User manual Spirit

(original instructions)

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CONTENTS

Designation

This manual applies to the Spirit 2-group (Duette) and 3-group (Triplette) espresso machines with touchpad or Bastone operation manufactured by Kees van der Westen Espressonistic Works B.V. Separate rotational pumps with electric motors are part of the appliance.

Precaution

Hot surfaces!

Parts of the machine will be hot when the machine is turned ON.

- The cup tray can reach temperatures up to 65°C.
- The metal groups are intended to radiate heat and can reach a set-temperature of up to 99°C.

Hot water and/or steam!

When the machine is heated up, hot water and steam can escape from various parts of the machine upon manipulation of a corresponding interface (valve, switch, touch-button, …).

- Activating the group will lead to water being dispensed with a temperature of up to 99°C.
- Activation of the hot water dispense can lead to steam escaping with temperatures up to 130°C as well.
- Activating the mix-water dispense can lead to overheated water (steam) being dispensed when the cold-water addition is not set correctly.
- Opening the steam tap will start steam escaping from the steam wand-tips, the steam can reach temperatures up to 130°C.

Safe operation

- The espresso machine needs to be installed with the feet at a height of 95-100 cm above the floor.
- The espresso machine has to be placed in a horizontal position on a sturdy and flat surface.
- If the supply cord is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazard.
- The new hose-sets supplied with the appliance are to be used. Old hose-sets should not be reused.
- Intended use of the appliance is restricted to well-trained personnel only.
- The appliance must be installed in locations where it can be overseen by trained personnel.
- The appliance may not be left unattended when there is the possibility that children and/or vulnerable people can reach the machine.
- This appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved. Children shall not play with the appliance. Cleaning and user maintenance shall not be made by children without supervision.
- The mains electricity the appliance is connected to must include a residual-current-circuit-breaker of 30 mA.
- The appliance may not be cleaned with the aid of a water jet.
- The appliance is not suited for outdoor use.
- Ambient temperature for correct operation of the appliance is 10-30°C (50-86°F).
- If ambient temperature falls below 5°C (41°F), keep the machine at ECO or ON to prevent freezing of water inside the machine.
  Note that the external rotational pump should be kept above freezing point of water as well.
  Whenever the machine and/or pump have suffered freezing conditions, ask a technician to start-up the appliance again.

Water Quality

Have a water treatment system installed and its function checked regularly. The treatment system should at least have a carbon block that not only traps drug-remnants, Chlorine and organic compounds but also prevents rigid particles >30 µm to enter the pump. Optimally, the water fed into the espresso machine would fall in the upper-right part of the SCA "core zone", see Figure 1, and have a pH of 7.0-7.5 (at 25°C).

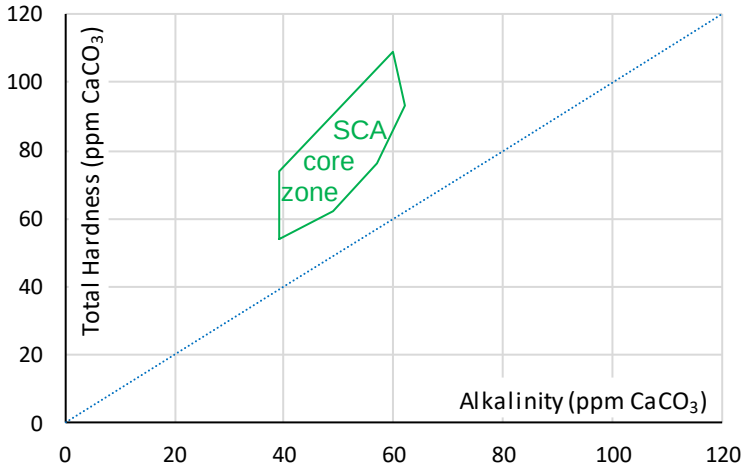


Figure 1. Alkalinity vs Total Hardness graph showing the SCA "core zone" in green outline.

Besides the Alkalinity and Total Hardness requirements, the water should have the following properties:

Parameter	Target	Acceptable range	unit
Total Hardness	72	50-175#	ppm
Total Alkalinity	40*#	40-75#	ppm
pH	7.0*	6.5-7.5*, 6.5-8.0#	--
Electrical conductivity		< 3 times Alkalinity (in ppm)#	µS/cm[1]
Total Dissolved Solids	150*	75-250*	ppm[1]
Calcium Hardness	51-68*	17-85*	ppm
Sodium	10*	at or near 10*	ppm
Sulphate	30	0-50	ppm
Chloride	0	0-30	ppm
Silica	0	0-5	ppm
Odour and colour	clean*, fresh*, odour free*, clear*		
Taste influencing organic compounds*#		not present	
Chlorine#, Hypochlorite#, Chloramines#			
Iron#, Lead#, Manganese			

* SCAA Technical Standards Committee, 2009: water properties for optimum taste.
# Values from "The SCAE water Chart" (2015?).

Table 1. Showing parameter values for water meant to brew coffee with.

Water with properties that lie within the SCA "core zone" and has correct pH combines technical aspects enabling a safe operation and sensory aspects yielding a high quality brew, provided the other parameters are met as well. High brew-ratio's, as for espresso, shift the optimum of total hardness and alkalinity towards higher values within the core zone.

[1] The conversion from electrical conductivity to TDS depends heavily on the water composition and temperature, yielding results that can vary significantly. Additionally, even if the estimated TDS value is accurate, it does not contain any information about what the TDS is actually made up of.

User manual

Parts identification

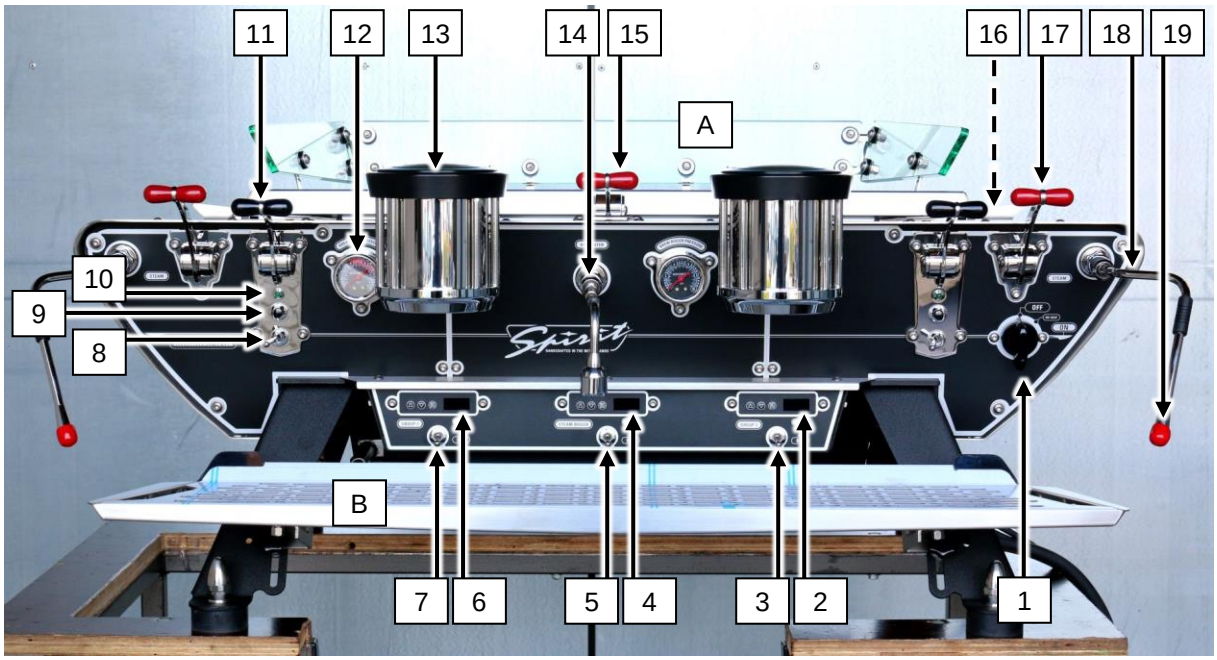


Figure 2. Showing main operational parts of the Spirit Duette Bastone version. The Spirit Triplette is wider since it has three groups but its functions are identical to the Duette. On the Touchpad version, the group brewing lever units are replaced with touchpads (see photo in Table 2).

1. Mains switch
2. Coffee boiler PID temperature controller (right group)
3. Coffee boiler heating ON-OFF switch (right group)
4. Steam boiler temperature controller
5. Steam boiler heating ON-OFF switch
6. Coffee boiler PID temperature controller (left group)
7. Coffee boiler heating ON-OFF switch (left group)
8. Volume switch (left group)
9. Program button (left group)
10. Group indicator light (left group)
11. Group brewing lever (left group)
12. Coffee brew pressure gauge (left group)
13. Group (left)
14. Hot water spout
15. Hot water lever
16. Steam power adjustment lever (right)
17. Steam lever (right)
18. Steam wand (right)
19. Steam tip (right, with protective cap)

A. Cup warmer tray
B. Drip tray

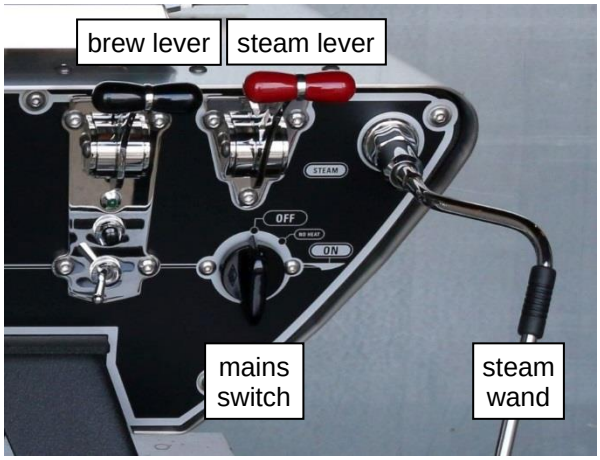
Not visible on this photo:

- Green indicator lights for heating spirals (one for each spiral; see p. 18)
- Switch for illumination of transparent back panel (see p. 5).

Mains switch

The mains switch (see Figure 3 a) is located at the right hand side of the machine and has 3 positions:

OFF	All power to the machine is disconnected.
NO HEAT	The machine is connected to power, but power to the heating elements is disconnected. The machine functions but there is no heat and thus neither hot water nor steam pressure. The lack of steam pressure means that flow from the hot water spout is less than normal.
ON	Machine and heating elements are connected to power.



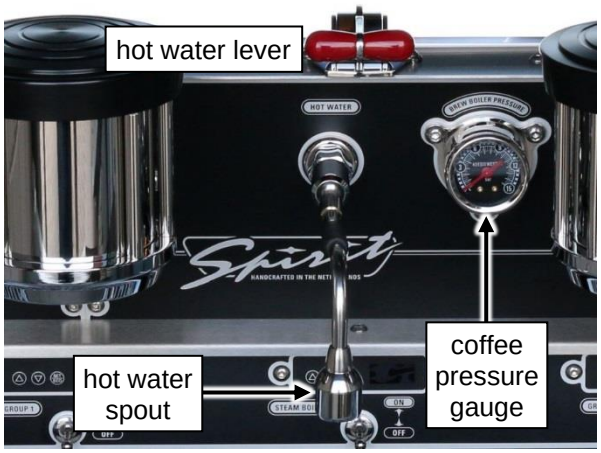


Figure 3 a (left). Showing mains switch with its 3 positions, the right hand brew lever and steam lever on the right steam wand.
Figure 3 b (right). Showing hot water lever and -spout and a coffee boiler pressure gauge.

Back light switch

The LED's that illuminate the Spirit or customers logo on the back side of the machine can be turned ON or OFF. When the machines leaves the shop, the illumination is turned OFF to make sure that you use the switch at least once. The switch is located behind the right hand side front leg of the machine (see Figure 4).

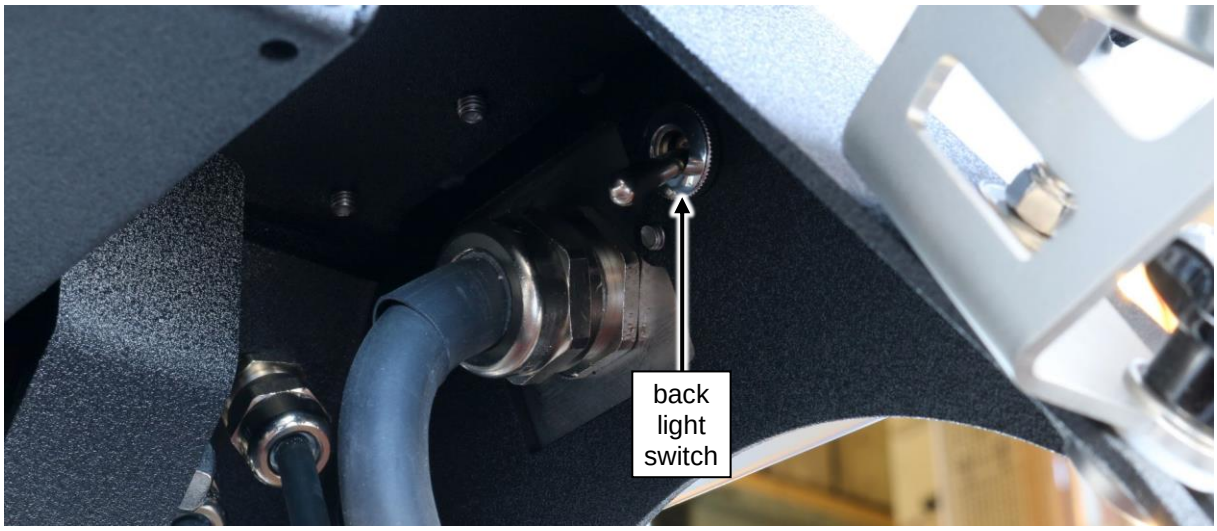


Figure 4. Showing the switch that turns the back LED's on and off (lever pointing down is OFF).

Temperature controller switches

Each boiler is equipped with its own temperature controller and ON-OFF switch (see Figure 5) so that you can engage and disengage the heating of any group individually, e.g. when business is slow.

You may also disengage the steam/hot water boiler heating if only espressos are made. However, keep in mind that in this case the heat exchangers are immersed in cold water so that the water flowing into the coffee boilers is not pre-heated. With high output, the coffee boiler heating element (900 Watt) may not be able to keep up with the demand and brewing temperatures may fluctuate more than when the steam boiler is engaged.

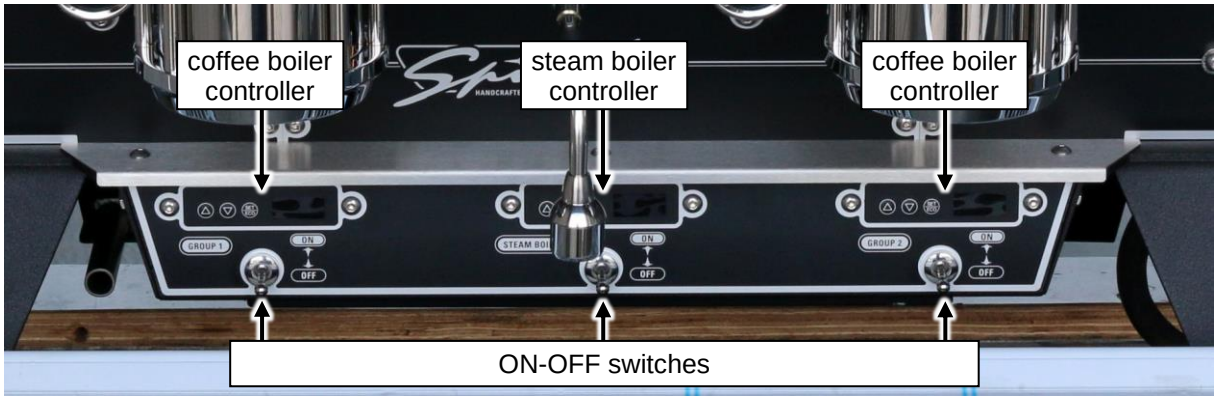


Figure 5. Showing the temperature controllers with their ON-OFF switches for the steam boiler and the two groups on a Spirit Duette. Switches are in the OFF position with levers pointing down, displays are unlit.

Volumetric stop of a brew

When water flows through a coffee group, the flow meter of that group sends pulses to the controller. The controller counts the pulses after activation of the group and will de-activate the group when the pre-set number of pulses has been received (that is when the pre-set volume of water is counted). However, the amount of water that will end up in the cup may still vary considerably.

The next paragraph describes why a consistent volume programming procedure should be followed to have …

Consistency in programmed volumes

Volumes should be programmed as if you are making a normal brew: with fresh coffee grinds in the filter basket and a 2 second flush.

See next paragraphs for step-by-step instructions for touchpad and Bastone versions of the Spirit, the description and explanation below is valid for all Spirits.

The machine must have been used for a few days before accurately repeatable volumes can be programmed.
Programmed volumes mutate during a few days after installation as during first fill there will be an inflow of about 2.5 litres of fresh water to each group. After a few days the excess air, which is always present in tap water, has segregated and will be expelled from each group and air content in the coffee-water is stabilised.

The machine must be completely warmed up and used to make coffee a few times per group.
Using the machine ensures that the drain trap contains some water (which may evaporate overnight when the machine is not used but still warm).

Variance in coffee bed characteristics (ground coffee particle size and distribution and packing/ tamping) should be a small as possible.
You have to make sure that the coffee-bed during volume-programming is the same as during the day (for that reason: do not use grinds that have been in a storage container if you normally use grinding-on-demand; level and tamp the grinds as if to make an actual brew; …).

Pressure in the coffee boiler just before the start of a brew should not vary.
The pressure inside a coffee system fluctuates according to its heating cycle. If a shot is started when this pressure is approximately 12 bar (pressure set-point for the expansion valve to open) some more water will flow during the initial infusion, than when you start with a 3 bar (line) pressure. This effect is not measured by the flow meter because the meter is installed far upstream from the group-valve. For that reason we recommend a short flush (2 seconds) just before locking in the filter holder with new grinds such that pressure right before a brew is started is always the same.

Flow rate during the entire brew may not fall outside the range of the flow meter.
At the start of a brew, when the coffee bed is dry, flow-rate in the coffee system is very high. Right after the pre-infusion stage when the coffee is wetted and swollen up, the flow-rate in the coffee system drops dramatically, the more so with smaller grain-size and closer packing of the coffee-bed. As there is no flow meter available that can accurately count volumes in a wide range from very slow to very fast flow we install different flow meters for different preferred brews: 0.7mm aperture (3300 pulse/litre) for short brews like ristrettos and espressos, 1.15mm aperture (2000 pulse/litre) for longer brews like (double) lungos. A flow meter intended for short brews may not accurately count the volume of a long brew and vice-versa. The flow meter is installed during assembly of the machine according to the wish of the client but can be exchanged for a type with different aperture later.

If brews are made with very fine and closely packed coffee grinds, the flow at the early stage of the brew becomes so slow that volumes counted by the controller may still deviate from brew to brew when the flow at any time during the brew becomes slower than 25 ml/minute (0.7mm flow meter) or 35 ml/minute (1.15mm flow meter) as the impeller in the flow meter will come to a stand-still or is running too slowly. When an LED on the group starts flashing during the brew it is certain that the flow is too slow but the blinking may hold off even when flow was too slow for accurate counting. When you prefer to brew that slowly we advise to use scales under the cup in combination with manually (de-) activating the group for best weight consistency in the cup.

Adjust coffee system pump pressure

A flat-jet in each group-circuit restricts the flow when a group is activated to prevent channelling in the coffee bed and thus ensure proper pre-infusion. The restrictor is located underneath the group valve (it was relocated during October 2016). The pressure gauge just left of each group displays the pressure in the corresponding coffee system downstream of the group valve. At idle, the pressure shown is thus 0 (minimum value of the gauge). While brewing espresso, with the group valve “open” and the pump activated, water will first fill the empty infusion tube and dispersion plate and then wet the coffee bed (and fill the optional Idro-matic when it is present) such that pressure on the corresponding coffee grinds will gradually increase as the wetted coffee loses in permeability until the set pump pressure (ideally 9 bar) is reached.

The pressure at the outgoing side of the pump depends somewhat on the pressure at the ingoing side of the pump. Therefore, you should check and possibly adjust the pump pressure after installation. Adjustments are made by turning the set screw on the right hand side of the pump housing (see **Fout! Verwijzingsbron niet gevonden.**).

Procedure

1. Place a filter with ground coffee in a filter holder (this should be fresh coffee).
2. Activate that group:
   touchpad: shortly press the upper button
   Bastone: shortly press the push button
3. Observe the pressure gauge of the activated group to check how the pressure evolves and wait until it no longer increases.
4. Undo the lock-nut on the set screw a few turns.
5. To increase the pump pressure turn the set screw in the pump housing clockwise (see Figure 6). Turn the screw counter-clockwise to decrease the pump pressure.
6. De-activate the group when the pressure is correctly set at 9 bar.
7. Tighten the lock nut again.

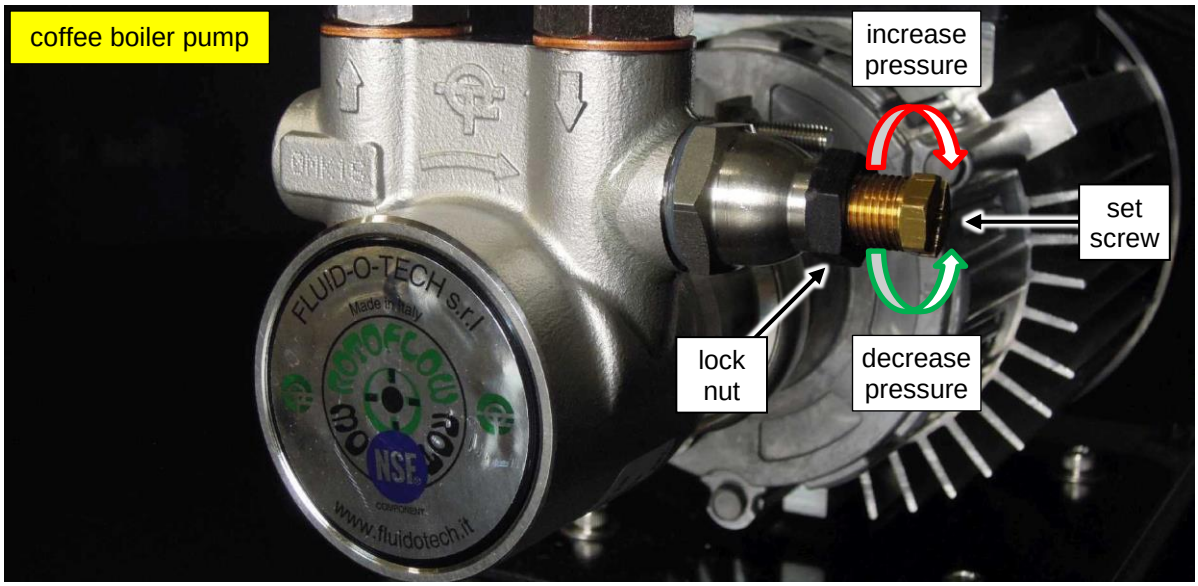


Figure 6. Showing the lock nut and set screw on the pump to change pump pressure.

Touchpad

Each group is operated by a touchpad and each touchpad has 5 buttons with internal LED's (see photo in Table 1. Showing parameter values for water meant to brew coffee with.Table 1). The left hand side touchpad has some functions which are not available on the other touchpad(s).

ON-OFF

The upper button (larger circle) is an ON-OFF group switch with programming function.
Press this button briefly to open the group valve and activate the pump, the LED in the button will light up. Press it briefly again to deactivate the pump and close the group valve, the LED will go off.

	special functions left pad	TOUCHPAD	normal operation	special function all pads
#5	program all doses #		ON-OFF continuous	program doses 1-4 #
#4	clean ⊙		dose 4	
#3	fill possible/ impossible while brewing ⊙		dose 3	
#2			dose 2	
#1			dose 1	
	⊙ press-hold button while switching machine "ON"		press briefly to start	# press-hold button until top LED flashes

Table 2. Listing the functions of the 5-button touchpads.

Program brew volumes

During the programming phase of a group, all other groups, even hot water, remain disabled.
You can program up to 8 different volume doses in a Duette, and up to 12 different doses in a Triplette.

Volumes should be programmed as if you are making a normal brew: with fresh coffee grinds in the filter basket and a 2 second flush. Have a pre-filled and tamped portafilter ready.

1. Keep the upper button (#5) of the left hand touchpad pressed for 6 seconds (until the upper LEDs of all touchpads start flashing) to enter the programming mode. You may now program any one of the lower 4 buttons of any touchpad.
2. Press one of the lower 4 buttons briefly to activate the group, the LED in the selected button will light up (the upper LEDs of all touchpads will also be lit) and press briefly again after 2 seconds (this is the short flush). This flush-volume will temporarily be stored in the memory.
3. Quickly lock in the filter holder with coffee grinds and with the same button activate the group again to start the brew (within 4 seconds, while LED is still flashing).
4. When the desired volume for the selected button is reached, press the button briefly again. The "dosing" LED will go off and the programmed volume for that button will replace the initially stored flush-volume in the memory of the controller.
5. Within 4 seconds (as long as the indicator light is flashing): continue to program another volume (other button on touchpad, or go to next group, repeat the 2 second flush just prior to locking in the filter-holder with fresh grinds and start the actual brew), or …
6. Briefly press the upper button (#5), or wait 30 seconds (until the indicator lights dim) before touching any lever or button, to exit the programming mode. You can re-start from 1 for another volume to be programmed.

Left hand rules

Attention! Programming the left hand group overrides the stored volumes of the other group(s). If you want different volumes on each group, start by programming the left group (using the left hand touchpad), then program the other group(s).

Program hot water timer

The left hand touchpad also governs the hot water timer. Programming is similar to dosing the coffee buttons. Keep the top button (#5) on the left hand touchpad pressed until the upper LEDs of all touchpads start flashing (about 6 seconds). Briefly press down the hot water lever (see Figure 3 b) to start water flow. Press briefly again when the desired amount of hot water is reached. The controller actually stores the amount of seconds between activation and de-activation of the hot water distribution. Briefly press the top button (#5) again to exit the programming mode.

Start automatic back-flush program

See paragraph "Back flush group" on page 20 for complete back-flush procedure.

The left hand touchpad is also used to start the automatic back-flush program (see also Table 2).

To start the back-flush program:

1. Switch machine "OFF".
2. Press-hold the #4 button on the left touchpad, turn the mains switch to "NO HEAT" or "ON".
3. The cleaning program pressurises and de-pressurises all groups simultaneously for 8 times in a row.
4. As soon as the program has ended, the main controller will return to normal operation (provided that the mains switch is in position "ON"). It may take a while for the boilers to reach the programmed temperatures as a lot of cold water has flown into the system during back-flushing.

Note! The controller incorporates several functions which you may accidently address while trying to start the automatic back-flush program.

Function	Press when mains switch is turned from "OFF" to "NO HEAT"	Visual signal
start automatic back-flush program	button #4 of 1st group	no signal
steam boiler fill-up during brewing possible (CORRECT)	button #3 of 1st group	LED 5 of 1st group
steam boiler fill-up during brewing not possible (FALSE)	button #3 of 1st group	LED 3&5 of 1st group
engage steam boiler pump during fill-up (CORRECT)	button #1 & #4 of 1st group	LED 1&4 of 1st group
disengage steam boiler pump during fill-up (FALSE)	button #2 & #4 of 1st group	LED 2&4 of 1st group
disengage coffee boiler pump with hot water (CORRECT)	button #2 & #3 of 1st group	LED 2&3 of 1st group
engage coffee boiler pump with hot water (FALSE)	button #1 & #3 of 1st group	LED 1&3 of 1st group

NB: buttons are numbered from bottom to top, see Table 2.

Bastone

(bastone = Italian for stick)

The Bastone version is very similar to the touchpad version but the touchpads have been replaced by Bastone units that include a brew lever, an indicator light, a push button and a toggle switch. The push button underneath each brew lever is the continuous (ON-OFF) switch for that group. Each brew lever can be configured to deliver 2 pre-set volumes according to the position of the toggle switch underneath the push button. The indicator light will light up when the group is active, or flash when the controller is in programming mode. A pre-set volume can be stopped before the volume is reached by shortly pressing the brew lever again.

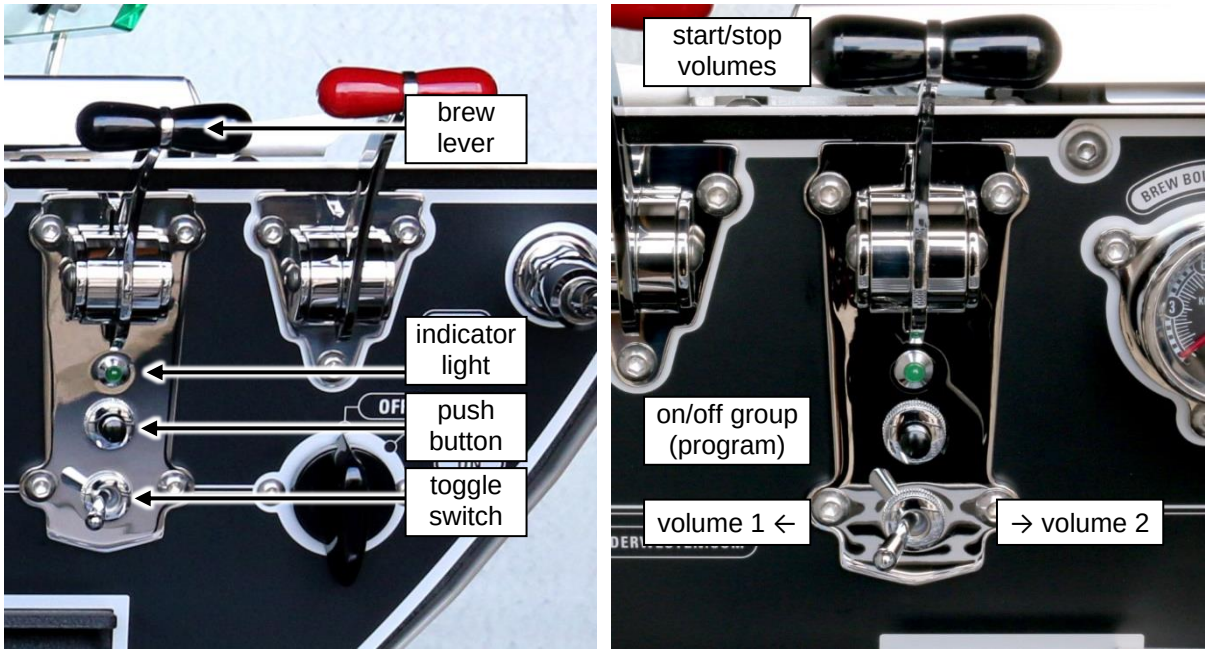


Figure 7 a (left). Components of the right hand side Bastone unit.
Figure 7 b (right). Functions of the different Bastone components.

Program brew volumes

During the programming phase of a group, all other groups, even hot water, remain disabled.

You can program up to 4 different volume doses in a Duette, and up to 6 different doses in a Triplette.

Volumes should be programmed as if you are making a normal brew: with fresh coffee grinds in the filter basket and a 2 second flush. Have a pre-filled and tamped portafilter ready.

1. Keep the push button of the left group pressed for about 6 seconds (until the LEDs of all Bastones start flashing) to enter the programming mode. You may now program any one of the volumes.
2. Press the brew lever briefly to activate the group (the LEDs of all Bastones will be lit) and press shortly again after 2 seconds (the volume of this short flush will be temporarily stored in memory).
3. Quickly lock in the filter-holder with coffee grinds and activate the group again to start the brew. (preferably within 4 seconds, but certainly not later than after 25 seconds)
4. When the desired volume for the selected group is reached, press the lever briefly again. This latest volume for that group will overwrite the previously stored -flush- volume in the memory of the controller.
5. Briefly press the push button switch, or wait 30 seconds (until the indicator lights dim) before touching any lever or button, to exit the programming mode. You can re-start from 1 for another volume to be programmed.

Left hand rules

Attention**!** When you program a volume for the left hand group, the other group(s) will copy this volume. If you want the right (and, if present, middle) group to be programmed differently from the left group, start by programming the left group, then program the other group(s).

Program hot water timer

1. Press-hold the push button underneath the left brew lever for 6 seconds, then release (all indicator lights start flashing).
2. Within the next 20 seconds: press the hot water lever briefly to start flow. The indicator lights of both groups will be lit continuously.
3. Press hot water lever again to stop flow when amount of water wanted is reached. The indicator lights will start flashing again.
4. Briefly press the push button switch or wait 30 seconds to store the programmed volume and exit the programming mode (the indicator lights go dim).

Start automatic back-flush program

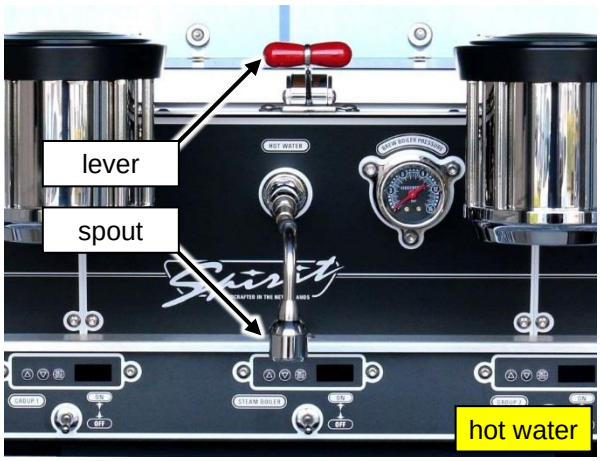
See paragraph "Back flush group" on page 20 for complete back-flush procedure.

1. Shut down machine by turning mains switch to "OFF".
2. Make sure that the toggle switch under the left hand group is in the left position (see Figure 8).
3. While pressing the left group lever down, turn the mains switch to "NO HEAT" or "ON".
4. The back-flush program will start (if it does not start, check position of toggle switch).
5. As soon as the program has ended, the main controller will return to normal operation (provided that the mains switch is in position "ON"). It may take a while for the boilers to reach the programmed temperatures as a lot of cold water has flown into the system during back-flushing.

Figure 8. The toggle switch under the left hand brew lever is positioned to the left.

Dispensing hot water

Place a cup under the hot water spout and press the hot water lever down briefly (see Figure 9). The flow will stop when the pre-set time has elapsed, or when the lever is pressed down briefly again, whichever comes first. An interrupted dispensing is not stored in the memory, pressing the hot water lever again will start a new dispensing cycle.



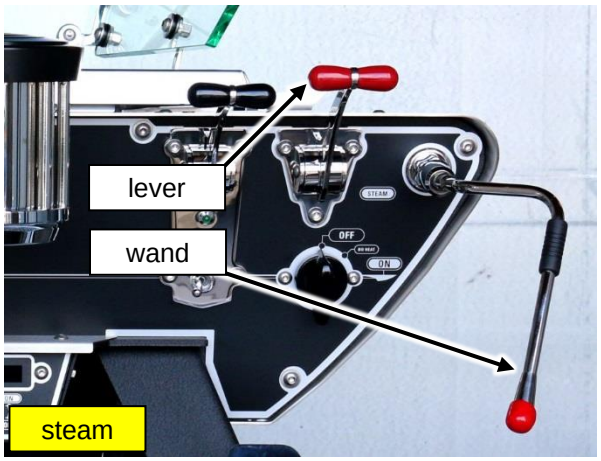


Figure 9 (left) showing the hot water lever and spout.
Figure 10 (right). Showing the right hand side steam lever and wand (with protective cap on steam tip).

Steaming

The Spirit has two identical steam wands with solenoid valves activated by a lever on the front of the machine (see Figure 10) and/or optional foot pedal on the floor. You may reduce the maximum steam power of an individual steam wand by adjusting the horizontal handle adjacent to the cup warming tray on top the machine (see Figure 11).

Close to its most downwards position, the steam valve lever will lock in position. Lifting the lever upwards a little will unlock it so that it automatically returns to the rest position (steam valve closed).

Before steaming milk it is necessary to open the valve for a short while to purge water from the steam wand and heat up the wand and valve. The purged water is condensate from steam coming in contact with the cold tubing, valve and wand. Position the tip of the steam wand over the drip tray when purging the condensate.
Directly after steaming milk, flush the steam wand with a little steam and clean the tip of the steam wand with a damp cloth. For hygienic reasons, do not use this cloth for anything other than cleaning the steam tip.

Set maximum steam power

The steam power handle operates a ball valve incorporated in the steam line (see Figure 11). Changing the position of the handle will adjust the steam power at the steam tip. You cannot completely close the steam power with the handle to protect the solenoid. Before adjusting the maximum steam power, make sure that the machine is fully heated up.

It is advised not to decrease the steam power by reducing the steam pressure in the boiler (lower boiler temperature), as this will reduce the amount of steam that can be produced.

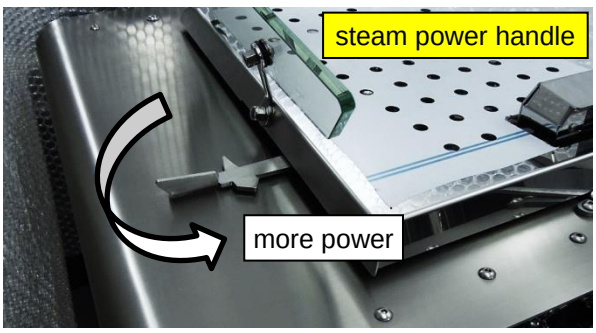


Figure 11. Showing the left exterior steam power handle. Positioned to the front gives maximum power.

Change boiler temperatures

The factory set operational temperatures of the boilers are 93 °C (coffee) and 125 °C (steam) (199 °F and 257 °F) respectively. 125 °C is equivalent to approximately 1.35 Bar steam overpressure.

Switch boiler temperatures with Störk ST25-Eco controllers

Your machine is equipped with Störk ST25-Eco controllers which allow you to easily change the temperature of the corresponding boiler to a second (lower) setpoint. This way you can save energy during the night or set a coffee-boiler on “stand-by” during slow periods while preserving a relatively short start-up time.

Figure 12. The Störk ST25-Eco controller. (Left) The lit indicator dot signifies that the heating element is activated. (Right) the controller in ECO-mode.

Factory standard is that the second setpoint for a steam-boiler controller is 70 °C (158 °F) and for a coffee-boiler controller 50 °C (122 °F), see Table 3. While the second setpoint is active, the display will show “Eco” instead of the actual temperature in the boiler.

	Operational			**Eco-mode**	
	°C	°F	← Press SET/ECO 6 seconds →	°C	°F
Steam boiler	125	257		70	158
Coffee boiler	93	199		50	122
Display example	125		← Turn power OFF and ON	Eco	

Table 3. Factory set temperatures in the Spirit and way to switch between modes.

Procedure to change from operational to Eco-mode

1. Press-hold the SET/ECO button (for approximately 6 seconds) until the display changes to “Eco”.

Procedure to return from Eco- to operational mode

1. Press-hold the SET/ECO button (for approximately 6 seconds) until the display shows a temperature value.
   NB: The start-up mode of the controller is “operational mode”. When power is discontinued for a short time (mains switch to “OFF” and then back to “ON”), all controllers will start up in operational mode simultaneously. A momentary power-failure will have the same result.

Procedure to adjust the operational boiler temperature

1. Make sure that the operational temperature is active (a temperature value is visible).
2. Press-hold the SET/ECO button. The operational temperature is now displayed.
3. While holding the SET/ECO button pressed and before the controller switches to Eco-mode, the △ and ▽ buttons are used to increase and decrease the temperature.
4. Releasing all buttons will enforce the newly set temperature.

The operational temperatures can be set within the following ranges:

- Steam boiler: 0-130 °C (32-266 °F).
- Coffee boiler: 0-100 °C (32-212 °F).

Notes!

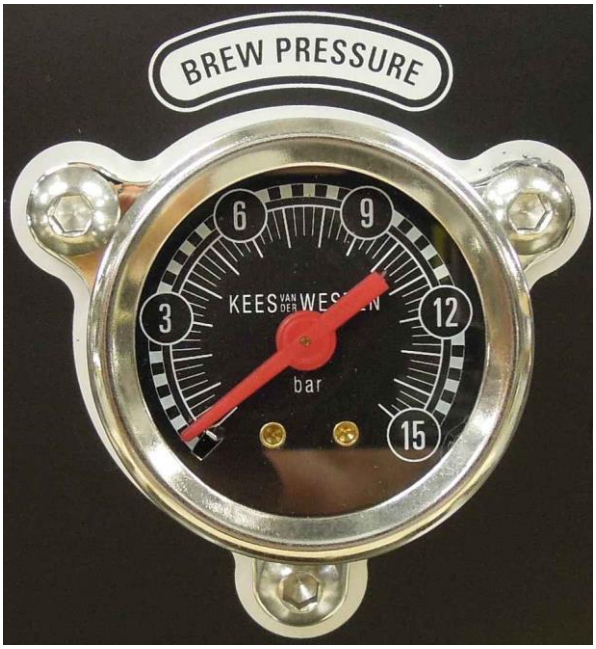
The temperature sensor of the steam-boiler is placed above the water-level for quick response to steam withdrawal. At temperatures below 110 °C (230 °F) the sensor will not register a change in (water) temperature quickly. For that reason, the steam-boiler temperature may be up to 6 °C higher than the Eco-setpoint at the moment you switch from Eco to operational mode.

Do not adjust the temperature of the hot water dispense by changing the temperature of the steam/hot water boiler.

You can adjust the hot water dispense temperature by changing the pressure of the steam/hot water pump.

Brew pressure gauge

In Spirits from October 2016 onwards, the pressure gauge no longer displays the pressure inside the coffee boiler but the pressure in the line at the exit of the group valve, thus the actual pressure on the coffee bed.



Pressure gauge that shows pressure on the coffee bed. When the group is inactive, the pressure displayed is thus (very close to) 0.

This means that when the group is inactive (open connection between coffee-bed and drain) the pressure gauge will display 0 bar. When brewing a shot the coffee-bed becomes less permeable after wetting (pre-infusion stage) and pressure will rise until brew-pump pressure is reached (ideally 9 bar).

If 9 bar pressure is not reached during a normal brew, either the pump pressure is set too low, or the coffee bed was not able to produce enough counter pressure (not enough coffee grinds, coffee grinds too coarse, channelling in coffee bed during extraction, …), or the gauge is malfunctioning.

Checking opening pressure of expansion valve

You can check the opening pressure of the expansion valve of a group by first having a long flush (about 20 seconds) then quickly locking in a blind filter and activating the group again. Pressure will quickly rise to pump pressure and then the expansion of heating up the cold inflow of water will increase the pressure inside the coffee system above pump-pressure. The gauge should reach a maximum value between 11 bar and 13 bar and then remain constant. If the pressure rises above 13 bar, the expansion valve should be re-adjusted. If the pressure does not rise above pump-pressure, the expansion valve may need adjustment or the one-way valve in that coffee-circuit may be malfunctioning: call in a technician.

Set hot water temperature

Hot water from the steam/hot water boiler is mixed with some cold water before it is dispensed. Water temperature at the hot water spout depends on the temperature and amount of the mixed-in cold water. The temperature of the incoming water differs from place to place and possibly on season as well. The amount of cold water inflow is related to the inflow pressure and can thus be adjusted by changing the (outgoing) pressure of the steam/hot water boiler pump. Increasing the pump pressure decreases the temperature at the spout and vice versa.

With incoming water temperature of approximately 10 °C (50 °F) and a steam/hot water boiler temperature of 125 °C (257 °F) and a pump pressure of 8.5 Bar, the water at the hot water spout is approximately 95 °C (203 °F).

Procedure

1. Wait for the machine to be completely warmed up: at least “ON” and heating for 25 minutes and used (as if) to make coffee and dispense hot water at least 5 times over the last 5 minutes.
2. Get the main controller in adjusting mode (to get a long lasting flow of hot water):
   Touchpad: press-hold the upper button on the left hand touchpad for 6 seconds;
   Bastone: press-hold the programming button below the left group lever for 6 seconds.
3. Within 5 seconds, activate water dispensing by shortly pressing the hot water lever down. Water will start flowing.

Note! Work swiftly: the boiler quickly empties when hot water is dispensed continuously.

4. Measure the temperature of the outflowing water with a quick-response temperature sensor* and de-activate the hot water by shortly pressing the lever again. The water temperature should be around 95 °C (203 °F).
5. See Figure 13. If the temperature is too low: decrease pump pressure of the steam/hot water boiler pump (turn set screw counter-clockwise).
   If the temperature is too high: increase pump pressure (turn set screw clockwise).

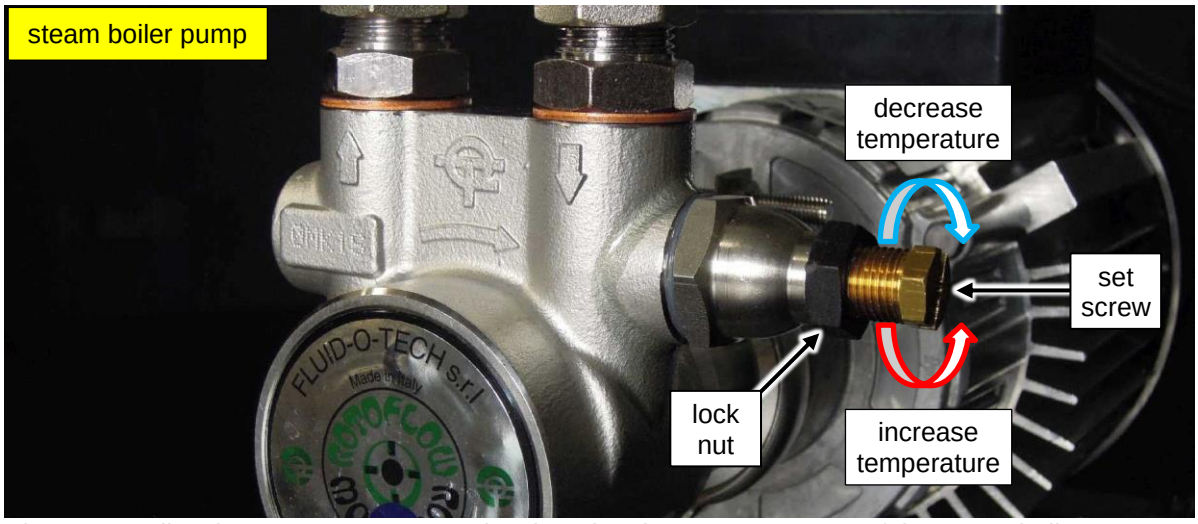


Figure 13. Adjust hot water temperature by changing the pump pressure of the steam boiler pump.

6. After adjusting the pump pressure, measure the temperature again.
7. When the required temperature is reached, re-set the hot water timer to the desired amount of water (see section “program hot water timer”).
8. When the required temperature cannot be reached, the fixed restrictor in the mixblock can be exchanged for one with a larger diameter (to obtain a lower temperature at equal pump pressure) or smaller diameter (to obtain a higher temperature). Contact a qualified technician for this.

* If you do not have a quick response temperature sensor, decrease the pump pressure until boiling water is flowing from the spout (flow will sputter instead of dispensing a calm flow). Then increase the pump pressure a little until a calm flow is obtained.

Shot timers

The timers on top of each group (see Figure 14) measure the time in seconds that the corresponding group valve is open and thus indicate the brew-time. As soon as the group valve opens the time is set to zero and counting starts. The timer stops counting when the group valve is closed and the measured time between opening and closing of the group valve is displayed until the group valve is opened again.

The shot time gives an excellent indication of the brew process and can assist the trained barista to refine that process.

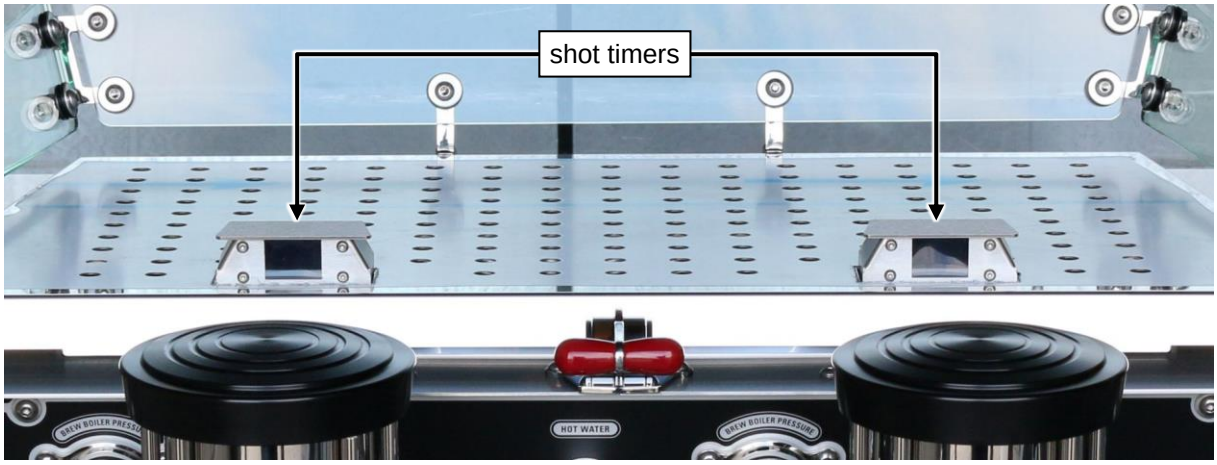


Figure 14. The Spirit shot timers.

A pre-set amount of water will pass through the machine when the brew process is started. Pump pressure and diameter of smallest duct in the set-up (generally the restrictor underneath the group-valve) determine the “free flow” rate (the flow rate when no filter holder with coffee bed is locked in).

During the pre-infusion phase, the combination of pump pressure, size of the restrictor, optional Idro-matic and the coffee bed characteristics determine flow rate onto the coffee bed. The starting pressure in the coffee boiler may fluctuate between 9 and 13 Bar but has very minor influence.

During the extraction phase, it is mainly pump pressure and coffee bed characteristics that determine the flow rate. Variables in the coffee bed are numerous, the most important depend on the grinder (amount of coffee particles and particle size distribution) and the barista (levelling and tamping of coffee and thus packing of particles). Other variables in the coffee bed are: roasting grade, freshness and air humidity.

During “free flow” the timer gives an indication of the condition of the smallest restrictor in the espresso machine which, depending on individual set-up, has an orifice of 0.5 – 0.8 mm. With such small openings, even a minor divergence can cause quite a large difference in free flow rate. Production variances of the restrictors are known to cause a difference in free-flow “shot time” between groups of up to 15%.

Notes!

Measuring the free flow time will only give a rough indication of (smallest) restrictor size and will give no information about pre-infusion and/or extraction. Only with a filled and tamped filter holder in the group can timing measurements be used to give information about pre-infusion and extraction phase.

During the extraction phase, the coffee-bed in the filter is completely dominant in terms of flow rate and any production variations in restrictor sizes are completely swamped by the restrictive effect of the coffee-bed.

Indicator lights

Two groups of indicator lights are found on the bottom of the electronics box, see Figure 15. The set on the left hand side (3 lights) indicate if the steam boiler heating element gets power or not. The set on the right consists of 2 (Duette) or 3 (Triplette) lights and indicate if the individual coffee-boiler heating elements get power or not. If the machine is functioning correctly, the 3 lights on the left (steam boiler heating) should always light up simultaneously, the lights on the right show more erratic behaviour. All lights should be “in sync” with the indicator dot on the corresponding temperature controller.

If there is a problem with the machine, these indicator lights help to determine possible causes.

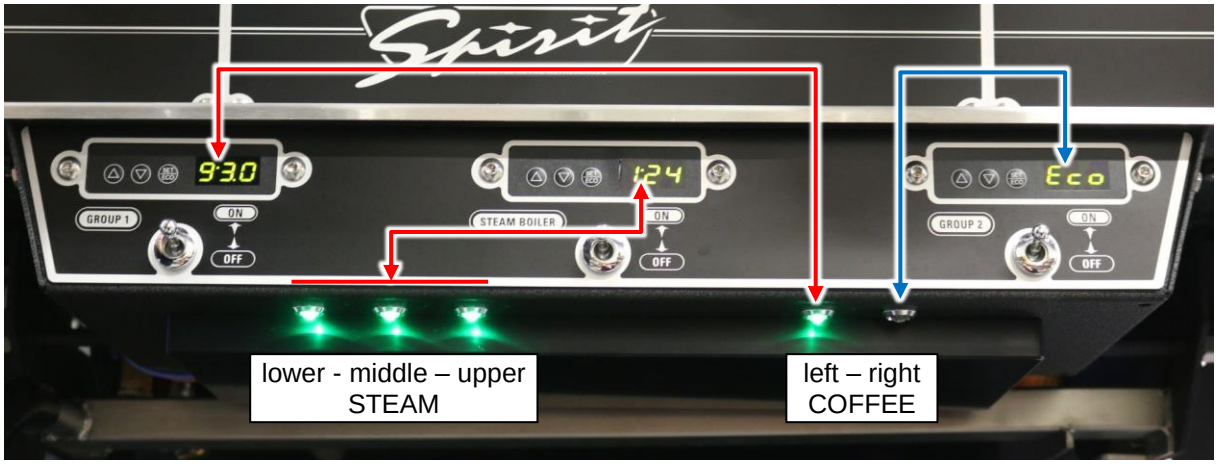


Figure 15. The heating element indicator lights on a Spirit Duette, left indicator lights for the steam boiler, right for the coffee boilers. The indicator dot on the left hand coffee boiler controller is lit and the corresponding indicator light (left light of right set) as well. The indicator dot on the steam boiler controller is lit, as are all steam boiler indicator lights (left set). The right coffee boiler controller is in ECO mode and the indicator dot is not lit, the corresponding indicator light (utmost right light) is off.

Daily to weekly routine

Clean body

The outside of the machine can be cleaned with window cleaner in a hand spray flask in combination with a soft, clean, cotton cloth. When the machine is turned “ON” it will be warm and you have to work swiftly to prevent stripes: spray and immediately rub.
Resistant smudges on high gloss panels may be removed with silver polish and a soft cloth (these surfaces scratch easily, even copper polish may leave marks).

Lift the drip tray grill from the machine and clean it with washing up liquid and a sponge.

Activate the groups (without filter holder locked in) or let the hot water run for a moment and use a brush to push remains into the drain.

As often as needed (with regular use once every day), pour one teaspoon of coffee dissolving powder into the drain and flush it with some hot water down the drain to prevent clogging of the drain hose.

Remove filter basket

Materials needed

- Group screen extractor (or back end of teaspoon)

Procedure

1. Remove the filter holder from the group.
2. Pry the filter basket from the filter holder (see Figure 16).
3. When remounting the filter basket, make sure the spring remains in the indentation of the filter holder and grabs the basket.

Figure 16. Pry filter basket from filter holder with the group screen extractor.

Clean filter holder

Remove the filter basket from the filter holder and clean the filter basket with a little washing up liquid and plastic scouring pad or firm brush. Soak the metal part of the filter holder for 10 minutes in a solution of 1 tablespoon of coffee dissolving powder in 0.5 litre hot water. The plastic handle will eventually disintegrate in this solution and should thus be kept out of the solution.

⚠ **Caution!** Never clean the filter holder in a dish washer as dish washer detergent will ruin it.

Clean steam wand

Milk easily bakes to the hot inner and outer surfaces of the steam wand and tip. Therefore, the steam wand and tip should be cleaned with a damp cloth directly after each use. Do not use this cloth for anything else than the steam wand.

Note! Immediately after steaming milk you should purge the steam wand with a little steam. This will prohibit milk creeping into the pipe, and even into the valve house, through so called capillary rise. Flushing also prevents clogging of the 4 holes in the tip. In the event that clogging occurs, place the end of the steam wand and tip for several minutes in a glass of hot water. The remains will soften and can be wiped off easily. NEVER scrape, grind or cut the steam wand or tip since it leads to damage.

Back flush group

Back flushing cleans the group and conduits from coffee residue which influences the taste of the extraction since fresh (hot) water is transported to the coffee bed through these parts. It is advised to back flush the groups at least once a day and when the machine is intensively used several times per day.

Note! The automatic cleaning program is best performed at the end of the day and is very useful as there is no need to repeatedly engage-disengage each group individually. You should run the program twice: first with cleaning powder, then rinse the blind filter baskets and run the program again without cleaning powder. In this second run you quickly empty a blind filter in between pressurising of the groups, when the groups have depressurised you do the same with the next group, etc.

Described next is the procedure for an individual group in which the other group(s) remain(s) operational.

Materials needed

- Plastic group brush (included in shipment)
- Blind filter (looks like a filter basket but has no holes, included in shipment)
- Coffee dissolving powder (included in shipment)
- Group screen extractor (included in shipment, or back end of teaspoon)

Procedure

1. Remove filter holder and flush the group for approximately 5 seconds.
2. Clean the group screen and group seal with the plastic group brush.
3. Pry the filter basket (e.g. with the group screen extractor) from the filter holder (see Figure 16) and replace it with the blind filter.
4. Scoop 1 teaspoon of coffee dissolving powder in the blind filter and lock the filter holder in the group.
5. Activate the group until full 9 Bar pressure is reached, then de-activate the group.
6. Wait for approximately 3 seconds then activate the group again for approximately 5 seconds.
7. Repeat steps 5 and 6 eight times (wait 3 seconds, activate group 5 seconds), or use the automatic back-flush program (see page 10 or 12).
8. Remove the filter holder from the group, clean the blind filter by flushing it under the tap, activate the group for approximately 5 seconds to remove possible powder from the group screen.
9. Lock filter holder in group, activate pump for about 5 seconds, de-activate pump, remove filter holder and pour out remaining liquids.
10. Repeat step 9 four times (or use the automatic back-flush program).
11. Pry the blind filter from the filter holder and replace the filter basket.

⚠ **Warning!** Finishing the back flush routine without cleaning powder is essential to prevent remnants of cleaning powder settling between the plunger and housing of the 3-way group valve.

Clean group screen, check and replace group seal

The group screen helps to disperse the incoming hot water onto the coffee bed and also prevents coffee grinds entering the group.
The group seal will deteriorate slowly over time. We advise to check the group seal regularly and replace when needed.

Materials needed

- Group screen extractor (included in shipment, or back end of a fork or spoon)
- Plastic brush (included in shipment)
- Coffee dissolving powder (included in shipment)
- Replacement group seal and/or group screen (when necessary)

Procedure

1. Pry the group screen gently from the group using the screen extractor levered under the bayonet-ring. Place the pointed edge of the tool **in the rim of** the group screen (see Figure 17 a), do not puncture the group screen. Pry left and right, the screen will fall out together with the group seal.
2. Remove the group seal from the group screen.
3. Soak the metal group screen in a solution of coffee dissolving powder and warm water for about 5 minutes. Rinse under streaming water.
4. Check the group seal for cracks and/or hardening, replace if necessary.
5. One side of the group seal has a somewhat more rounded surface. When replacing the group seal on the group screen, make sure the rounded side of the ring is inserted into the group (facing upwards, see Figure 17 b).
6. Place group screen with group seal on the filter holder and insert into group, pushing upwards.
7. Turn filter holder in bayonet to press group seal firmly into the group.

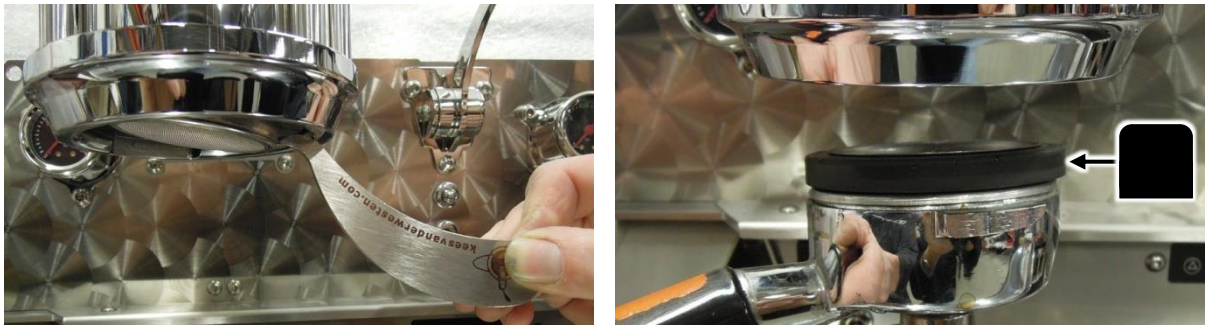


Figure 17 a (left). Pry left and right with screen extractor to remove group screen and group seal.
Figure 17 b (right). Mount group screen with filter holder and group ring. Inset shows schematic cross section of group ring with rounded surface upwards.

Clean group dispersion plate

The group (lower) dispersion plate ensures uniform wetting of the coffee bed. When dirty, the wetting will become less uniform. As the dispersion plate is made of plastic material, it is heat neutral such that no oils and fats will bake on. The plate remains clean for quite long.
The dispersion plate is a wearing item. It is slowly affected by the aggressive cleaning powder and needs replacement eventually. The dispersion base (or upper dispersion plate) wears at the same rate (or even a little faster) as the dispersion plate and should be replaced together with the dispersion plate. The new version of the dispersion set is made from (light brown) PEEK material that should have a longer life-span than the (black) POM.

Materials needed

- Short flat screw driver no.2
- Group screen extractor (included in shipment, or back end of a fork or spoon)
- Plastic brush (included in shipment)
- Coffee dissolving powder (included in shipment)

Procedure

1. Remove group screen and group seal (see previous item).
2. Remove the two bolts from the plastic dispersion plate with a short screwdriver (see Figure 18), the dispersion plate will fall out.

△ **Caution!** The dispersion base remains in the group bottom. With the bolts removed, the connection between the dispersion base and group bottom is fragile.

3. Clean the dispersion plate with a plastic brush. When necessary, put the dispersion plate in a solution of coffee dissolving powder and warm water for about 5 minutes. Rinse under streaming water.

△ **Caution!** Do not scrub the dispersion plate with a metal brush or Scotch-pad as it will scratch easily and dirt adheres more easily on a scratched surface.

4. When re-installing, do not over-tighten the bolts that hold the group dispersion plate.
5. Remount group screen and group seal (see previous section).


Figure 18a (left). Dispersion set (POM material) mounted in group head.
Figure 18b (right). Dispersion plate removed from group. The dispersion base remains in the group.

Replace dispersion base and plate

When the dispersion plate is to be renewed, you should renew the dispersion base as well. The protrusion on the dispersion base easily breaks off when the plastic material is deteriorated (by cleaning powder).
The fit of the dispersion base into group bottom has changed a little over time, as has the thickness of the dispersion plate. That is why you should receive new screws together with a new dispersion base and plate. The new version of the dispersion set is made from (light brown) PEEK material that should have a longer life-span than the (black) POM.

Procedure

1. Remove the group dispersion plate (see previous item).
2. Gently pull the dispersion base from the group bottom, pull as perpendicular as possible. Do not twist the dispersion base.
   If the dispersion base does not come off from the group bottom easily, use two longer M5 bolts to get a grip on the base (see Figure 19). If the protrusion breaks from the base and remains in the group head, pull out with needle nose pliers or twist in a (wood) screw and pull the screw with protrusion from the group bottom.
3. Mount the new base and plate with the new screws, discard the old screws.
4. Remount the group screen and seal (see previous item).

Figure 19. How to remove the dispersion base if it does not come out easily. The picture on the right clearly shows the protrusion on the dispersion base.

Recommended maintenance scheme

Daily (see user manual)
- Clean filter holder
- Clean steam wand
- Back flush groups

Weekly (see user manual)
- Clean group screen
- Clean group dispersion plate

Monthly (see user manual)
- Check pump pressure
- Check and replace if necessary:
  - group seal
  - group screen
  - filter basket
  - filter holder clip
- Check the functioning of your water treatment system

Every 3 months
monthly maintenance PLUS:

- Grease brewing, steam and hot water lever mechanisms
- Grease steam wand ball with food-safe grease and check play between nut and ball of steam wand; replace nut if necessary
- Check anti-vacuum valve for leakage
- Check safety-valve on steam boiler for leakage
- Check opening pressure of expansion valves on inlet manifold; adjust when necessary

Every 6 months
quarterly maintenance PLUS:

- Check dispersion plate and base; replace when necessary
- Check tube from mix-block to hot water outlet for scale build-up

Every 12 months
bi-annual maintenance PLUS:

- Clean level probe and safety probe
- Replace:
  - group screen
  - filter basket
  - filter holder clip
- Replace anti-vacuum valve
- Replace anti-burn sleeves on wands and service ball-joints
- Renew water treatment filter cartridge

Every 5 years
yearly maintenance PLUS:

- Replace all solenoid valves (fill, hot- and cold-water and group valves)
- Replace O-rings on flat-jets (underneath fill, cold-water and group valves)
- Replace ball-joint nuts
- Replace screen assembly on hot water wand
- Replace combi-valves (one-way/expansion)

For maintenance procedures, we refer to the technical manual.

Maintenance Record

(machine number: _____ , installation date:_____)

Date		Task	Comments

Notice

⚠ Warning!

Maintenance on the Spirit should be done by a qualified technician. Parts of the machine can reach a temperature of close to 130 °C (266 °F). The steam/hot water boiler contains water and pressurised steam of 125 °C at 1.35 Bar overpressure (257 °F at 20 PSI), temperature and pressure in the coffee system may reach up to 96 °C at 12 Bar overpressure (205 °F at 175 PSI).

When servicing the machine it is sometimes necessary to keep the Spirit connected to the AC power outlet and the machine switched “on”. In both cases there is a possibility that you touch a live wire.

☠ Danger

We cannot be held responsible for damage and/or injuries resulting from actions performed on our machines by non-qualified personnel.

Any qualified technician working on the Spirit is urged to thoroughly read the latest editions of the “Technical manual” which can be obtained via:

support@keesvanderwesten.com

When seeking contact with the e-mail address above, please forward the model and serial number of the machine in question.

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Please supply machine details (model and serial number) and full contact information when ordering.