



EXPOBAR

Brewtus Operating Manual



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<http://groups-beta.google.com/group/brewtus>

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Authors' Note: This manual may always be a “Work in Progress” so getting the latest version to you is important to us. Please check back often. Current version is 1.6, submitted 04/27/05.

Chapter I: Unpacking the Machine

The Brewtus is a very heavy machine, weighing in at 61 pounds. Use care in removing the Expobar box from within the shipping carton. After you have done so, turn the Expobar box upside down, open the bottom four flaps, turn the box right side up and lift the box straight up. Then lay the machine on its side and remove the top layer of molded foam. Next, carefully remove the machine from the bottom piece of molded foam. It is easier to have a second person helping during this operation as the machine is heavy and the bottom piece may stick to the machine.

Included Accessories: The accessories include are a portafilter with double spout, single shot filter basket, double shot filter basket, a plastic tamper, back flush disk, and a coffee scoop.

Chapter II: The Anatomy of the Brewtus

What's inside that gleaming exoskeleton?

1. How It All Works:

The Brewtus is a double boiler, E61 brewgroup espresso machine utilizing some very clever techniques and controls to enable 120V operation of two 1000 W boiler heaters and pump from a 15 amp service.

We hope that this section will take some of the mystery out of the things that go on inside your machine while it is operating and during idle times as well.

2. The Boilers:

The single feature that distinguishes this machine from the vast majority of other makes and models in both the commercial and home market place, is the double boiler system and how it handles the interaction between brew and steam boilers.

***Note:** Now is an excellent time to become acquainted with the schematic diagram of the plumbing of the machine on page 7 of this manual. Item numbers on the schematic will be shown as superscripts throughout this section.*

In the center of the diagram are the two 1.7L boilers; Steam⁴⁶ and Brew⁴⁷, each Boiler has a 1000W heater¹⁶ that is screwed in from the bottom of the boiler. With the exception of a heat exchanger⁴² installed in the steam boiler for brew boiler feedwater pre-heat, the construction of the two units is identical. Fittings on the boilers are BSPP thread of various sizes and consist of the following:

Brew Boiler:

- Upper feedwater from the Steam boiler HX.
- Upper supply to the Brewgroup.
- Lower return from the Brewgroup.

Steam Boiler:

- Lower inlet to HX for Brew boiler feed water from the pump.
- Lower inlet for steam boiler fill from solenoid valve.

- Lower outlet to hot water tap.
- Upper outlet from HX to brew boiler.
- Upper outlet to steam wand/Pressurestat.
- Fitting for water level sensor.²⁵
- Fitting for a vacuum break assembly.

Conditions during operation:

Idle:

- Brew boiler⁴⁷ will be completely full of water including the brewgroup³⁵ (a very slight air gap may exist in the brewgroup). Thermosyphon action will be circulating hot water from the top of the boiler into the brewgroup³⁵ where it cools and exits out the bottom pipe of the group and returns to the bottom of the boiler, pulling more hot water into the top of the group as it settles.
- The steam boiler⁴⁶ is kept half-full by virtue of the electronic level control sensor²⁸, this allows sufficient steam for frothing and ~ 760ml of water for the hot water tap. Boiler pressure is regulated at 1.2Bar by the pressurestat³¹ and the HX⁴² is full of feedwater for the brew boiler. The vacuum break²³ is held closed by the steam pressure and will emit a slight hissing sound during warm-up only.

Brew:

- The Pump³ maintains 9Bar of pressure through the HX⁴² in the steam boiler⁴⁶ where the feedwater is pre-heated and then routed to the top of the brew boiler⁴⁷ that is also maintained at 9Bar during brew. This water flows out of the brew boiler to the brewgroup³⁵ and then out of the machine into the drip pan.
- The steam boiler⁴⁶ will drop in temperature during brewing due to the cooling effects of the incoming feedwater in the HX⁴². This cooling action will most likely cause the pressurestat³¹ to call for steam boiler heat^{16/46}; when this happens, the heat to the brew boiler^{16/47} is put in standby until 1.2Bar is reached.
- The solenoid valve¹¹ is not activated at this time.

Steam boiler details:

- The steam boiler⁴⁶ will automatically refill itself when the water level drops below the bottom of the level sensor²⁸. When this happens, the control module (not pictured) will activate the pump³ and the solenoid valve¹¹ to fill the steam boiler⁴⁶. The water will flow into the steam boiler⁴⁶ by virtue of the fact that the brew boiler⁴⁷ circuit is already filled with water; forcing the water to flow into the steam boiler until it reaches the level sensor²⁸.
- The safety relief³⁷ opens at approximately 1.8Bar
- The vacuum break²³ is a valve that is held closed by boiler pressure, it will hiss during warm-up until enough pressure is built up to hold it closed. This valve prevents pump operation issues and also prevents generation of a vacuum in the steam boiler⁴⁶. A vacuum can draw contaminated water

back into the boiler in the event that either the steam wand³⁶ or the water wand³⁴ are left submerged in pitchers of water/milk when the machine is turned off.

3. The Pump:

The “pump” consists of three distinct components:

- A 41watt Ulka or 50watt CEME vibe pump³
- A de-aeration valve⁴⁵ to reduce the incidence of air bubbles in the pump output.
- An Over-Pressure-Valve or OPV⁵ that regulates the system brew pressure.

Some machines have shipped with an Ulka pump and others have the original CEME version. Both pumps are fine units and should give years of trouble-free service. The pump³ inlet line is connected to a water softener³⁹ that is at the end of the intake hose. As the water leaves the pump³, it passes through a de-aeration valve⁴⁵ that removes the air bubbles that may be present in the water. The de-aeration valve⁴⁵ is essentially a port with a very fine opening that allows air to pass easily, but presents a difficult path for water to pass. This port is vented back to the water reservoir³⁸ for recovery of the water that does pass through the port. After the water passes the de-aeration valve it comes to the OPV⁵, this valve uses an adjustable, spring-loaded ball that opens when a pre-set pressure is exceeded. When the ball opens, the excess pressure (water) is vented back to the water reservoir³⁸ until the pressure lowers to the pre-set value. At times, this process of open-close can cause slight “moaning” noises, this is not detrimental, just noisy. Incorporated into the outlet of the OPV is a one-way check valve⁴⁴, this valve prevents water backflow through the pump assembly.

4. The Electronics:

Temperature control

Temperature control of the brew boiler is maintained by a digital on/off type control. The control is a 2-digit display unit set for readout in degrees Celsius with adjustments to brew temperature in 1 degree increments. Temperature sensing is via a proprietary sensor that is inserted into a thermowell in the brew boiler and which is held in place with thermally conductive paste.

Programmed into the control is an offset between the measured boiler temperature and the displayed value on the control; this compensates for the temperature difference between the boiler and the brewgroup. Displayed value should reflect the temperature of the brewgroup.

System Control, A.K.A “The Brain Box”:

Control of the overall system is performed by a small black box mounted behind the front panel, just below the temperature controller. This controller coordinates the automatic refilling of the steam boiler and the logic required for switching the pump on during brewing.

Inputs to this unit are:

- The spring-loaded switch under the reservoir for detection of an empty reservoir.
- The microswitch for the pump. (behind the brew handle)
- The level sensor in the steam boiler.

Outputs from this unit are:

- The pump.
- Heater power for the boilers.
- Solenoid valve control.

The heaters:

The heater control for the machine is actually very straightforward. The steam boiler has priority in this system and that prioritizing is performed via the pressurestat. Overall, the switch on the platform for the reservoir controls power to the boilers. This power is then routed to the pressurestat where the steam boiler is assigned priority by the SPST switch on the pressurestat.

- When the steam pressure is below ~1.1Bar, the pressurestat switches power to the steam boiler heater through the safety thermostat (steam).
- When the pressure is above ~1.2Bar, the power is routed to the brew temperature controller and then through the safety thermostat (brew) and brew boiler heater.

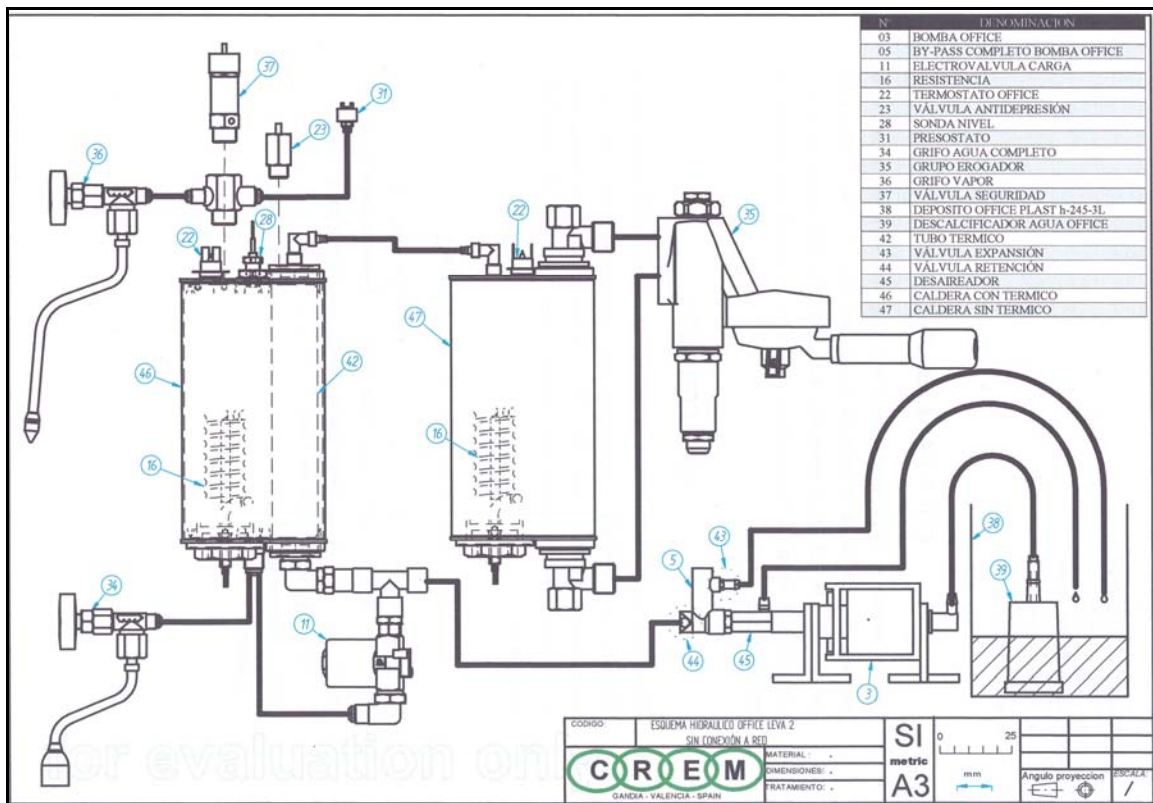
IMPORTANT:

It is possible to for the light for the steam boiler to be on at the same time that the digital temperature controller is calling for heat (small LED in the upper left hand corner of the display); keep in mind, that although the temperature controller is calling for heat, all power switching for boiler priority is done at the pressurestat and the display only reflects a “request” for heat in the brew boiler.

Notes:

- a. The control can be programmed to read in degrees Fahrenheit but due to the 2 digit display limitation; it will display an E1 (out of range) error when the display rolls from 99 to 100; this will also occur if the temperature exceeds 100 degrees Celsius at any time. Normal operation will resume once the temperature displayed drops below the “100” value.
- b. Programming information for the controller can be found in Appendix A on page 26 of this manual.

Schematic of the Internal Parts of the Brewtus

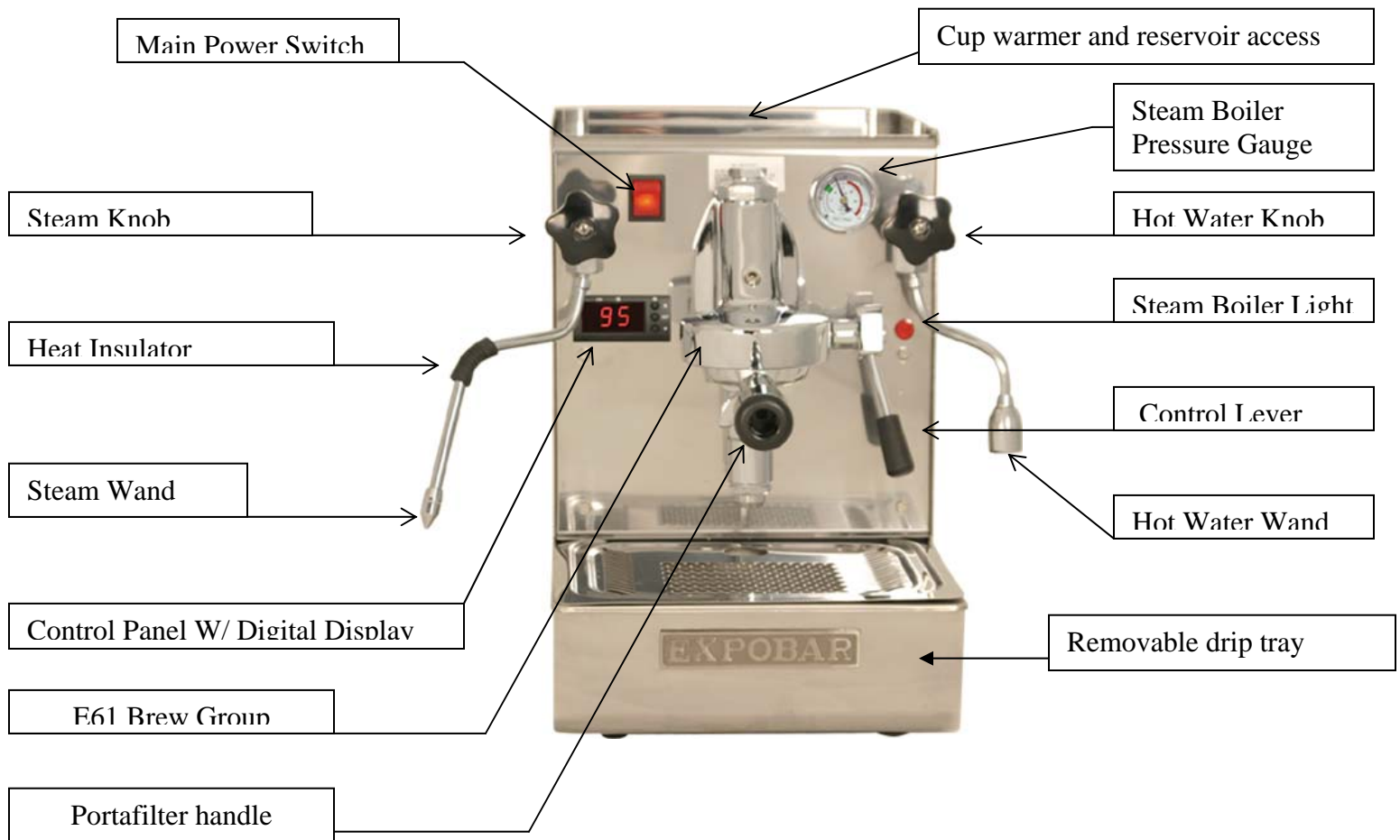


To zoom in, hold down your CTRL key and move the scroll wheel on your mouse

Nomenclature Translation:

- 03 Pump Housing
- 05 Complete Pump Bypass Housing & OVP Valve
- 11 Charged Electrical Valve
- 16 Resistance Heater Coil
- 22 Thermostat Housing
- 23 Relief Valve
- 28 Water Level Control Sensor Valve
- 31 Pressure Gauge
- 34 Water Faucet Assembly
- 35 Brewgroup Assembly
- 36 Steam Faucet Assembly
- 37 Safety Valve
- 38 Plastic Water Reservoir
- 39 Water Softener Orifice
- 42 Thermal Pipe
- 43 Expansion Valve
- 44 Retention Valve
- 45 De-aeration Valve
- 46 Boiler with Thermal Sensor
- 47 Boiler Without Thermal Sensor

Description of the controls



Identifying the Important Features of the Machine

Control Lever: The control lever on the front of the machine controls a valve inside of the brewgroup and controls the pump for brewing. The lever has three positions: up, middle and down.

1. Up: When the lever is in the up position, the pump turns on for brewing and the valve inside the brewgroup opens and allows water to flow under pressure onto the coffee grounds.
2. Middle: When in the middle position, the pump is turned off but the pressure in the brewgroup has not been released. *Do not attempt to remove the portafilter yet!*
3. Down: When in the down position, any pressure left in the group is released and deposited into the drip tray through the bottom of the brewgroup. **Important: Always move the lever to the full down position before removing the portafilter handle from the brewgroup!**

Main Power Switch: The main power switch is the red-lighted switch on the top left side of the front of the machine. When the switch is engaged, the machine will automatically begin the heating up cycle.

Steam Boiler Light: This is the round red light on the right of the machine. It will turn on whenever the heating element in the steam boiler is on. It is perfectly normal for this light to turn on or off without any discernable pattern.

Pressure Gauge: The pressure gauge shows the amount of pressure inside the steam boiler. The pressure comes pre-set from the factory at around 1.2 Bar. This is the proper steam boiler pressure and there should be no needs to make any adjustments. The needle will go down during steaming but will quickly rise up as the steam boiler element is activated.

Steam Knob: When this knob is turned counter clockwise, the steam valve is opened and high-pressure steam will exit through the steam wand.

Hot Water Knob: When this knob is turned counter clockwise, steam and hot water will exit through the hot water wand. **Note: Use caution when using this function as boiling water exiting the wand can cause painful burns.**

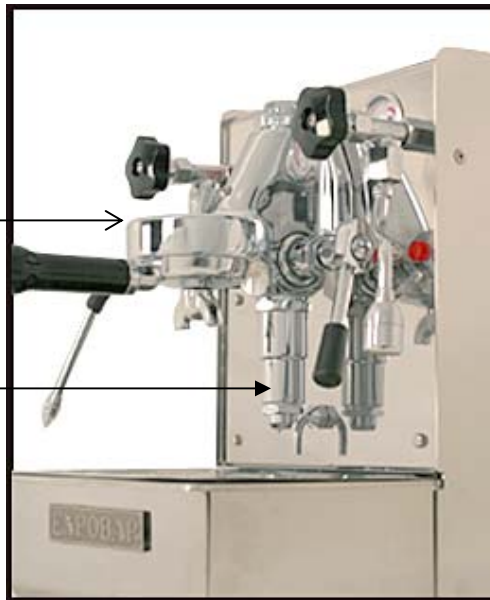
Steam Wand: Always use caution while steaming and frothing milk as the wand will become very hot. When adjusting the position of the wand, only grip the black rubber insulator.

E61 Brew Group:

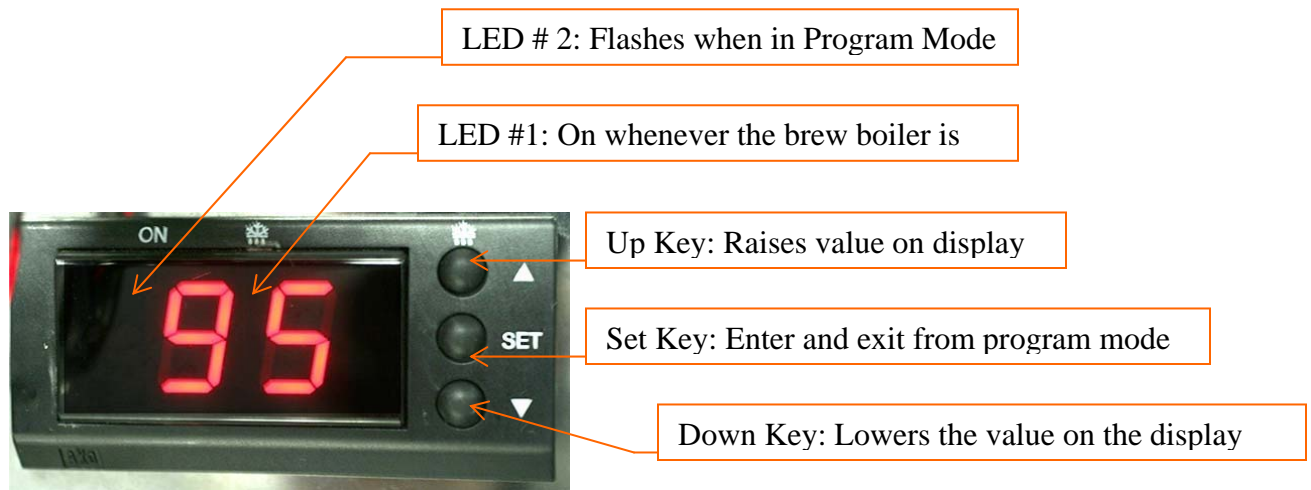
The brew group will become very hot so always use caution while working with the machine.

E61 Brew Group Very Hot

Water exits here when lever in the down position.



Control Panel with Digital Display:



This electronic controller is designed to monitor, control and regulate the temperature of the brewing boiler only. All temperature is in Celsius.

It has no control over the steam boiler. It has two functions; it will display the current temperature inside the brewing boiler and will be used to adjust the temperature of the brewing boiler only. We recommend brewing between 95 and 96 Degrees C.

Display functions: All temperature readings are in Celsius. It has no control over the steam boiler whatsoever.

1. On start up, the digital display will show the current temperature inside the boiler and the LED will illuminate when the boiler is on. You will see the temperature numbers change as the boiler is heating.
2. When the boiler reaches the set temperature the LED will go out. When the boiler cycles on again, the LED will illuminate.

Note: The steam boiler is the first to heat and will take about eight to ten minutes and then the brewing boiler will turn on. Both boilers will not operate at the same time.

Programming the Brewing Boiler Temperature: When you want to change the temperature of the brewing boiler, please follow the next set of instructions:

1. Push and hold the “Set Key” until the second smaller LED starts flashing.
2. Push the “Up Key” or the “Down Key” until the desired temperature is displayed.
3. Push and release the “Set Key” to accept the new temperature setting.

Celsius	89	90	91	92	93	94	95	96	97
Fahrenheit	192.2	194	195.8	197.6	199.4	201.2	203	204.8	206.6

Steam Boiler Adjustments: We do not recommend attempting any adjustments to the steam boiler. It is set for 1.2 Bar, which works very well with the Brewtus.

Chapter III: Preparing the Machine for Start Up

1. Remove the white protective covering from all parts of the machine,
2. Remove reservoir from inside of the top of the machine and wash it out with warm soapy water and be sure to rinse well.
3. Fill the Reservoir with water and place it back in the machine. Make sure the plastic tubes are placed back into the reservoir and are not pinched anywhere.
Note: Do not use water that has had all the minerals removed, e.g., distilled water. Minerals are necessary for the sensors in the boilers to work properly.
4. Plug the machine into an outlet that matches the three-pronged plug on the cord. The machine must be grounded! If you have any questions regarding this, call Tech Support at 888-411-5282 before proceeding further.
5. Turn on the main power switch and lift the lever on the brewgroup to the top position to start the pump and fill both the main brew boiler and the steam boiler, both of which have a 1.7-liter capacity. Leave the lever in this position until there is a steady stream of water coming out of the brewgroup.
6. Look into the reservoir to see if the water level is lowering as the boilers fill. If the water is not lowering, the pump is having a difficult time priming. Turn off the machine and call us at the phone number given above for further instructions.
7. If the boilers filled and this step was successful, move the lever down to the neutral or middle position and let the machine heat up—about 20 minutes.
Important: Now you must refill the reservoir, as it will be critically low.
8. Always leave the empty portafilter in the brewgroup so that it will always be hot and ready for use.

NOTES:

Chapter IV: Understanding Water Quality and the Water Softener

Defining Water hardness: Water hardness often is expressed as milligrams of hardness per liter of water (mg/L). **Table I**, adapted from the Water Quality Association (WQA), shows hardness classifications. Hardness ions are typically combined with sulfate, chloride, carbonate, or bicarbonate ions. For consistency, concentrations are generally converted to the equivalent concentration as calcium carbonate (CaCO_3) and expressed in terms of hardness as calcium carbonate.

Table I. Classification of water hardness (hardness as calcium carbonate).

Classification	mg/l or ppm	grains/gal
Soft	0 – 17.1	0 – 1
Slightly hard	17.1 – 60	1 – 3.5
Moderately hard	60 – 120	3.5 – 7.0
Hard	120 – 180	7.0 – 10.5
Very Hard	180 & over	10.5 & over

For our purposes here, it will suffice if you understand that dissolved calcium and magnesium salts are primarily responsible for most scaling in pipes, water heaters as well as espresso boilers. Hardness is usually expressed in grains per gallon (or ppm) as calcium carbonate equivalent. However, because we are dealing with very small quantities of water for our purposes, our reference should always be made in parts per million or ppm.

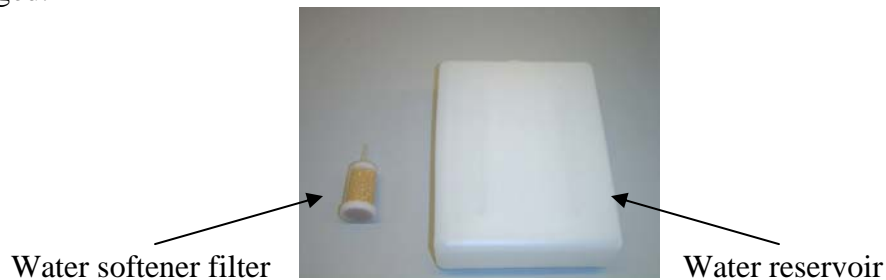
It is important to have your water tested if you intend to use tap water in the reservoir of your espresso machine to brew coffee. Tap water, it should be noted, may also have chlorine, ozone and/or sulphur as well as numerous other chemicals that can adversely affect the taste of your coffee. Thus, you may ultimately prefer bottled water or water from your own filtering system or device.

A typical home water purification system uses a prefilter to remove particulates, then a reverse osmosis filter, and a final filter, which contains a solid block carbon (charcoal) filter. This type of system removes nearly all of the priority pollutants as well as bacteria. They are widely available from various companies listed in your local Yellow Pages. Generally, a dedicated water faucet is installed on the sink from which to draw the purified water. A line can also be run to the refrigerator water dispenser. These systems condition the water admirably and samples will typically test between 25 and 50ppm hardness. The downside is that they are costly and can run upwards of \$500.

To have a sample of water tested for hardness, use a clean well-rinsed screw-top container and take the sample in to your nearest swimming pool supply store. They will usually perform a hardness test free of charge.

Note: Many manufacturers of coffee machines recommend you use distilled water in their machines. The Brewtus is an exception because the dissolved salts enable the boiler sensors to do their job.

The Brewtus comes with a convenient water softener that will help keep damaging minerals out the boilers. There is nothing that has to be done on initial start up to get the water softener ready for use. After 3 months of use it is recommended that it be recharged.



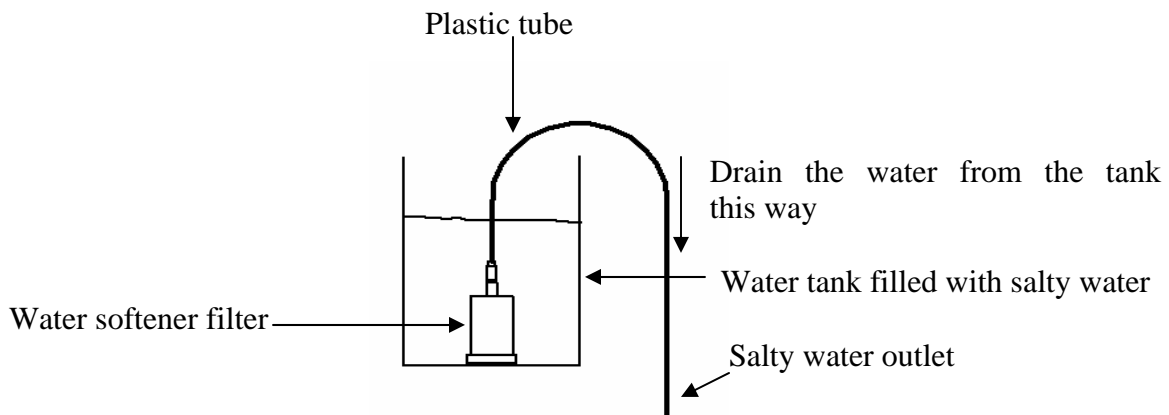
Recharging Instructions:

- a) Fill the water reservoir.
- b) Pour in 3 big spoons of salt.
- c) Stir the salt into the water.
- d) Insert the water softener filter inside the reservoir.
- e) Drain the water from the reservoir through the water softener filter.

To drain the water from the reservoir:

- Place the plastic tube as it is indicated.
- Suck in the tube until it fills with water.
- Press your finger over the inlet from the tube in order to avoid any air.
- While the tube is being pressed, place the inlet from the tube downwards (as indicated). Wait until the reservoir is completely empty.

Once the water reservoir is empty, fill it again with water (without salt) and repeat the process, in order to clean the water softener filter.



<i>Liters of softened water, depending on its hardness</i> (In French Degrees)						Salt
Water Hardness	20	30	40	60	80	Grams
Maximum Volume of water softened by filter	11	9	8	7	5	300

*Now you are ready to proceed to **Chapter V: Brewing and Operating Techniques**.*

Let the fun begin!

Chapter V: Brewing and Operating Techniques

Getting Ready to Brew: After you have pulled about four “blank” shots to clean and normalize the machine, please be sure to refill the reservoir. A blank shot is simply a shot without grounds in the basket. Now you are ready to pull your first real shot of espresso! As you work through the following steps while learning to use your new machine and calibrating your grinder, you may use up to a pound of coffee so be sure you have plenty of the very same kind on hand.

To answer the age-old question of why Italian coffee is so amazing, Paul Bennett from Bon Appetit magazine asked Luca Vizzini, the head barista at Tazza d’Oro in Rome the same question. He says it is three *m*’s: miscela (the mixture of coffee; usually four or five beans), macchina (the machine), and mano (the preparation, ideally by someone who understands “the art of espresso”).

The entire theory of the extraction process for our purposes here can be summarized in four words: **Temperature, Grind, Dose and Tamp**. As each of these factors constitutes a variable, it is therefore vitally important to gain complete control of the techniques required of each. Thankfully, with a little practice and understanding they are not difficult to master.

Temperature: Perhaps the primary reason aficionados decide to purchase the Expobar Brewtus, is its remarkable ability to maintain the exact temperature in the boilers and brewgroup required for perfect extraction, thus virtually eliminating temperature from the list, though it is the most critical factor of all. Other machines require the seasoned barista to perform a series of quick manipulations, sometimes called “temperature surfing”, to achieve the desired brewhead temperature. The Brewtus does it all for you electronically and in combination with the E61 brewgroup which circulates the hot water through brewing head surrounding the portafilter and basket. There is nothing to forget to do or anything left to chance. Moreover, any guesswork is eliminated with the digital heat gauge and the boiler pressure gauge for both the steam and hot water wands.

Grinding and Dosing: The following set of instructions begins with the assumption you will be grinding and dosing directly into the filter basket by itself (or into a spare one, or some other small container, which you can then dump into the actual one). During the grinding step, the portafilter handle can remain in the brewgroup to maintain its heat.

However, if at first you choose to fill the basket while it is seated in the portafilter handle, remove the handle from the group, dry the basket and dose and tamp as quickly as possible. Then return the handle to the brewgroup immediately so it does not lose too much precious heat!

Of the four variables, temp, grind/dose and tamp, the grind/dose step is the process many people find the most vexing. The object here is to grind exactly 14 grams into the double filter basket. However, the problems that frequently occur with nearly all grinders are the effects of temperature, humidity, freshness, roast and variety of the beans as well as the

selected fineness of the setting. The finest settings may create a powdery grind, which produces tiny balls or causes the grinds to stick in the chute or doser. Worse, too fine a grind may prevent the water from penetrating the puck at all.

On the other hand, too coarse a grind adversely affects shot quality and diminishes the amount of the desired crema and flavor. The only solution is to experiment to determine which settings are the right ones for your grinder, beans and ambient conditions. Bear in mind the grind should most often imitate very fine sand, not a silky powder.

Tip: While standard food scales tend to be inexact as well as bulky, there is another class of scales known as pocket scales. These tiny precision wonders are usually accurate to $\pm 1/10^{\text{th}}$ of a gram. Some people will put the basket on the scale's platform and for every shot grind 14 grams directly into it, then transfer it to the handle, which has been heating in the group head. Others fill a small container on the scale and then fill the heated basket.

Note: If you elect to dose into the basket itself each time then you will have to contend with the issue of the spring in the portafilter, which holds the basket very tightly in place. It will need to be adjusted for tension or removed entirely to use this method successfully. Thus, grinding directly into the basket in the handle without removing it, and then tamping, may work the best for you—but be sure to work quickly so heat is not lost.

Still another option is to weigh each dose until the grinder is properly calibrated for the dose amount. You will have to do this often with changes in the weather, grind setting or different batches of roasted beans. In the end, many people simply learn to determine what a reasonable approximation of what 14 grams looks like in the basket. With practice, this method can become surprisingly accurate.

Others like to overfill the basket and use a straight edge to level off before tamping. This, however, is quite messy and surely a waste of good coffee and does not necessarily assure an accurate dose.

It is important to remember that consistency with each step builds a professional foundation of accuracy, so choose a routine you like and stay with it.

Tamping: Much has been written about this subject and its importance. The David Schomer method seems to be the most widely adopted tamping method. Quite simply, it involves distributing the grounds in north, south, east and west directions with the finger until they are level and even but with a slight indentation or well in the center. Then a 30 to 40 pound tamp is delivered straight down with a twisting motion. After carefully removing the tamper, lightly tap the side of the filter or basket with the tamper to dislodge any loose grounds. Tamp and polish again. Sometimes three tamps may be required. To test your tamp pressure, practice with a bathroom scale.

Now you are ready to return the basket or filter handle to the brew head and begin your shot. If you have done the tamp step correctly you have successfully minimized the

negative effects of another variable. The good news is the Brewtus is about to help you with your tamp also, thanks to its ability to pre-infuse the grounds with hot water.

Progressive Coffee Infusion: the Brewtus's specialized brewing system enables a smoother delivery of the pressurized hot water to the grounds in the basket in order to moisten them before the full force of the hot water hits them. This is a unique ability among machines and it effectively eliminates channeling or pinholes in the puck that are responsible for weak shots with very little crema.

Brewing: Okay, without further ado, it is time to pull the perfect shot! First, move the lever to full up position and let the pump run about 2 to 4 ounces of water through the empty portafilter basket and handle into the cup you plan to use. This step pre-heats the cup and also brings the brewgroup up to temperature if it has been sitting idle for a while. Do not forget to move the lever to the fully lowered position before you remove the handle to release any pressure and/or water. Quickly dry the surface of the basket with a towel and grind, dose and fill the basket. Tamp as described above. Now return the handle to the brewgroup and tighten it by moving the handle to the right or counterclockwise.

Next, if your cup has cooled you can refill it with hot water from the wand on the right, being mindful that it is also under pressure and can scald the skin if you open it too quickly.

Now is a good time to do a quick cleanup of any spilled grounds, wet spots on the counter, and take out your milk and pitcher from the fridge if you intend to froth for a cappuccino. A cold pitcher and cold milk create the best microfoam.

Zero your timer, empty the hot water from the cup into the drip tray and center it under the spout. Now simultaneously hit the timer's start button and move the lever up to the brew position and the pump will turn on. In a few seconds, the brew should emerge from the spout hesitatingly in long strings, turning to a light chestnut color as it becomes crema. Timing your shot, it should take 23 to 28 seconds to produce a double espresso shot of 2 to 2.5 ounces. Now, to end the shot, immediately move the lever to the full downward position! The heat and water pressure are instantly relieved in the brewhead and excess water pours down the drainpipe into the drip tray.

If you are now looking at a beautiful head of golden crema sitting atop your brew, everything went according to plan. Excellent! Great job! If not, you may need to adjust one or both of the two variables of the grind/dose or tamp steps. Be patient as it often takes a half dozen or so attempts before you get all the factors working together just right.

Important: NEVER attempt to remove the portafilter handle without relieving the pressure or you may get a mild scalding as well as blow wet grounds onto your work area. Also, forgetting to relieve the pressure by putting the lever in the full down position and only lowering it to the middle position, just to where the pump stops, will cause excess brewing water to drip into your cup and turn your double espresso into an

Americano. This is still a very nice drink but not what you intended here. This is a very common mistake with new lever machine users. This writer actually developed a liking for Americanos by making this mistake three times in a row over two days!

At this point, feel free to enjoy your double espresso and come back later to do the few minor points of cleanup which will be discussed next. However, if you are making a cappuccino, let's move on...

Frothing: Much has been written about the subject of frothing when actually it is the easiest part of the brewing ritual. The main factors to successful frothing are: 1) Use the correct sized pitcher and fill it no more than a third full as the milk will triple in volume. 2) Chill or freeze the pitcher and use very cold milk. 3) Use a frothing thermometer until you learn to “feel the heat” in the pitcher.

There are two techniques that are commonly used to froth, but first point the steam wand into the drip tray and open the valve slightly to release any watery steam. You want pure steam vapor.

The first technique involves inserting the steam tip just off-center and barely under the surface of the milk to circulate it and create foam. Do this until the thermometer reaches 100 degrees. Then bury the wand to about 1/8th of an inch from the bottom and tilt the pitcher slightly to create a vortex in the milk. Continue until the milk reaches a temp of 155 to 160 degrees, but no higher or you will scorch the milk. The pitcher should now contain froth up to the brim.

The second technique is just the opposite in that you begin with the wand near the bottom of the pitcher and as the thermometer rises to 100 degrees, you very slowly bring the wand up to the surface, always maintaining the vortex. This is called “stretching”.

After you have finished frothing and set the pitcher down, immediately take a wet cloth or small scouring pad and clean the drying milk from the wand. Point the wand into the drip tray again and open the valve briefly to clear the tip of dried milk.

One final note—do you pour or may you spoon the foam into the cup? The vast majority of home baristas admit to using a spoon most of the time. The professional baristas insist pouring is the only acceptable method. If your pitcher contains near-perfect microfoam, then by all means, learn to pour and thus you will have taken the first step to learning latte art.

The Quick and Final Cleanup: You left the lever in the full down position after pulling your shot, so remove your portafilter handle and give it a tap on the knock box. The dry puck should fall out leaving a clean basket, requiring only a quick wipe with a bar rag or paper towel. Next move the lever up to brew for a couple of seconds to rinse any residue off the shower screen with hot water and then give it a wipe.

After you empty the drip tray, please do not forget to check and fill the reservoir. Incorporating this step into your cleanup routine at this time will avoid the inconvenience of the Brewtus shutting itself down to protect an empty boiler.

The Best Advice: The best advice you will ever receive is “*Practice consistency!*” Create a step by step brewing routine and maintain it until it becomes second nature. Polish and perfect each individual step within your routine and in no time at all, you will be serving the best coffee drinks money can buy. That is a guarantee!

Chapter VI: Machine Maintenance

Don't forget to wash out the reservoir with hot water and liquid detergent occasionally. Cleaning the brew head is necessary in order to maintain the quality of flavor you expect and are accustomed to with your new Brewtus. There are three different processes used to thoroughly clean the machine: 1) Backflushing with water only, 2) backflushing with a specialized cleaner and 3) removing the shower screen for cleaning by hand.

Under normal household conditions, it is recommended you backflush with water only about every ten to 14 days to remove any grinds or sediment buildup within the brewgroup and the water lines.

Using a recommended product, such as *Urnex® Cafiza Espresso Machine Cleaner*, you should backflush about six times a year.

We also recommend you remove the shower screen, inspect and clean it as well as the brewgroup behind the screen. Do this inside cleaning as often as you feel it is necessary after inspecting it during the regular cleaning intervals.

Next, to prepare for a backflush cycle, your machine must be up to brew temperature and pressure. ***Important:*** Please make sure your drip tray is clean and empty.

The Water-Only Backflush:

1. Install the single shot filter basket in the portafilter and place the rubber backflush disc in the filter basket with the nipple side facing up.
2. Raise the control lever up to the brew position for 5 to 10 seconds. Listen carefully to the pump. You will notice an audible decrease in water volume as the machine pressurizes.
3. Turn the lever to the full down position to release the pressure. You will notice an immediate stream of pressurized backflush water jetting into the drip tray. Now check the water in the tray. Is it dirty or does it contain particles? If so, repeat the process until the released water runs out clean.

The Backflush with Cleaner: The recommended maintenance interval for backflushing with a cleaner is six times a year under normal usage. WLL prefers *Urnex® Cafiza* as it

gives excellent results and is easy to use. Simply add ½ teaspoon of *Cafiza* cleaner to the blind filter basket or backflush disc and follow the exact same procedure as above. It may take five cycles or more to completely clean the machine. Thereafter, rinse the brewgroup thoroughly and backflush four times without any cleaner. Repeat until you are absolutely sure that no cleaner remains in the system.

Cleaning the Brewgroup by Hand: Wait until the machine is cold to avoid burns!

1. First remove the shower screen under the brew head. Using a flat head screwdriver, wiggle the screen out as it is a press fit. Work it a little on one side, then the other. Both the screen and gasket will come out together.
2. Separate the screen from the gasket as the cleaning solution can damage plastic and rubber parts. **Note:** Remember what side of the gasket faces up.
3. Mix up a solution of *Urnex® Cafiza Espresso Machine Cleaner* and very hot water in a container. Use 2 tablespoons of cleaner but only fill the container halfway as it will foam up.
4. Soak the shower screen, shot baskets and portafilter head in the solution for about ten minutes. **Note:** It is important that the plastic handle of the portafilter does not contact the solution or it will permanently mark it.
5. After cleaning thoroughly, rinse all parts well with fresh clean water.
6. Reassemble in reverse order and brew yourself a wonderful shot of espresso.

Cleaning the Housing: When the surfaces are cool, you may use a special stainless steel cleaner or polish with a soft cloth. Never use anything abrasive or it will scratch. For stubborn stains, try some Windex but the surface must be cool.

Chapter VII: Check List of Accessories and Essentials

1. The little plastic **tampers** that are usually included with new espresso machines are definitely not up to the job. Solid, high quality tampers come in many shapes, weights and styles. The Espro tamper is a training device which delivers an exact 30 pound tamp. The Brewtus requires a 58 mm tamper. Prevailing wisdom says spend a little more and get the very best because you may be using it a thousand times a year or more.
2. A **timer** is essential for brewing the perfect 28 second shot. Polder makes a good one for about \$12.95.
3. A **knock box** is generally considered an essential item for the home barista. It sits next to the machine and is the receptacle for spent pucks. It prevents messy drips and trips to the sink.
4. **Brushes** are also essentials. A stiff round brush is used to clean the gasket around the rim of the brew head and the burrs in your grinder. Flat brushes are useful for cleaning spilled grounds from around your grinder.
5. **Stainless steel pitchers** are used for frothing milk and pouring latte art. Choose one that is three times the volume of the milk you will use to allow for the expansion of the foam. A 400ml/1.3 cup size is sufficient for two or three cappas.
6. A **graduated beaker** is very handy for measuring liquids in both metric and American equivalents. These can be purchased through science and medical supply stores as well as some of the larger hobby shops.

7. A **frothing thermometer** is most handy for learning the technique of foaming milk. You need to learn the 100 and 160 degree points and with practice, you will know by touch when they are reached.
8. **Espresso machine cleaners** are also essential. Use *Urnex® Cafiza* or its equivalent for best results. Do not use dish washing detergents as they may contain fragrances and fillers and are not suited to the task.
9. Invest in a bundle of **terry cloth bar mops**. Making espresso drinks can be a bit messy, especially in the beginning. Wives may soon become overly protective of their tea towels.
10. **Pocket scales** are excellent devices for weighing doses and calibrating the grinder. Food scales are not as accurate, are bulkier and can cost more.
11. A medium **funnel** with at least a 1-cup capacity is very convenient for filling the reservoir and preventing water spills into the depths of the machine.

Chapter VIII: Trouble Shooting

1. *The machine does not turn on:* Make sure the power is turned on and the machine is plugged in. Also, check ground fault interrupter which is the small button on the outlet receptacle.
2. *Coffee exits the portafilter too quickly:* The grind should probably be finer or the coffee may be old and dry. Also, measure the force of your tamp to be sure you are in the 30 pound range.
3. *Coffee comes out too slowly:* Too fine a grind and/or too hard a tamp. Also, make sure reservoir is full and/or clean the brewgroup as described Chapter VI.
4. *Coffee is not hot enough:* Make sure the cup and all brewing components are preheated as described in Chapter V.
5. *Pump runs but does not produce a head of water:* The pump may need priming. Call Whole Latte Love for instructions.
6. *Water is leaking around the portafilter:* Make sure group gasket is clean by brushing inside the groove with your round espresso brush. Depending on its age, the gasket may be old and need replacing. Also, there may be too much coffee in the basket. Try again with a shot adjustment.

NOTES:

Chapter IX: Recipes

Espresso: Espresso is pressure-brewed coffee and should have a thick golden crema on top and not taste bitter or sour.

1. A single shot consists of approximately 7 grams of ground coffee and 1 to 1.5 ounces of liquid in the cup.
2. A double shot is 14 grams of ground coffee and 2 to 2.5 ounces of liquid in the cup.

Café Latte: A latte is made with 2/3rds steamed milk and 1/3 espresso.

1. Steam and froth a small pitcher of milk.
2. Fill your cup with 2/3rds steamed milk.
3. Brew your espresso and pour it down the side of your cup.

Cappuccino: A Cappuccino is traditionally served in a 7 oz. cup. The drink is comprised of equal amounts of espresso, steamed milk and frothed milk.

1. Steam and froth a pitcher of milk.
2. Brew a double espresso into your cup.
3. Add steamed milk by holding back the froth with a spoon.
4. Spoon the froth on top.

Ristretto: Also known as the “little one”, is the strongest espresso of the family. The Ristretto uses the same amount of ground coffee as a regular espresso but uses less water. The name is derived from the “restricted use of water”.

1. Prepare to brew an espresso using your normal amount of coffee.
2. Stop the extraction just short of a regular shot.

Café Mocha: By adding some chocolate to milk to an espresso you’ve got a Mocha.

1. Steam a small pitcher of milk.
2. Add a squirt of chocolate syrup to the milk and mix well.
3. Brew your espresso and pour it into a larger mug or glass.
4. Add the chocolate milk.
5. Top it off with some whipped cream and/or some chocolate shavings.

Café Crema: A Café Crema is a long espresso. Instead of stopping the shot at the normal time for a single or double shot, let the pump run longer until you have a full cup of coffee.

Café Americano: Brew a proper single or double espresso and then add hot water from the wand to fill the cup.

Espresso Macciato: This is just an espresso with a wee bit of froth on top.

Latte Macciato: Just brew a standard Latte and add a little foam on top.

Try this amazing dessert—You have certainly earned it!

Affogato Mocha: Affogato is a typically Italian way to enjoy ice cream. It is literally “drowned” in espresso or another liquid topping. For four servings:

1-pint chocolate ice cream. (Try Godiva’s)

8 tablespoons finely chopped bittersweet (not unsweetened) or semisweet chocolate

8 tablespoons hot freshly brewed espresso coffee. A dark roast works really well.

8 tablespoons dark rum

Divide ice cream among 4 dessert bowls, cappuccino or latte cups. Spoon 2 tablespoons each of chocolate, espresso, and rum over the ice cream and serve immediately.

(May 2005/ Bon Appetit)

NOTES:

Chapter X: Shipping the Brewtus

For whatever reason, whether you are moving, taking your machine with you for a long summer vacation or sending it in for service, it may someday be necessary to box it up for shipment. You will need to empty the boilers first.

The following set of instructions is specific to the Brewtus and the directions are different from HX machines or single boiler units.

Draining the Boilers:

1. Read and comprehend these instructions entirely before attempting to drain your boiler. Pose any questions to the WLL Tech Department before continuing.
2. Caution! Machine must be heated to steam temperature/pressure to properly drain the boiler. ***Note: Machine and water will be at scalding temperatures!***
3. Plug the machine in and allow it to come to normal brewing temperature/pressure.
4. Find (2) large tall-sided containers and place one under the brewgroup and one under the hot water dispenser. ***Make sure that both containers are solidly in place and will not spill or fall when water begins to drain into them!***
5. Remove the cover of your water reservoir, that is, the cup warming tray.
6. Remove the water intake line from the water reservoir.
7. Engage the pump by moving the brew lever to the up or brew position.
8. ***Beware of splashing hot water! It will burn!***
9. Run the pump/machine until water stops flowing from the brew head.
10. Disengage the pump by moving the lever to the full down position.
11. Turn off the main power switch.
12. Open the hot water dispensing valve.
13. Run the machine until water stops flowing from the hot water dispensing valve.
14. ***Beware of splashing hot water!! It will burn!!***
15. Close the hot water dispensing valve.

Your machine's boiler is now drained.

Cautions

- **There are no user serviceable parts inside the machine. Defer service to a qualified technician.**
- **Do not try to put anything inside the machine through the vents.**
- **Please check the water level in the reservoir frequently.**
- **Do not let children touch or operate the machine, as it is very dangerous to do so and could cause injuries.**
- **Do not use the machine with wet hands.**
- **To disconnect the machine from the power supply, pull the plug itself—do not pull on the power cord.**
- **Please consult with a qualified technician for any problems or questions.**

The manufacturer reserves the right to make any changes to the machine for improved performance without prior notice.

Appendix A: To zoom in/out on the following diagrams, hold down the CTRL key and use the scroll wheel on your mouse.

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1301H201 Ed.02 (GB)



Thermometers, thermostats and electronic controllers for 58 x 25,4 mm panel cut-out pattern



Small dimensions unit range, designed to monitoring, control and regulating refrigerating generators (with manual or automatic defrost programmed by stopping the compressor) or heating generators.

Index:

- | | |
|---------------------------------|--|
| 1- Versions and references | 6- Parameters description and messages |
| 2- Technical data | 7- Parameters transfer |
| 3- Installation | 8- Relay operation and control |
| 4- Front panel functions | 9- Maintenance |
| 5- Adjustment and configuration | 10- Warnings |

1- VERSIONS AND REFERENCES

MODEL	FUNCTION	RELAY	POWER SUPPLY, 50/60 Hz
AKO-13012	Thermometer	-	12 V ~ ±20%
AKO-13020	Thermometer	-	120 V ~ +8% -12%
AKO-13023	Thermometer	-	230 V ~ ±10%
AKO-13112	Thermostat	16(4) A, 250 V, cos φ=1, SPST	12 V ~ ±20%
AKO-13120	Thermostat	16(4) A, 250 V, cos φ=1, SPST	120 V ~ +8% -12%
AKO-13123	Thermostat	16(4) A, 250 V, cos φ=1, SPST	230 V ~ ±10%

REMARK: A reference number followed by /**, one or two alphanumeric characters, means "with a special program". In such a case, in addition to these general instructions, the particular instructions attached, with variations for each device should be followed.

2- TECHNICAL DATA

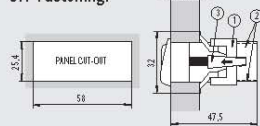
Temperature range: -50 °C a 99 °C
 Resolution, Set Point and differential: 1 °C
 Input for NTC probe: AKO-149XX
 Controller accuracy: ± 1 °C
 Probe tolerance at 25 °C: ± 0,4 °C
 Maximum input power: 3 VA
 Working ambient temperature: 5 °C a 40 °C
 Storage ambient temperature: -30 °C a 70 °C
 Voltage pulse assigned: 800 V
 Pressure ball test temperature
 - Accessible parts: 75 °C
 - Active elements positioning parts: 100 °C
 CEM emission voltage test: 207 V
 CEM emission current test: 9 mA
 Control device classification:
 Independent mounting, with characteristic of automatic operation action Type 1B, to be used in clean situation, logical medium (software) class A.
 Double insulation between the power supply, the secondary circuit and the relay output.

3- INSTALLATION

The controller must be installed in a place protected from vibrations, water and corrosive gases, and where the ambient temperature does not surpass the value specified in the technical data.

In order the controllers be suitable having IP65 protection, the gasket should be installed properly between the apparatus and the perimeter of the panel cut-out where it is to be fitted. In order to give a correct reading, the probe has to be installed in a place without heat influences other than the temperature that is to be measured or controlled.

3.1 Fastening:



To fix the unit, place the fasteners 1 over the sliders 2 as shown in the figure. Move the fasteners in the direction of the arrow. By pressing tab 3 the fasteners may be moved in the opposite direction of the arrow.

3.2 Connection:

See diagram in the unit rating plate.
 The probe and its lead should NEVER be installed in ducting along with power, control or power supply wiring.

The power supply circuit should be connected with a minimum 2A, 230V, switch located close to the unit. The cables should be of the type H05VV-F 2x0,75 mm² or H05V-K 0,75 mm².

Section of connecting wires for relays contacts must be between 1,5 mm² and 2,5 mm²

4- FRONT PANEL FUNCTIONS



UP key

When pressed for at least 5 seconds, a manual defrost is started with programmed duration, (in thermostats function).

In programming, it increases the displayed value.

DOWN key

In programming, it reduces the displayed value.

SET key

When pressed for at least 5 seconds, it displays the SET POINT temperature value, (in thermostats function). In programming, accept the programmed new value.

LED 1: Defrost in operation indicator. (in thermostats function)

LED 2: Relay ON indicator. (in thermostats function)

LED 2 flashing: Programming phase.

5- ADJUSTMENT AND CONFIGURATION

It should only be programmed or modified by personnel who are fully conversant with operation and possibilities of the equipment.

5.1 Set Point temperature.

The factory SET POINT default value is 0 °C.

Press **SET** key for at least 5 seconds to DISPLAY SET POINT. It displays the CURRENT SET POINT value and LED "2" start flashing.

Press **UP** or **DOWN** keys for CHANGE SET POINT to the required value.

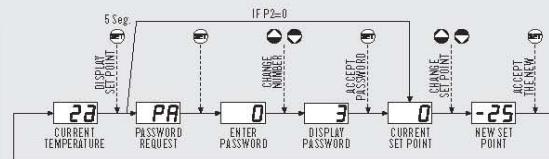
Press **SET** key to ACCEPT THE NEW SET POINT. The display returns to the current temperature display status and the LED "2" stop flashing.

When PA appears in display, PASSWORD programmed in L5 parameter should be entered for access to the CURRENT SET POINT.

Press **0** key. 0 will be displayed to ENTER PASSWORD.

Press **UP** or **DOWN** keys to CHANGE NUMBER and DISPLAY PASSWORD.

Press **SET** key to ACCEPT PASSWORD. The CURRENT SET POINT value will be displayed and possible to be modified.



5.2 Parameters configuration

Level 1 Parameters

Press **UP** + **DOWN** keys simultaneously for at least 10 seconds. The LED "2" will be flashing, we are in the LEVEL 1 PARAMETERS and in the display appear the first parameter "CO".

Press **UP** key to access the next parameter and **DOWN** key to return to the previous one.

Pressing the **SET** key in the last parameter EP, the controller returns to the current temperature display status and the LED "2" will stop flashing.

When PA appears in display, PASSWORD programmed in L5 parameter should be entered for access to programming LEVEL 1 PARAMETERS.

Press **0** key. 0 will be displayed to ENTER PASSWORD.

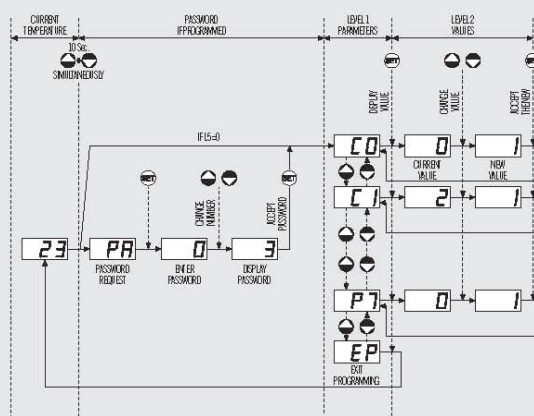
Press **UP** or **DOWN** keys to CHANGE NUMBER and DISPLAY PASSWORD.

Press **SET** key to ACCEPT PASSWORD. The first parameter "CO" will be displayed.

Level 2 Values

To DISPLAY CURRENT VALUE of any parameter, select the required one and press **UP** key. Once it is displayed, you can CHANGE VALUE pressing **UP** or **DOWN** key.

Press **SET** key to ACCEPT THE NEW VALUE. The programming returns to LEVEL 1 PARAMETERS.



REMARK: If no key is pressed for 25 seconds in either of the previous steps, the controller will automatically return to the current temperature display status without modifying any of the parameters values.

6- DESCRIPTION OF PARAMETERS AND MESSAGES

The values in the **Def.** column are factory-set.

Thermometers parameters						
Thermostats parameters						
	Functions and description	Values	Mín.	Def.	Máx.	
C0	Sensor calibration (Offset)	(°C)	-20	0	20	• •
C1	Sensor differential (Hysteresis)	(°C)	1	2	20	•
C2	Set Point upper limit (It cannot be set above this value)	(°C)	xx	99	99	•
C3	Set Point lowers limit (It cannot be set below this value)	(°C)	-50	-50	xx	•
C4	Compressor protection delay type: 0=OFF/ON (From the last switch-off) 1=ON (At switch-on) 1=ON (A la conexión)		0	0	1	•
C5	Protection delay time (Value for the option selected in parameter C4)	(min)	0	0	99	•
C7	Relay time in ON in case of faulty sensor (If C7=0 and C8=0, the relay will always be OFF disconnected)	(min)	0	10	99	•
C8	Relay time in OFF in case of faulty sensor (If C8=0 and C7=0, the relay will always be ON connected)	(min)	0	5	99	•
d0	Defrost frequency (elapsed time between 2 starts)	(h)	0	1	99	•
d1	Defrost maximum duration	(min)	0	0	99	•
d2	Type of message during defrost: (0=Current temperature display) (1=Defrost start temperature display) (2=Display dF message)		0	2	2	•
d3	Message maximum duration (Time added at the end of defrost)	(min)	0	5	99	•
L5	Access password to parameters		0	0	99	• •
L6	Parameters transfer: (0=Disabled) (1=Send) (2=Receive)		0	0	2	• •
PU	Program version (Information)					• •
P0	Type of operation: (0=Cold) (1=Heat)		0	0	1	•
P1	Delay of all functions on power supply switch on	(min)	0	0	99	•
P2	Allocation of password to Set Point: (0=Without allocation) (1=With allocation of L5 password)	0	0	1	•	
P3	Initial parameters: (1=YES, configure to "Def" and exit programming if P2=0)		0	0	1	•
P5	Address for units with communication (not activated)		0	0	99	• •
P7	Temperature display mode: (0=Integers in °C) (2=Integers in °F)		0	0	2	• •
EP	Exit programming					• •

Messages

dF	It indicates defrosting is being carried out. In order to display "dF" during defrosting, it is essential that parameter d2 is set to option 2
E1	Sensor failure (Open circuit, crossed, temp. > 110°C or temp. < -55°C)
--	Temperature > 99 °C/°F
EE	Memory failure
PA	Password request to enter in programming parameters or SET POINT

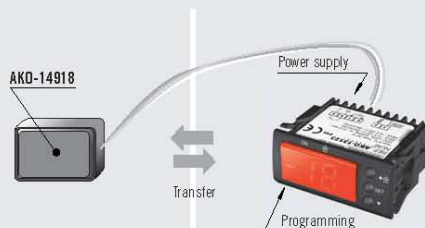
REMARK: When the time parameters are modified, the new values are applied once the current cycle is completed. In order for it to have an immediate effect, switch the controller off and then on again.

7- PARAMETERS TRANSFER

AKO-14918

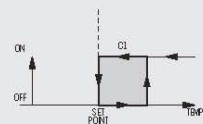
Portable server without supply, to which can be copied by transferred the parameters programmed in a powered unit. The parameters may then be transferred again from the server to other identical powered units.

To transfer parameters, other servers are available for controllers that should be programmed identically in high quantity without power supply.

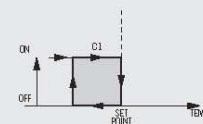


8- RELAY OPERATION AND CONTROL

Operation for COLD (P0=0)



Operation for HEAT (P0=1)



9- MAINTENANCE

Clean the controller surface with a soft cloth and soap and water. Do not use abrasive detergents, petrol, alcohol or solvents.

10- WARNINGS

The use of the unit different to the manufacturer's instructions voids the safety qualification.

To ensure correct operation of the apparatus, only NTC type probes supplied by AKO should be used.

Between -40 °C and +20 °C, when the probe is extended up to 1.000 m with minimum 0,5 mm cable, deviation will be less than 0.25 °C (probe extension cable ref. **AKO-15586**).