is possible to clean the contacts with emery cloth and WD-40. If cleaning does not restore power, proceed to step 6.



6. Remove the steam tube supplying the pressure switch, and the lock nut securing the pressure switch to the frame.



7. Leaving the wires attached, pull the pressure switch from the machine to facilitate easier replacement of the switch.

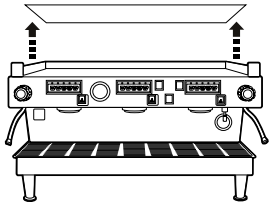


8. Loosen the screws securing the wires going to the pressure switch. Lable each wire and remove from the switch.

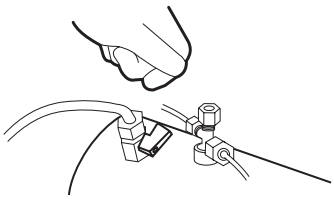
9. Discard the old switch and install the new switch in the reverse order. Return the machine to service and adjust the pressure switch to the desired operating pressure. Generally between 1.2 - 1.5 bar.

Problem 9 - The steam assembly and/or wand is leaking.

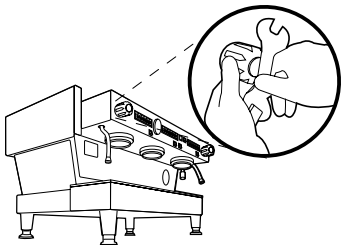
Solution 1 - Rebuild the steam assembly.



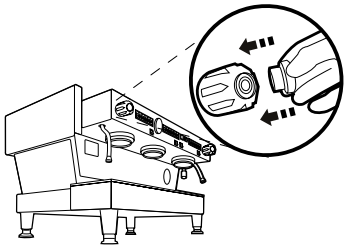
1. Remove the machines top panel and turn the ball valve off on the appropriate steam assembly.



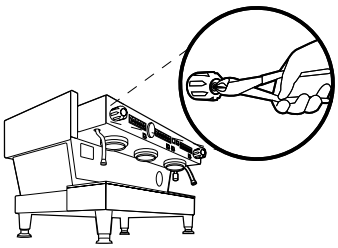
2. Turn off the steam supply ball valve and open the steam knob to relieve pressure in the tube.



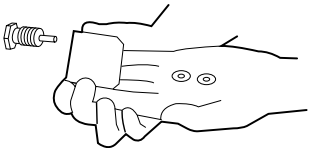
3. Using the flat side of a foam knife, unscrew the steam knob bezel.



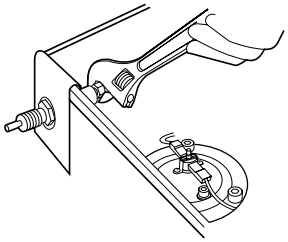
4. Remove the bezel from the knob.



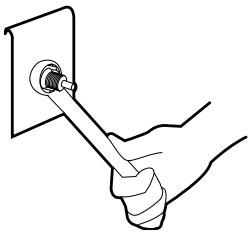
5. Remove the cotter pin using diagonal cutters.



6. Place one hand under the knob as you unscrew it to catch the two washers.

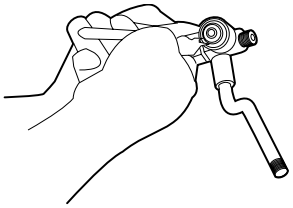


7. Loosen the steam tube nut using a 17mm wrench and unseat the tube from the assembly.

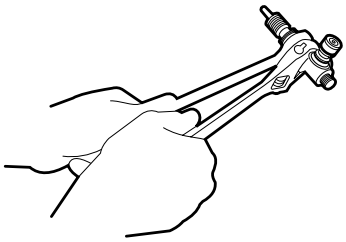


8. Remove the steam assembly mounting nut using a 26mm wrench. NOTE! Use care not to scratch the facia.

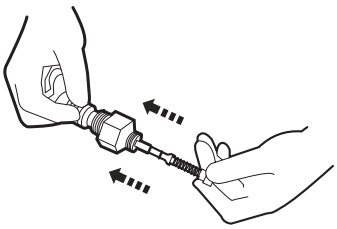
9. Remove the steam assembly from the machine.



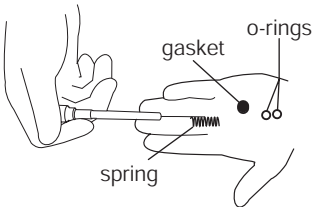
10. Compress the washer and spring against the valve body and remove the snap ring using a pair of snap ring pliers.



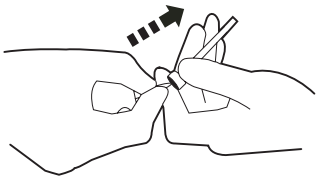
11. Remove the valve body from the shaft using 24 and 26 mm wrenches.



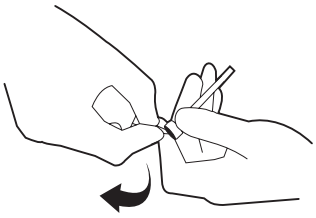
12. Pull the shaft from the body.



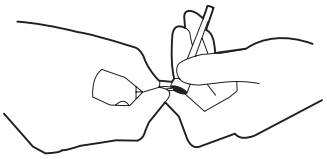
13. When the shaft is dissassembled, you should have 2 o-rings, 1 bushing, and 1 spring.



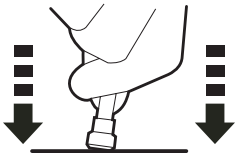
14. Remove the shaft end gasket by prying an awl or gasket pick into the gasket....



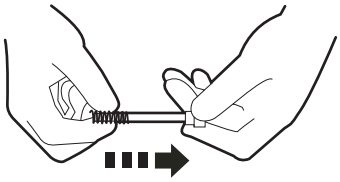
15. Then carefully pry out the old gasket.



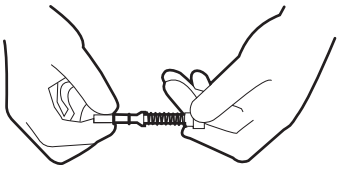
16. Install a new shaft-end gasket by tucking in one edge of the gasket with a small screwdriver.



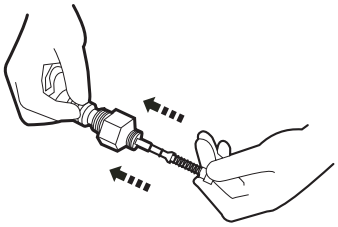
17. When the gasket has been partially inserted with the screwdriver, press the gasket against a firm surface and roll it into postition.



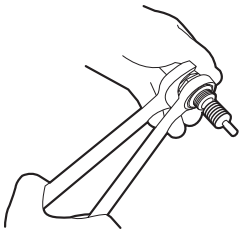
18. Reinstall the spring and bushing. Ensure the bushings larger diameter surface faces the spring.



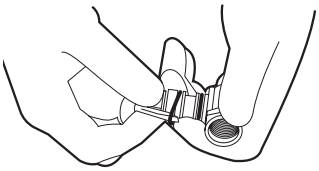
19. Install two new shaft o-rings and apply a film of food-grade lubricant.



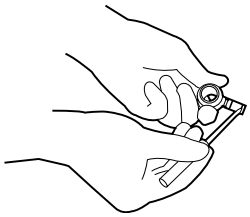
20. Reinstall the steam shaft into the valve body.



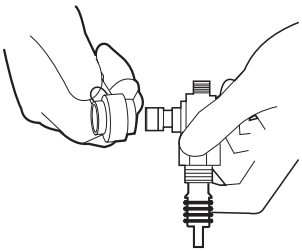
21. Reinstall the shaft assembly onto the valve body.



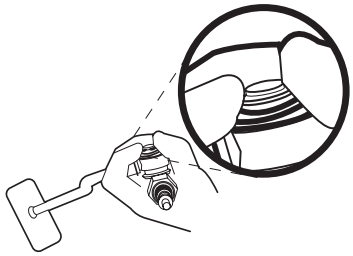
22 Replace the steam arm o-rings and apply a film of food-grade lube.



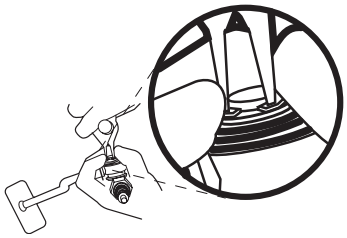
23. Replace the swivel wand o-rings (if so equipped). Apply a film of food-grade lube.



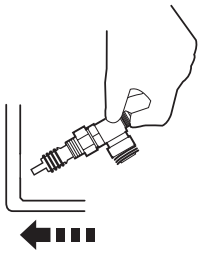
24. Install the steam wand onto the steam valve



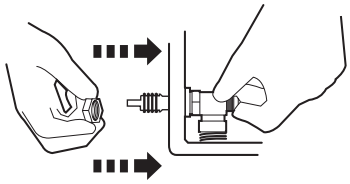
25. Install the wand spring and washer.



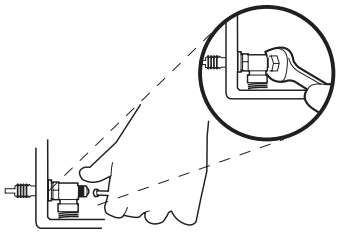
26. Compress washer and spring and install the new snap-ring



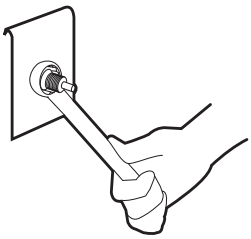
27. Reinstall the steam assembly onto the machine.



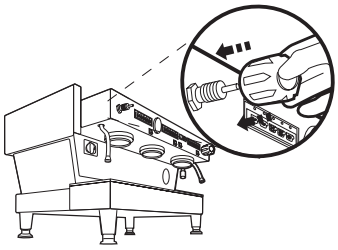
28. Install the valve retaining nut.



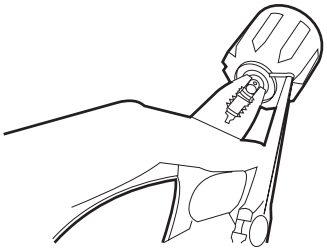
29. Reposition and install the steam supply tube.



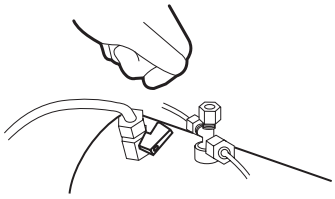
30. Tighten the retaining nut and supply tube simultaneouly to position the wand near the center of the wand access cutout.



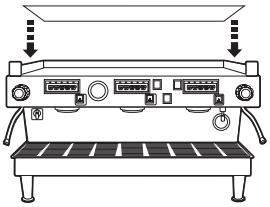
31. Reinstall the knob and washers.



32. Install and bend a new cotter pin.



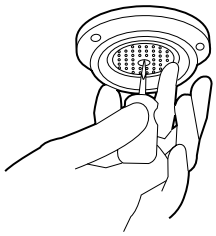
33. Open the steam supply ball valve. Open the steam valve and check for leaks.



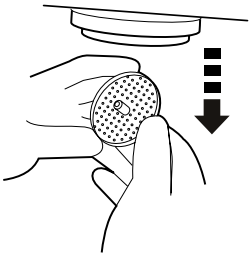
34. Reinstall the machine's top panel.

Problem 10 - Water leaks from around the portafilter while brewing.

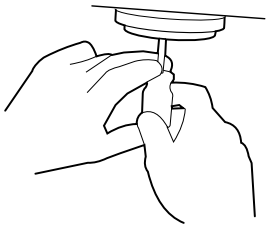
Solution 1 - Replace the portafilter gaskets.



1. Using a stubby flat-tip screwdriver, remove the diffuser screw and set aside.

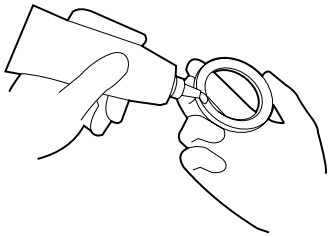


2. The diffuser screen should come off with the screw. If it doesn't gently pry it off with the screwdriver.

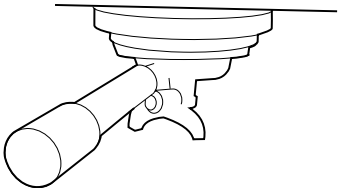


3. Using an awl or gasket pick. Pry the old gasket from the groups bayonet clamp ring.

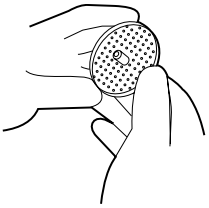
4. Note the small bevel on one side of the new gasket. The beveled side goes up, the flat side should face down.



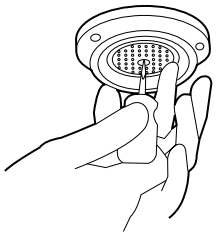
5. Apply a thin film of food-grade lube to the new gasket and install it into the group. Push the gasket into place with the stubby flat-tip screwdriver.



6. Ensure the gasket is fully seated by inserting a portafilter into the bayonet clamp ring.



7. Clean the diffuser screen, if needed, and reinstallthe diffuser screw and screen onto the group head.



8. Tighten the diffuser screw and check for leaks.

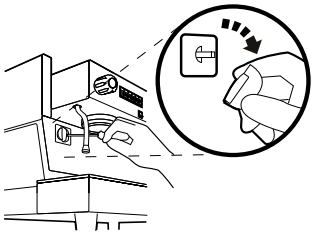
Problem 11 - Shot volumes are consistently short..

Solution 1 - Replace the group valve plungers.

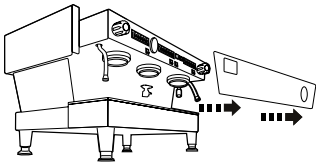
Each group valve has a plunger that is mechanically closed, preventing water flow to the group head. The plunger is electromagnetically opened by the solenoid coil, allowing water flow to the group. Over time, the rubber seat on the plunger becomes dried-out and/or cracked. When this occurs, water, metered by the flowmeter, will actually discharge out of the bottom of the valve into the drain box. If you notice water flowing from the discharge fitting in the drain box while brewing, this is an indication that the group valve plungers require replacement.

Important! - Before proceeding with solution 2, the following steps must be accomplished.

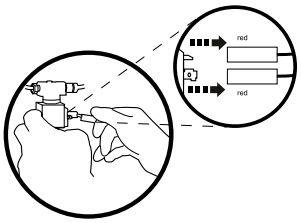
1. Turn off the main water supply to the machine.
2. Locate the expansion valve in the drain box.
3. Turn the barrel of the expansion valve counter-clockwise to releive pressure in the front boiler.
4. When the lower portion of the gauge reads 0 bar, you may proceed.



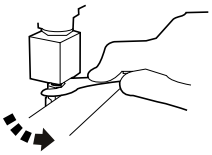
1. Using a small phillips screwdriver, remove the main power switch knob.



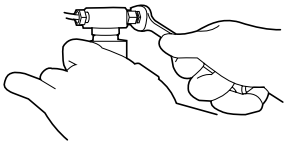
2. Remove the 5 phillips head screws that secure the front panel and remove the panel.



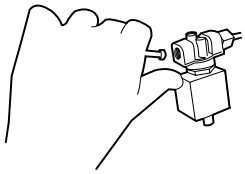
3. Remove the two power leads going to the coil.



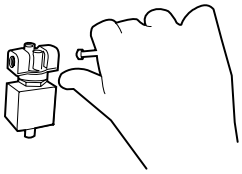
4. Using a 14mm wrench, remove the discharge nut on the bottom of the valve.



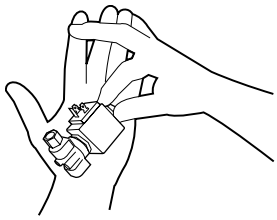
5. Using a 13mm wrench, remove the outlet fitting....



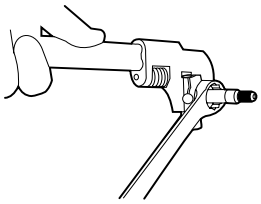
6...and the inlet fitting from the group valve.



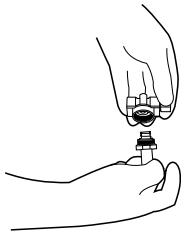
7. Gently manuever the valve until it is free from the inlet and outlet tubes.



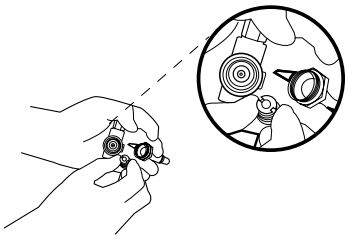
8. Using a 14mm wrench, remove the solenoid coil retaining nut and coil from the valve stem.



9. Using a 22mm wrench, remove the valve stem from the valve body.

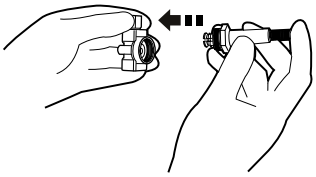


10. Seperate the stem from the body and remove the plunger.

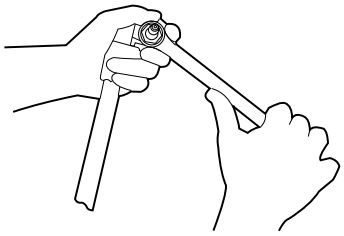


11. Inspect the plunger seat for evidence of excessive wear. Replace if necessary.

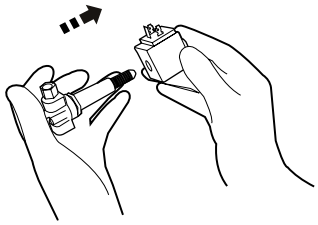
12. Install a new plunger and ensure it travels smoothly in the stem.



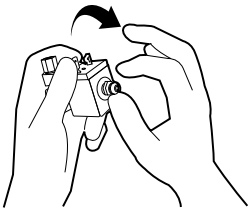
13. Reassemble the valve.



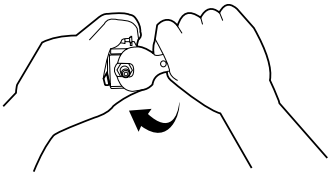
14. Tighten the valve stem to the valve body.



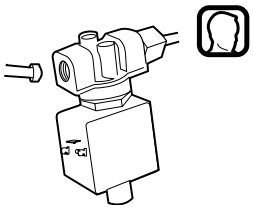
15. Reinstall the valve coil.



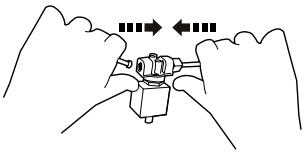
16. Reinstall the coil retaining nut...



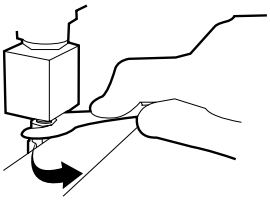
17...and tighten with a 14 mm wrench.



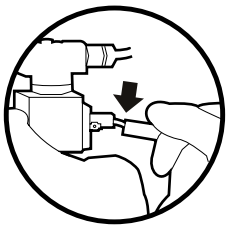
18. Reinstall the valve onto the machine by....



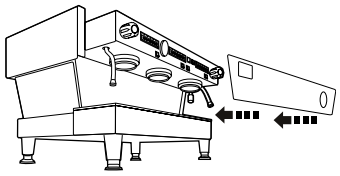
19...realigning and securing the inlet and outlet tubes.



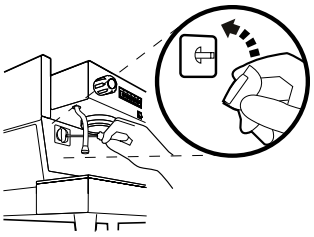
20. Carefully align and secure the discharge tube.



21. Reinstall the two power leads to the coil.



22. Reinstall the machines front panel.



23. Reinstall the main switch knob and return the machine to service. Check for proper operation.

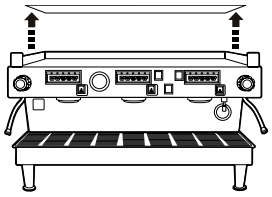
Problem 12 - The steam boiler overfills.

There are generally two reasons the steam boiler over-fills, a foreign object lodged in the auto-fill valve allowing water to slowly seep into the boiler causing it to over fill, or the auto-fill probe can build-up with scale deposits due to excessively hard water. When the probe builds up with scale, it fails to allow the voltage flowing through the probe to ground out properly which causes the machine to think it's low on water and overfill under power.

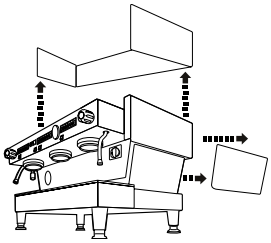
Solution 1 - Inspect the auto-fill valve for proper operation and/or foreign object.

Important! - Before proceeding with solution 1, the following steps must be accomplished.

1. Turn off the main water supply to the machine.
2. Locate the expansion valve in the drain box.
3. Turn the barrel of the expansion valve counter-clockwise to releive pressure in the front boiler.
4. When the lower portion of the gauge reads 0 bar, you may proceed.

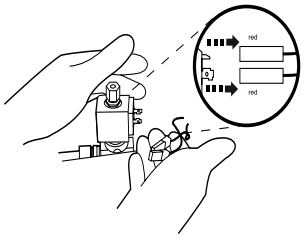


1. Remove the machines top panel.

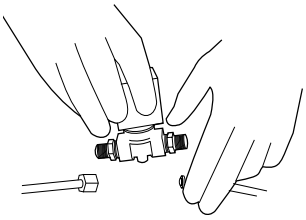


2. Remove the machines right side panel and surround.

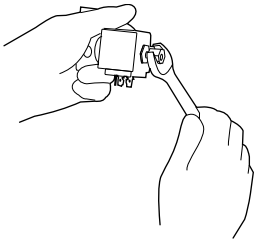
3. Remove the control box mounting bracket from the machine.



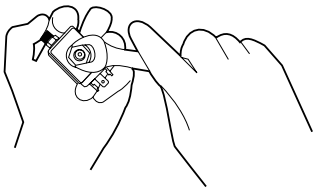
4. Disconnect the power leads going to the solenoid coil.



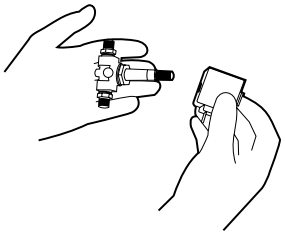
5. Disconnect the inlet and outlet tubes and remove the autofill valve from the machine.



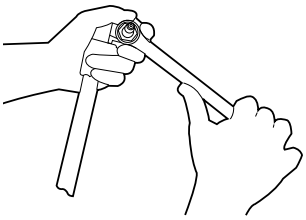
6. Remove the end-cap from the valve stem.



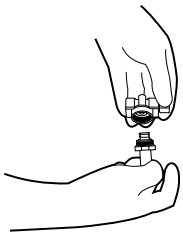
7. Remove the coil retaining nut.



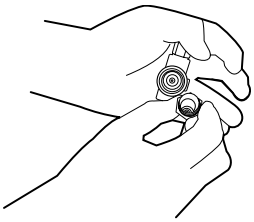
8. Remove the coil from the valve stem.



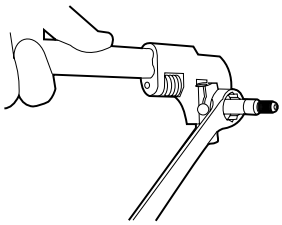
9. Using a 22 mm wrench, loosen the valve stem from the valve body.



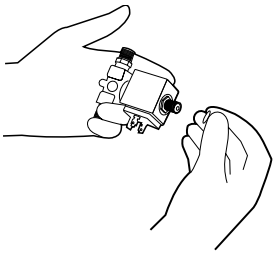
10. Remove the valve stem and plunger.



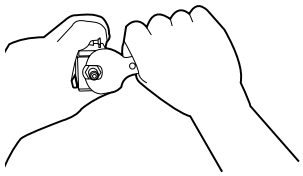
11. Inspect the plunger for a damaged or worn seal. Inspect the valve stem and seat for scale build-up. Replace as necessary.



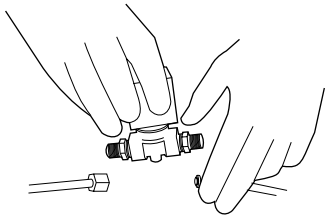
12. Reinstall the valve plunger and stem. Reinstall the stem to the valve body.



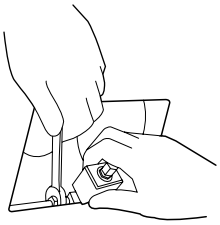
13. Reinstall the valve coil and retaining nut. Reinstall the valve stem cap.



14. Using a 14 mm wrench, tighten the cap to the stem.



15. Reinstall the valve.



16. Tighten both fittings.

17. Reattach the power leads to the coil.

18. Replace the control board bracket.

19. Replace the machines surround and right side panel.

20. Replace the machines top panel.

Solution 2 - Inspect the auto-fill probe for scale build-up.

Important! - Before proceeding the following step must be accomplished:
Turn the machine off and depressurize the steam boiler.

1. Remove the machine's top panel.
2. Locate the auto-steam probe near the center of the boiler.
3. Remove the white or black wire attached to the probe.
4. Using 17mm wrench, remove the probe from the boiler.
5. Inspect the probe for scale build-up due to hard water.
6. If scale build-up present, clean the probe with a fine-toothed file.
7. Reinstall the probe and wire.
8. Check for proper operation.

Problem 13 - No water flow from the group head.

There are several reasons for lack of water flow from the group while trying to brew.

1. The flowmeter is clogged with hard water scale deposits.
2. The group valve is faulty or clogged.
3. The banjo tube and/or bolt is clogged with coffee grounds due to the group be brewed with without the diffuser screen and screw installed.

Solution 1 - Inspect the flowmeter for scale build-up.

Refer to Problem 1, Solution 2 for detailed instructions.

Solution 2 - Inspect the group valve for proper operation.

Refer to Problem 11, Solution 1 for detailed instructions.

Solution 3 - Inspect the group for a missing diffuser screen and screw. Unclog the banjo tube if necessary.

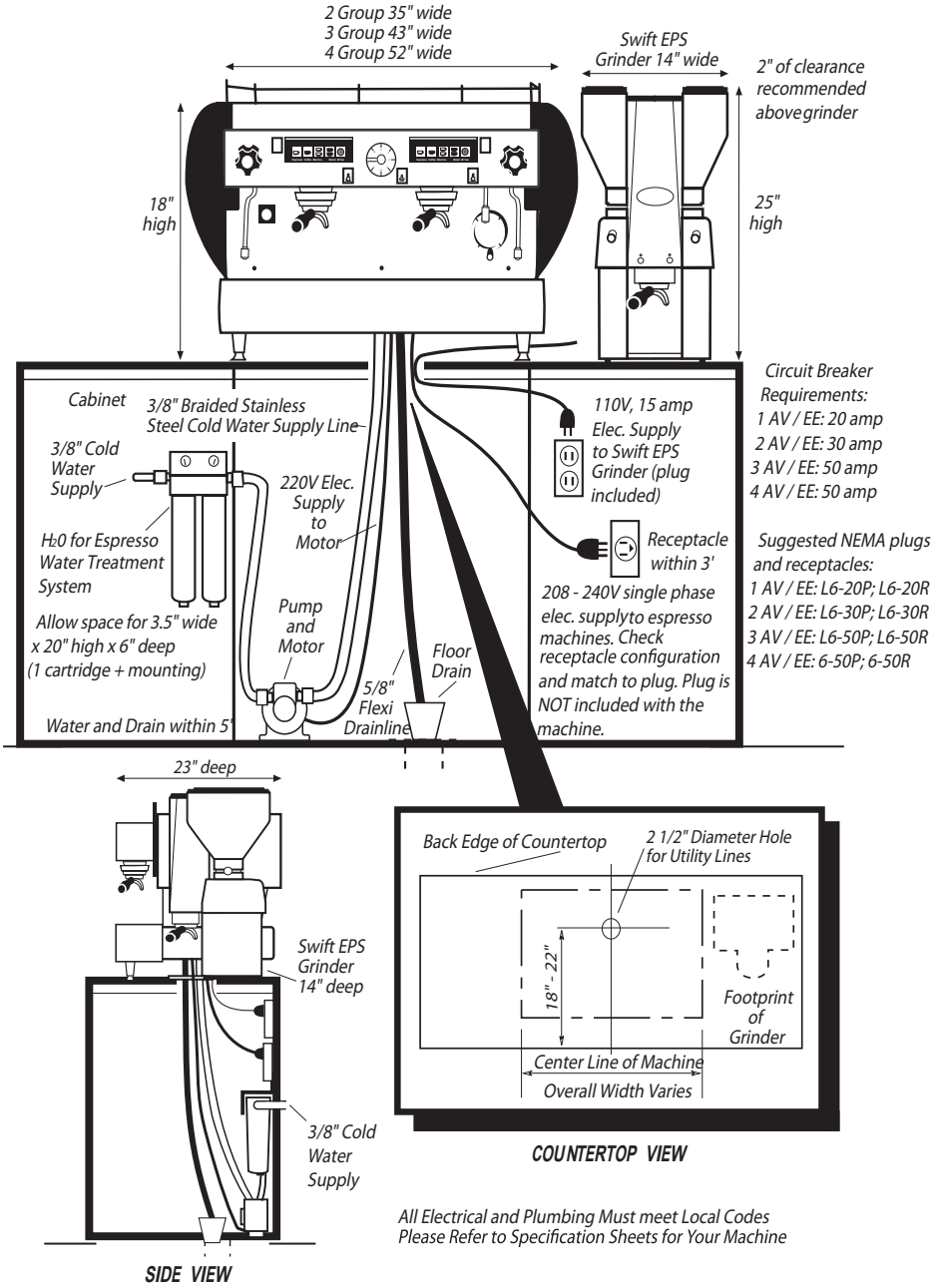
If espresso is brewed on a group head in which the diffuser screen and screw are not installed, coffee grounds will get sucked into the banjo nut and tube due to the back pressure of water exiting the group valves discharge.

Important! - Before proceeding with solution 3, the following steps must be accomplished.

1. Turn off the main water supply to the machine.
2. Locate the expansion valve in the drain box.
3. Turn the barrel of the expansion valve counter-clockwise to releive pressure in the front boiler.
4. When the lower portion of the gauge reads 0 bar, you may proceed.

1. Remove the machines top panel.
2. Remove the three 6mm allen head screws that secure the group cap to the group.
3. Gently pry the group cap from the group head.
4. Using a 24mm socket, remove the banjo nut.
5. Clean any compacted coffee from the banjo nut and set aside.
6. Using a 17mm wrench, remove the group valve discharge fitting from banjo tube inlet.
7. Using a 20mm wrench, remove the nut securing the banjo tube to the group.
8. Remove the banjo tube and remove any compacted coffee using a stiff but flexible wire.
9. Reassemble the group and check for proper operation.

La Marzocco FB-70 and Swift Grinder.
Installation Guidelines



All Electrical and Plumbing Must meet Local Codes
Please Refer to Specification Sheets for Your Machine

FRANKE

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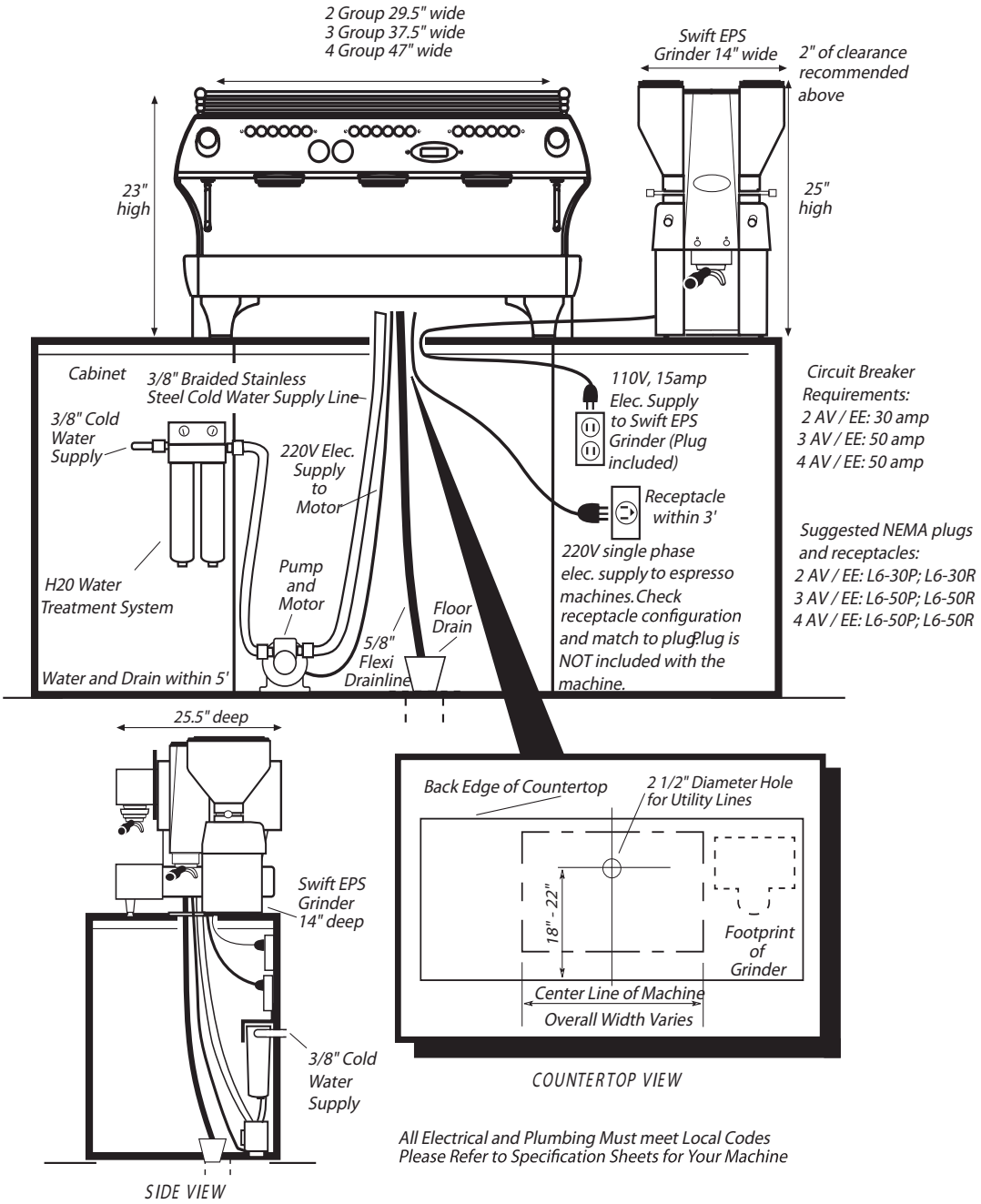
www.franke-cs.com

La Marzocco FB-80 and Swift Grinder.
Installation Guidelines



All Electrical and Plumbing Must meet Local Codes
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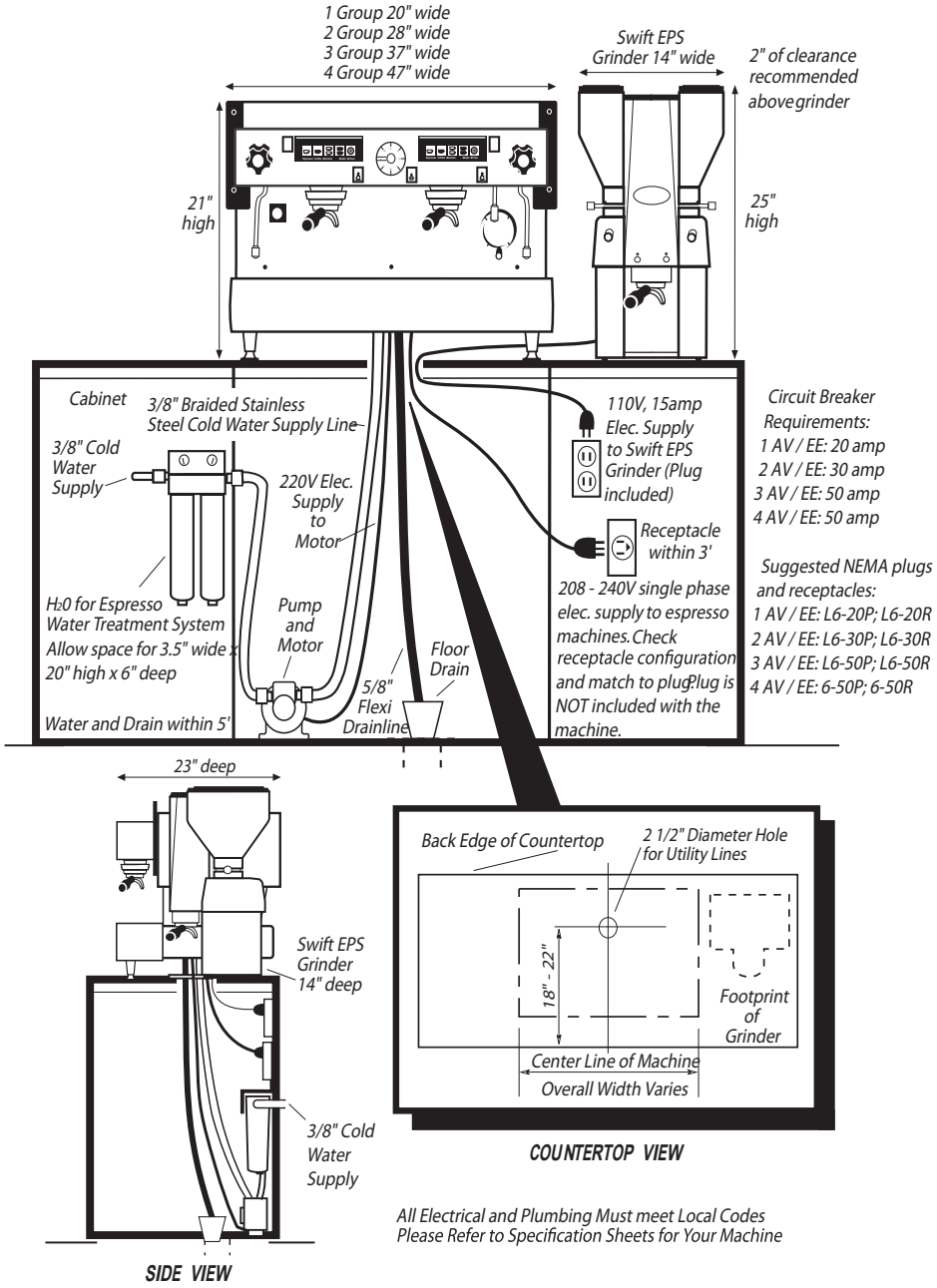
La Marzocco Linea and Swift Grinder.
Installation Guidelines



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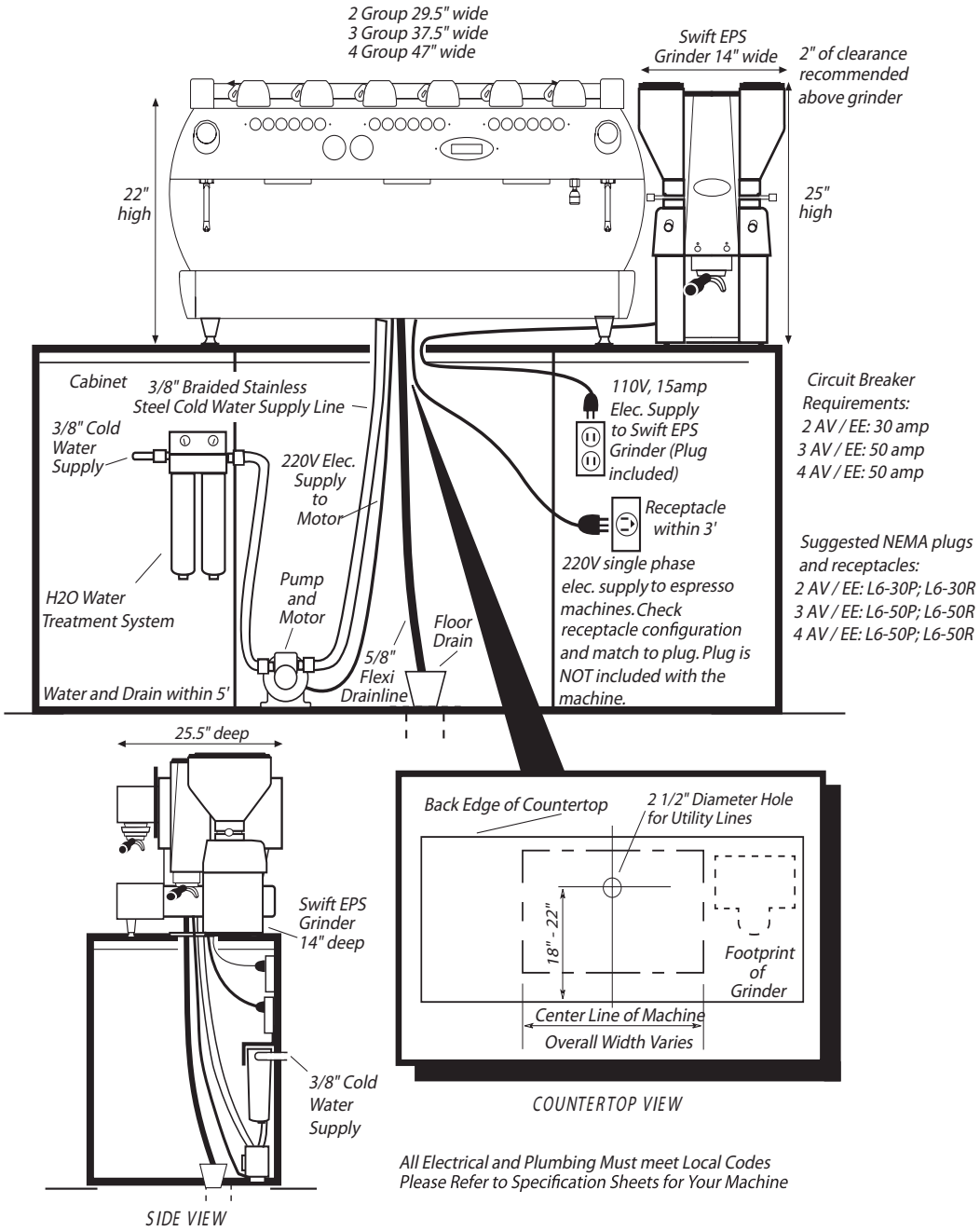
La Marzocco GB-5 and Swift Grinder.
Installation Guidelines



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PRE-INSTALLATION CHECKLIST

La Marzocco Linea 3-Group Espresso Machine (3AV, 3EE)

*****See also: Installation Guidelines diagram*****

LOCATION: **INSTALLER / PHONE NUMBER:**

The following onsite requirements must be ready prior to the arrival of the equipment installer. Please check each box and obtain the store manager's signature verifying that all requirements have been met.

**The installer will be notified of a tentative date for this upcoming installation.*

**Franke Coffee Systems is not financially responsible for trips to sites that do not meet pre-installation requirements.*

Electrical Requirements

- ☐ 208–240 volt, 50/60 hz, single phase power on its own 50 amp circuit breaker
- ☐ An L6-50R amp receptacle within 3' of the machine's installation location with matching plug (L6-50P) as one is not supplied with the machine
- ☐ Power is operational

Plumbing Requirements

- ☐ 3/8" cold water supply with shutoff valve within 5' of machine's installation location
- ☐ Water supply is operational
- ☐ Floor drain in place within 5' of machine
  A 5/8" flexi drain line is included with the machine
- ☐ Appropriate water filtration connected and active –
  Water must be softened to a maximum 3 - 5 grain hardness level

Height, Width, and Depth Requirements

- ☐ Machine is 37"W x 20.5"H x 21"D
- ☐ Minimum 5" of clearance above the grinders

Countertop Requirements

- ☐ 2 ½" diameter hole for utility lines drilled into countertop beneath machine's installation location

Additional Requirements

- ☐ Coffee and milk onsite

Store Manager's Signature:_____ **Date:**_____

Print Name:_____

*****If machine is shipped to store, DO NOT UNPACK*****

Machine should only be unpacked by installer at time of installation, as many small parts are included inside box

Recommended Periodic Maintenance Schedule

At 3 Months

* Rebuild the steam assemblies
* Replace the portafilter gaskets
* Clean the auto-fill probe
* Ensure the shot volumes are correct
* Replace the grinder burrs
* Ensure the brew temperature is correct

At 6 Months

* Rebuild the steam assemblies
* Replace the portafilter gaskets
* Clean the auto-fill probe
* Ensure the shot volumes are correct
* Replace the grinder burrs
* Replace the portafilter baskets
* Replace the diffuser screens
* Ensure the brew temperature is correct

At 9 Months

* Rebuild the steam assemblies
* Replace the portafilter gaskets
* Clean the auto-fill probe
* Ensure the shot volumes are correct
* Replace the grinder burrs
* Ensure the brew temperature is correct

At 1 Year

* Rebuild the steam assemblies
* Replace the portafilter gaskets
* Clean the auto-fill probe
* Ensure the shot volumes are correct
* Replace the grinder burrs
* Replace the portafilter baskets
* Replace the diffuser screens
* Replace the group valve plungers
* Ensure the brew temperature is correct

Note: Grinder burrs should be replaced based on coffee volume.

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COFFEE SYSTEMS

Linea and GB-5 Minor A Scheduled Maintenance Checklist

Tasks covered in the ***La Marzocco Troubleshooting Guide*** are indicated by TSG followed by the appropriate page numbers.

Maintenance to be Performed **Completed**

Replace Portafilter Gaskets ..... ☐

Rebuild Steam Assemblies..... ☐

Clean Auto-fill Probe..... ☐

Check Vacuum Breaker for Proper Operation (Tap piston down to loosen any scale build-up)..... ☐

Ensure Brew Temp is at 92C or 200F..... _____ C/F

Ensure Brew Pressure is at 9 bar ..... ☐

Check Water Hardness..... _____ GPG

(Replace softener cartridge if above 4 Grains Per Gallon)

Check grinder burrs and replace if necessary ..... ☐

(This item is to be completed upon customer approval and is billable to the customer)

Adjust Grind – Caffeinated..... ☐

Adjust Grind – Decaffeinated..... ☐

Check Dosage..... _____ Grams

Check All Switches for Proper Operation..... ☐

Check Shot Volume..... Single_____oz Dbl _____oz

Itemize any additional repairs performed during this PM visit:

1. _____

2. _____

3. _____

_____	_____	_____
Technician's Signature	**Store Manager's Signature**	**Date Service Performed**

FOR TECHNICAL ASSISTANCE, PLEASE CALL 800-310-5710

FRANKE

COFFEE
SYSTEMS

Linea and GB-5 Minor B Scheduled Maintenance Checklist

Tasks covered in the ***La Marzocco Troubleshooting Guide*** are indicated by TSG followe the appropriate page numbers.

Maintenance to be Performed **Completed**

Replace Portafilter Gaskets ..... ☐

Rebuild Steam Assemblies ..... ☐

Check Portafilter Baskets and replace if necessary ..... ☐

(This item is to be completed upon customer approval and is billable to the customer)

Replace Diffuser Screens ..... ☐

Check Vacuum Breaker ..... ☐

Clean Auto-fill Probe..... ☐

Ensure Brew Pressure is at 9 bar ..... ☐

Ensure Brew Temp is at 98C or 200F..... _____ C/F

Check Water Hardness..... _____ GPG

(Replace softener cartridge if above 4 Grains Per Gallon)

Check grinder burrs and replace if necessary ..... ☐

(This item is to be completed upon customer approval and is billable to the customer)

Adjust Grind – Caffeinated..... ☐

Adjust Grind – Decaffeinated..... ☐

Check Dosage..... _____ Grams

Check All Switches for Proper Operation..... ☐

Check Shot Volume..... Single_____oz Dbl _____

Itemize any additional repairs performed during this PM visit:

1. _____

2. _____

3. _____

_____	_____	_____
Technician's Signature	**Store Manager's Signature**	**Date Service Performed**

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COFFEE SYSTEMS

Linea and GB-5 Major A Scheduled Maintenance Checklist

Tasks covered in the ***La Marzocco Troubleshooting Guide*** are indicated by TSG followed by the appropriat page numbers.

Maintenance to be Performed **Completed**

Replace Portafilter Gaskets ..... ☐

Rebuild Steam Assemblies ..... ☐

Check Portafilter Baskets and replace if necessary ..... ☐

(This item is to be completed upon customer approval and is billable to the customer)

Replace Diffuser Screens ..... ☐

Replace Pressure Switch ..... ☐

Replace Vacuum Breaker ..... ☐

Replace Safety Valve ..... ☐

Inspect Flowmeters and Replace Impellor ..... ☐

Replace Group Valve Plungers ..... ☐

Clean Auto-fill Probe ..... ☐

Ensure Brew Temp is at 98C or 200F ..... _____ C/F

Ensure Brew Pressure is at 9 bar ..... ☐

Check Water Hardness ..... _____ GP

(Replace softener cartridge if above 4 Grains Per Gallon)

Check grinder burrs and replace if necessary ..... ☐

(This item is to be completed upon customer approval and is billable to the customer)

Adjust Grind – Caffeinated ..... ☐

Adjust Grind – Decaffeinated ..... ☐

Check Dosage ..... _____ Gra

Check All Switches for Proper Operation ..... ☐

Check Shot Volume ..... Single _____ oz Dbl _____ oz

Itemize any additional repairs performed during this PM visit:

1. _____

2. _____

3. _____

_____	_____	_____
Technician's Signature	**Store Manager's Signature**	**Date Service Performed**

LINEA PM PARTS KITS

as of 02/09/07

3 OR 9 MONTH PM

Quantity – each*	Part Number and Description		List Price
1 per group	L105/B6	6MM GROUP GASKET	$ 3.03
1 per steam wand	L165/K	STEAM VALVE REBUILD KIT #2	$ 20.63

Cost* for: 2 Group - $47.32; 3 Group - $50.35; 4 Group – $53.38

6 MONTH PM

Quantity – each*	Part Number and Description		List Price
1 per group	L105/B6	6MM GROUP GASKET	$ 3.03
1 per steam wand	L165/K	STEAM VALVE REBUILD KIT #2	$ 20.63
1 per group	L107	DIFFUSION SCREEN	$ 5.98

Cost* for: 2 Group - $59.82; 3 Group – $68.29; 4 Group - $77.30

ANNUAL PM

Quantity – each*	Part Number and Description		List Price
1 per group	L105/B6	6MM GROUP GASKET	$ 3.03
1 per steam wand	L165/K	STEAM VALVE REBUILD KIT #2	$ 20.63
1 per group	L107	DIFFUSION SCREEN	$ 5.98
1	L271	NEW STYLE PRESSUE STAT	$ 33.34
1	L190	VACUUM BREAKER	$ 21.37
1	L180	VALVE, PRESSURE SAFETY	$ 64.15
1 per group	LAD070/V	FLOW METER IMPELLOR	$ 19.32
1 per group	L100/H	PLUNGER, SOLENOID VALVE	$ 39.35
1 per group	L116/A	DOUBLE BASKET	$ 6.49

Cost* for: 2 Group - $308.46; 3 Group – $382.63; 4 Group - $465.80

*Prices subject to change. Confirm with Franke Customer Support.

GB5 PM PARTS KITS

as of 02/09/07

3 OR 9 MONTH PM

Quantity	Part Number and Description		List Price – each*
1 per group	L105/B6	6MM GROUP GASKET	$ 3.03
1 per steam wand	A.1.001.R	GB5 STEAM VALVE REBUILD KIT	$ 6.96

Cost* for: 2 Group - $19.98; 3 Group - $23.01; 4 Group - $26.04

6 MONTH PM

Quantity	Part Number and Description		List Price – each*
1 per group	L105/B6	6MM GROUP GASKET	$ 3.03
1 per steam wand	A.1.001.R	GB5 STEAM VALVE REBUILD KIT	$ 6.96
1 per group	L107	DIFFUSION SCREEN	$ 5.98

Cost* for: 2 Group - $31.94; - 3 Group - $40.95; 4 Group - $49.96

ANNUAL PM

Quantity	Part Number and Description		List Price – each*
1 per group	L105/B6	6MM GROUP GASKET	$ 3.03
1 per steam wand	A.1.001.R	GB5 STEAM VALVE REBUILD KIT	$ 6.96
1 per group	L107	DIFFUSION SCREEN	$ 5.98
1	L271	NEW STYLE PRESSUE STAT	$ 33.34
1	L190	VACUUM BREAKER	$ 21.37
1	L180	VALVE, PRESSURE SAFETY	$ 64.15
1 per group	LAD070/V	FLOW METER IMPELLOR	$ 19.32
1 per group	L100/H	PLUNGER, SOLENOID VALVE	$ 39.35

Cost* for: 2 Group - $268.24; 3 Group - $335.82; 4 Group - $403.50

*Prices subject to change. Confirm with Franke Customer Support.