



Speedster

Technical manual 2014 Speedster

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Parts identification

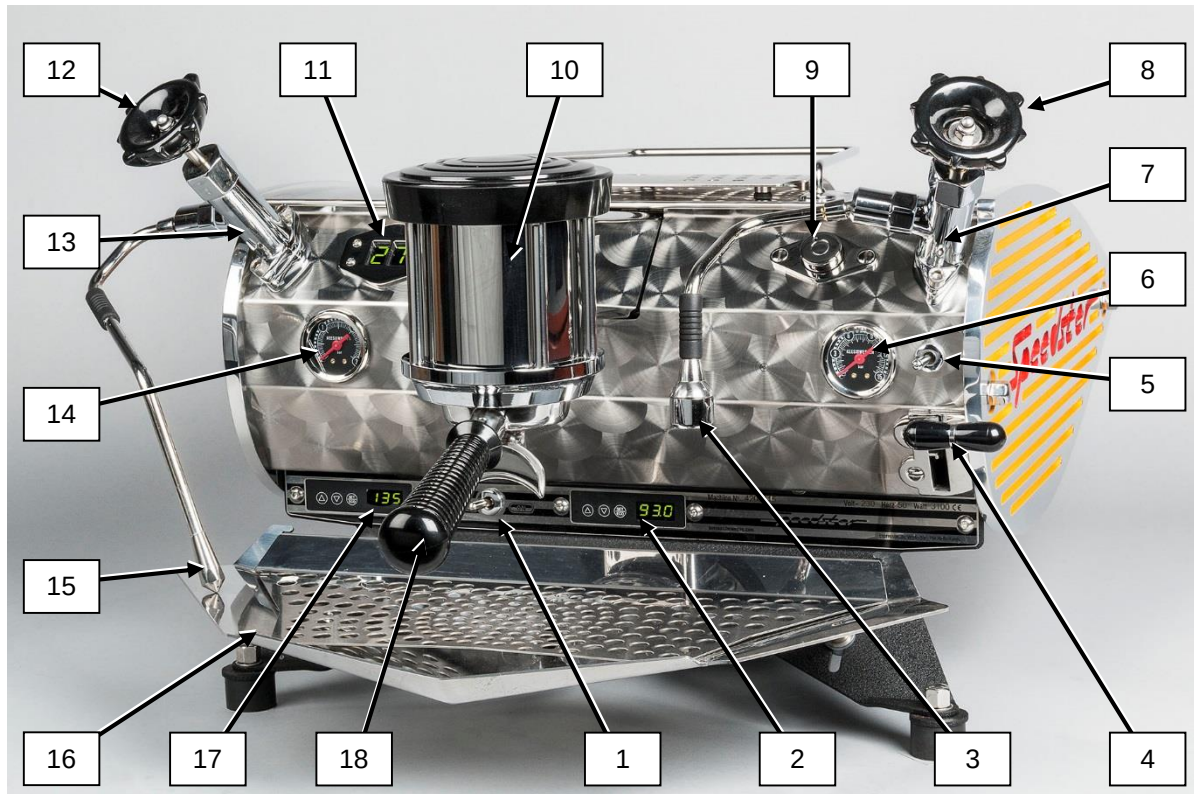


Figure W 1. Showing main operational parts of the 2014 Speedster

1. Mains switch
2. Coffee boiler PID with temperature display
3. Hot water spout
4. 3-way brewing lever
5. 3-way hot water toggle switch
6. Coffee boiler pressure gauge
7. Hot water valve
8. Hot water valve knob (no operational function)
9. Visible end of pre-infusion piston
10. Group head
11. Shot timer display
12. Steam valve knob
13. Steam valve
14. Steam boiler pressure gauge
15. Steam tip
16. Drip tray
17. Steam boiler thermostat with temperature display
18. Filter holder



Welcome

Thank you for ordering a Speedster espresso machine from Kees van der Westen Espressonistic Works B.V. The Speedster is a professional one group machine which is hand built and individually tested at our shop in Waalre, the Netherlands.

Standard shipment includes an external rotation pump with electrical motor, 3 high pressure water supply lines and several accessories. The frame, body and both boilers are made from high grade stainless steel (group and boiler: grade 316L).

As water quality changes from location to location and no single water treatment system exists that can deal with all different water specifications, a water treatment system is not included in the shipment; you need to obtain one separately. Contact a water expert with knowledge of the local water-situation to advise you on water treatment.

The Speedster functions according to the so-called double boiler system in which there are separate boilers for both coffee water and for steam/hot water supply. This system allows for very accurate temperature stability of espresso and steam/hot water, also with large quantities over long periods. The coffee boiler is equipped with a PID¹-regulator which is a very user friendly device ensuring near perfect temperature stability. Both steam boiler and coffee boiler temperature controllers have a "stand-by" setting which allows for power saving during prolonged non-use of the machine with a quick start-up time.

An in-house developed pre-infusion system is incorporated within the Speedster. This "soft-start" mechanism (progressive pre-infusion cylinder) absorbs initial water pressure such that it increases gradually to either 3 Bar (water line pressure) or 9 bar (pump pressure) which ensures pre-wetting and swelling of the coffee grinds before extraction starts. The 3-way group operation lever with positions "off", "pre-infusion" and "pump active" gives the barista total control over the pre-infusion phase by adjusting the pre-infusion time as desired. A timer shows the amount of seconds since the group-valve has been opened. The combination of these techniques guarantees that the delicate coffee flavours can fully develop during extraction which results in more taste and aroma in the cup.

Both the steam boiler and the coffee boiler are equipped with an individual electronic safety shut-down system which interrupts the power to the heating elements. An expansion valve in the coffee water system is adjusted to 10-12 Bar at our workshop and a safety valve of 3 Bar in the steam boiler ensure that the pressures in the Speedster cannot exceed safety values.

The Speedster is built with a maximum power limiting device to reduce the maximum power rating of the machine. This cuts 900W from the maximum power consumption with negligible effect on temperature stability once the machine is warmed-up. If wanted or upon request, the device can be by-passed for shorter warming up period (220-240 VAC version only. In a 110-120 VAC machine, the device is always active).

¹ PID: Proportional Integral Derivative; a very fast and precisely responding electronic feedback system.



Notice

Filled with water, the Speedster espresso machine has a mass of approximately 45 kg (100 lbs), produces heat and measures approximately 50x60x40 cm (width x depth x height; 20x24x16 inch). To properly operate the Speedster a sturdy platform with a fully horizontal surface is essential while space is needed above and to the sides of the machine for coffee grinder, knock-box, tamper and other accessories. The pump and water treatment system should be placed in the proximity of the machine. Water supply and discharge, as well as an AC socket with earth are needed for installation (see table below and “Technical specifications – Electricity”). The location of your Speedster should account for these.

Maximum power consumption	220-240 VAC		110-120 VAC	
	Watt	Amps	Watt	Amps
Speedster	2200*	9.6	2050	17.8
Speedster high power	3100	13.5	n.a.	n.a.

* The identification tag of a 220-240 VAC Speedster will always read 3100W, also when the maximum power limiting device is active.

Water quality

Since water content in an espresso is more than 90%, the quality of your water supply is highly important for the taste of your coffee. While too much mineral content will hasten damaging lime scale build-up inside your Speedster, an absence of minerals will give your espresso a flat taste while also harming the boilers inside the machine. As a rule of thumb, the amount of total dissolved solids (TDS) in your water should be 100-150 mg/l (=ppm).

We recommend that you contact your water company for details about your water quality and have a water expert with knowledge of (local) water quality in espresso-machines help you to determine a suitable water-treatment system. Below some guiding principles.

Hard water treated with an ion exchange water softener only has calcium replaced, and so it is wise to further treat your water with an activated carbon or a carbon block water filter. These kinds of filters also remove other impurities that affect taste, but, on their own, are not able to remove water hardness. Calcium and magnesium in the form of carbonates dissolved in water are the two most common minerals that make water "hard". It is recommended that water hardness is 2-3 German degrees (35-50 mg/l Ca/Mg carbonate). The water treatment system hooked up to your machine should establish these values.

The acidity (pH-value) of your water should be close to neutral (pH=7). A lower value (pH < 6.5) will make your espresso start to taste acidic and is corrosive to the metal parts in your machine. A higher value (pH > 7.5) results in bland tasting brews although it can also neutralise slightly acidic coffee grinds. You are advised to check the acidity of your water every once in a while.

Chlorine should not be present in your water since it has a highly corrosive effect on all metal parts (copper, brass and even stainless steel) inside your machine and makes your espresso smell and taste awful. Chlorine treated water should therefore not be used in your machine unless chlorine is removed from the water after the chlorine treatment (e.g. by use of an activated carbon or a carbon block water filter).



WELCOME

Water Quality Parameter	Superior Brew	Adequate Brew
Odor	Clean/Fresh	Clean/Fresh
Color	Clear	Clear
Chlorine	0 mg/L	0 mg/L
TDS	150 mg/L	75-250 mg/L
Calcium Hardness	51 mg/L to 68 mg/L	17 mg/L to 85 mg/L
Total Alkalinity	At or near 40 mg/L	10-100 mg/L
pH	7 to 8 pH	6.5 to 7.5 pH
Sodium	10 mg/L	Less than 30 mg/L

Water properties for optimum taste. Source: SCAA Technical Standards Committee, 2009.

Any installed water treatment system should take the above into account and also prevent coarse particles and aggressive components to enter the machine. We do not favour the use of de-scaling agents in our machines and therefore recommend that the function of the water treatment system is checked regularly. Not only changes in Alkalinity and Hardness of water, but also temperature have dramatic effects on scale deposits and/or aggressiveness of water on the machine thus no single water is optimal for both steam- and coffee boiler. We favour scale deposit over corrosion and advice the use of the higher hardness value shown in the table below. Flushing the steam boiler will help to reduce scale deposit in the steam boiler. Drawing lots of hot water reduces the scale-forming induced by steaming due to removal of pure water.

°C ↓	Alkalinity (mg/l)											
	33	37	40	43	47	50	53	57	60	63	67	70
90	342	250	202	166	130	110	93	77	67	59	51	46
95	280	205	166	136	106	90	77	63	55	49	42	38
115	130	95	77	63	49	42	37	31	27	24	21	19
120	108	79	63	52	41	36	31	26	23	21	18	16
125	89	65	53	43	35	30	26	22	20	18	15	14
130	75	55	44	37	30	26	22	19	17	15	13	12

Maximum non-scaling Hardness (mg/l) by temperature and Alkalinity. With an Alkalinity of 50, ideal hardness would be about 100 mg/l for the coffee boiler and about 25 mg/l for the steam boiler. We advise to use 100 mg/l hardness at 50 mg/l Alkalinity. Source: Jim Schulman's Insanely Long Water FAQ.

For comprehensive information about water in espresso machines we refer to: *Jim Schulman's Insanely Long Water FAQ, Originally Posted on alt.coffee.*

Note on this manual

Work on the Speedster manual is a continuing process. Photographs in this manual were taken mid 2015 in the shop from machines being built or from parts available at the time. For that reason, body panels and/or parts from the machines on display may be missing and parts in the machine you bought some time ago may not look identical to the parts shown in the manual. Over time, sections are added and/or improved, sometimes as result of readers making comments. If you have suggestions for improvements, do not hesitate to send them to: support@keesvanderwesten.com.



Maintenance inside the Speedster



To avoid hazardous situations it is of the utmost importance that repairs are only performed by a professional when the power cord, pump cord or other electric parts of your Speedster get damaged or should be replaced for other reasons.

Warning!

We strongly recommend to only have well-experienced espresso machine technicians performing the tasks described further on in this manual. Kees van der Westen Espressonistic Works B.V. cannot be held responsible for any damage and/or injuries caused by non-trained people working on our machines.

Remove body panels

Most parts within the machine that need regular maintenance can be accessed by removing either the left, the right and/or the upper body panel. Since the upper body panel is enclosed between the side panels, the upper body panel should not be removed with the side panels still attached. Removing only the upper body panel will result in scratching the side panels and possible bending of the upper body panel.

△ Caution!

Parts of the interior of the machine will have a temperature (nearly) as high as the set temperature of the steam boiler.

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

Take the necessary precautions when one or more body panels are removed.

Tools needed

- Spanner 13 mm
- Allen key 3 mm
- Copper-ease (anti-seize lubricant)

Procedure side panels

1. Unscrew the 2 nuts on the side panel with a 13 mm spanner (see *Figure M 1*).
2. Carefully pull side panel away from the machine.
3. When re-mounting the side panels, don't forget the stainless steel washers under the nuts and use some copper-ease on the threads.





Figure M 1. To remove side panel loosen the 2 nuts with a 13 mm spanner.

Procedure upper body panel

1. Make sure that both side panels are removed.
2. Use a 3 mm Allen key to remove 5 bolts. The remaining 2 bolts on the body panel should not be loosened (indicated "X" see Figure M 2).
3. Lift back side of panel up then pull panel a little to the front.
4. When re-mounting, make sure that the upper body panel hooks onto the front of the machine. The positions of the 2 shorter (6mm) Allen bolts are at the far sides of the panel and indicated "6" on the figure. Do not over-tighten the Allen bolts, use copper ease.
5. Re-mount side panels.

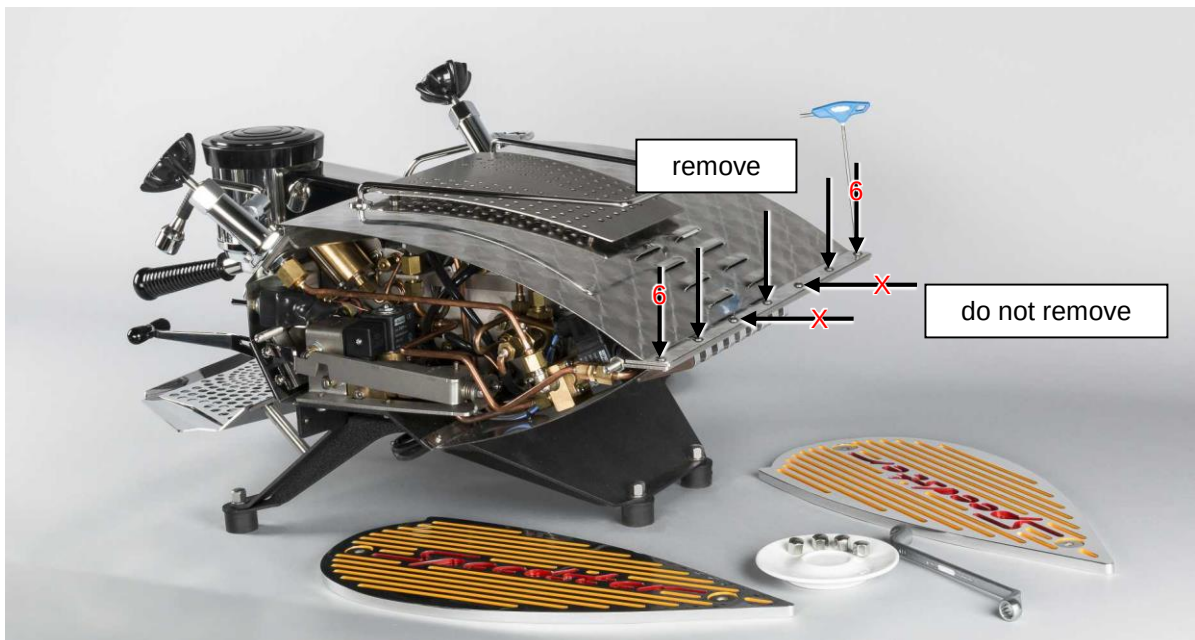


Figure M 2. Showing which bolts should be removed to lift the upper body panel.



Replace anti-vacuum valve

The anti-vacuum valve could malfunction when the machine is turned off regularly. It is advised to replace the anti-vacuum valve every year.

Some sputter and hiss inside the drain pipe at the back of the drip tray is normal when the machine is warming up from cold when the water reaches boiling temperature and a little steam is released through the anti-vacuum valve into the discharge.

A malfunction of the anti-vacuum valve is recognised by a continuous hissing sound combined with the lack of pressure and temperature building up while the heater in the steam/hot water boiler is engaged continuously and the boiler is filled automatically once in a while. (However, a malfunctioning safety valve leads to similar symptoms.)

Materials needed

- Spanner 13 mm, 16 mm
- Allen key 3 mm
- Replacement anti-vacuum valve

Procedure

1. Turn Speedster "off".
2. Open the steam valve, this will relieve the pressure in the hot water/steam boiler.
3. Remove left and right side panels first, then upper body panel.
4. Pull the black silicone (drain-) hose from the anti-vacuum valve (see *Figure M 3*).
5. Unscrew the brass nut underneath the sub-frame on which the anti-vacuum valve is mounted with a 16 mm spanner.
6. Replace the anti-vacuum valve, do not tighten the brass nut with a lot of force.
7. Put the silicone hose on the valve.
8. Close the steam valve and turn the Speedster "on".
9. Check the anti-vacuum valve for leakage. If necessary, tighten nut a little more.
10. Mount upper body panel first, then both side panels.

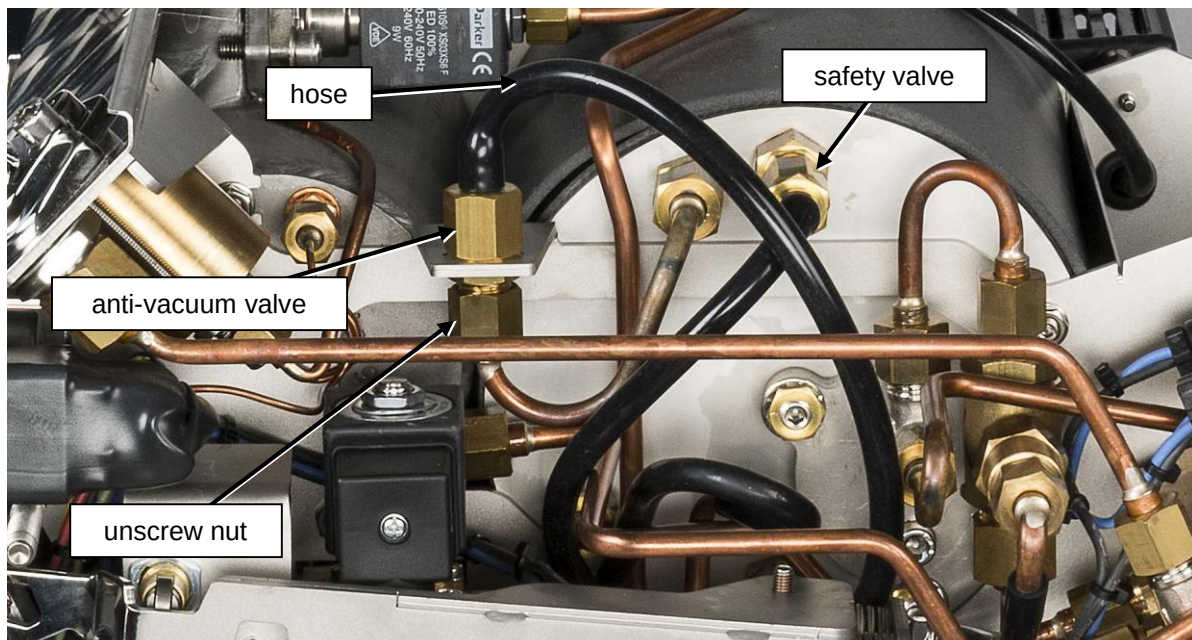


Figure M 3. Machine's interior at right hand side. Showing anti-vacuum valve and nut to unscrew for replacement. Also showing position of safety valve.



Grease wands and check play between nut and ball

The ball shaped end of the steam and hot water wands is in direct contact with the conical nut and should therefore be lubricated. If not lubricated, the steel ball will erode the bronze nut and eventually the wand will “pop out” of the nut.

When opened, you may just as well grease the plunger in the valve.

Materials needed

- Spanner, 22 mm
- Heat resistant, food safe, silicon grease
- Loctite 542 (thread sealant)

Procedure

1. Make sure that valve is closed and valve temperature is such that it can be firmly gripped.
2. Turn conical valve nut with spanner 22 mm counter-clockwise to remove. Beware that a spring inside the valve pushes a plunger against the ball end of the wand. A Teflon sealing O-ring will probably remain on the valve.
3. Clean the threads on the valve, do not damage the Teflon O-ring. When damaged, the Teflon O-ring should be replaced.
4. When removed, slide the nut a little over the wand towards the tip. A (red) silicone O-ring inside will be pushed out of the nut.

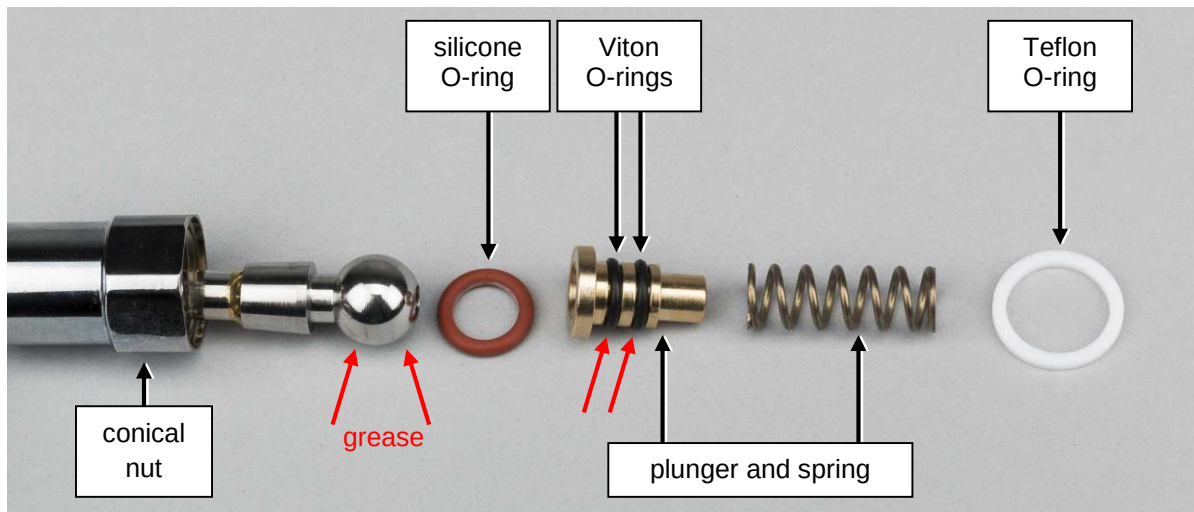


Figure M 4. Steam or hot water wand end with plunger removed. Grease (food-safe) parts as indicated by red arrows.

5. Apply a small amount of grease to both sides of the ball end of the wand and the two Viton O-rings on the brass plunger in the valve (see Figure M 4).
6. Slide the spring and plunger back into the valve.
7. Slide the nut back over the wand, insert the red silicone O-ring.
8. By hand, screw the nut a few turns onto the valve.
9. Apply 2 drops of Loctite to the threads of the valve. Tighten nut with spanner, do not use excessive force.



Check in-line jet for scale build-up

DURING 2013, THE JET IN THE GROUP HEAD WAS DISCONTINUED. At the same time, the 1.5 mm jet in between heat exchanger and coffee boiler was changed to 0.6 mm.

Even when you keep your water softener in excellent condition, a minor amount of scale will still be deposited on the inside of your Speedster. Most ducts within the machine have such dimensions that a little scale will not influence the brewing process. However, the flow restrictor, or jet, within the coffee boiler supply line (normally) has an opening with a diameter of 0.6 mm and is thus most affected by any scale build up. When new, the flow (with filter holder removed) is 110 ml (+/- 20 ml) in 15 seconds. When this drops to less than 80 ml in 15 seconds your machine needs attention.

Check/clean/replace in-line jet

Materials needed

- Spanner 13 mm, 14 mm, 16 mm
- Allen key 3 mm
- Small screwdriver (no. 1)
- Copper ring; 1/8"
- Jet filter screen
- Teflon tape or Loctite 542 (thread sealant)

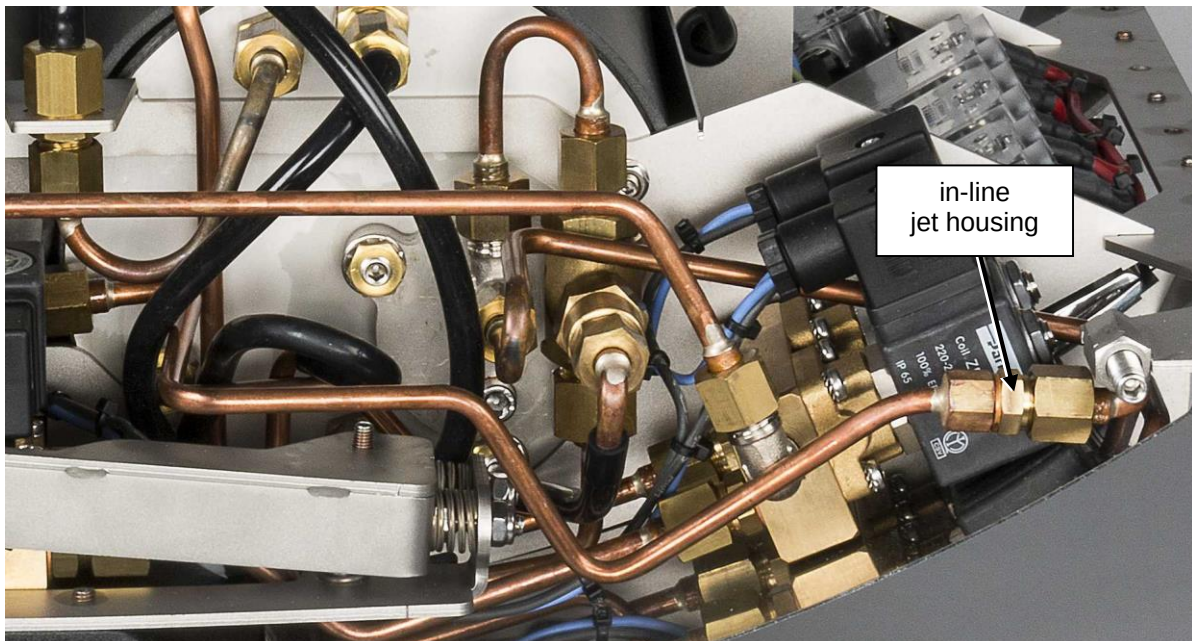


Figure M 5. Showing the jet housing in the coffee boiler supply line.

Procedure

1. Disconnect the pump motor (unplug special connector).
2. Close main tap of water supply.
3. Make sure that machine is still switched "on".
4. Put brewing lever in middle position, this will relieve the water pressure in the coffee boiler and group.
5. Put brewing lever back in upper position and switch machine "off".
6. Remove side panels first, then upper panel.
7. While retaining the jet housing (14 mm), undo the nut at the back end (16 mm).



MAINTENANCE

8. While retaining the welded-on fitting (13 mm) remove the jet housing from the line (14 mm).
9. Use a needle or pin to remove the O-ring and filter screen from the jet housing.
10. Now clean the assembly or use a 3 mm Allen key to remove the jet from its housing. Retain the jet housing with a 14 mm spanner, see *Figure M 6*.

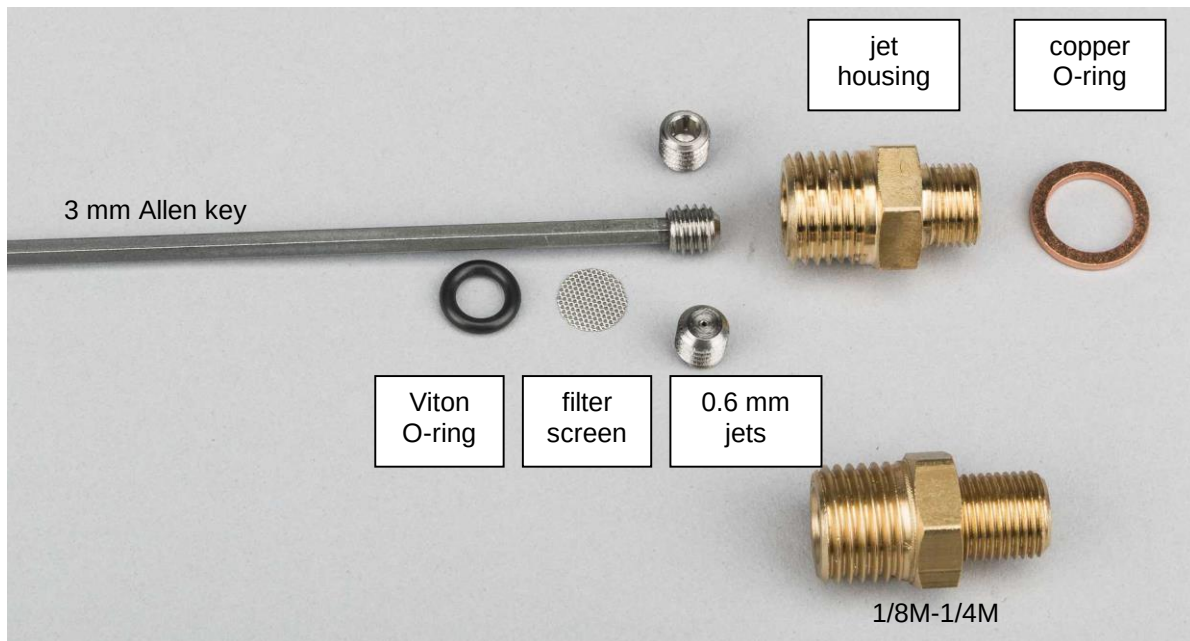


Figure M 6. Exploded view of jet and housing. Three jets are shown, as well as an ordinary 1/8M-1/4M fitting; the jet housing has a lot shorter 1/8 threads.

11. Clean the jet (if possible twist a 0.6 mm drill-bit or well measured pin by hand through the hole).
12. Remount the jet, do not over-tighten.
13. Remount the new jet filter screen with the Viton O-ring in the jet housing.
14. Remount the jet housing with a new copper ring and a drop of Loctite or windings of Teflon tape onto the welded-on fitting, retain the fitting while tightening the jet-housing.
15. Remount the nut onto the jet housing while retaining the jet housing.
16. Open water mains.
17. Connect pump motor.
18. Switch machine "on".
19. Check for leakage, first with brewing lever in middle position (line pressure; up to 3 Bar), then in lower position (pump engaged; 9 Bar).
20. Remount upper and then side panels.



Safety valve on steam boiler

When the safety valve on the steam/hot water boiler is malfunctioning it will open at a (much) lower than operating pressure (2.2-2.5 Bar). When this occurs, the safety valve has to be replaced. A malfunction of the safety valve is recognised by a continuous hissing sound combined with the lack of pressure and temperature build-up while the heater in the steam/hot water boiler is engaged continuously and the boiler is filled automatically once in a while. (However, a malfunctioning anti-vacuum valve leads to similar symptoms.)

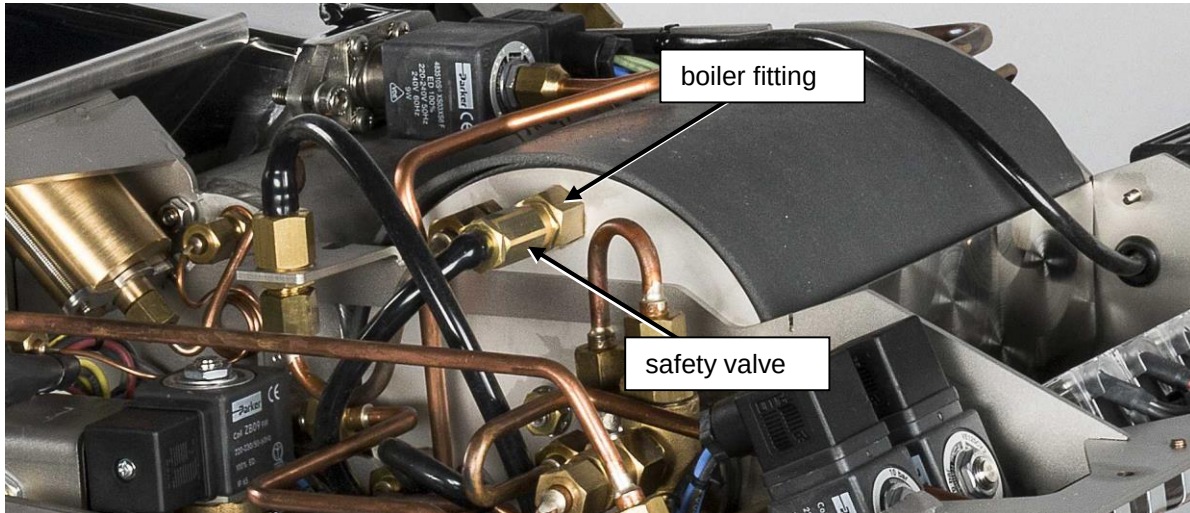


Figure M 7. showing the safety valve and boiler fitting.

Check safety valve

Materials needed

- Spanner 13 mm, Allen key 3 mm

Procedure

1. Remove right hand side panel.
2. Pull black silicone drain hose from safety valve (see Figure M 7).
3. Check for leakage, the hose should be dry and should not show evidence for leakage (deritical build-up) on the inside.
4. If necessary, replace safety valve (see below).
5. Remount hose.
6. Mount upper body panel first, then both side panels, or just right side panel.

Replace safety valve

Materials needed

- Spanner 13 mm, 15 mm, 17 mm, Allen key 3 mm
- Replacement safety valve
- Loctite 542 (thread sealant) or Teflon tape

Procedure

1. Turn mains switch of Speedster to "off", remove both sides and upper panels.
2. Open steam valve to let off steam, this will relieve the excess pressure in the steam/hot water boiler.
3. When pressure in boiler has dropped, remove the safety valve from the fitting in the boiler with a 15 mm spanner, retain the boiler fitting with a 17 mm spanner.



MAINTENANCE

Note

The valve is mounted with Loctite to ensure sealing, you may need a little extra torque to loosen it.

4. Clean inside threads of the fitting as well as possible.
5. Apply a few drops of Loctite or a few windings of Teflon tape to the threads of the replacement safety valve and mount in fitting on boiler.
6. Turn machine "on", wait until pressure has built up.
7. Check valve and sealing for leakage.



Expansion valve on heat-exchanger system

The coffee water heating system consists of a heat-exchanger inside the steam boiler and the coffee boiler with group. This entire system is filled with water only, no steam, no air. At the entrance of the coffee water system a one-way valve, or check valve, is installed to prevent hot water being pushed back into the fresh water lines.

When water is heated it will expand. As there is no room for the expanded water (no air pockets, no way out) pressure will build up. The right hand pressure gauge indicates the pressure in the coffee water heating system.

To keep this pressure within safety limits, an expansion valve is part of the system. When functioning correctly, the expansion valve will release drops of water every time the pressure reaches the set value. The released water is directed into the discharge.

As soon as the brewing lever is moved to its middle (pre-infusion) position (group valve open, no pump activated) the pressure will drop immediately to incoming line pressure.

When the lever is moved to the lower position the pump will be activated. The pump now pressurises the entire coffee water system.

The expansion valve and one-way valve is a combined part in the Speedster (see *Figure M 8*). The vertical part is the one-way valve, the horizontal part is the expansion valve.

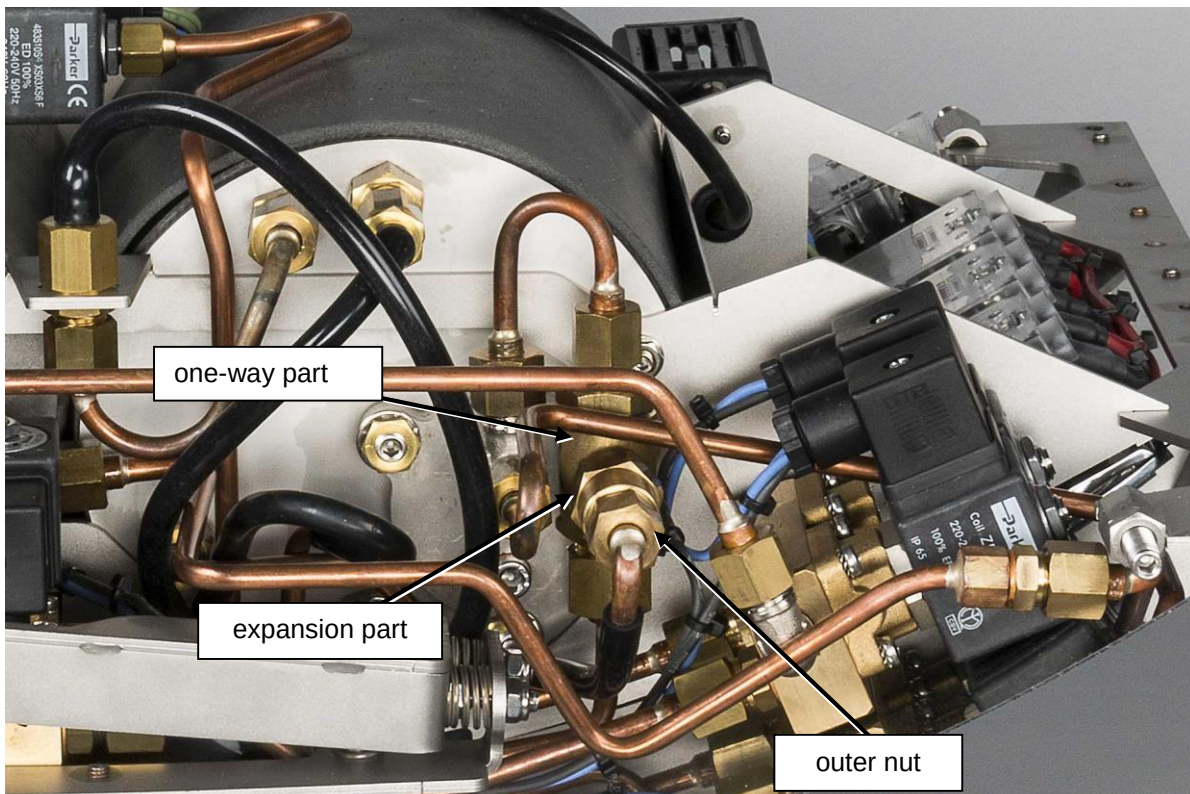


Figure M 8. Showing combined expansion valve and one-way valve. Flow direction within the one-way valve is upwards.

Easiest is to work with the machine heating up from cold. This will give a long trajectory of heating up and thus expanding of water in the coffee water system such that a proper adjustment can be made. When the machine is at idle (boiler water already warm) the heating element is only engaged for short bursts every once in a while and the water within the coffee water system does not expand, at least not enough for a proper adjustment.

When warm, the pressure needed for checking and adjustments can be supplied by the pump.

Note

The group valve has a rating of 15 Bar. This means it will be pushed open when pressure exceeds 15 bar. The group valve thus acts as a second safety, should the expansion valve fail to open.

Check expansion valve

Materials needed

- Spanner 13 mm, 16 mm, 21 mm
- Allen key 5 mm
- Wide screwdriver
- Towel or sponge

Procedure when machine is cold

1. Turn the machine “on”.
2. Be sure the coffee water system is completely filled: water should exit immediately from the group when the brew lever is moved downwards.
3. Remove both left and right side panels and upper body panel. (When the outer nut of the expansion valve is not too tight, there is no need to retain the expansion valve such that the left side and upper body panels do not have to be removed.)
4. Turn outer nut loose from expansion valve with 16 mm spanner. Retain expansion valve with 21 mm spanner. Let drain hose with short copper tube and nut dangle to side.
5. Check on right hand pressure gauge at what pressure the expansion valve starts to drip. Have a towel ready to pick up the spills.
6. If opening pressure is lower than 12 Bar, use a 5 mm Allen key to turn the set screw inside the expansion valve clockwise (see *Figure M 9*).
If expansion valve does not start dripping when 12 Bar is reached, turn set screw counter-clockwise until it does.
When the valve cannot be closed at 12 Bar, the sealing disk inside has to be replaced (see below).
7. Re-mount drain hose to expansion valve. Wiggle the tube a little when fastening the nut, do not over-tighten the nut; a wrench is not really needed.
8. Re-mount upper body panel (if removed), then side panel(s).

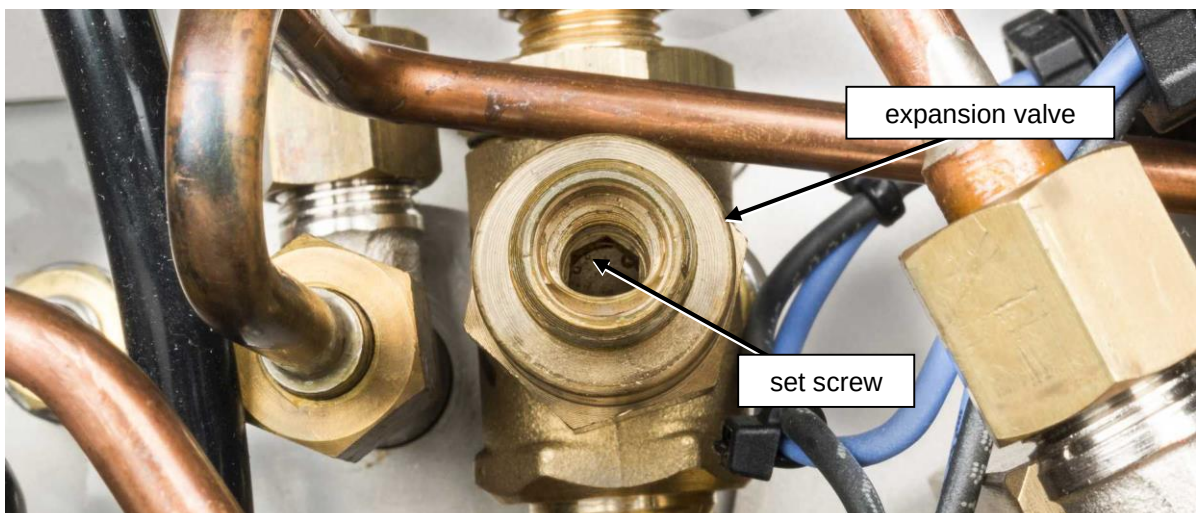


Figure M 9. Showing detail of expansion valve and hexagonal opening in set screw. Drain hose is removed from valve.



Procedure when machine is warm/hot

Extra material needed blind filter

1. (Make sure machine is switched "on".)
2. Remove both left and right side panels and upper body panel. (When the outer nut of the expansion valve is not too tight, there is no need to retain the expansion valve such that the left side and upper body panels do not have to be removed.)
3. Unscrew outer nut from expansion valve with a 16 mm spanner. Retain expansion valve with 21 mm spanner. Let drain hose with short copper tube and nut dangle to side.
4. Turn the set screw inside the expansion valve with Allen key 5 mm clockwise to increase the opening pressure of the valve.
5. Replace filter basket in filter holder by blind filter.
6. Mount filter holder in group.
7. Activate pump (brewing lever in lower position).
8. Check pump pressure in coffee boiler on (right) pressure gauge.
9. Increase pump pressure to 12 Bar by turning the set screw on the pump clockwise. It is possible that the expansion valve starts to leak water before 12 bar is reached, in that case, replace the sealing disk in the valve (see next paragraph).

Beware! The set screw on the pump is made from brass and is easily deformed. To avoid damage use a screw driver that snugly fits the slot.

10. Turn set screw inside the expansion valve (see *Figure M 9*) counter-clockwise until the valve starts to drip. Have a towel ready to pick up the spills.
11. De-activate pump (lever in upper position), wait for 3 seconds and watch pressure drop on gauge.
12. Turn set screw on pump anti-clockwise to reduce pump pressure.
13. Activate pump and increase pump pressure slowly until expansion valve starts to drip. If necessary, re-adjust pressure at which expansion valve starts to drip.
14. De-activate pump (lever in upper position).
15. Re-mount the hose to expansion valve. Wiggle the tube a little when fastening the nut, do not over-tighten the nut, a wrench is not really needed.
16. Re-mount upper body panel (if removed), then side panel(s).
17. Set pump pressure back to 9 Bar (use ground coffee in filter basket; see section "adjust pump pressure" in user manual.)

Replace sealing disk in expansion valve

Materials needed

- Spanner 16 mm, 21 mm, adjustable
- Allen key 5 mm
- Small screw driver
- Replacement (Viton) sealing disk
- Loctite or Teflon tape
- Heat resistant, food safe, silicon grease

Procedure

1. Close water mains to machine.
2. Put brewing lever in middle position to depressurise the coffee water system.
3. Turn machine "off" and brewing lever in upper position.
4. Remove left and right side panels first and then upper body panel.
5. Unscrew outer nut from expansion valve with a 16 mm spanner. Retain expansion valve with 21 mm spanner. Let drain hose with short copper tube and nut dangle to side.



MAINTENANCE

6. Remove outer part of expansion valve with 21 mm spanner. Retain expansion valve with suitable spanner since outer part of expansion valve is sealed with Loctite. Inside you will find a set screw, spring and plunger, the sealing disk is mounted in the plunger (see *Figure M 10*).

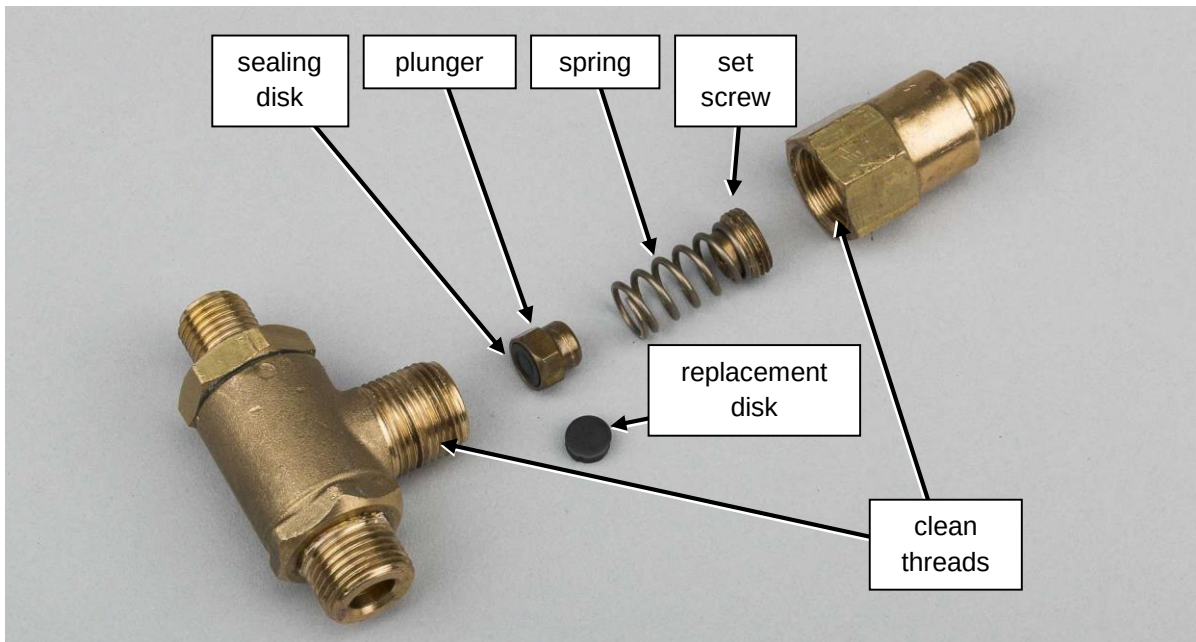


Figure M 10. Exploded view of expansion valve showing plunger, spring, set screw, and replacement sealing disk. There is no need to remove the expansion valve from the machine when replacing the disk.

7. Clean threads on expansion valve and inside the outer part.
8. Carefully remove sealing disk from plunger with small screw driver, do not damage the plunger.
9. Put a little silicon grease on both plunger and sealing disk.
10. Mount new sealing disk on plunger, make sure that you push out possible air between plunger and disk.
11. Mount plunger and spring back into the expansion valve (disk inwards).
12. Apply a few drops of Loctite to the threads of the expansion valve (or a few windings of Teflon tape).
13. Screw outer part back on the expansion valve, retain the valve with a suitable spanner.
14. Adjust opening pressure of expansion valve (see previous paragraph).
15. Re-mount the drain hose to expansion valve. Wiggle the tube a little when fastening the nut, do not over-tighten the nut, a wrench is not really needed.
16. Re-mount upper body panel first, then side panels.
17. Open water mains to machine.



Rebuild valves

When properly maintained, the steam and hot water valves have a very long life-span. Since temperatures in these valves rise up to 135 °C (275 F), the (Viton, Teflon and silicon) sealing parts inside wear out a bit quicker than in your house-hold taps.

Materials needed

- Allen key 5 mm
- Adjustable spanner
- Spanner 10 mm, 20 mm, 22 mm
- Rag
- Heat resistant, food safe, silicon grease
- Replacement rings and disks (for both valves: 1x Teflon O-ring in valve, 1x plunger with Viton seal, 4x Viton ring on shaft -see *Figure M 11*; 2x silicone O-ring in wand, 2x Teflon O-ring in wand, 4x Viton O-ring on plunger -see *Figure M 4*)

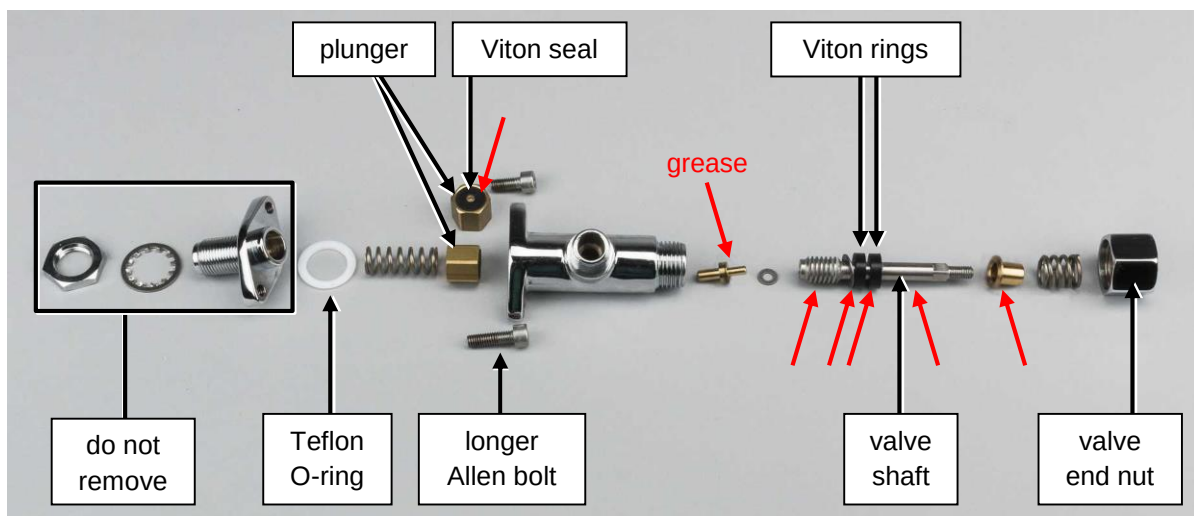


Figure M 11. Exploded view of steam valve. The base of the valve will remain attached to the Speedster. Note position of longer Allen bolt on bottom side of valve. On the machine, the longer bolt is in the lower position. The Viton sealing rings are not removed from the valve shaft. Grease (food-safe) at red arrows.

Procedure steam valve

1. Turn machine "off".
2. Open steam valve until no more steam escapes the machine. This is to release pressure from hot water/steam boiler, keep valve open.
3. Remove steam wand: twist off conical nut with spanner 22 mm (see *Figure M 4*).
4. Remove locking nut in the centre of the steam valve knob with 10 mm spanner (retain knob when loosening nut), remove knob.
5. Put rag over valve end nut to protect chrome, loosen with adjustable spanner, do not remove the nut completely at this moment.
6. Remove the two Allen bolts (5 mm), a spring will push the valve from its base (the base of the valve will remain on the Speedster). Be careful not to lose any parts. The Teflon O-ring will probably remain in the valve, pry out gently.
7. Now remove valve end nut.
8. Use valve knob to remove shaft from valve.

Beware! These threads are counter-clockwise.

9. Replace Teflon O-ring, Viton sealing rings on shaft (2x) and plunger with Viton seal.



10. Be generous with food-safe grease on Viton sealing rings and other parts and threads on shaft.
11. Re-assemble valve and remount on machine, note position of longer Allen bolt. On the machine the longer Allen bolt is the bottom one.
12. Remount valve knob. Close valve.
13. Replace the 2 Viton O-rings on the plunger and silicon O-ring (use grease; see *Figure M 4*), and Teflon O-ring in conical nut of steam wand.
14. Remount steam wand with a drop of Loctite.
15. Switch machine “on”.
16. When machine is heated up, use valve and check for leakage.

Procedure hot water valve

Although the twist-knob on the water valve has no function, the interior parts of the valve get warm and must be serviced. The hot water valve contains fewer parts (see *Figure M 12*, compare to *Figure M 11*). Since there is no plunger, it is not necessary to remove the valve from the machine.

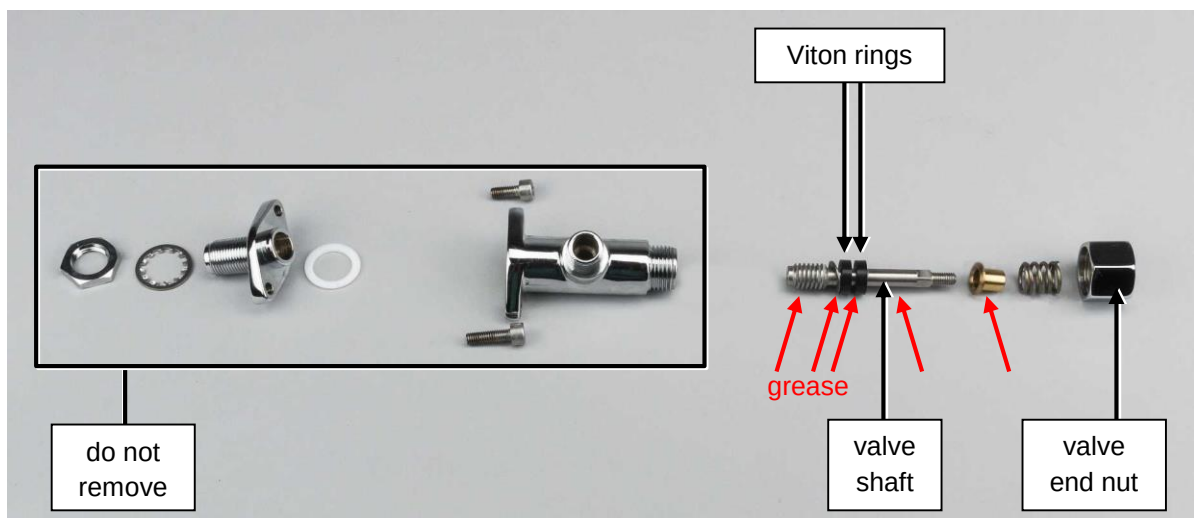


Figure M 12. Exploded view of hot water valve and assembly. The valve itself will remain on the machine. The Viton sealing rings are not removed from the valve shaft.

1. Turn machine “off”.
2. (For your safety: Open steam valve until no more steam escapes the machine. This is to release pressure from hot water/steam boiler, keep valve open.)
3. Remove valve shaft from valve (see procedure steam valve).
4. Replace Viton sealing rings on valve shaft (2x). Be generous with grease on Viton sealing rings and shaft threads.
5. Remount valve shaft in valve, valve end nut and valve knob.
6. Replace the 2 Viton rings on the plunger and silicon ring (use grease; see *Figure M 4*), and Teflon O-ring in conical nut of hot water wand.
7. Remount hot water wand with a drop of Loctite.
8. Close steam valve, switch machine “on”.
9. When machine is heated up, use valve and check for leakage.



Clean probes, level and safety

Two probes are mounted in the hot water/steam boiler. The lower probe checks the water safety level. Power to the temperature controllers in the Speedster (both hot water/steam boiler and coffee boiler) is disconnected when water level is lower than this probe. The upper probe checks the water level for normal operation; when water level is below the probe, the boiler will start filling with the pump engaged, provided that no shot is being pulled. The boiler stops filling when water level reaches the probe.

Precipitation on the probes may either act as (electrical) insulation or conductor which prevents proper functioning of the probes.

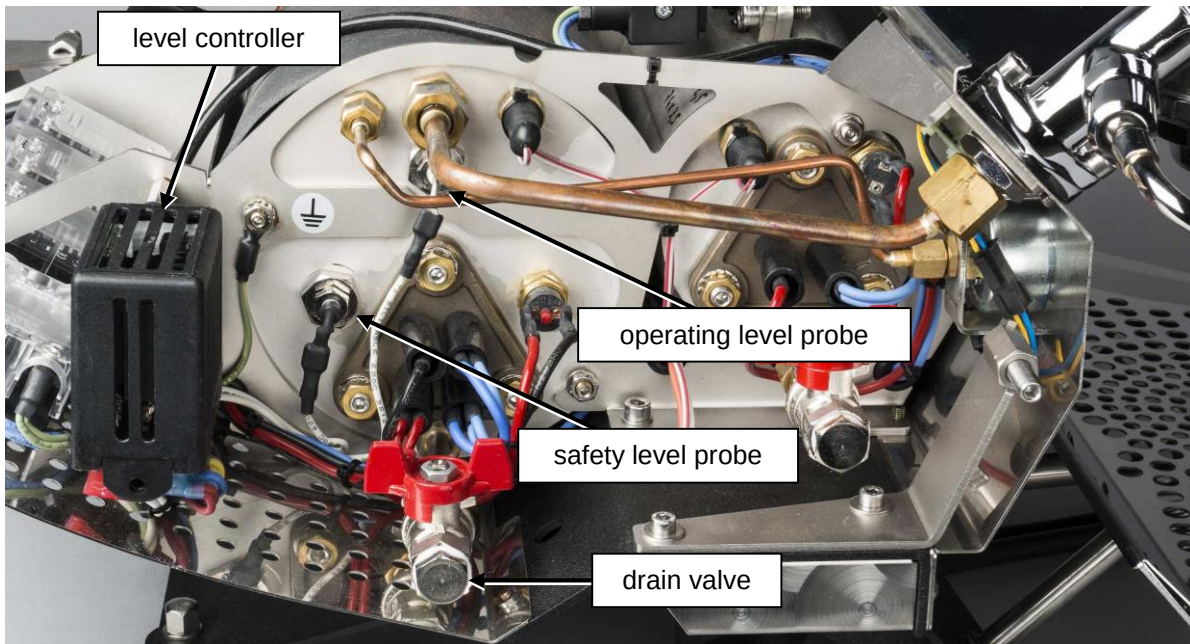


Figure M 13. Showing drain valve (with cap), safety level (lower) and operating level (upper) probes and steam boiler level controller. In later machines, the wire on the safety level probe is orange instead of white.

Materials needed

- Spanner 13 mm, 17 mm, 19 mm
- Adjustable spanner
- Allen key 2.5 mm, 3 mm
- Drain hose with fitting (included in shipment)
- Bucket
- Flat screwdriver no.2
- Loctite or Teflon tape

Procedure

1. Close water mains.
2. Switch power "off", unplug machine from AC outlet.
3. Open steam valve until no more steam escapes the machine. This is to release pressure from hot water/steam boiler, keep valve open.
4. Remove both side panels and upper body panel.
5. Drain water from hot water/steam boiler: remove plug (or cap in older model) from the hot water/steam boiler drain valve with a 17 mm spanner (see Figure M 13). Insert the fitting of the drain hose in the open end of the drain valve, dangle the other end in the bucket. Open drain valve on steam/hot water boiler until water stops running. Close drain valve, remove drain hose and fitting, replace plug.



MAINTENANCE

6. Pull electrical connections from probes.

Beware!

Unscrew the outer fittings (large nuts). The inner nut holds a Teflon sealing which, once tightened, cannot be removed from the outer fitting without damaging it. Furthermore, the operating level probe is also bent on the inserted end, it cannot be pulled through the Teflon sealing.

Since there is not enough space to handle a spanner as you normally would, you have to use an unconventional approach.

7. Put a 19 mm spanner perpendicular on the outer fitting of the probe. With an adjustable spanner on the 19 mm spanner, twist the fitting from the boiler (see *Figure M 14*).

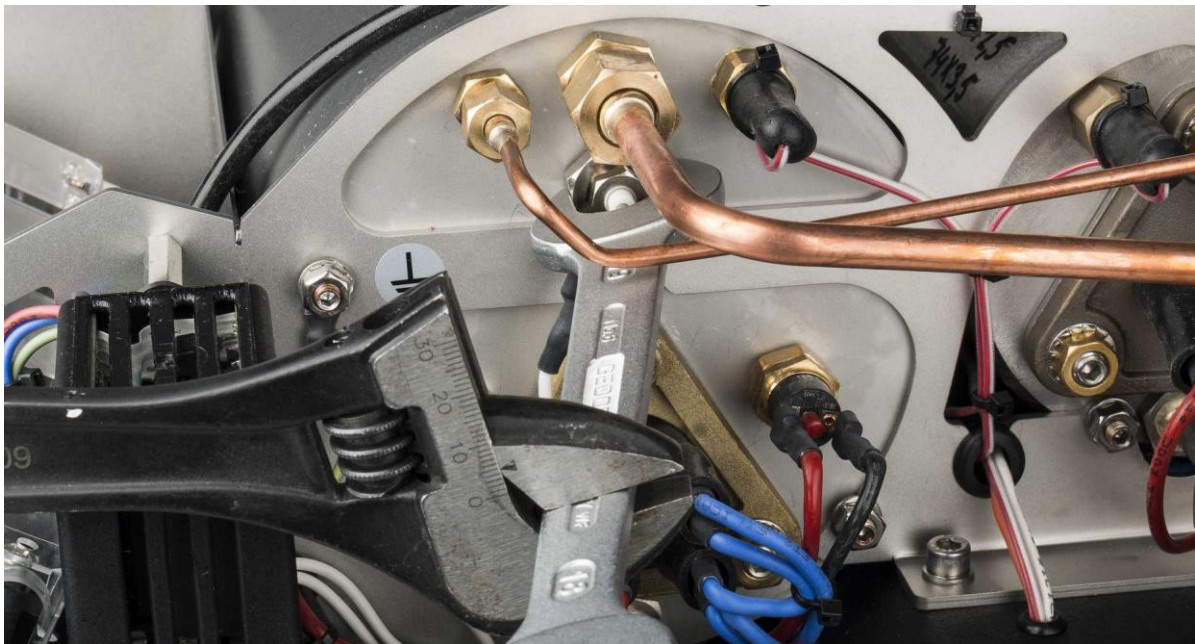


Figure M 14. Showing unconventional approach to remove operating level probe.

8. Clean the metal end of the probes with a well-used plastic scrub pad (see *Figure M 15*). Scale and dirt adheres better on a rough surface: try not to scratch the probes.
9. Clean the threads on the probes and boiler.
10. Apply a drop of Loctite, or a few windings of Teflon tape, on the threads and remount the probes. Use the same technique as when removing. Turn the probes in position: the bent flat ends of the probes should point downwards.
11. Connect the electrical connections to the probes: the shorter (orange or white) wire is safety level (lower), the longer (white) wire is operating level (upper).



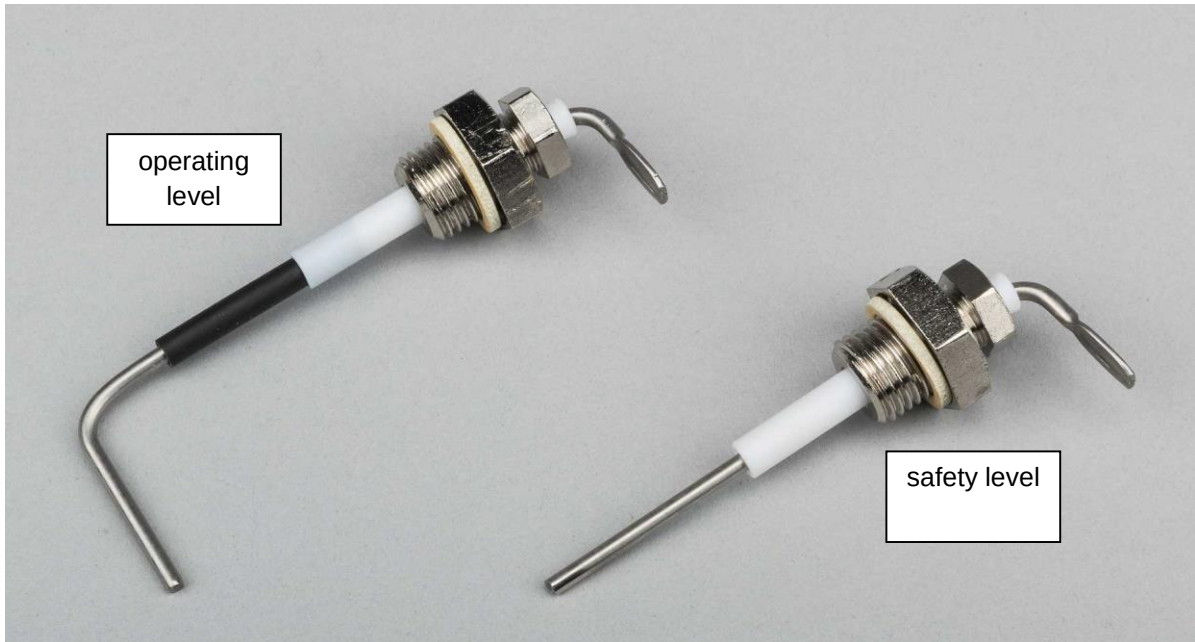


Figure M 15. Showing operating level (left) and safety level (right) probes.

12. Open water mains.
13. Plug machine into AC outlet.
14. Switch Speedster "on", the boiler will start to fill automatically.
15. Check for proper operation (no power to heating element until safety level is reached; boiler stops filling when operation level is reached; leakage).
16. Remount upper body panel first, then side panels.



Check O-ring and spring in progressive pre-infusion cylinder

A progressive pre-infusion cylinder is incorporated in your Speedster to guarantee a gradual pressure build-up prior to extraction thus allowing for pre-wetting and swelling of the coffee grounds. At the start of the brewing cycle, the cylinder fills with water until the piston reaches its maximum position. A Viton O-ring around the piston ensures that no pressure is lost in the cylinder. After extraction, when the brewing lever is in the upper position and the group valve is open, the spring pushes the piston back thus expelling water from the cylinder. The expelled water flows through the 3-way group valve into the drain and thus cleans the valve after each extraction.

Over time, the Viton O-ring may harden and crack and the spring could break. When the O-ring is cracked, water may drip from the visible end of the progressive pre-infusion cylinder.

Materials needed

- Spanner 12 mm (flat), 13 mm
- Allen key 3 mm
- Screwdriver no.2, small
- Retaining ring pliers
- Heat resistant, food safe, silicon grease, Loctite or Teflon tape

Procedure

1. Switch machine "off".
2. Remove side panels and upper body panel.
3. Remove the copper tube from the back-side of the pre-infusion cylinder with a 13 mm spanner, retain the cylinder with a flat 12 mm spanner.
4. Remove the tube leading to the coffee boiler pressure gauge from the boiler with a spanner 13 mm. Retain the fitting with a 14 mm spanner. Bend the copper tube a little downwards.
5. Remove the fitting of the pressure gauge tube from the boiler. This will give you enough space to remove the progressive pre-infusion cylinder.
6. Remove the 2 mounting screws on the front of the machine to detach the cylinder from the frame, take the cylinder out of the machine (see *Figure M 16*).
7. Remove the retaining ring on the front of the cylinder (see *Figure M 17*).
8. Remove the O-ring from the piston (e.g. with a small screwdriver, do not scratch the piston).
9. Inspect Viton O-ring and spring on piston, replace when necessary.
10. Clean cylinder and piston, do not scratch the inner surface of the cylinder.
11. Grease the groove in the piston, replace the Viton O-ring and put some grease on the O-ring itself. Put a little grease on the piston shaft.
12. Re-assemble the progressive pre-infusion cylinder.
13. Remount the cylinder in the machine and the copper tube on the cylinder.
14. Remount the fitting of the pressure gauge tube on the boiler with a drop of Loctite or a few windings of Teflon tape
15. Remount the tube from the pressure gauge.
16. Switch machine "on".
17. Check for proper operation: use blind filter and make sure that progressive pre-infusion cylinder moves out when brewing lever is (in middle or) lower position, and returns when brewing lever is in upper position.
18. Check for leakage.
19. Remount upper body panel first, then side panels.





Figure M 16. Progressive pre-infusion cylinder isolated from machine, the mounting parts that hold the cylinder to the machine are also shown.

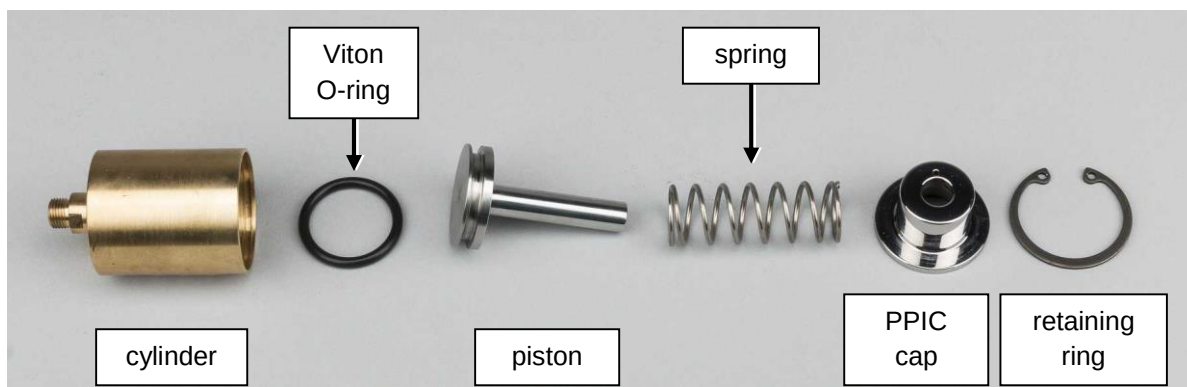


Figure M 17. Exploded view of progressive pre-infusion cylinder.



Replace all solenoid valves

To be sure that the solenoid valves inside your Speedster keep operating properly, it is advised that you replace them every 5 years. The electrical coil outside, and spring and Viton sealing inside the valve are prone to wear and tear.

Materials needed

- Allen key 3 mm
- Spanner 13 mm, 14 mm, (24 mm)
- Phillips screw driver no.1, no.2
- Replacement flange valves (3x brass, 1x stainless steel or all stainless steel)
- Replacement locking washer M4; 16x

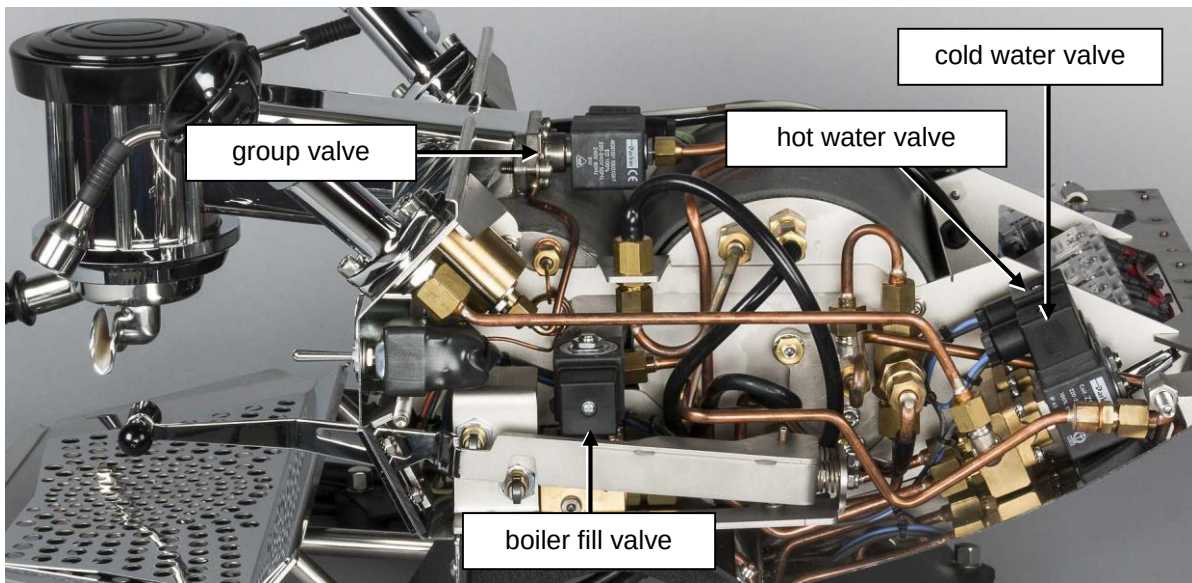


Figure M 18. Showing the Speedster with side and upper panels removed. Location of solenoid valves as indicated.

Procedure for all valves

1. Close water mains.
2. Dis-engage pump connection by pulling apart the male-female plugs (press in locking tab).
3. Remove filter holder.
4. Relieve pressure from coffee boiler by shifting brewing lever to middle position until water stops flowing from group.
5. Switch machine "off".
6. Relieve pressure from hot water/steam boiler by opening steam valve until steam flow stops.
7. Remove both side panels and upper body panel.
8. If present (only on 3-way group valve), remove drain tubing from valve (14 mm spanner).
9. Remove screw from electrical plug on valve with Phillips screw driver no. 1 (see Figure M 19). (Turn the group valve coil and plug such that you can reach the screw, if necessary loosen the flat nut on top of the coil a little with spanner 14 mm.)
10. Remove flat nut that retains coil to valve with spanner 14 mm, remove coil.
11. Remove 4 screws that hold flange valve to base with Phillips screw driver no. 2.
12. Replace flange valve. When mounting, make sure that the new valve has both seals and that you position the openings in the flange over the openings in the manifold/valve base.
13. Use new locking washers on flange screws and correct length of screws (stainless steel flange valves need M4x6, brass flange valves need M4x12).



MAINTENANCE

14. Replace coil with correct side up and electrical connectors in the proper position. When mounting, tighten the flat nut on top just enough to hold the coil in position. Too much strain on the coil-tube will separate it from the valve.
15. (On group valve: mount drain tubing.)
16. Remount electrical plug, note position of plug (see *Figure M 19* and *Figure M 18*).
17. Open water mains, reconnect pump.
18. Switch machine "on".
19. Check for proper functioning.
20. Remount upper body and side panels.

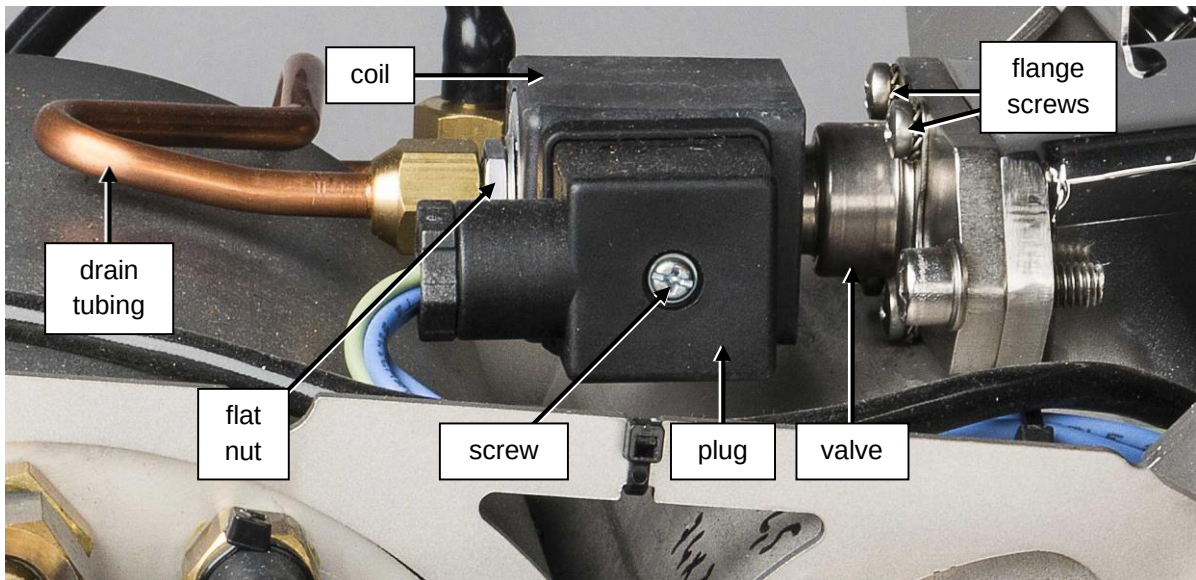


Figure M 19. Detail of (3-way) group flange valve.



Adjust brewing lever

When too much lateral force is exerted on it, the brewing lever may bend and thus not function properly. After straightening the lever, it is possible that you have to adjust the position of the lever mechanism for correct functioning of the switches.

Materials needed

- Spanner 13 mm, 10 mm
- Allen key 5 mm, 2.5 mm

Procedure to align lever

1. Switch machine "off".
2. Remove both side panels and upper body panel.
3. Make sure that the lever is straight; the part protruding from the front of the machine should be parallel to the back end of the lever. The lever is most likely to bend where it passes through the front panel.
4. With the lever in the middle position (pre-infusion, pump off) the wheel on the upper switch should protrude halfway over the lever thickness at the point where it touches the lever (see *Figure M 20*).

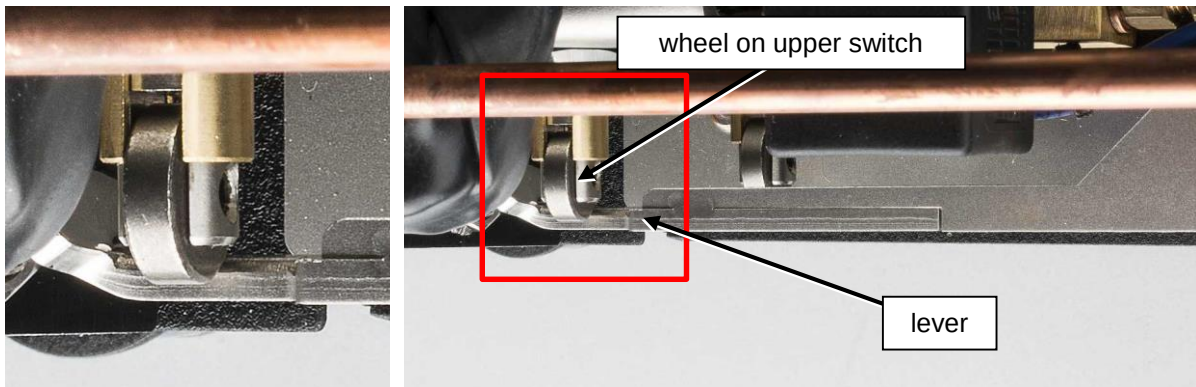


Figure M 20. With the brewing lever in the middle position, the wheel of the upper switch should protrude halfway over the thickness of the lever material.

5. When adjustments are necessary, loosen the two Allen bolts underneath the frame (see *Figure M 21*).
6. Position the bottom bracket of the lever mechanism parallel to the side of the frame with the wheel of the upper switch halfway over the lever thickness.
7. Tighten the two Allen bolts underneath the frame, re-check the position of the lever mechanism (wheel position and parallel alignment with frame).
8. Switch machine "on".
9. Check lever for proper operation.
10. Remount upper body panel first, then side panels.



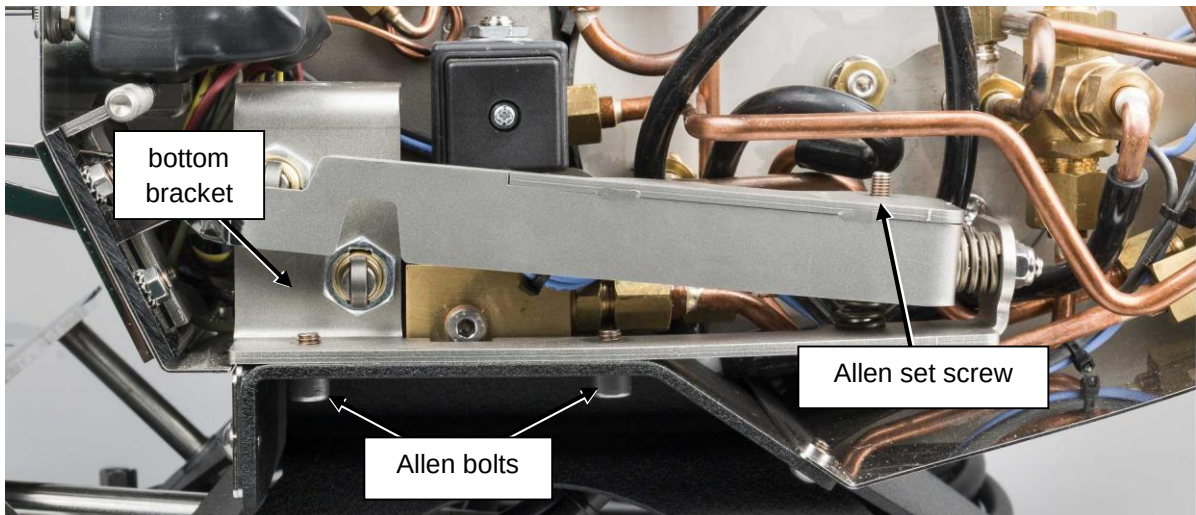


Figure M 21. Showing the brewing lever mechanism. Adjustment of the lever w.r.t. the switches can be made by loosening the lower 2 Allen bolts underneath the frame.

Notes

The force required to press the lever down can be adjusted with the Allen set screw (Allen key 2.5 mm) on top of the lever mechanism.

The two self-locking nuts at the back of the lever mechanism adjust the force by which the lever is pressed horizontally against the slotted front guiding plate (and the amount by which the lever protrudes from the front of the machine). Be sure the front of the lever is pulled lightly against the most outward (right hand) side of the slot in the guiding plate.



Drain all water when freezing is possible

Because boiler freeze-up will lead to the need of replacing the affected boiler your Speedster should never be in a freezing environment unless all water is drained from it. Cargo bays in ships and planes are normally not temperature controlled and cannot be trusted to remain above freezing at all times.

Materials needed

- Spanner 13 mm, 17 mm
- Allen key 3 mm, 5 mm
- Drain-hose with adapter (included in shipment)
- Bucket
- Towel and/or sponge
- Loctite or Teflon tape

Procedure

Steam/hot water boiler

1. Turn mains switch of Speedster to "off".
2. Shut off water supply to machine and unplug pump from Speedster.
3. Fully open steam valve.
4. Remove left and right side panels.
5. Wait until all pressure is released from steam/hot water boiler.
6. Remove plug from steam/hot water boiler drain valve with a 17 mm spanner (see Figure M 22).

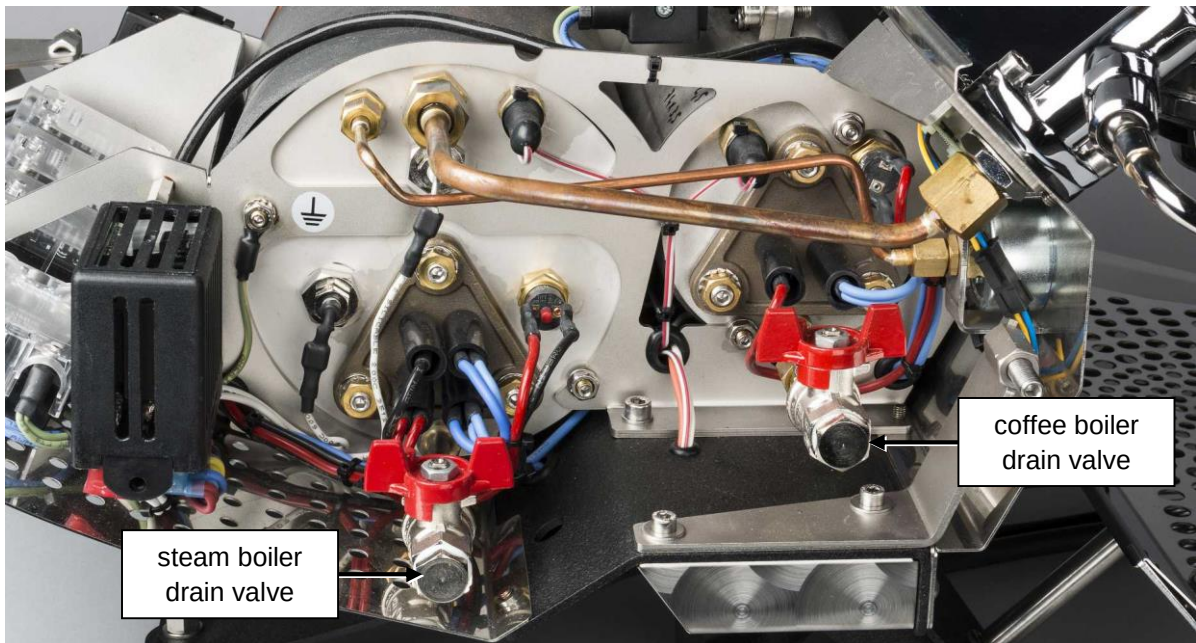


Figure M 22. Showing steam boiler drain valve on the left and coffee boiler drain valve on the right. Plugs have to be removed to fit hose adapter on valve.

7. Insert drain hose adapter in drain valve, dangle other end in bucket.
8. Open drain valve on steam/hot water boiler.
9. When water flow stops, tilt Speedster by lifting the right side to drain remaining water from steam/hot water boiler until flow stops.
10. Close steam valve. Close drain valve and remove drain hose from the steam/hot water boiler.
11. Put a little silicone grease on the plug and replace on drain valve, use only little force to tighten (a spanner is not really necessary).



Coffee boiler

12. Remove plug and mount drain hose adapter on drain valve, dangle other end in bucket.
13. Open drain valve: Hardly any water will flow from the coffee boiler since it is completely filled and no air can flow into the boiler yet.
14. Turn mains switch "on". (Since no water is present in the steam/hot water boiler the heating elements will not be activated when the machine is turned on.)
15. Make sure that the filter holder is removed from the group. Activate group valve by positioning brewing lever in the middle position. (This will open group valve thus letting air into the coffee boiler which will now start to drain.)
16. When water flow stops, tilt Speedster by lifting the right side to drain remaining water from the coffee boiler until flow stops.
17. De-activate group valve (brewing lever in upper position).
18. Switch machine "off", unplug Speedster from the 230 VAC.
19. Keep drain valve open and hose attached.

Heat exchanger

20. Remove the Allen bolt on heat exchanger with Allen key 5 mm (see *Figure M 23*). This bolt is sealed with Loctite and may need some torque to loosen.

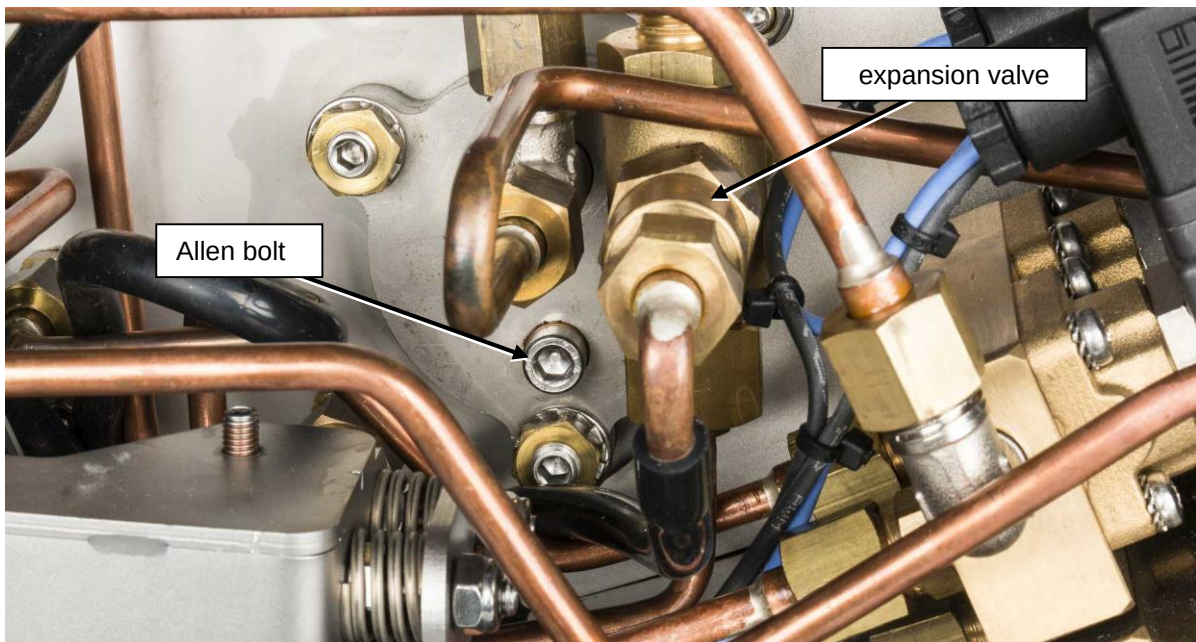


Figure M 23. Showing Allen bolt to remove for draining heat exchanger.

21. A little water may flow from the opening. Have a towel or sponge ready to remove the spills, make sure that no water flows onto the electrical wiring/parts in the machine.
22. Tilt Speedster by lifting the left side, keep machine tilted.
23. In order to drain the heat exchanger, blow air into the "drain hose" on the coffee boiler, water will flow from the opening.
24. When flow is stopped, stop blowing.
25. Set machine back in horizontal position.
26. Replace Allen bolt. Use Loctite or a few windings of Teflon tape to ensure sealing.
27. Close drain valve and remove drain hose with adapter from coffee boiler.
28. Put a little silicone grease on the plug and replace on drain valve, use only little force to tighten (a spanner is not really necessary).
29. Replace upper body panel first, then both side panels.



Speedster technical manual

Technical details

Dimensions

	<i>cm</i>	<i>in</i>
Width of body	47	18.5
Width including steam pipe and hot water spout	50	19.7
Height of body	31	12.2
Height including valves	37	14.6
Depth from front feet to back of body	53	20.9
Total Depth including drip tray	65	25.6
Width of front feet	44	17.3
Width of back feet	18	7.1
Depth between front and back feet	37	14.6
Depth between back feet and back of body	12	4.7
Depth between front feet and front drip tray	13	5.1
Feet diameter	3	1.2

Boiler capacity

	<i>litre</i>	<i>fl.oz.(US)</i>
Steam boiler	3.5	118
Coffee boiler including group	2.1	71

Electricity

Power consumption heating element steam boiler	<i>Watt</i>	1800	1800
Power consumption heating element coffee boiler	<i>Watt</i>	900	900
Total power consumption (pump activated)	<i>Watt</i>	3100 ²	2015
Maximum total current	<i>Amp</i>	13.5 ²	17.8
Tension	<i>Volt</i>	220-240	110-120
Frequency	<i>Hz</i>	50	60

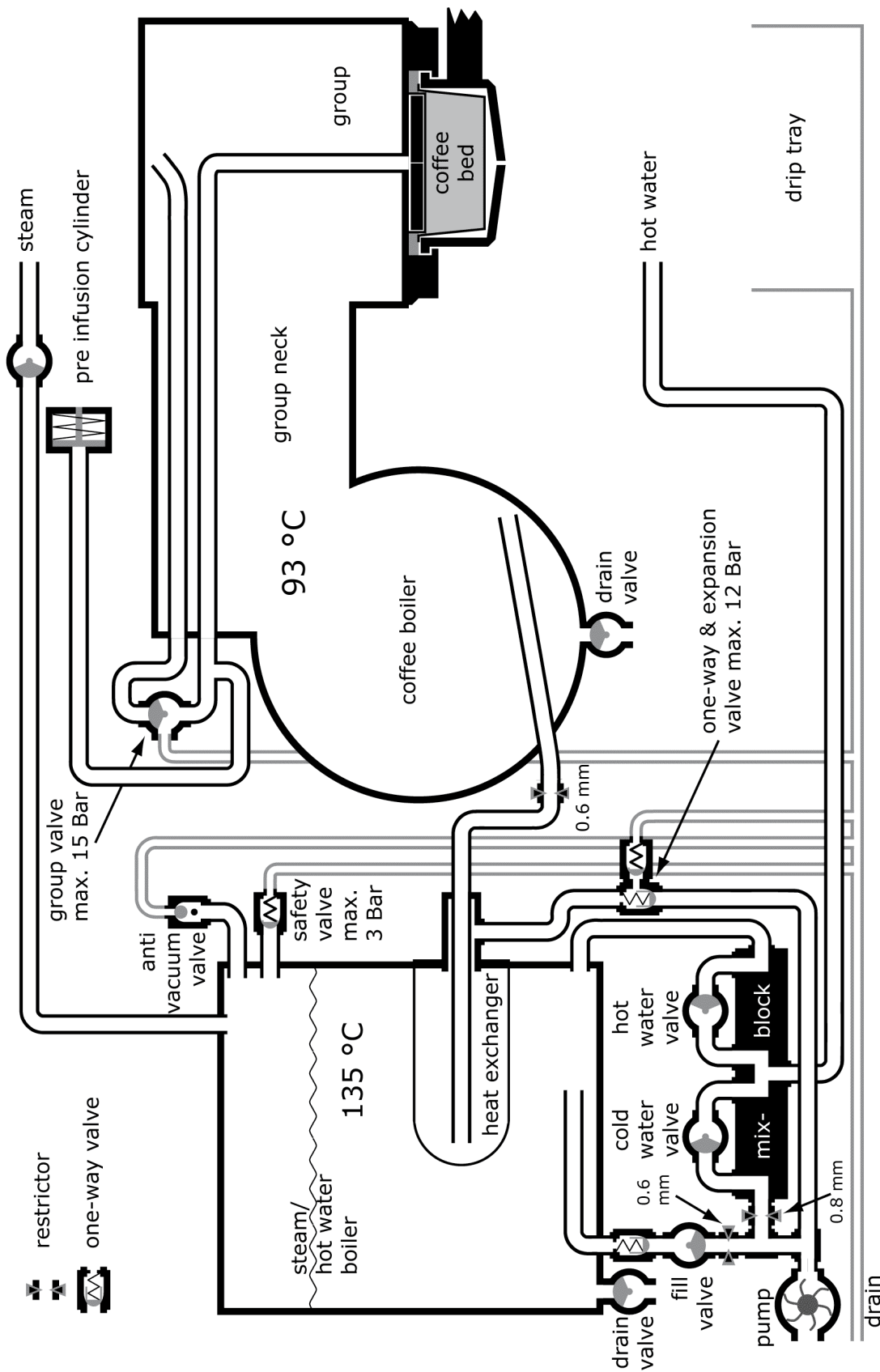
Weight

	<i>kg</i>	<i>lb</i>
Speedster solo and empty	35	77
As shipped in crate	82	187

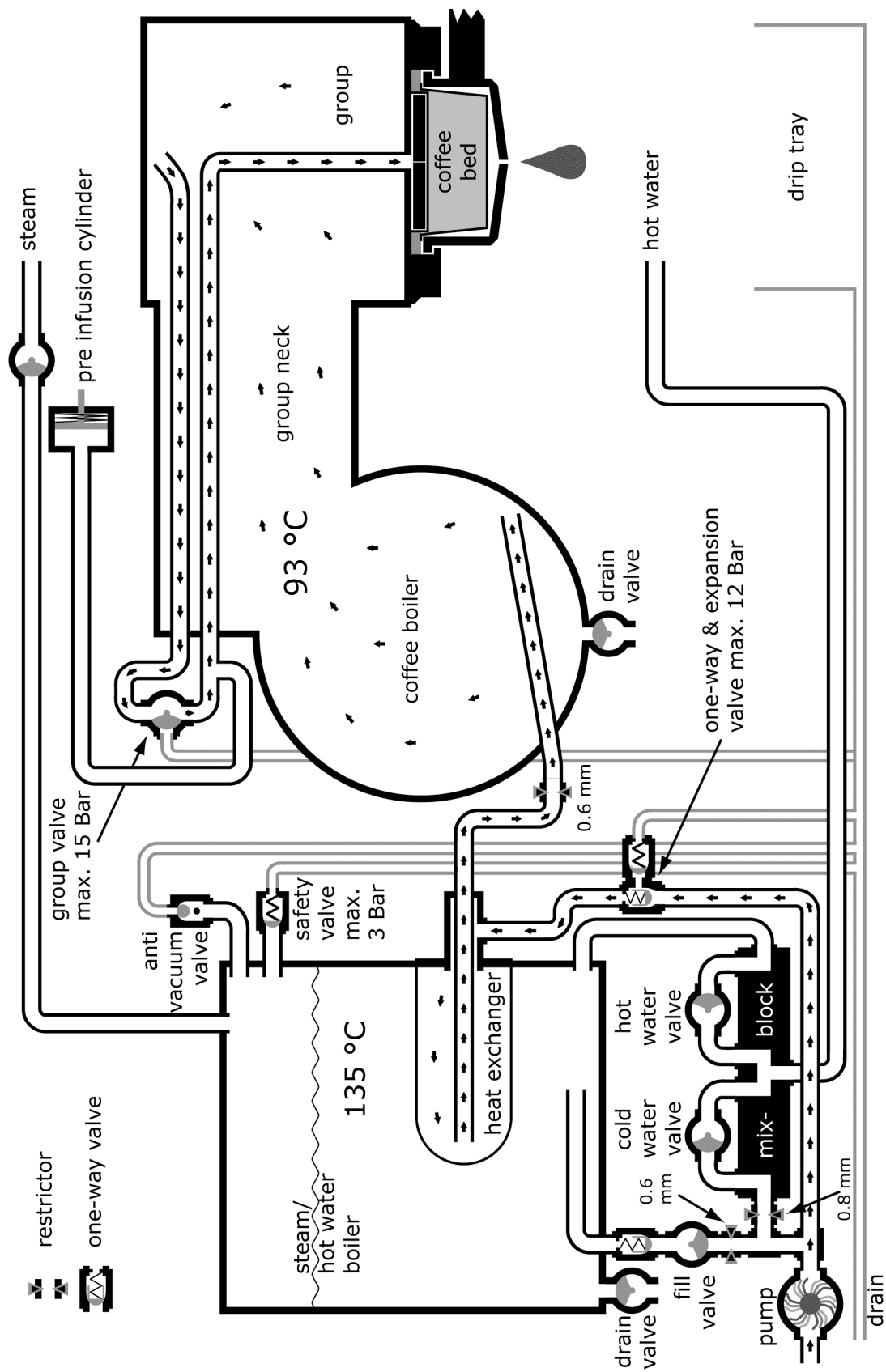
² All Speedsters come with a maximum power cut-off device (the NC SSR on the Speedster electric scheme, page 37) which switches off one steam boiler heating element spiral when the coffee boiler heating element is active. In a 220-240VAC machine, this device can be shorted to have reduced heating up time and maximum power consumption is 3100W. With the device active the maximum power will be 2200W; 9.6A. at 230VAC.



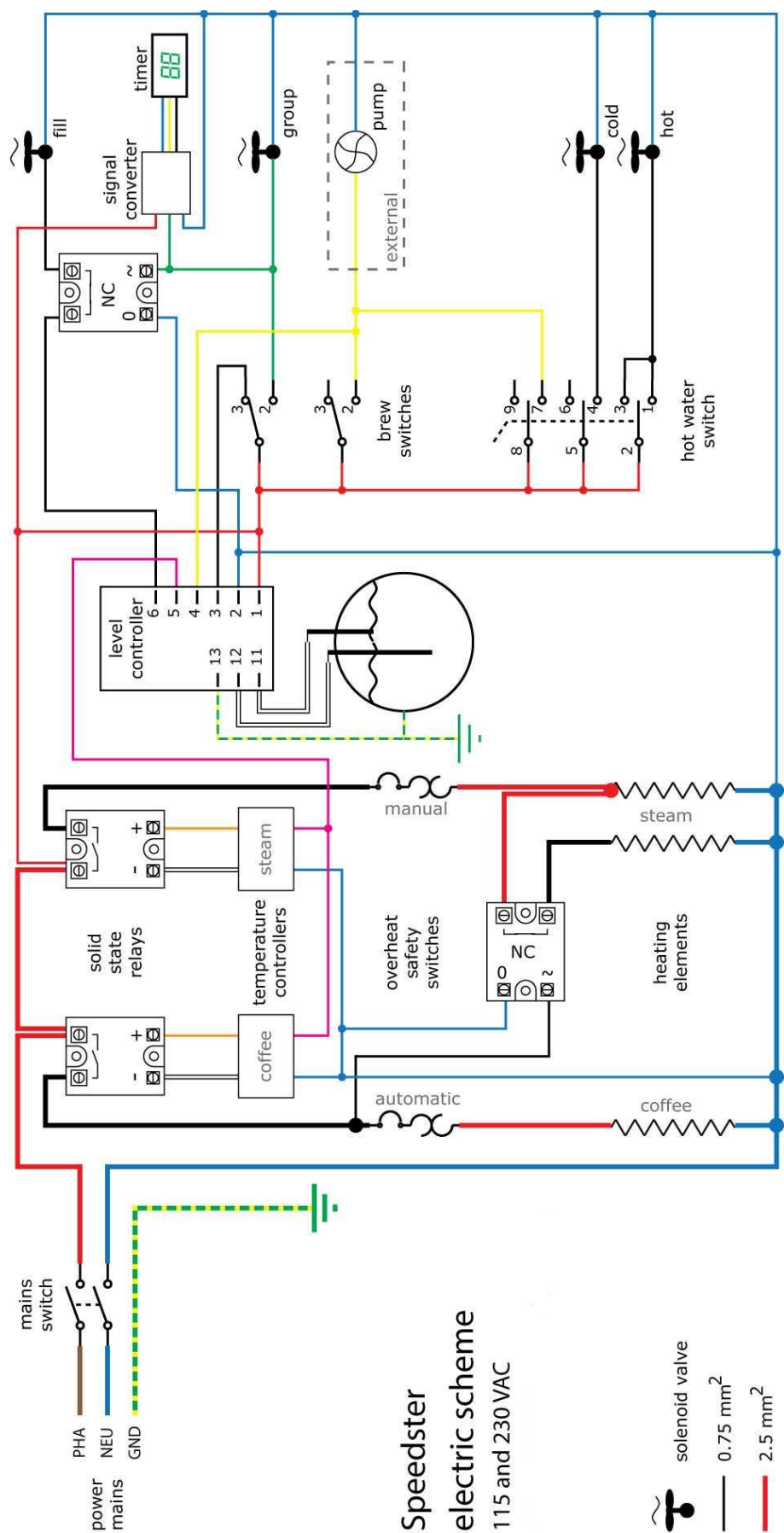
Schematic Speedster hydraulics at idle



Schematic Speedster hydraulics at brewing



Speedster electric scheme



Störk tronic steam temperature controllers

The Störk tronic controller as mounted in the Speedster can process just one sensor. The parameter C1 is the normal operating temperature of the water in the corresponding boiler. The controller is set to function as a PID when used to control the coffee boiler temperature. For the steam boiler, the controller is set to function as a quick-responding very accurate thermostat. Changing the controller from one function to another (in case you need to install a new one) requires a number of parameter-values to change in a specific order. We advise you not to do this yourself but have a qualified technician do this when necessary.

To change other parameters than C1 (the boiler temperature), a "password" is needed. This password is factory set at "-19" and cannot be changed on the keypad.

Several parameter levels (C, b, H, d, A) can be adjusted using the keys on the front panel of the controller. To change an individual parameter, you first have to enter the programming mode with password protection, then enter the appropriate level, then choose the parameter to change and then change its value. The example below shows how to change from °C to °F (change the value of parameter H15 from "0" to "1"). With this change, the controller will set other temperature values to Fahrenheit automatically.

Entering programming mode

Press-hold $\triangle$ and ∇ simultaneously for approximately 3 seconds.

The display will read "P d r".

With ∇ or $\triangle$, change the display in "P H".

Now press-hold SET/ECO, the display will read "0".

While holding SET/ECO, but within 6 seconds, press ∇ until the display reads "- 19", then release SET/ECO.

The display will read "C _ _".

Note!

When the SET/ECO key is pressed for about 6 seconds continuously, the controller will change to ECO-mode and the display will show "Eco". Keeping pressed again for about 6 seconds will change the controller back to operational mode with a temperature value in the display.

Enter appropriate level

(If you want to change a parameter in the C level, press SET, the display will read "C 1". You want to change a parameter in a different level and use $\triangle$ to scroll through the levels until you reach the appropriate level.)

Press $\triangle$ twice and the display will read "H _ _".

Now press SET/ECO and the display will read "H 1" (this example).

Choose parameter

Repeatedly press the $\triangle$ or ∇ key shortly until the appropriate parameter is displayed.

The display will read "H 15".

Change parameter value

Press-hold SET/ECO, the display will read the parameter value for H15, e.g. "0" (controller set at °C).

While keeping SET/ECO pressed, use $\triangle$ or ∇ to change the parameter value (e.g. use $\triangle$ to change the display to "1": controller set at °F).

Release the SET key, the display will read "H 15".



Leave parameter level

Press-hold $\triangle$ and ∇ simultaneously for approximately 1 second.

The display will read "H _ _".

Leave programming mode

Press-hold $\triangle$ and ∇ simultaneously for approximately 3 seconds.

The display will read "275" (boiler temperature in °F).

Note!

Each parameter level has its own password which is factory preset at value "0". You can change these passwords but if you lose them, the controller has to be sent to Störk to unlock.

parameter	function	value					
		coffee		Steam			
				Spirit/Mirage		Speedster	
		°C	°F	°C	°F	°C	°F
	J1=	0		1		2	
C1	Setpoint	93.0	199	125	257	135	275
C2	ECO setpoint	50.0	122	70.0	158	70.0	158
C3	Offset	0.0 (32.0 in °F)					
C4	Heat/cool	0					
C5	Hysteresis	0.3	0.5	0.3	0.5	0.3	0.5
C6...C9	--	0; 0; 0; 0					
C10	Min Temp	0.0	32.0	0.0	32.0	0.0	32.0
C11	Max Temp	100	212	130	266	140	284
C21...C29	--	0.0; 0.0; 0; 1.0; 0; 0; 0; 0 (°C)					
C41...C49	--	32.0; 32.0; 0; 1.8; 0; 0; 0; 0 (°F)					
C61	Low alarm T	2.0	36	2.0	36	2.0	36
C62	High alarm T	102	216	132	270	142	288
C63	AI function	1					
C64	Alarm	1					
C65	Alarm hyst	1.0	1.8	1.0	1.8	1.0	1.8
C81	PID funct.	2		0			
C82	Prop. area	5.5	9.9	10.0	18.0	10.0	18.0
C83	I-portion	75		500			
C84	D-portion	15		50			
C85	Cycle t-PID	3		8			
C86	Dead vol.	0.0					
C87	PID contr.	0.0					
C88	PID mode	0					
C89	Cycle t-mot.	8					
C99	Password C	0					
b1	--	0					
b2	--	0					
b11	Delay	3					
b12	--	0					
b13	--	20					
b21	--	0					
b99	Password b	0					
H1	Key lock	0					
H11	Indic mode	2					
H12	Display	1					
H13	Brightness	20					
H15	°C or °F	0	1	0	1	0	1

parameter	function	value	
		50 Hz	60 Hz
H16	--	0	
H17	"on" mode	1	
H31...H35	--	0; 5; 4; 3; 0	
H41	Output K1	0	
H42	Output K2	5(coffee); 1	
H43	--	0	
H44	Hybrid K1	0	
H51	Freq	0	1
H61	LED1	0	
H62	LED2	4	
H63	LED3	0	
H99	Password H	0	
A1	Actual value	\$\$	
A2	Corr F1	0.0	
A3	--	1.00	
A4	Type F1	2	
A17	Reset	0	
A18	Actual max	\$\$	
A19	Actual min	\$\$	
A40	Filter	16	
A50	Show PID	\$\$	
A99	Password A	0	
d0	--	0	
d2	--	10.0	
d3	--	30	
d9	--	--	
d99	Password d	0	
J1	Para. Set	0 or 1 or 2	
J3	Para. Reset	0	
L0	ST-bus	5	
Pro	Prog. Vers.	1.2	
L40	Release	0	
USR	Passw. USR	19	
J98	Passw. PA	-19	
Z99	Password Z	0	
	Not accessible on keyboard		

List of parameter values of the Störk tronic controller which can be accessed by the keys on the front panel. -- means that this parameter has no function.



Exchanging jets for different infusion

The Speedster coffee water system includes a restrictor (or jet) in the tube that leads from the heat exchanger to the coffee boiler (see *Figure T 1*). Standard, the in-line jet is found inside the restrictor housing and has an opening of 0.6 mm diameter. If you only make ristretto's or single espresso's you may want to change to 0.5 mm, if you make lungo's you may want to change to 0.7 or 0.8 mm.

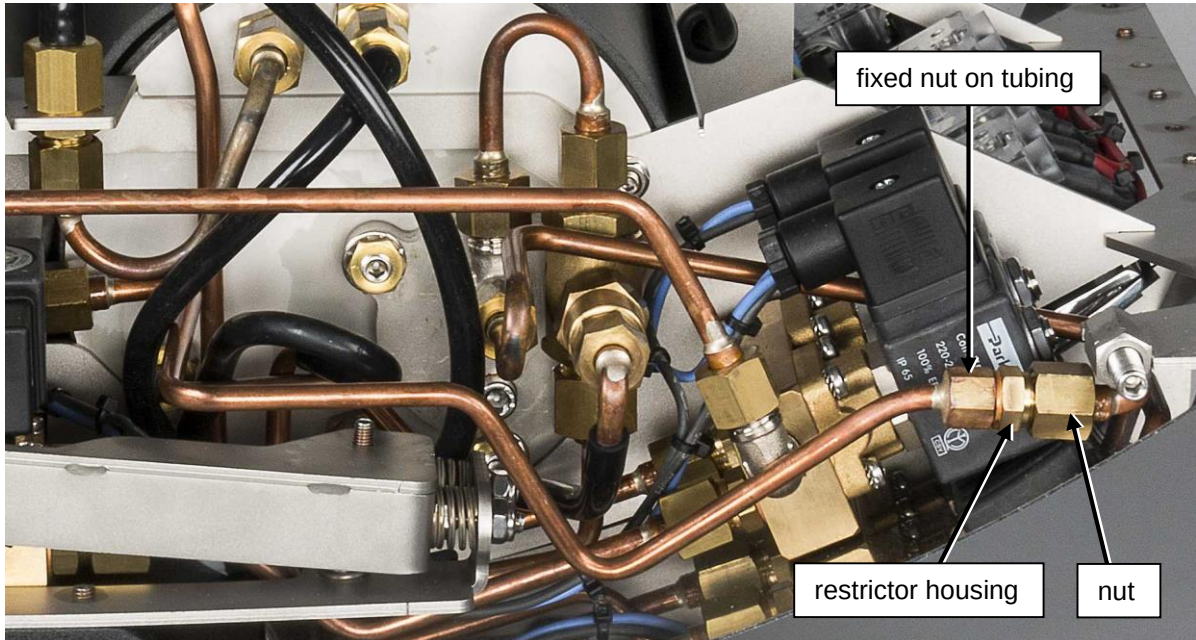


Figure T 1. Shows location of restrictor in tube from heat exchanger to coffee boiler.

Once the group valve is open (brewing lever in middle or lower position), the pressure inside the coffee boiler (up to 12 Bar) will soak the coffee grounds rapidly while pressure is also released into the pre-infusion cylinder. Since the 0.6 mm jet restricts the flow towards the coffee boiler, the pressure on the grounds reduces to practically zero before increasing only gradually to line pressure (or pump pressure when pump is activated).

Materials needed

- Spanner 13 mm, 14 mm, 16 mm
- Very small screw driver, needle or pin, Allen key 3 mm
- Copper O-ring 1/8, new restrictor housing or: jet + screen
- Loctite or Teflon tape

Procedure

1. Close water mains, activate group valve to release pressure in the coffee boiler, switch machine off, remove side and upper panels.
2. Retain restrictor housing while undoing the nut.
3. Then retain the fixed nut while removing the restrictor housing.
4. You may have to bend the tubing a bit to take the restrictor housing out.
5. Either replace the restrictor housing with proper jet and screen completely (advised) or:
6. Pry the Viton O-ring from the housing, take the perforated screen out with a needle or pin.
7. Use Allen key to remove the jet from the housing.
8. Remount in reverse order; a new jet should be tight in the housing, but when too much force is applied the jet will just pass through instead of being locked-in. Use a new copper ring and apply 1 drop of Loctite to mount the housing back onto the fixed nut.
9. Open water mains, turn machine on, check for leaking, remount panels.



Solid state relays

A solid state relay is an electric relay without the moving parts found in an electro-mechanical relay. When a (small) control voltage is applied to the SSR, a LED illuminates which in turn switches on a photo sensitive diode. The diode current turns on a back-to-back thyristor to switch the load. The optical coupling allows the control circuit to be electrically isolated from the load.

The Speedster contains 4 SSR's, see *Figure T 2*. Power to the heating elements in the hot water/steam boiler and the coffee boiler is controlled by 2 low voltage, normally open, relays. Maximum power limiting and prevention from steam boiler filling when a shot is being pulled is achieved by high voltage, normally closed, SSR's.

In most cases when a SSR malfunctions, the load connectors are continuously coupled even when there is no control voltage applied. For the heating elements this means that the heating element remains switched on even when the controller does not transmit a control voltage. For the fill valve SSR it means that the hot water/steam boiler might be filled while a shot is being pulled. However, it has been known to happen that the SSR fails with the load connectors not coupling or only occasionally coupling when the control voltage is applied.

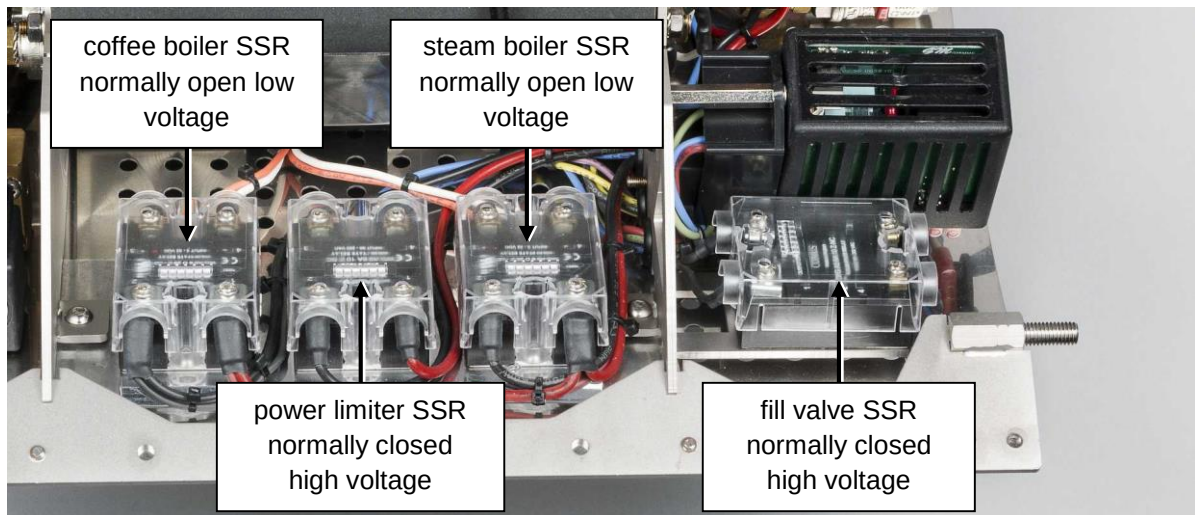


Figure T 2. The 4 solid state relays in the Speedster seen from the back side of the machine.



Temperature sensors

The Speedster is equipped with two Pt100-type, 2-wire, temperature sensors (see *Figure T 3*). As the connecting cables are short, there is no need for a compensating third wire.

The steam boiler sensor is short (27 mm probe length) and its measuring tip is located above the water level. As de-pressurized steam decreases in temperature nearly immediately (adiabatic expansion) this ensures quickly responding heat input upon opening of the steam valve.

The coffee boiler sensor is longer (100 mm probe length) such that the measuring tip is in the sweet spot of the coffee boiler. As this probe is always immersed in water, it also reacts quickly upon a temperature change in brewing temperature.

The sensors are connected to the controllers with cables that can be disconnected on each end, thus facilitating the exchange of a malfunctioning sensor. On the sensor itself, the cable connects with fastons which are then covered with an protecting cap. Connection on the controller-side is with screw connections.

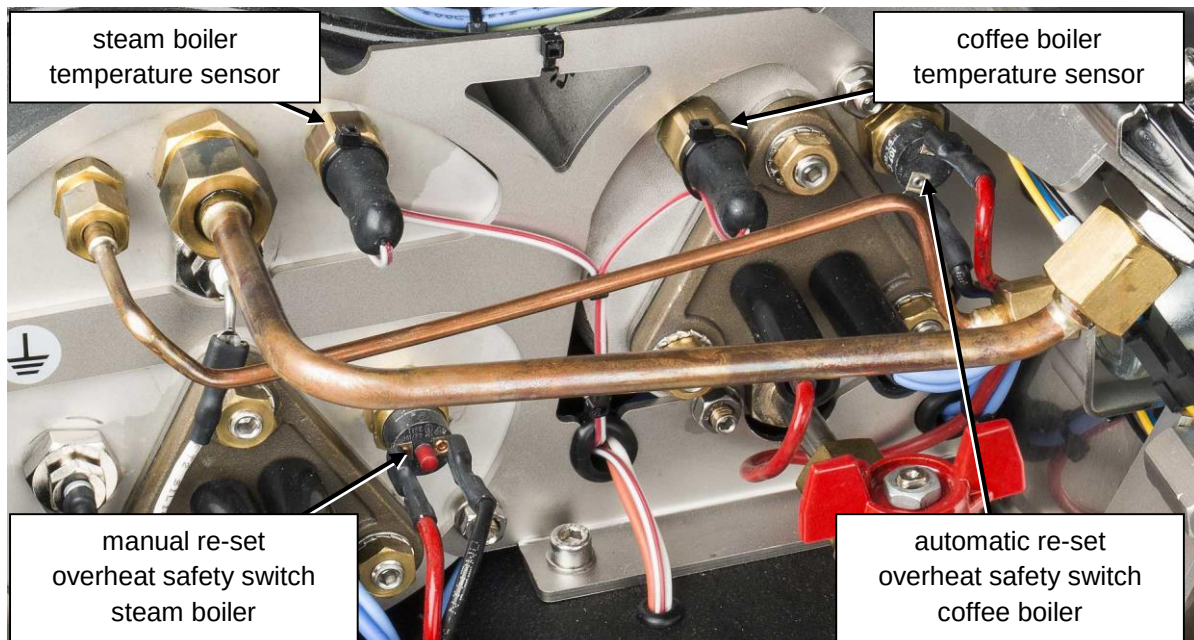


Figure T 3. Left hand side of the Speedster showing the position of the overhear safety switches. Resetting the switch on the steam boiler must be done by hand.

Overheat safety switches

Both the hot water/steam boiler and the coffee boiler are equipped with an overheat safety switch which disengages power to the heating elements when the temperature rises above safety level. These are located on the left hand side of the boilers (as seen from the Barista) and can be reached when the side panel is removed, see *Figure T 3*.

The switch on the coffee boiler will re-set itself when temperature within the boiler has dropped enough. The switch on the steam boiler must be reset by pressing the little red button in the centre of the switch after temperature has dropped. Make sure to turn mains switch off before re-setting the manual switch on the steam boiler.



Contact information

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Use the above email address for technical support. Forward the machine number in question.

Ordering replacement parts

A spare parts list can be found on our website.

<http://www.keesvanderwesten.com/assets/speedster-parts-list.pdf>

You can order spare parts directly via:

spareparts@keesvanderwesten.com

Clearly state parts number and short description of the parts needed, as well as full contact information.

