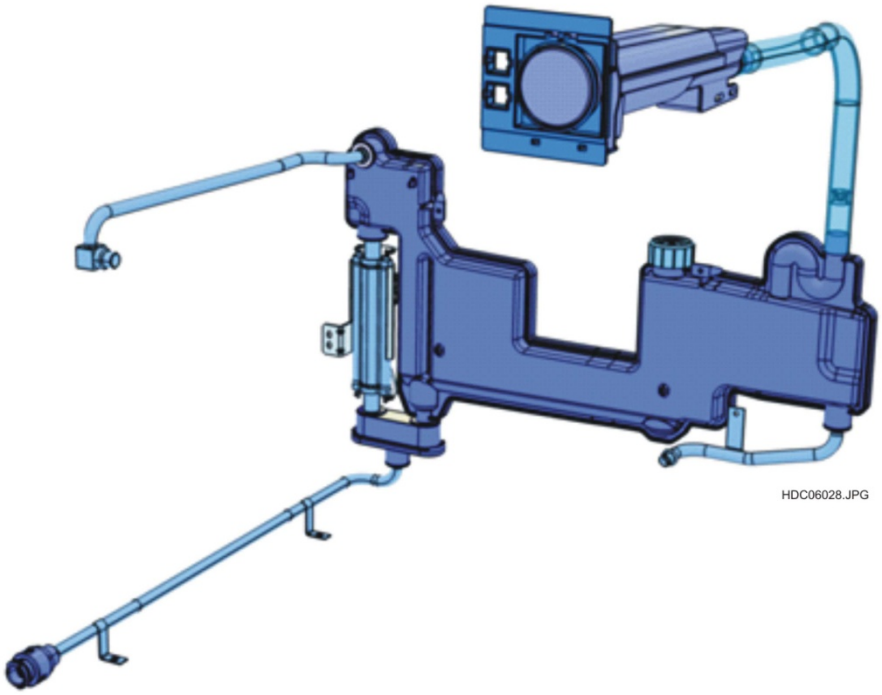
SERVICE MANUAL

COOKING



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Built-in ovens

STEAM OVENS
GENERAL MANUAL
“HOT STEAM SPUTNIK”

TABLE OF CONTENTS

1 - INTRODUCTION

1.1 - PURPOSE OF THIS MANUAL

The present document describes the steam generator installed on Sputnik platform, describing the main features, components and working behaviours.

1.2 - WARNINGS

- **All work with open appliances must be done with the mains supply disconnected.**
- **Work on electrical equipment should only be carried out by qualified personnel.**
- **Before working on a device, check the efficiency of the system casing using appropriate equipment. As an example, refer to the indications described / illustrated in the portal Electrolux Learning Gateway (http://electrolux.edvantage.net).**

  After the work, carry out electrical safety tests and ensure that the all safety devices are working properly.

- **In the case of manipulation / replacement of the PCB, use the ESD kit (Code 405 50 63-95/4) to prevent electrostatic discharge damage the circuit board see SB No. 599 72 08-09**

2 - GENERAL DESCRIPTION

The same steam circuit for the generation of heated steam (Hot Steam system) is applied in various types of ovens in the Sputnik structure.

2.1 - RANGE OF APPLICATION

There are several variations of steam ovens "Hot Steam" in Sputnik structure, with SET programmer or user interface + power board OVC3000 in the different aesthetic and brands:

- SET programmer
- Hexagon User Interface with OVC3000 power board
- VCU User Interface with OVC3000 power board

2.1.1 - EXAMPLE OF APPLICATION MODELS

Fig. 1

3 - STEAM COOKING “HOT STEAM”

For steam cooking, the appliance uses the steam produced by heating water in combination with the traditional functions of a normal oven.
This method cooks the food uniformly maintaining its flavour and nutritional value unaltered; all the vitamins and mineral salts are conserved, and the flavour of the food remains
Using the steam cooking method, the food being cooked does not dry out, but remains fresh and nourishing.
This type of cooking method is sometimes referred to as "dietary cooking", since it requires almost no seasoning or flavouring, so that the final dish is light and healthy.
The steam generated by a boiler is ducted at atmospheric pressure into the oven cavity, which is already heated by the traditional heating elements. The temperature is maintained constant at between 130°C and 230°C approximately, which prevents the formation of condensation so that the user can check the food inside the oven during cooking.
Steam is generated only when the temperature is above 130°C.

NOTE: If the oven door is opened during steam cooking, care must be taken since the steam is at a very high temperature.

4 - THE SYSTEM OF STEAM GENERATION

4.1 - COMPARISON OF SYSTEMS "HOT STEAM" OF GENERATION STEAM

ACCESS PLUS

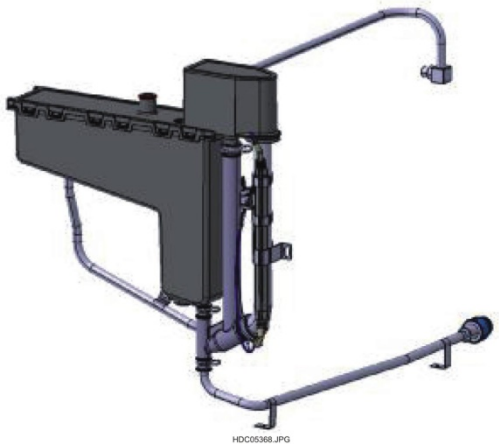

Fig. 2

SPUTNIK

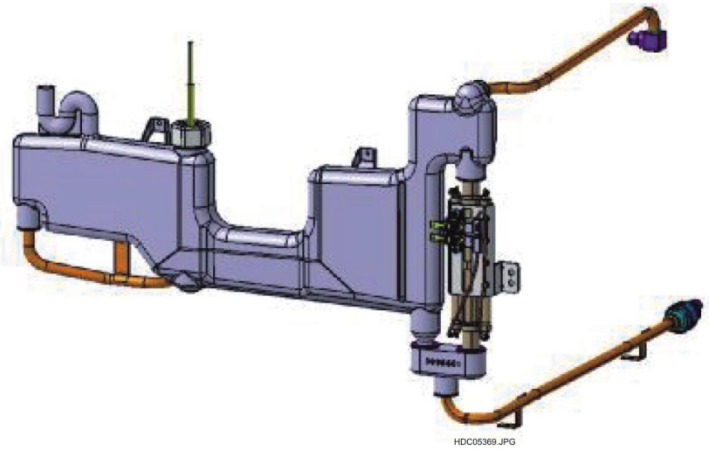

Fig. 3

4.2 - NEW STEAM GENERATOR "HOT STEAM" FOR SPUTNIK

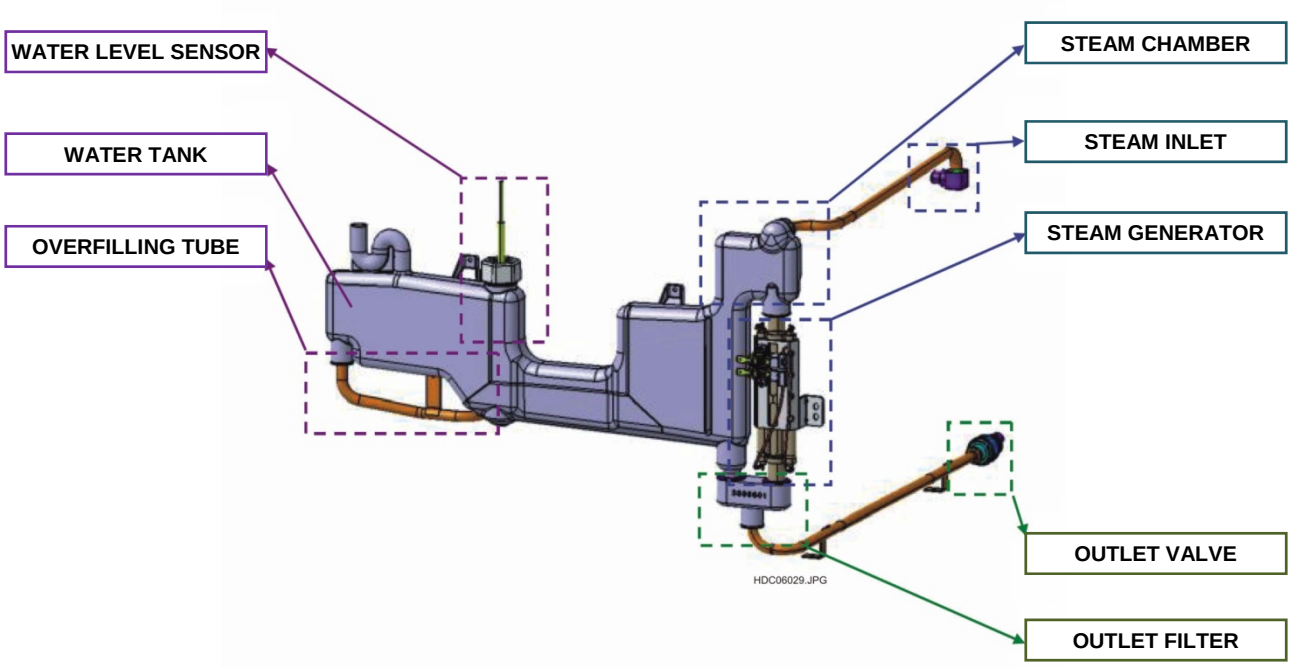

Fig. 4

5 - STEAM GENERATION SYSTEM DESCRIPTION

5.1 - GENERALITIES

The steam generator installed on the Sputnik platform is meant to provide steam at atmospheric pressure, exploiting a water heater external to the cavity. The cooking functions to be implemented belong to “Hot Steam” type, i.e. steam generation is allowed only after a certain temperature threshold is reached in the cavity, preventing condensation on cavity walls and oven door.
All components are manufactured using food compliant materials where a direct contact with water exists.
A sketch of the system is reported in Fig. 4:

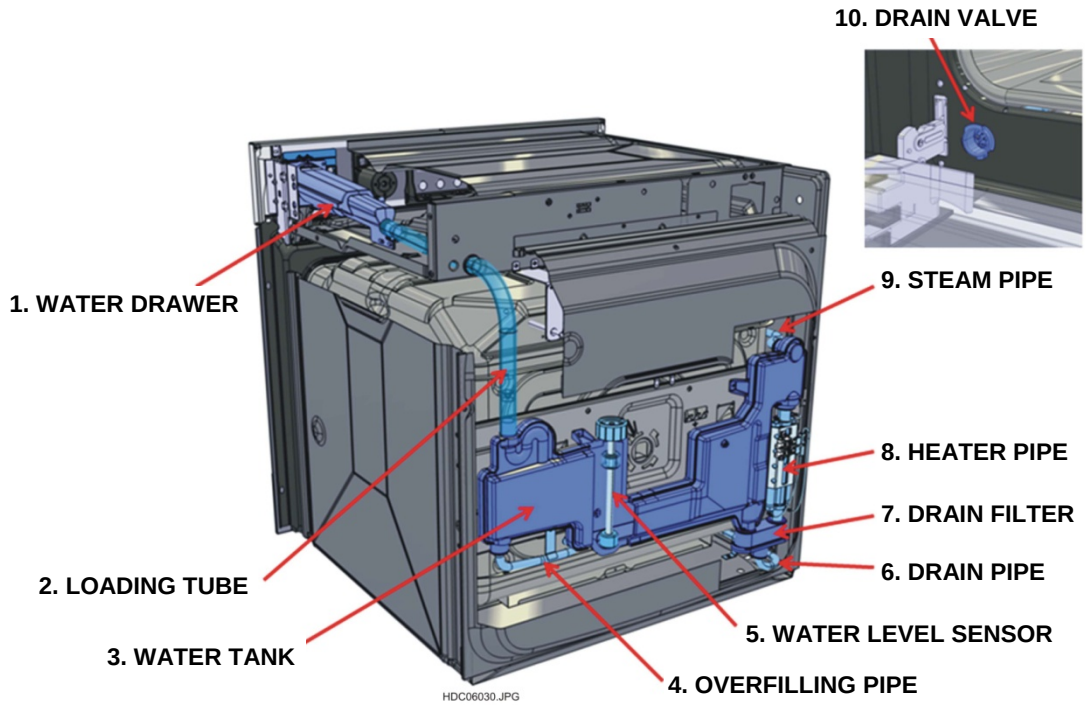

Fig. 5 : Sputnik hot steam system overview

5.2 - DRAWER WATER LOAD

Water loading is achieved by a water drawer, placed on the right side of dashboard, actable either by a push-in/push-out mechanism or manually, depending on versions; the drawer can hold several aesthetical covers, not affecting the operation modality.

Fig. 6 : Water drawer installation

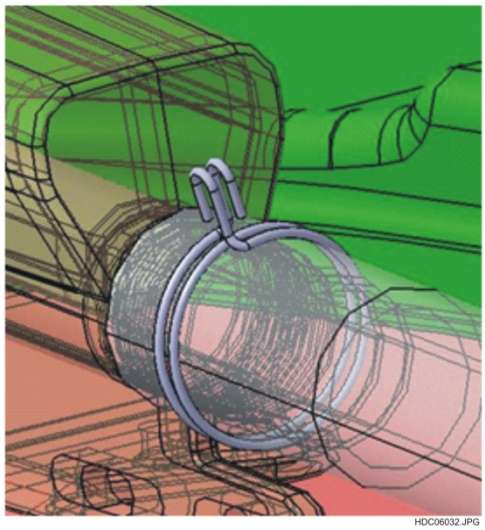

Fig. 7 : Detail of the loading tube installation

5.3 - LOADING TUBE

The water poured in the drawer flows through a silicon pipe, fixed by spring clips on the drawer back (Fig. 7) end and on the tank siphon inlet (Fig. 8). Proper positioning of the horizontal segment of the pipe is ensured by a lace fixed on the component carrier, preventing backflow events due to upwards bending of the pipe itself.
A conical membrane (Fig. 9) is inserted in the final part of the pipe vertical segment, just before tank siphon inlet, acting as one-way valve, supporting tank siphon in preventing or limiting steam backflow.

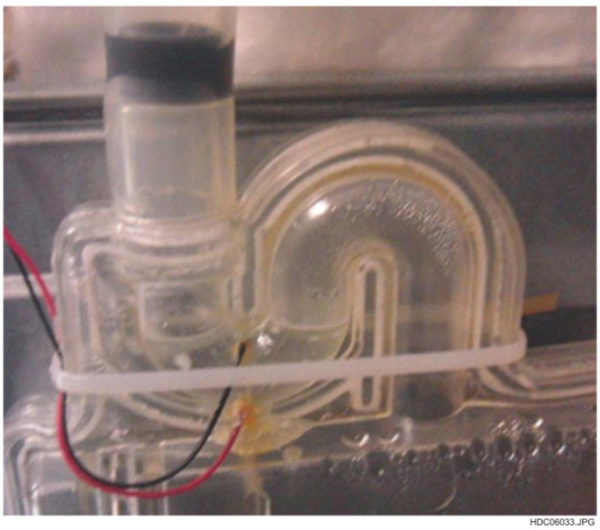

Fig. 8 : Tank siphon inlet detail

Fig. 9 : One-way steam valve

5.4 - WATER TANK

The main component of the steam generator is the water tank (Fig. 10); it is fixed by two screws on the component plate.

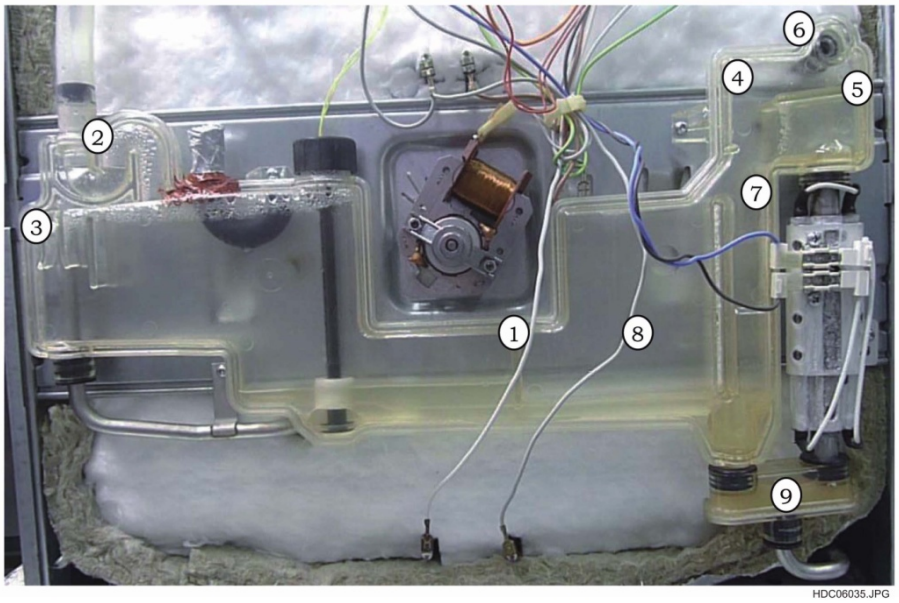

Fig. 10 : Water tank assembled on the oven

The internal volume (**1**) is split in two halves by an internal wall, limiting the mass transfer between the two sub volumes; in this way, the water heated at high temperature in the tank left side is scarcely mixed with the water in the tank right side, speeding up the water, generation start and reducing the average water temperature. Due to pressure developed by steam generation, a difference in water levels between the two tank sides is observed.
The water flows in from the loading tube into the siphon, whose function is to decouple the tank internal environment from the outside, preventing moist air to flow back towards the water drawer. In situations where the siphon is not effective (repeated hot cooking cycles with no steam involved and some water leftover can run it dry, even if after a very long time) backflow of steam or moist air is prevented by the one-way membrane (see **2** and **3**).
Maximum water level is determined by the overfilling pipe top edge; such component is held in the prescribed position by a holder (**3**). A gap exists between the water level triggering the full tank signal from the sensor and the overfilling pipe top edge, corresponding to 50 g of water approx.
The right side of the tank, assembled with the outlet filter (**9**) and the heater pipe, acts as the actual steam generator. Water boils in the heater pipe, and the mixture of water drops and steam coming out enters the plenum chamber (**4**), where a barrier (**5**) creates a labyrinth, collecting liquid splatters and allowing dry steam only to enter the steam pipe from the top opening (**6**). Liquid water flows down into recirculation channel (**7**), to the bottom inlet of the heater pipe. The recirculation channel is connected on the top and the bottom to the water buffer (8), continuously refilling the steam generation system.

5.4.1 - WATER LEVEL IN THE TANK

Maximum water fill (starting from empty tank) is 1050 g; at the end of the cycle, the residual water is about 240 g, ensuring about 50 min of continuous operation. At the end of the cycle, the level of the water is as shown in Fig. 11.

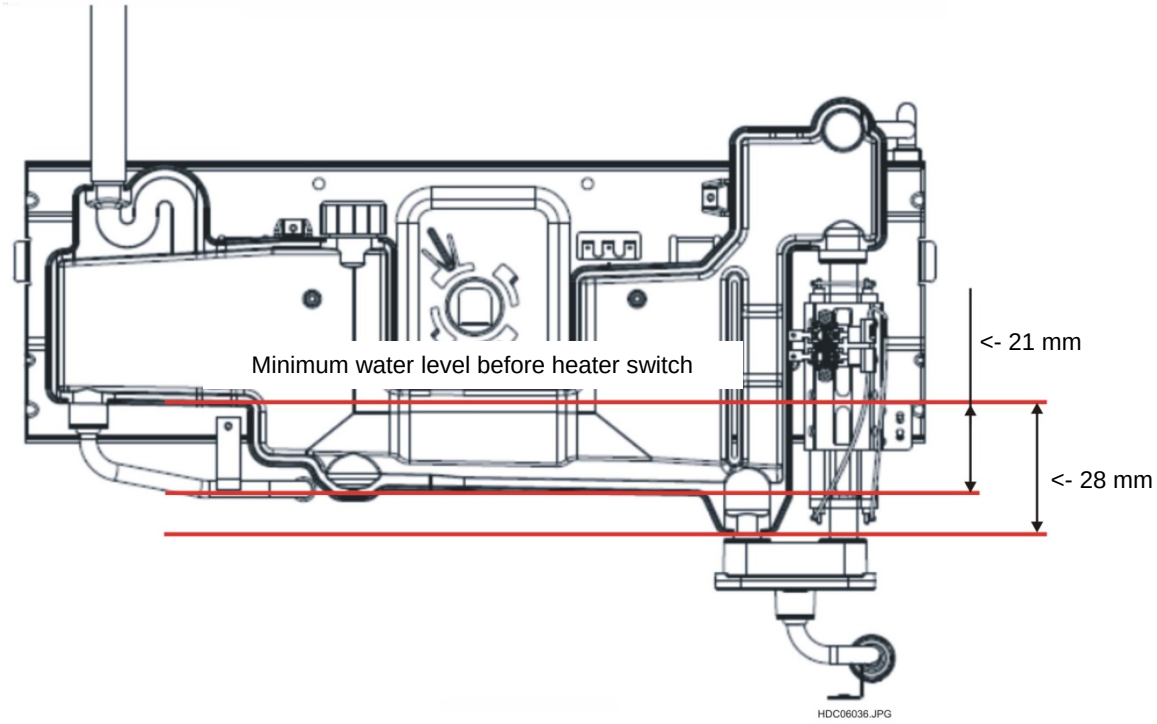

Fig. 11 : Water levels at cycle end (first time heater pipe temperature increase)

5.5 - OVERFILLING PIPE

The overfilling pipe is connected to water tank by a snap-in system, relying on a silicone gasket (Fig. 12). The pipe is then fixed on the component plate (Fig. 13), and ends into the cavity through a dedicated hole behind the fan cover (Fig. 14); an armed pure graphite gasket ensure the connection tightness.
Upon excess of water filling, the overfilling pipe drains it to the cavity, preventing issues deriving from water backflow into the drawer.

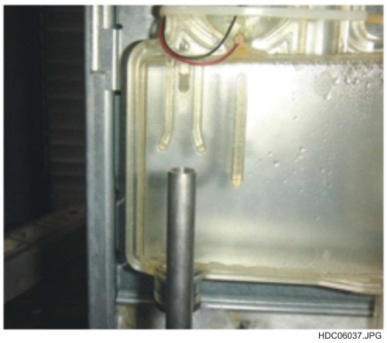

Fig. 12 : Overfilling pipe snap assembly.

Fig. 13 : Overfilling pipe fixing detail.

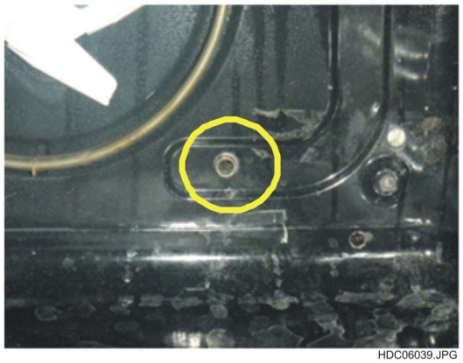

Fig. 14 : Draining hole inside the cavity.

5.6 - WATER LEVEL SENSOR

The water level sensor versions are two:

- Digital (low voltage - Fig. 15), changing the ohmic value read at the cables' end upon position;
- Electromechanical (high voltage - Fig. 16); this acts as a power supply multi switch directly operating dashboard lights.

The working principle is the following: a magnet, integrated in a swimmer, slides over a stem. At the top and at the bottom of this stem, two Reed switches are integrated. When the tank is empty, the bottom switch will close, enabling the "empty tank" alarm. When the tank is full, the top switch will close, enabling the "overfilled tank" alarm.

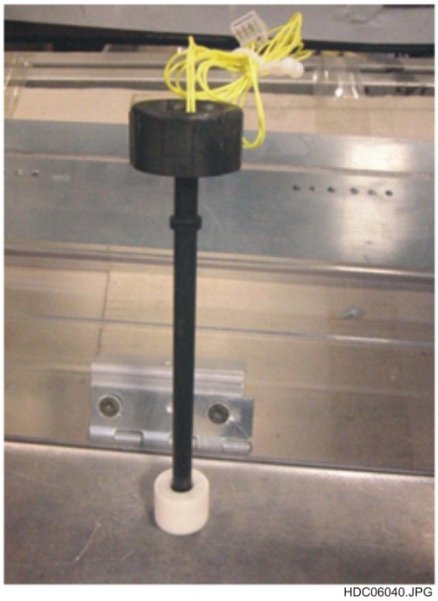

Fig. 15 : Digital sensor

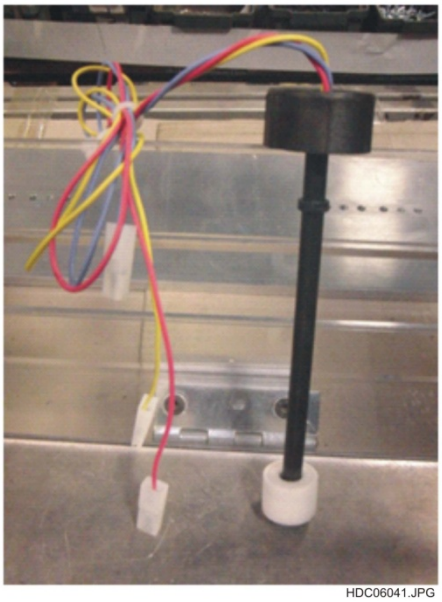

Fig. 16 : Electromechanical sensor

5.7 - OUTLET PIPE

Customers will be advised to drain residual water after each steam assisted cooking cycle. This caution is needed to guarantee a longer system's lifecycle (avoid limestone sediment to build up), and to prevent hygienic issues.
Outlet pipe is located under the cavity (Fig. 17). Its exit section is 70mm lower than the tank's lowest point. This means no water pump is needed to drain the tank: needed energy will be provided by gravity.

Fig. 17 : Outlet pipe detail

Fig. 18 : Outlet filter detail

5.8 - OUTLET FILTER

Boiler and tank's lower connections, are joined by an outlet filter (Figure 18) via three silicone gaskets. This device acts as a scale collector, preventing coarse debris to clog the outlet valve at the end of the pipe.

5.9 - OUTLET VALVE

A simple check valve has been placed at the end of the outlet pipe. This device is so tiny that it can be held in the oven's door frame (Fig. 19).
The valve is operated by the user via a manual actuator, equipped with a rubber pipe, to be inserted in the valve core. Caution must be taken in such operation, as the residual water at the end of a steam cycle can reach about 70 °C. It is hence advisable to wait at least one hour to drain water remains.

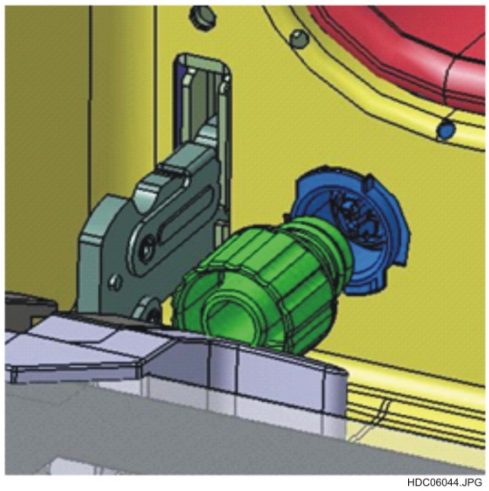

Fig. 19 : Outlet valve seat detail

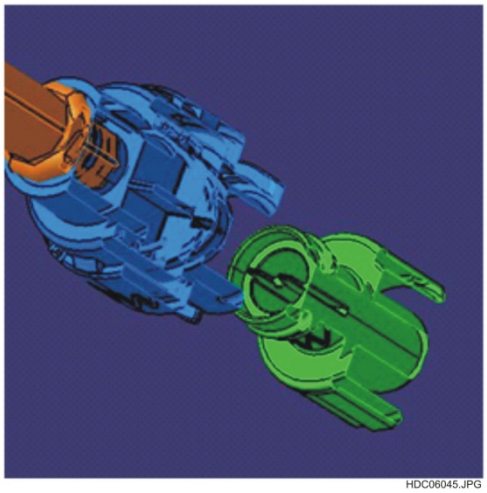

Fig. 20 : Outlet valve

5.10 - HEATER PIPE

This is the steam system core technology. It is composed by a pipe and two resistors welded on it by an aluminium flange. They both are connected with a series type electrical circuit (Fig. 21).
The Power of this heaters are 800W and they produce approximately 17g/min evaporate water per minute.
Two clicks-on breakers are equipped on the boiler (Fig. 22), triggered at 130°C, acting as connectors for the power supply. When this temperature is overcome (due typically to lack of water in the tank), they will break the electrical connection. Breakers are the only control system of the heater, both in electronic and electromechanical oven versions.

Fig. 21 : Boiler detail

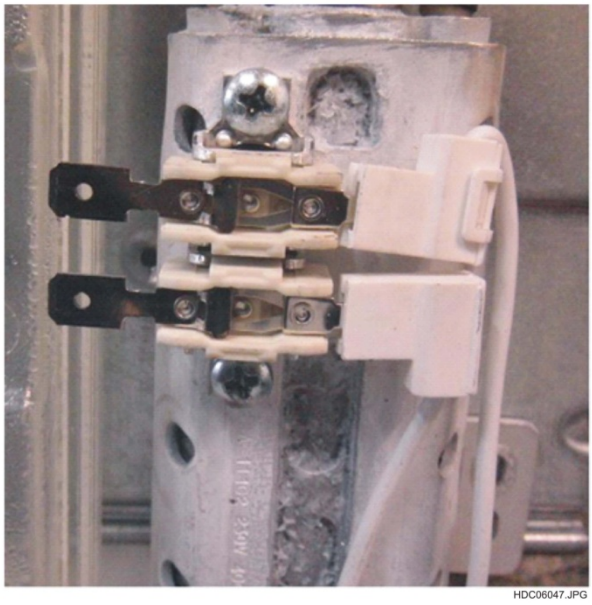

Fig. 22 : Klicson detail

No breaker driven cycling should happen during steam generator operation until enough water is present in the tank; thermal profile on the heater pipe below breaker is described in Fig. 23.

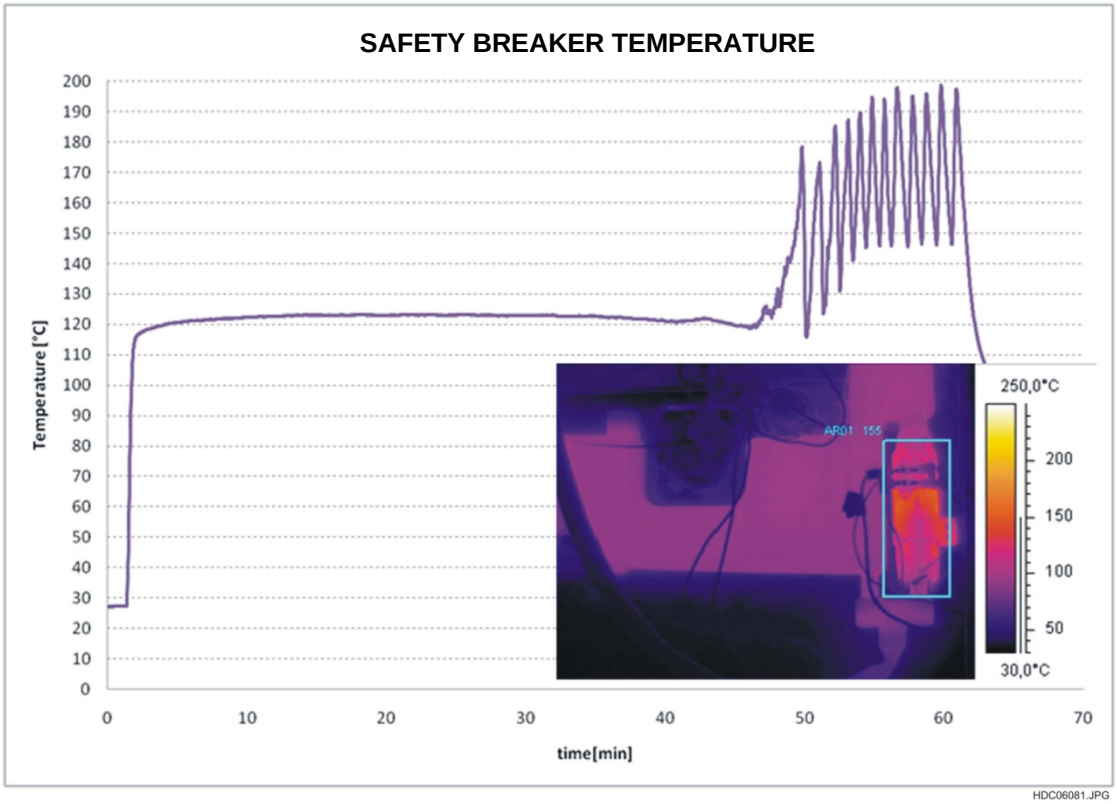

Fig. 23 : Temperature profile on heater pipe between pipe surface and breaker

5.11 - STEAM PIPE

Steam is driven by a metal pipe inside the cavity (Fig. 24). Its position ensures a quick heat up, preventing condensation in the pipe. The limited condensation amounts resulting from previous cooking cycles are driven back to the tank entrance by the slope of the pipe, designed by purpose.
This device is plugged to the upper part of the tank, and fixed to a lateral cavity hole by a washer and a nut. The cavity hole is placed in the front left side, just behind the drip rails. Such position allows connection steam accessories fittings (Fig. 25).

Fig. 24 : Steam pipe

Fig. 25 : Steam hole

6 - GENERAL CHARACTERISTICS AND NOTES

6.1 - PYRO FUNCTION

The particular design and choice of material resistant to the temperatures for this system of steam generation, it also allows the use in ovens with Pyro functions.

6.2 - CLEANING CYCLE (DESCALING)

Descaling operation is mandatory to preserve system functionality; the customer will be prescribed to perform such operation using a mildly acid solution (25mg/l of citric acid in water) to fill the tank, then to drain the remaining (see instruction book).

6.3 - MECHANICAL OVEN

The Mechanical oven controls the hot steam function by a thermal breaker on the cavity external side, near the top heating element. This element switches the steam system on when the oven temperature is over 130°C.

6.4 - ELECTRONIC OVEN

The Electronic oven switch on the steam system when the oven sensor reach 130°C. This happens between 6-10min after heating up phase start, depending on the load (see Fig. 26).

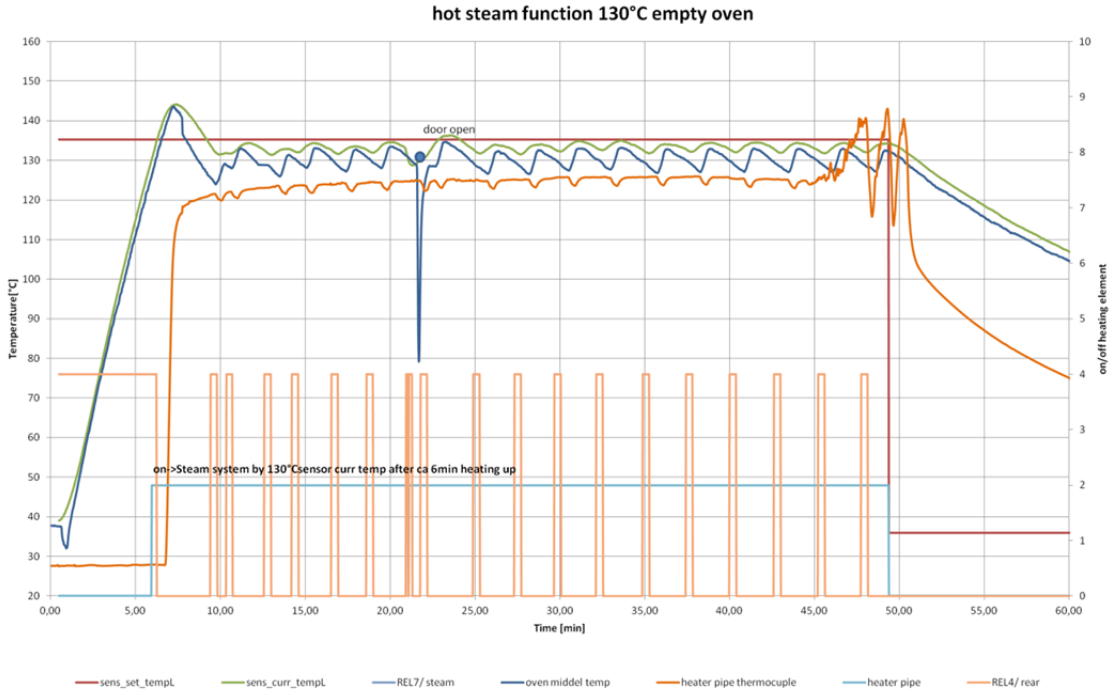

Fig.26: electronic oven - steamer switch on measurement

7 - STEAM COOKING FUNCTIONS

7.1 - GENERALITIES

The steam generator installed on the Sputnik platform allows cooking functions whose working temperature is above 130 °C (“Hot” steam). In particular, four functions have been implemented on the ovens, exploiting the steam generator:

- Hot steam
- Steam cooking
- Pizza
- Reheating
- Bread baking

7.2 - HOT STEAM FUNCTION - STEAM ASSISTED

Hot steam 130 - 230°C (OVF_ ring+fan)

Temperature:	default	180°C
	changeable	130°C - 230°C

			Heating element	Power	Stick point	Remark
			Phase 2: main phase			
	15 min – max_duration		Top	0%	0%	OVF_Rfxlb
			Bottom	0%	0%	
			Grill	0%	0%	
			Ring	100%	0%	
			Steam	0%	0%	
			Boiler	ON		
			Cooking fan	ON		
			Cooling fan	ON		
			Exhaust	ON		

Time	default	-
	changeable	between 0 min and dur_max
Specials:	cooling fan low speed at last 10 minutes after end of time	

7.3 - PIZZA - STEAM ASSISTED

Pizza steam 210°C (OVF_ bottom+ring+fan 60/40)

Temperature:	default	210°C
	changeable	130°C - 230°C

		Heating element	Power	Stick point	Remark
15 min – max_duration		**Phase 1: heat up phase**			
		Top	0%	0%	OVF_Rfxlb
		Bottom	100%	0%	
		Grill	0%	0%	
		Ring	100%	0%	
		Steam	0%	0%	
		Boiler	ON		
		Cooking fan	ON		
		Cooling fan	ON		
		Phase 2: main phase			
		Top	0%	0%	OVF_B6R4fxlb
		Bottom	60%	40%	
		Grill	0%	0%	
		Ring	40%	0%	
		Steam	0%	0%	
		Boiler	ON		
		Cooking fan	ON		
		Cooling fan	ON		

Time	default	40 min.
	changeable	between 15 min and dur_max
Specials:	cooling fan at last 10 minutes after end of time	

7.4 - REHEATING - STEAM ASSISTED

Steam reheating 130°C (OVF_ bottom+ring+fan 20/20)

Temperature:	default	130°C
	fixed	

		Heating element	Power	Stick point	Remark
15 min – max_duration		**Phase 1: heat up phase**			
		Top	0%	0%	OVF_Rfxlb
		Bottom	100%	0%	
		Grill	0%	0%	
		Ring	100%	0%	
		Steam	0%	0%	
		Boiler	ON		
		Cooking fan	ON		
		Cooling fan	ON		
		Phase 2: main phase			
		Top	0%	0%	OVF_B6R4fxlb
		Bottom	20%	40%	
		Grill	0%	0%	
		Ring	40%	0%	
		Steam	0%	0%	
		Boiler	ON		
		Cooking fan	ON		
		Cooling fan	ON		

Time	default	25 min.
	changeable	between 15 min and dur_max
Specials:	cooling fan at last 10 minutes after end of time	

7.5 - BREAD BAKING - STEAM ASSISTED

Bread baking 130 - 230°C (OVF_ ring+fan)

Temperature:	default	180°C
	changeable	130°C - 230°C

			Heating element	Power	Stick point	Remark
			Phase 2: main phase			
	15 min – max_duration		Top	0%	0%	OVF_Rfxlb
			Bottom	0%	0%	
			Grill	0%	0%	
			Ring	100%	0%	
			Steam	0%	0%	
			Boiler	ON		
			Cooking fan	ON		
			Cooling fan	ON		
			Exhaust	ON		

Time	default	60 min.
	changeable	between 15 min and dur_max
Specials:		cooling fan low speed at last 10 minutes after end of time

8 - REVISIONS:

Revision	Date	Description	Author	Approved by - on
00	03/2012	Document Creation	FV	