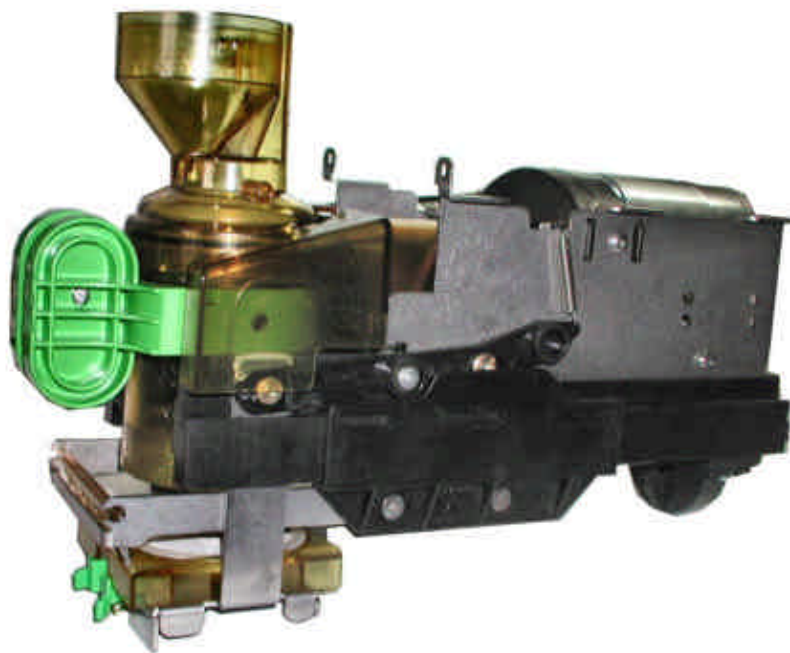


## **AFTER-SALES SERVICE**



# SERVICE MANUAL

H & C FUNCTIONAL UNITS

# "SIGMA BREWER"

# SIGMA BREWER UNIT

## (Filtered coffee)

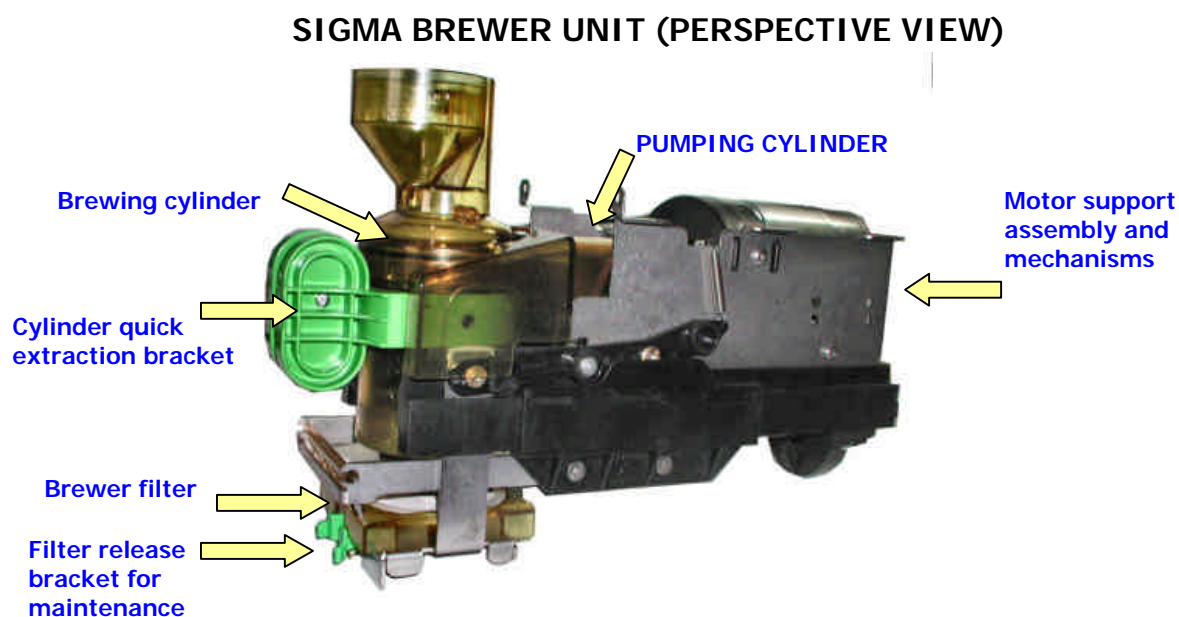
Simple filtered coffee is obtained by natural "Percolation" of hot water through a special paper filter where a ground coffee dose of approx 10 g is placed.

The ground coffee is coarser than the type used for espresso, and then a higher quality coffee, "Arabica" type is used.

This operation, carried out using simple machines of a domestic type or similar, takes a considerable amount of time, not compatible with the requirements of a vending machine, which must produce high quality but in a as short a time as possible.

Therefore special brewing units are used, called simply "FRESH BREWER"

The **Sigma Brewer** unit can be used to obtain either a coffee brew or an infusion with tea leaves, simply by replacing the filter with one more suitable to tea brewing; in some versions there are provisions also for a paper filter.



## DESCRIPTION OF FRESH BREWER UNIT OPERATION

When a selection is made, the lower ratiomotor activates a worm screw, which by means of a slider drives a system of levers, lifting the filter holder until closing the brewing cylinder in the lower side.

Then a gravity type solenoid valve, located on the boiler, opens and water starts flowing into the upper section of the cylinder; the amount of water (dose) is pre-set via SW as length of time (the solenoid valve flow-rate is factory preset).

After a few moments, the coffee doser device is started, conveying a dose of ground coffee, variable between 9 and 12 grams according to the time setting of the doser device (a 10 gram dose is set by default).

Immediately after dispensing powder and water, there is a programmable period defined as brewing time, with 0 to 5 second setting (this time is set to one second by default).

When increasing such time also the coffee extraction time increases, however it is necessary to balance between quality and total time of the selection; in any case after 4 seconds the quality starts to decrease.

After the brewing phase, the upper ratiomotor is started and through a worm screw pushes the piston inside the pumping cylinder, thus creating a pressure inside the brewing chamber that closes the valve located at the top of the cylinder; in addition the same internal pressure created by the horizontal movement of the piston pushes and at the same time stirs the water and coffee mixture through the lower filter, conveying it to the dispensing spout and to the cup.

At the end of the stroke, the piston returns to the initial position and again repeats the cycle to completely empty the coffee residue from the system. Then the first ratiomotor is started, opening the filter holder and a scraper pushes the spent coffee dose outside the filter area, dropping it into the grounds container.

At this point, the system is re-positioned in stand-by until the next selection.

The piston, the brewing chamber and the filter holder are fitted with vent valves (see description in the following pages).

Water tightness between cylinder and lower filter is ensured by a special silicone seal on the filter holder, which when closed is pushed against the filter holder cylinder, ensuring a 1 bar water tightness under standard conditions.

**To achieve an excellent FB filtered coffee, the following objective parameters must be kept constant:**

- 1) COFFEE QUALITY AND AMOUNT AND ITS GRADE OF GRINDING**
- 2) THE TEMPERATURE OF THE BOILER**
- 3) BREWING AND DISPENSING TIME**
- 4) WATER AMOUNT IN RELATION TO THE COFFEE DOSE**
- 5) DRY RESIDUE**
- 6) AMOUNT OF GROUNDS PASSING THROUGH THE FILTER**

### **1) COFFEE QUALITY AND AMOUNT & GRADE OF GRINDING**

Mainly 100% ARABICA coffee is used for FB filtered coffee (or a blend with very small amounts of ROBUSTA coffee). In Europe, generally already ground coffee is used with different grades of grinding, according to the market and type of brew.

For FB coffee made in vending machines very finely ground coffee is used.

The ideal dose for FB coffee is 60 g / litre, i.e.: 10.8 g for 180 cc of water  
10.2 g for 170 cc of water

**Note:** The water amount must be approximately 20 cc greater than the dispensed dose because of the water absorption in the spent coffee powder.

### **2) THE TEMPERATURE OF THE BOILER**

The optimum water temperature is between 90° and 95° C, and it is very important to control the temperature differential.

### **3) BREWING, DISPENSING AND DRYING TIME**

Brewing time is determinant to achieve good quality, but being vending machines it is also necessary to control the total time for the selection, obviously to reduce the waiting time.

Under normal conditions, such time can be adjusted between 3 and 8 sec; by default it is set to 3 sec.

Other than this time, the time necessary to fill the brewing chamber with water must be added, filled simultaneously with the powder, permitting to start the brewing phase.

For the Necta unit this time is set to 14 sec.

After brewing, dispensing starts, with a time fixed to 5 sec, then at the end a 2 sec pause is necessary to allow the spent coffee dose to dry.

A very long brewing time does not necessarily improve the dispensed drink quality: there is a time limit after which the quality worsens.

### **4) WATER AMOUNT IN RELATION TO THE COFFEE DOSE**

As already mentioned, the ideal amount is 60 g / litre, there are however situations where coffee is dispensed in amounts of 120 g / litre (strong coffee).

### **5) DRY RESIDUE (coffee extraction)**

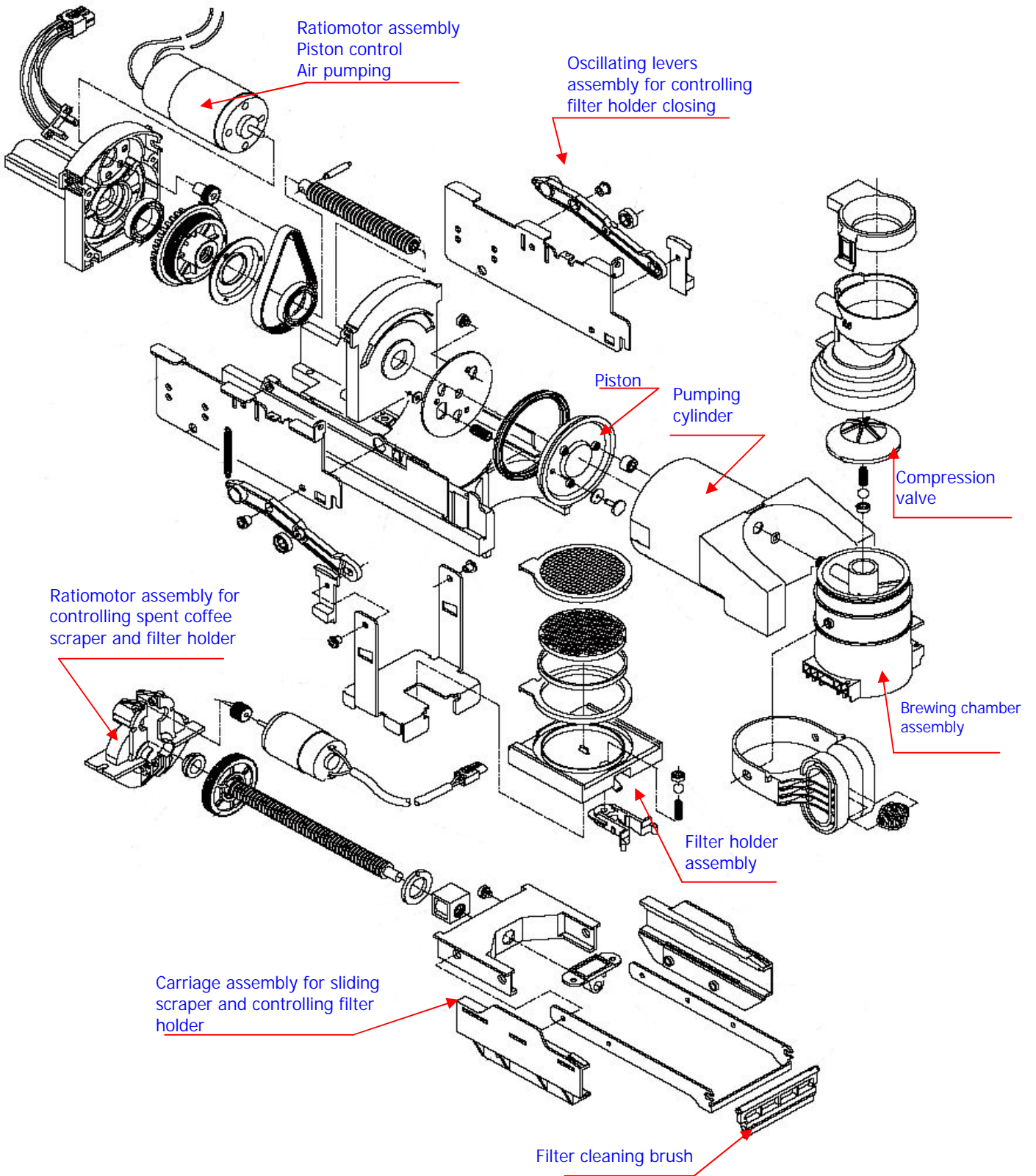
The optimum dry residue is between 1.30 and 1.60% of the extracted substances.

Coffee extraction must be between an optimum range of 18 and 22%.

### **6) THE AMOUNT OF GROUNDS PASSING THROUGH THE FILTER**

Grounds must not be greater than 75 mg / 100 cc.

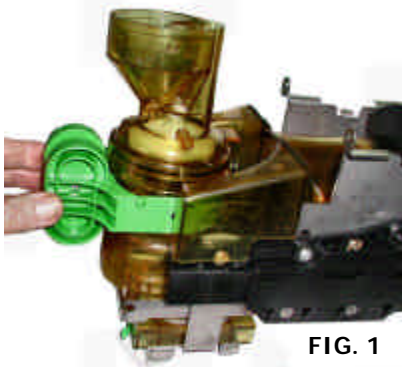
# EXPLODED VIEW OF SIGMA BREWER UNIT





# ROUTINE MAINTENANCE

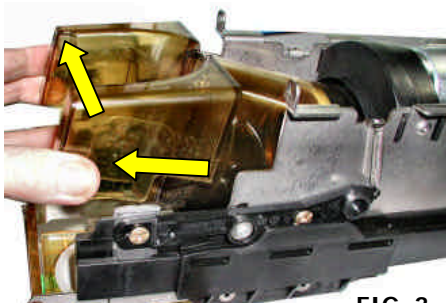
## PROCEDURES FOR DISASSEMBLING THE SIGMA BREWER UNIT FOR ROUTINE MAINTENANCE



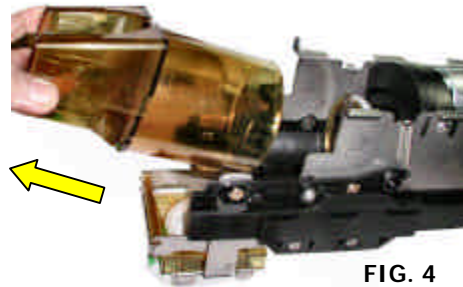
**FIG. 1**  
Press the extraction grip jaws (green) and pull outwards



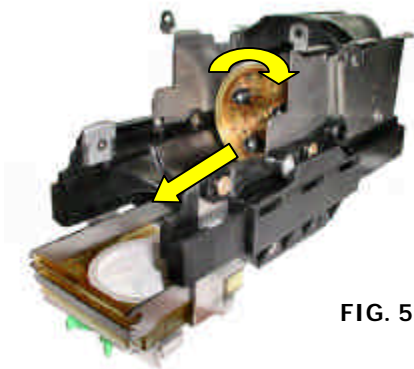
**FIG. 2**  
Slide out the complete brewing chamber



**FIG. 3**  
Grasp the pumping chamber, lift slightly and pull outwards



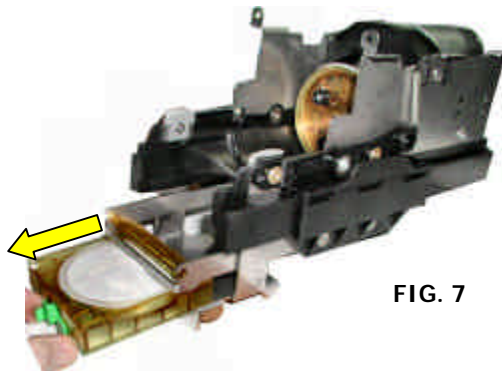
**FIG. 4**  
Slide out completely the pumping chamber



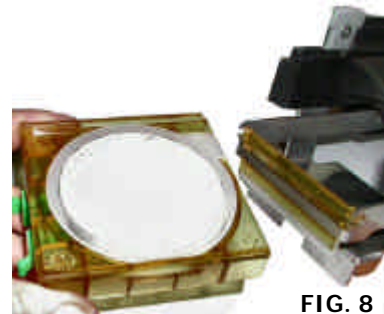
**FIG. 5**  
Grasp the piston and rotate clockwise a few degrees and slide it out completely



**FIG. 6**  
Pumping piston removed completely



**FIG. 7**  
Grasp the external pincers and pull outwards until completely removing the filter holder assembly

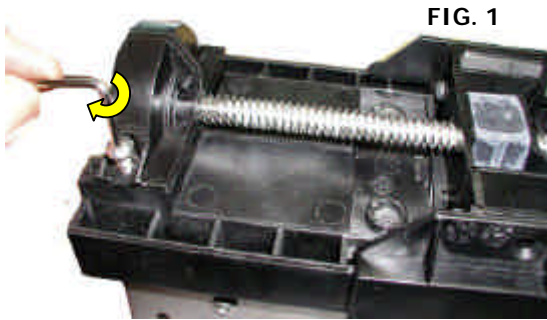


**FIG. 8**

## EXTRAORDINARY MAINTENANCE

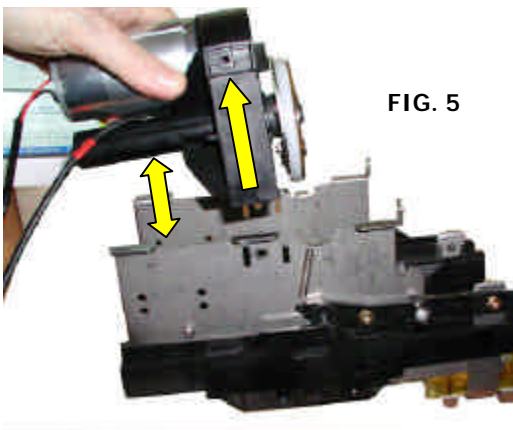
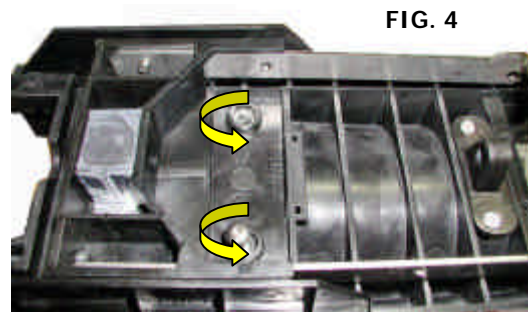
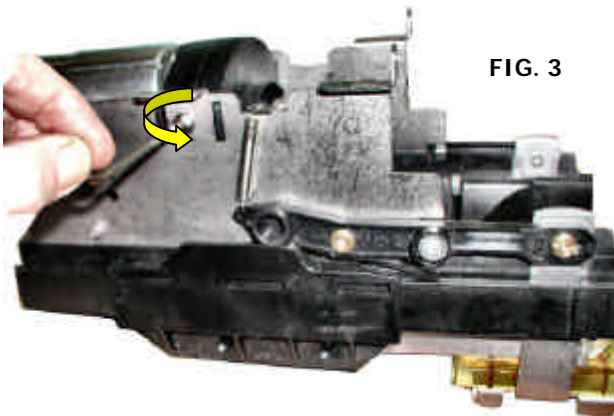
Procedures for disassembling the SIGMA BREWER unit for extraordinary maintenance (to be carried out in the event of malfunctions and preventative maintenance- see description in the following sections)

### REMOVAL OF RATIOMOTOR ASSEMBLY CONTROLLING SCRAPER HOLDER AND FILTER HOLDER



Remove the complete SIGMA BREWER unit from the machine  
(SEE DESCRIPTION IN THE RELEVANT SERVICE MANUAL)

Turn the unit upside down and undo the ratiomotor assembly fastening screws with a special key – **(FIG. 1)**  
Free and remove completely the ratiomotor, manually rotating the worm screw until removing it completely from the threaded bush - **(FIG. 2)**



Place the brewer unit on a flat surface and undo the two side screws using a special key - **(FIG. 3)**

Turn the unit upside down and undo the two fastening screws of the ratiomotor - **(FIG. 4)**  
Release the motor, slightly forcing the two side metal-sheeting supports to release the right angle ribs and completely remove the ratiomotor - **(FIG. 5)**



FIG. 6

With the ratiomotor completely removed from the brewing body (FIG. 6) undo the worm screw and remove it completely, free the piston with a slight rotation movement and extract it



Vent valve

FIG. 7

Disassemble the vent valve completely (FIG. 7)

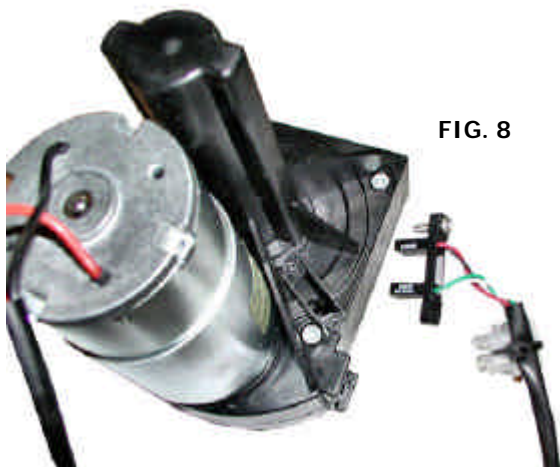


FIG. 8

With a special tool, undo the two fastening screws of the position sensor and remove it completely - (FIG. 8)

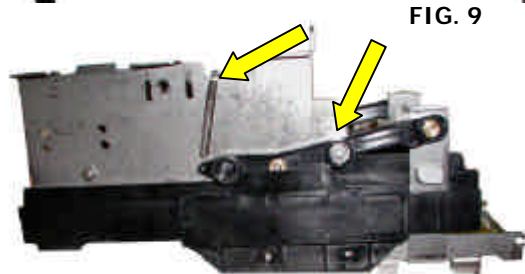


FIG. 9

Undo the fastening screws of the oscillating lever, release the return spring and free the oscillating levers (FIG. 9)

For reassembly, carry out the operations in the reverse order of disassembly. Make sure to tighten well all screws. Lubricate with special grease (see specifications) the moving parts and the worm screws.



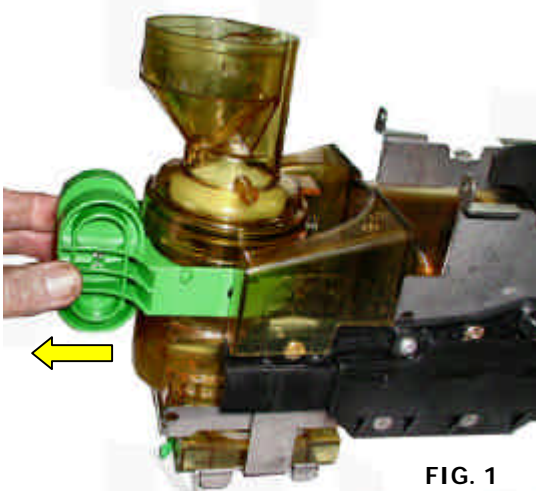
# SCHEDULED MAINTENANCE OPERATIONS

The **SIGMA BREWER** unit is very efficient and reliable; however, in order to maintain the initial features unchanged and for obtaining coffee dispensing always of excellent quality, scheduled maintenance at regular intervals is necessary.

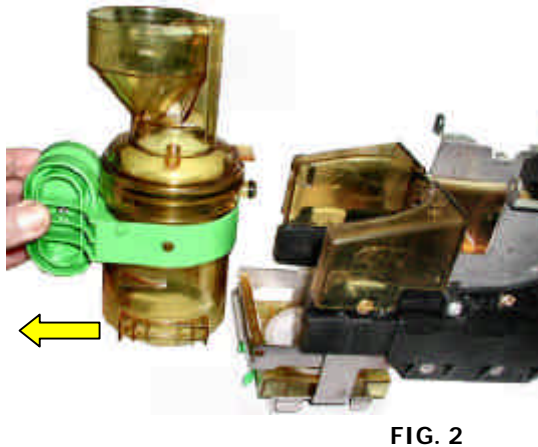
The planned maintenance time intervals are only a guideline, as they depend on the type of coffee and on other external factors.

## 1) EVERY 1000 COFFEES OR ONCE A WEEK

### Cleaning the brewing cylinder and piston, cleaning the lower filter – (Expected time 2 minutes)



Press the green pincers (**FIG.1**) and at the same time pull gently the brewing cylinder assembly until releasing it completely (**FIG. 2**)



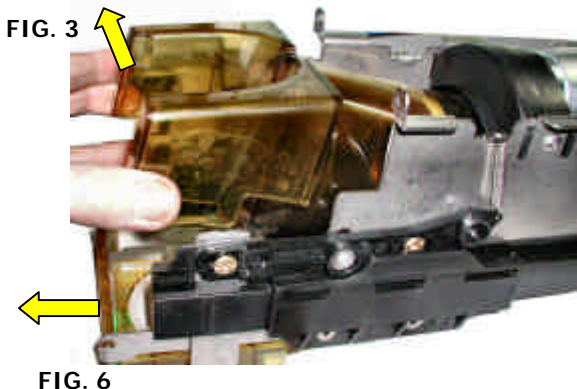
Slightly force upwards and at the same time pull outwards the blowing cylinder. (**FIG. 3 – FIG. 4**)

Disassemble the two parts of the lower cylinder with a rotating and pulling movement. (**FIG. 5**)

Completely remove the filter holder. (**FIG. 6**)

Thoroughly wash the disassembled parts with drinking water; in the event of persistent scaling use special detergents.

Air dry thoroughly, check the state of the filter and of seals (if necessary replace with original components)





## 2) EVERY 5000 COFFEES OR ONCE A MONTH

### Replacing or cleaning the filter and filter holder (Total expected time 3 minutes)

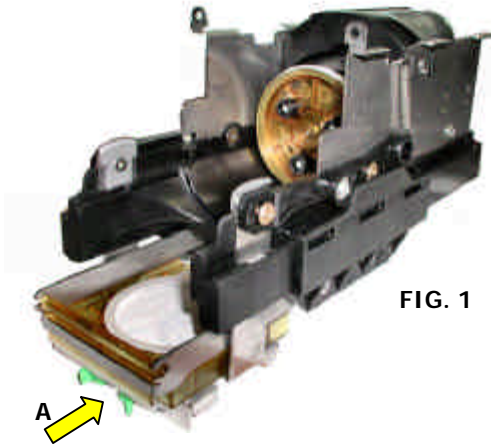


FIG. 1

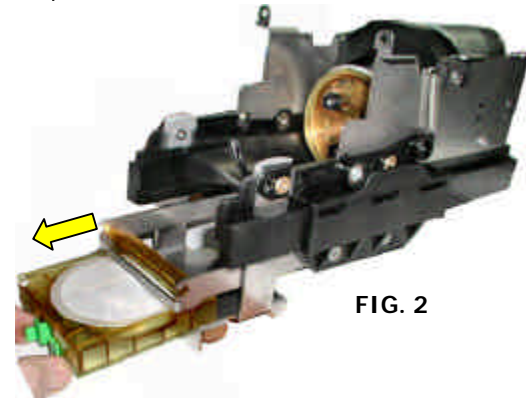


FIG. 2

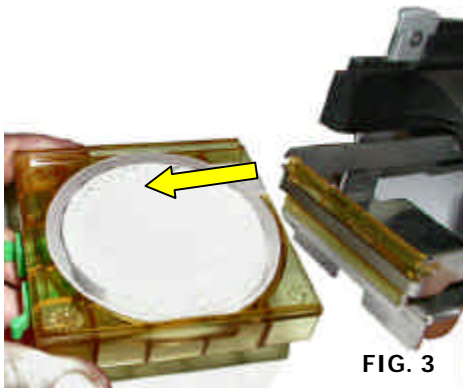


FIG. 3

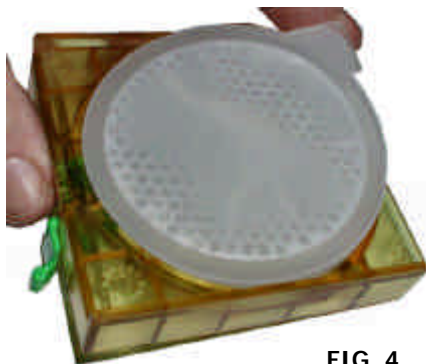


FIG. 4



FIG. 5

Remove the brewing chamber as described in the previous section.

Press on lever **A** and at the same time pull hard the lower filter holder until removing it completely (**FIG. 1, 2 & 3**)

Remove the gasket, lifting it by the special edge (**FIG. 4**) and remove the filter.

Inspect the state of the filter and its gasket. (**FIG. 5**)

In the event of a filter completely clogged with scaling, or torn or signs of damage, replace filter and gasket. (**FIG. 5**)

If in good state, or with very little scaling, wash, descale and reassemble all parts in the reverse order of disassembly.

Scaling reduces the size of the filtering holes, reducing its efficiency and worsening the quality of coffee

**N.B.:** A filter that is too clogged with scaling makes brewing slow and difficult with the risk of leaking product along the seal.

A filter that is too worn, allows the passage of coffee grounds into the cup, reducing the quality of the brew.

### 3) EVERY 150.000 BREWINGS OR ONCE A YEAR

Opening the unit and checking for worn internal parts, cleaning and lubrication of various components.

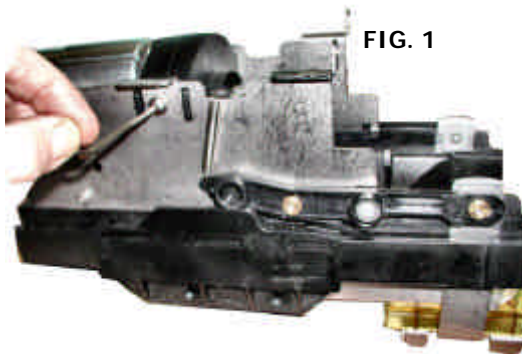


FIG. 1

Undo the ratiomotor support, controlling the blowing piston movement



FIG. 2

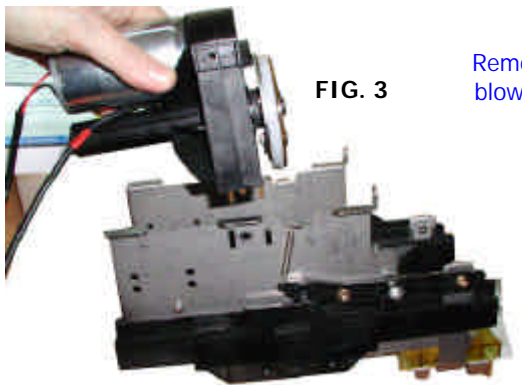


FIG. 3

Remove the ratiomotor controlling the blowing piston and remove the piston

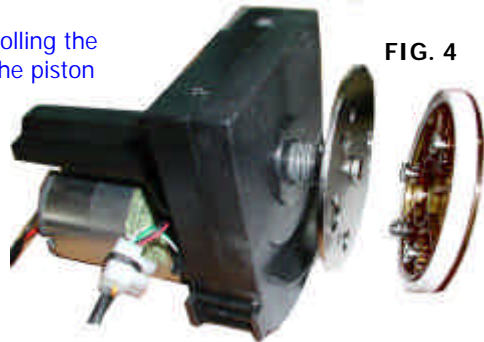


FIG. 4

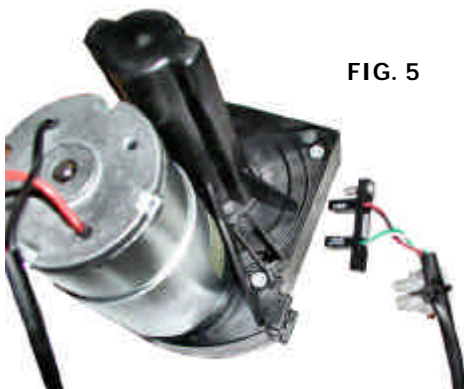


FIG. 5

Remove the position control sensor



FIG. 6

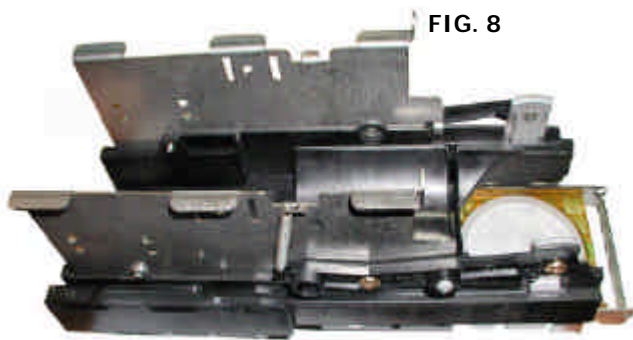
Undo the ratiomotor support, controlling the slide movement



FIG. 7

Remove the ratiomotor support, controlling the slide movement

Follow the procedures of **pages 5, 6, & 7** disassembling the unit's functional parts.  
Analyse each component, checking the state of wear, scaling and function. **(FIG. 1 - 12)**  
if necessary, replace critical parts.  
Descale, rinse, lubricate the moving parts, using specific food-safe grease for parts in contact with foodstuff, while for all other moving parts and for the worm screw special grease as indicated in the enclosed specifications can be used.  
Reassemble all parts in the reverse order of disassembly; make some test selections.  
Enter the operation in the special HACCP log  
Use exclusively original parts for replacement.  
With adequate maintenance the unit was tested to last 300,000 cycles \*  
(\* this figure is a guideline, reached after adequate preventative maintenance and depends on many factors)



**FIG. 8**

Check the state of the mechanisms and verify the correct movement of the slides and oscillation of the levers



**FIG. 9**

Disassemble the upper section of the brewing chamber, check the state of the chamber closing valve.



**FIG. 10**

Completely disassemble the filter and check the level of clogging



**FIG. 11**

Check the correct operation of the filter one-way valve



**FIG. 12**

Check the correct operation of the depression valve



## 4) TROUBLE-SHOOTING



RATIOMOTOR: OPENING THE BREWING CYLINDER AND SCRAPING THE FILTER



RATIOMOTOR: CONTROLLING BLOWING PISTON AND POSITION SENSOR



BREWING CYLINDER AND ONE-WAY VALVE



LOWER FILTER BEING REMOVED



PUMPING PISTON AND RETURN VALVE



LOWER FILTER HOLDER AND ONE-WAY VALVE

### 1) The unit does not find the standby position and the machine is locked out by the software.

-----  
 The slide movement ratiomotor for opening the brewing cylinder and scraping the filter is controlled by the operation time in tenths of a second for the functioning and by current absorption on the motor torque in the event of blockage. Check that the machine board is in working order, otherwise replace with one certain of working properly and verify that the problem is solved.

In the event the problem is not solved, replace the ratiomotor with a new one.

### 2) The filter holder does not find the standby position and the machine is locked out by the software.

-----  
 > **As above** < The system is activated by the same ratiomotor; also check that the mechanism slides freely and does not create struggling to the motor, causing the triggering of the protection device.

### 3) The air pumping piston ratiomotor does not start, or it stops in an inadequate position.

-----  
 Check that the protection system was not triggered, checking the torque in mA.

The piston position is determined by the rotation movement of the worm screw, which is controlled by a sensor that counts the number of rotations; therefore verify the correct functioning and if necessary replace with one certain of working properly.

### 4) The piston, although moving correctly, does not create the pumping effect, or during its return draws water and coffee from the filter.

-----  
 Check the functioning of the upper valve in the brewing chamber, during the piston stroke it must close the chamber perfectly; verify that the vent valve of the pumping piston works correctly

### 5) The brewed coffee comes out slowly from the spouts and overflows from the closing gasket of the brewing cylinder

-----  
 Check the state of clogging of the filter and of the gasket; if necessary replace.

### 6) During the return of the blowing piston, coffee is sucked in from the filter holder.

-----  
 Check the functioning of the two valves located on the piston and on the filter holder; they must not be dirty with scaling or clogged.